WOMEN IN ACADEMIA: CHALLENGES AND SOLUTIONS TO REPRESENTATION IN THE SOCIAL SCIENCES

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WOMEN IN ACADEMIA: CHALLENGES AND SOLUTIONS TO REPRESENTATION IN THE SOCIAL SCIENCES

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Editorial: Women in academia: Challenges and solutions to representation in the social sciences

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Editorial on the Research Topic
Women in academia: Challenges and solutions to representation in the social sciences

Introduction

Many scholars and calls to action focus on interventions that address disparities faced by minoritized faculty in the fields of science, technology, engineering, and math (STEM). The fate of women in the social sciences has received much less attention, in part because gender inequities are assumed to not be a problem there. This Research Topic counters these assumptions by providing demonstrations of and examining contributors to gender inequities. First, Fox Tree and Vaid describe the ways in which institutions founded by and for White men do not serve women and racialized faculty and how a focus exclusively on gender prevents understanding intersectional inequities and experiences. In their call for robust datasets (that, for example, go beyond the gender binary) they note that even in fields where there is gender parity, women of color are underrepresented.

Spotlighting demographics is only part of the challenge. Lived experiences also must be considered (and validated). van Veelen and Derks' study of all Dutch universities shows that although women are in the numerical majority in the social and behavioral sciences, women perceive the glass ceiling and estimate lower odds of becoming a full professor compared to their men counterparts. Ollrogge et al., show that in these domains, men and women expect men to be more successful, with men showing hostile sexist attitudes and women experiencing gender-based rejection sensitivity, which mediates personal success expectations. Similarly, Casad et al., summarize the complexities of women's representation and note the leaky pipeline from BA to PhD for women in psychology, anthropology, and sociology, and the consistent predominance of men among economics degree programs at all levels. They reveal gendered patterns

of inequity in financial compensation, grant funding, publications, authorship, citations, and speaking roles.

Echoing Fox Tree and Vaid, Morimoto's review of the NSF-ADVANCE program demonstrates how essential intersectionality is (and how it is missing) from most theory-informed interventions for addressing inequities. Morimoto's centering of the importance of NSF's requirement to include an intersectional framework is further emphasized by Wong et al.'s review of women's preferences for interventions and a survey of Dutch organizational diversity interventions. They found that default intervention models focused on white women's needs, but Asian, Black, and Latina women differ in their preferences for interventions that focus on intersectional differences, challenges to authority, and agency.

It is no surprise, then, that interventions in the behavioral and social sciences show mixed results. Research by Täuber highlights how despite years of policies, Dutch women experienced less psychological safety and less positive attitudes toward academic careers. She notes the lack of attention to intersectionality, and the ways in which intersectionality affects inclusion and safety. Rabinowitz and Valian's undergraduate institution case study shows that an infusion of good intentions and funding is insufficient for creating institutional change.

Publishing within the social sciences is also a context in which bias can emerge. As Brown et al. demonstrate, university students afford less value to psychological research published in journals about gender and women, compared to journals on other research topics, with men's lower feminist ideologies predicting lower support for gender journals. In addition, Ashburn-Nardo et al., reveal that the "reproducibility movement" within psychology and other fields has a tremendous impact on faculty careers. Their compelling experimental data shows the overwhelming negative perceptions of social scientists when their research does not replicate and speculate about the consequences on women-identified and faculty of color who are already in vulnerable positions in academia.

What we have learned

As three social science scholars in different university settings, and parts of the world, we each inhabit a variety of intersectional, although not fully inclusive, identities. In assembling this Research Topic, studies documenting systemic inequities and exploring solutions for women, and women of color in the social sciences, were relatively hard to find. For this Research Topic, scholars intentionally grappled with how their data, even if not specific to social sciences, could inform our understanding of the future of work. The social sciences are integral to understanding and improving the human experience. If people from across the spectrum of gender identities and from different ethnic, racial, and cultural groups are not inclusively engaged in social science scholarship, that scholarship is incomplete and the field unjust.

Importantly, contributing authors worked under extraordinary conditions of gender and racial strife as the publication process unfolded during the global pandemic. To mitigate the stress as much as possible we vowed to be flexible and supportive of our authors and reviewers, who were mostly women, many of whom told us they were caretakers, as they submitted abstracts, manuscripts, and revisions, as well as reviews and comments. In a striking example of how treating people the same does not create equity, we found that editorial systems that remove editorial privilege from the process are built for authors, reviewers, and editors with autonomy and resources. To center the needs of minoritized and marginalized scholars, we extended every single deadline preemptively as well as granted every single extension request. We communicated outside of the publisher's system as much as possible because it sent auto replies and emails that could not be modified. At publication time, we strongly encouraged authors to seek the publication designation that was the least expensive and to request discounts. While open access publication processes allow people to see into the science, which is vital for dissemination and public trust in science, the cost of supporting open access *via* high publications costs limits participation: several potential contributors declined to submit because they lacked the resources to pay the high fees.

Where does this leave us? This Research Topic does more than provide advice for future interventions. The study of gender equity in the social sciences facilitates social scientific discovery, as well as illuminates a specific context. There is more to learn, more assumptions to probe, interventions to design, and publication processes and perceptions to change. We must commit to applying the tools of our sciences to transform our fields. Reading this Research Topic is but one step.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Why so Few, Still? Challenges to Attracting, Advancing, and Keeping Women Faculty of Color in Academia

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From its earliest beginnings, the university was not designed for women, and certainly not for women of color. Women of color in the United States are disproportionately underrepresented in academia and are conspicuous by their absence across disciplines at senior ranks, particularly at research-intensive universities. This absence has an epistemic impact and affects future generations of scholars who do not see themselves represented in the academy. What are the barriers to attracting, advancing, and retaining women faculty of color in academia? To address this question we review empirical studies that document disparities in the assessment of research, teaching, and service in academia that have distinct implications for the hiring, promotion, and professional visibility of women of color. We argue that meaningful change in the representation, equity, and prestige of women faculty of color will require validating their experiences, supporting and valuing their research, creating opportunities for their professional recognition and advancement, and implementing corrective action for unjust assessment practices.

Keywords: women of color, scholars of color, academia, barriers, hiring, retention

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INTRODUCTION

The university as an institution was founded by and largely for men and, in particular, for White men (Thelin et al., 2021). Particularly in elite universities in Europe and the United States, women (White or other), and racialized groups (of any gender) were not allowed to pursue higher education or be employed as faculty until fairly recently (Lewis, 2019; Vaid and Geraci, 2016). Moreover, in the United States the intertwinement of the history of the university with the history of enslavement (Wilder, 2013) has contributed to a further entrenchment of beliefs (even in the academy) that perpetuate notions of white supremacy. Relatedly, the social construction of White (male)-as-default by professional societies and academic journals in the behavioral and social sciences has shaped what is seen as mainstream (and by implication, meritorious) research (Buchanan et al., 2020). Thus, even decades after women and racialized groups have entered the academic workforce there is no parity in their representation or salary and their professional advancement has been uneven and slow (Valian, 1998). Women have been regarded as "outsiders in the sacred grove" (Aisenberg and Arrington, 1988) and women of color have had to repeatedly prove their right to belong in the academy (Williams, 2014), being "presumed incompetent" (Gutierrez y Muhs et al., 2012).

As a recent analysis of the behavioral and social sciences research workforce based on 2013 NSF data showed, although there is gender balance in some disciplines (e.g., psychology and sociology), others remain male dominated (economics and political science). Yet even in psychology, a discipline that has had gender parity for several decades (American Psychological Association, 2006), the

percentage of women in full professor positions remains lower than that of men (American Psychological Association, 2014). Moreover, relative to the other social sciences, psychology has the highest proportion of White faculty. In 2013, the overall United States population of non-Hispanic Whites was 67% but the percent of non-Hispanic White faculty in psychology was 85%; the percent of Blacks and Hispanics in the overall United States population was 12 and 14%, respectively, and the corresponding figures among psychology faculty were 5% in each case (Hur et al., 2017). Indeed, relative to biomedical and engineering disciplines (which have less gender diversity), behavioral and social science researchers have less racial and ethnic diversity (Hur et al., 2017).

From getting in to a PhD program (Maton et al., 2006), getting graduate research support (Sheppard et al., 2001; Bartolone et al., 2014), finishing a PhD program (Maton et al., 2011), securing an academic job (Pico et al., 2020) or a federal research grant (Ginther et al., 2011), and getting promoted through the ranks (e.g., Dutt et al., 2016), people who have historically been excluded from academia have faced many obstacles. Decades of efforts have not made a noticeable difference in terms of representation or recognition (e.g., Stewart and Valian, 2018; Bennett et al., 2020; Vaid and Fox Tree, 2020).

Women faculty of color in academia are particularly conspicuous by their absence. In every STEM discipline, and particularly in the behavioral and social sciences academic workforce, women of color (particularly Black and Latina women) are disproportionately under-represented relative to their percentage in the overall population. In the United States, data from Fall 2005 showed that—across all ranks—the representation of women among full-time tenured or tenure track faculty (467,325) included 2.33% Black (10,879), 2.34% Asian (10, 944), 1.20% Latina (5,606), and 28.9% white (135,158) (Chronicle Almanac 2007–2008, 2008, p. 25). Viewed by rank, a 2015 report by the National Science Foundation found that Black/African American, Latina, and Native women in the United States collectively accounted for fewer than 1% of full professors, fewer than 2.5% of associate professors, and fewer than 3% of assistant professors (National Science Foundation, 2015). Relatedly, in the United Kingdom, of a total of 21,000 professors in 2020 there were only 25 female black professors (Agunsoye, 2020).

Why are there so few women faculty of color in positions of power and prestige in academia? Is it because they do not meet the standards expected of those in such positions? We do not think this is the case. We argue, instead, that the persistent absence of women of color in academia reflects systemic inequities reproduced and reinforced by the culture of academia and its discourse of meritocracy. As Carter-Sowell et al. (2019, p. 306) point out, the notion of meritocracy "masks ways in which certain groups have benefited and others have been excluded from access to resources and networks that lead to professional advancement." We believe that explicit attention to structural barriers in academia will be helpful in providing a context to understand the challenges faced by women and by scholars of color in their quest to achieve equity in academia. As United States-based senior women faculty of color in the social sciences who are full professors we are members of that rarified club of 1 percenters. The status of women of color in academia, thus, has personal resonance for us. We hope it will also resonate with other women faculty of color whose voices and perspectives are all too often missing or given cursory attention in scholarship on the status and/or lived experiences of women in academia.

Compounding the absence of women of color in academia is an absence of scholarship that takes an intersectional lens on gender in academia (but see Corneille et al., 2019). Many United States-based studies on gender disparities among faculty in academia (in pay, recognition, productivity, impact, service loads, etc.) do not differentiate among different groups of women (e.g., Hur et al., 2017). Because most women in academia in the United States are White women, this means the studies that do not disaggregate by race/ethnicity are generally reporting on the experiences of White women. Similarly, studies of racial disparities in academia tend to focus on minoritized groups with little discussion of gendered experiences of these groups (e.g., Dimmick and Callahan, 2021). The practice of discussing gender without consideration of how gender intersects with racialized gender identities, or of discussing ethnicity or race without consideration of its gendered aspect, has contributed to the invisibility of women of color in academia as a subject of inquiry. This invisibility is reinforced by the way that research questions on women's representation, equity, and prestige in academia have been framed and datasets coded. Thus, a crucial first step in addressing the persistent disparity in representation and prominence of women of color in academia is to acknowledge the dearth of intersectionality-oriented datasets and to push for more such data to be collected.

Because we cannot wait for the datasets to be reconfigured, we will consider existing scholarship on challenges faced by women in academia as a whole and those faced by scholars of color as a whole, recognizing that the challenges for women of color need not simply represent additive effects of being a woman plus being a person of color. Instead, the factors are likely to interact in unique ways. A fuller picture will come from intersectionality-informed quantitative data to supplement a growing number of first person accounts by women of color in the academy (e.g., Drame et al., 2012; Rollock, 2019; Buchanan, 2020; Chin, 2020; Comas-Dias, 2020; Niemann et al., 2020). These accounts bring up recurrent themes, including an unwelcoming institutional climate contributing to a sense of not belonging, being perceived as hypervisible and invisible, being asked repeatedly to prove one's legitimacy as scholars or teachers, and being overworked and underpaid (see Carter-Sowell et al., 2019, for further discussion).

Although not usually configured intersectionally, there has been a veritable explosion of research on gender and/or ethnicity-related biases that may arise in faculty hiring, promotion and retention. A large, evidence-based literature has accumulated across an array of academic disciplines. In deciding which sources to include in this review we focused on recent studies and studies involving large-scale datasets. Where available, we have sought to highlight studies on academic psychology but have not restricted ourselves to that discipline.

TABLE 1 | Summary of articles reviewed that tested disparities in research, teaching, and service.

	Women Only	Scholars of Color Only	Both
Research Impact	—	—	Hofstra et al. (2020)
Publication Process	Budden et al. (2008); Fox and Paine (2019)	—	—
Citation Rates	Caplar et al. (2017); DeJesus et al. (2021); Dion et al. (2018); Fox and Paine (2019); King et al. (2017); Lerchenmueller et al. (2019); Thelwall (2020)	Chakravarty et al. (2018)	—
Professional Recognition	Bendels et al. (2018); Ford et al. (2018); Nittrouer et al. (2018); Orchowski et al. (2021); Pico et al. (2020); Quadlin (2018); Treviño et al. (2018); Vaid and Geraci (2016); West et al. (2013)	Chakravarty et al. (2018); Roberts et al. (2020)	Ford et al. (2019)
Funding	Titone et al. (2018)	Erosheva et al. (2020); Ginther et al. (2011); Hoppe et al. (2019)	—
Recommendation Letters	Dutt et al. (2016); Madera et al. (2009); Madera et al. (2019); Steinpreis et al. (1999); Trix and Psenka (2003)	—	—
Training Institution	Clauset et al. (2015)	—	—
Teaching	Boring et al. (2016); El-Alayli et al. (2018); MacNell et al. (2015); Martin (2016); Mengel et al. (2019)	—	Chávez and Mitchell (2020); Pittman (2010)
Service	Guarino and Borden (2017); Misra et al. (2011)	—	Social Sciences Feminist Network Research Interest Group, (2017)

Our review is organized as follows. We first discuss the challenges that women of color face in the hiring and promotion process, including how research, teaching and service are assessed. We believe that seeking equity in evaluating faculty can aid retention. Scholars feel more valued when their research work is recognized by the broader community. By the same token, they feel less valued and are more likely to leave academia when they feel their research is not recognized. Settles et al. (2021) refer to this devaluation of scholarship as *epistemic exclusion* and find that it is a predictor of turnover intentions among women and faculty of color. Relatedly, a sense of not belonging fostered by a chilly climate and not being in the information loop characterized faculty of color (men and women) in a climate survey conducted at a large research-intensive university (Zimmerman et al., 2016). The same study also found that women experienced more ostracism in the academic workplace than men faculty, and that this was irrespective of the percent of women in the department (Zimmerman et al., 2016). After reviewing challenges to hiring and promotion, we discuss possible interventions, bearing in mind that any interventions proposed need to be intersectionality-minded as well (see Liu et al., 2019, for further discussion of this point).

CHALLENGES TO HIRING AND PROMOTION

Challenges to hiring women and people of color come from biases that arise in research assessment, teaching assessment, and service assessment. These same biases come into play with promotion files. Understanding these biases is important because even small biases can lead to large differences. In a computer simulation where women were given a 1% downgrade to their performance evaluations, and where employees were successfully removed from the model until all the employees were new, the resultant organization was 65% male in the highest positions (Martell et al., 1996).

Please see **Table 1** for a summary of the articles reviewed that tested disparities in research, teaching, and service.

Research Assessment

One of the biggest challenges in increasing representation of women of color in the professoriate is in evaluating research quality. Bias affects many aspects of research quality assessment. We begin this section by describing the contributions of women and scholars of color to science, and then describing the biases that affect evaluation of these contributions.

In what is probably the most comprehensive assessment of scientific innovation and the uptake of scientific ideas, Hofstra et al. (2020) evaluated the impact of all science dissertations produced in the United States from 1977 to 2015—over a million dissertations. The researchers used natural language processing techniques to identify topics in the dissertations, and then determined when those topics were first connected in a dissertation. They then looked at the uptake of those topic connections in future work. Women and people of color created more novel linkages. But while it was true that the more novel and impactful a PhD thesis, the more likely a scholar would have a research career, the work of women and people or color was not taken up to the same degree as work by men or White people. Women had about 5% lower odds of becoming faculty, and underrepresented minorities had 25% lower odds. Further, the more impactful the work, the greater the divide between women and men and underrepresented minorities and White scholars. Hofstra et al. (2020) dubbed this the *diversity-innovation paradox*. In essence, women and people of color were more likely to create novel connections in research work, but they were less likely to be rewarded for their innovation with research careers.

Disparity in the Publication Process

Some of the lack of recognition may stem from disparities in the publication process, resulting in the inability to get papers published or a delay in publication because of multiple rounds of revisions required. An assessment of over 23,000 manuscripts

submitted to six ecology and evolution journals from 2010 to 2015 revealed gender parity in the articles submitted, but papers with women as first authors got lower peer review scores and were less likely to be published (Fox and Paine, 2019). While the authors made no claims about the causes of their observations, one possibility is bias in the review process. After a science journal started using double-blind peer-review, more papers with women first authors were published (Budden et al., 2008). Bias in the publication process may also arise if journal editors or reviewers make judgments about the fit (or lack of fit) of the submitted work with the journal's intended scope or audience. Work that addresses groups that are not White or that is produced in a country that is less represented in academic literature may be considered not to be mainstream research and not suitable for mainstream outlets which typically have greater visibility than specialized outlets. As the primary metric of productivity and research prominence, the importance of publications cannot be overstated.

Disparity in Citation Rates

Even when papers are published, there is a lack of recognition of the contributions made by women and people of color. This is evident in lower citation rates of published reports across several disciplines. In political science, researchers observed undercitation of women scholars, although there was less of a gender gap the more women there were in the subfield (Dion et al., 2018). Undercitation of women's papers was also observed in evolution and ecology journals (Fox and Paine, 2019) and astronomy journals (Caplar et al., 2017). Women also self-cite less than men; from 1991 to 2011, of 1.5 million JSTOR articles, men cited themselves 1.7 times the rate of women, with men's higher self-citation rate persistent over time (King et al., 2017). While in the majority of papers there are no self-citations, the differential rate of self-citations can still lead to higher citation impact indices for men (King et al., 2017). Differences in citation rate also arise from differences in collaboration patterns, with multi-authored papers garnering more citations. The picture for people of color is similar. Researchers found that non-White scholars were underrepresented as authors in communication journals, and were also cited less often (Chakravarty et al., 2018). In contrast to these findings, an examination of six million papers produced between 1996 and 2018 showed that female first-authored papers were generally more cited than male first-authored papers, although citation rates were more even in the United States than in other English-speaking countries (Thelwall, 2020). At the same time, Thelwall (2020) proposed that female first-authored research was cited more because it had more societal implications. Thelwall (2020) also pointed out that evidence that female first-authored papers were cited more made the fact that women do not have parity in academia even more glaring.

Blind review would not necessarily remove citation rate discrepancies. Male lead authors used positive words like *novel*, *robust*, *excellent*, and *remarkable* in the titles and abstracts of their clinical research articles more than women lead authors (Lerchenmueller et al., 2019). Male lead authors also used more generic language than women lead authors (DeJesus et al., 2021). Generic language is overarching statements about groups, such as "Whites and Blacks disagree about how well Whites understand racial experiences" as opposed to focusing on how particular participants in a study behaved (DeJesus et al., 2019, p. 18,370). Papers using positive words and generic language were cited more often (DeJesus et al., 2021; Lerchenmueller et al., 2019). So, the discrepancy in citations may come about in part from the way men and women write about their work.

Citation counts matter because they introduce readers to the authors' engagement with other authors' thinking. As such, they are an important vehicle for bringing diversity of perspectives into a published work. Thus, it is not surprising that activist collectives such as Cite Black Women (see Smith et al., 2021) have discussed the importance and the politics of citation, both in terms of who cites whom and who tends to get erased by not being cited.

Citation counts are used as a proxy for impact and having lower citation counts adversely impacts the promotion of scholars. While it is important to increase citation to the work of women scholars of color, it is also important to note that citation counts may be lowest exactly for those doing cutting edge or non-mainstream work that has fewer researchers: Citation counts will be lower because there are fewer other scholars available to cite them.

Disparity in Professional Recognition

Tied to citation differences is author order and other markers of professional recognition. In a study of over 8 million research articles, researchers found that women were underrepresented in first and last author positions, as well as in single-authored papers (West et al., 2013). This assessment included natural and social sciences as well as humanities articles. Researchers who investigated almost 300,000 science articles found that women were more likely than men to be in non-prime author order on a multi-author paper (Bendels et al., 2018). Men were overrepresented in the prestigious last-author position, and particularly in the highest-impact journals (Bendels et al., 2018). In another study, women were found to be underrepresented as first authors in the thirteen top geoscience journals (Pico et al., 2020). Whatever the reasons might be that women do not seek first (or last) authorship to the same extent as men (e.g., perhaps they are more inclined to showcase student co-authors), these choices affect their professional recognition.

Beyond authorship practices, women and historically marginalized scholars suffer from a lack of professional visibility in other ways. One example is not being invited to give talks. An investigation of talks at a geophysical conference from 2014 to 2016 revealed that Black/African American, Latina/o/x, and Native American scholars were invited to give talks less often than White and Asian American scholars, and the situation was worst for underrepresented women (Ford et al., 2019). When men were the conveners of sessions, with control over who got a talk as opposed to a poster, they were less likely to give women talks (Ford et al., 2018). In another study, researchers evaluated how often over 3,000 speakers gave colloquium talks at one of the top 50 academic institutions in the United States in three social

science fields, one natural science field, one engineering field, and one humanities field: men gave more talks than women, but if the colloquium host was a woman, women were more likely to give talks (Nittrouer et al., 2018).

Other examples of lack of professional visibility have also been noted. In cognitive psychology, a field that has had gender parity in doctorates for over 40 years, one would expect there to be gender parity in indicators of status and prestige. Yet, an analysis of various indicators as of 2015 showed that male cognitive psychologists were over-represented in professional society governance, as editors-in-chief of the top 60 journals in the field, and as recipients of prestigious awards (Vaid and Geraci, 2016). Across the field of psychology, a recent analysis found that women received less than a third of awards given out by the American Psychological Association across ten award categories over a 63 year period from 1956–2019 (Orchowski et al., 2021). Another study found that the majority of named awards given by the four leading professional societies in education are named after white men (Bazner et al., 2021). Among management professors, women were less likely than men to be honored with endowed chairs—and women who were honored with endowed chairs had higher citation indices (among other performance metrics) than men with endowed chairs (Treviño et al., 2018). Professional visibility is also a problem for scholars of color. In a study of psychology journals from 1974 to 2018, 93% of editors in chief were White (including 100% in cognitive psychology; Roberts et al., 2020, p. 5). Similarly, researchers found majority White editorial boards in communication journals (Chakravarty et al., 2018).

At the same time that women and people of color are less professionally visible, there is evidence that performing at too high a level as a woman or a historically marginalized scholar can have negative ramifications. In an experimental study of manipulated job applications, a researcher discovered that high-achieving women were less likely to be called back than high-achieving men (Quadlin, 2018). A survey of potential employers revealed a preference for likeable women over smart women (Quadlin, 2018). In another study, more expert women were seen as less-expert, and were less likely to be listened to, than less-expert women on a group task; in contrast, there was no difference in expertise perception for men, and more-expert men were listened to more than less-expert men (Thomas-Hunt and Phillips, 2004). This meant that teams with expert women were unable to capitalize on the team's expertise.

Recognition decisions are made on numerous criteria. How to weigh the different criteria is an inherently subjective process. In addition, professional recognition is often based on whose name springs to mind when a small committee is thinking about whom to invite to serve on an editorial board or whom to honor with an award. Because there is no reason to believe that women or people of color are less deserving of recognition, extra effort is needed to identify potential candidates and to ensure that their contributions are properly weighed.

Disparity in Funding

Disparate funding is another concern. An analysis of publicly available NSERC funding data in Canada showed that women in cognitive psychology and cognitive neuroscience received smaller investigator-initiated Discovery grants than their male counterparts (Titone et al., 2018). In the United States, funding allocations have been argued to be about research topic choices. For example, because community-level studies are funded less by NIH than studies about the mechanism behind an effect, Black scholars who prefer community-level studies get fewer grants (Hoppe et al., 2019). But researchers who took a close look at NIH R01 applications from 2014 to 2016 using a matched-sample design (e.g., matching on gender, ethnicity, and career stage, among other variables) showed that reviewers gave Black scholars lower scores than White scholars (Erosheva et al., 2020), a result also observed in a study of NIH R01 applications submitted between 2011 and 2015 (Hoppe et al., 2019). Black scholars were also less likely to be awarded R01s between 2000 and 2006 (Ginther et al., 2011). Once again, the discrepancy in funding is not necessarily a result of overt bias, but it does signal a need for making reviewers more aware of how biases can affect their decision making.

Disparity in Recommendation Letters

The way research is assessed and valued is a big part of the problem in promoting the scholarship of historically marginalized faculty. As people tasked with assessment, recommendation letter writers are key to an applicant's success. But this process is also prone to bias. In one study, researchers did a content analysis of recommendation letters written for medical school faculty in the mid-1990s, finding that recommendations for women included more language that raised doubts (Trix and Psenka, 2003). Other researchers who controlled for the productivity and postdoctoral experience of applicants also found that recommendation letters for women to assistant professor jobs had more doubt raisers than letters for men. They further found that doubt raisers decreased evaluations of competence—even when the doubt raiser was only one sentence in an otherwise positive letter (Madera et al., 2019). Doubt raisers were sentences like, "She is unlikely to become a superstar, but she is very solid" and "I assume she will be a relatively good teacher of undergraduate and graduate students" (Madera et al., 2019, p. 294). The doubt raising happens not only in the recommendation letters, but also in review of files. In an experimental study of how 238 psychologists reviewed curriculum vitae, researchers found that the psychologists made four times more doubt-raising comments about a CV with a female name compared to an identical CV with a male name (Steinpreis et al., 1999). There were comments like "we would have to see her job talk" and "I would need to see evidence that she had gotten these grants and publications on her own" (Steinpreis et al., 1999, p. 523). The experimental study points to bias as the cause of the discrepancy observed in content analyses of recommendation letters.

Other aspects of language use also vary systematically across recommendation letters written for female and male applicants. Recommendation letters for female medical school faculty highlighted teaching rather than research (Trix and Psenka, 2003). For example, two of the most common terms associated with the pronoun *her* were *training* and *teaching*,

but of the pronoun *his* were *research* and *skills and abilities* (p. 211). Other researchers found that male applicants to psychology faculty positions were more likely to be described with active and assertive words (*confident*, *independent*, *outspoken*) rather than social or emotive words (*helpful*, *nurturing*, *caring*)—and the more active and assertive the descriptors, the higher the applicant was evaluated (Madera et al., 2009, p. 1593). Still others analyzed over a thousand postdoctoral recommendation letters from 54 countries collected from 2007 to 2012, finding that men were twice as likely to get excellent as opposed to good letters compared to women (Dutt et al., 2016).

Like professional recognition, recommendation letters are inherently subjective. Because there is no reason to believe that women as a group perform worse than men, we conclude that extra effort is needed to ensure parity in how women and men are evaluated. We could not find literature on recommendation letters for people of color. If such work reveals disparities, this information could further help letter-writers craft more equitable recommendation letters.

Disparity in Evaluation of Training Institutions

Recommendation letters are largely beyond a scholar's control. Another aspect of research quality assessment that is beyond a scholar's control is the prestige of the institutions they are affiliated with. The prestige of the institution where a faculty member trained has an inordinate pull on their future careers. A quarter of the institutions produced over 70% of the tenure-track faculty, and, at most, 14% of faculty get jobs at institutions that are more prestigious than where they earned their PhDs (Clauset et al., 2015). There is a gender component to many of these placements. The researchers looked at 19,000 faculty in three disciplines. They found that in computer science and business, men land in more prestigious places; in history, which has more female scholars, this pattern was not observed (Clauset et al., 2015).

But the quality of a scholar's work is more influenced by where they land than where they trained (Way et al., 2019). Researchers looked at productivity metrics from the 5 years pre-hire and 5 years post-hire of over 2,400 early career scholars at 205 PhD-granting computer science departments in the United States and Canada from 1970 to 2011. They used a matched-samples design to compare scholars from lower-ranking and higher-ranking institutions. While being trained at a prestigious institution did lead to more citations, it did not lead to greater productivity (Way et al., 2019). At the same time, people who landed at more prestigious institutions produced an average one more paper per year, five more over 5 years, and garnered more citations (Way et al., 2019). The authors rejected three alternative explanations for their observations: that scholars hired at prestigious institutions were selected because they were more productive, that scholars at prestigious institutions adapt their productivity to match their peers at the new institution, and that prestigious institutions are more likely to retain productive faculty (or let go of unproductive faculty). Instead, they argued that prestigious universities have more research support, such as more doctoral students per faculty member, or optimal department sizes to spread the service load and allow time for research (Way et al., 2019).

Other Disparities

There are many other marginalized identities that can affect research assessments of women and scholars of color in an intersectional way. One example of a factor that affects women differently from men is weight. In a study of 97 prospective graduate students, those with a higher body mass index were less likely to receive an offer of admission after an in-person interview compared to prospectives who were interviewed by phone (Burmeister et al., 2013). While weight bias affected everyone, it affected female applicants more (Burmeister et al., 2013). White female college students with higher body weight reported that their families contributed less money for their education than those with lower body weight; this difference was not observed in White male college students (Crandall, 1995). In a study using actors who wore prosthetics to make them appear heavier, the heavy female job candidate was less likely to be offered a job than the heavy male candidate (Pingitore et al., 1994). In an Italian study using CVs and photos, researchers also observed that weight bias was worse for women (Busetta et al., 2020).

Still other marginalized identities that could intersect with gender and race include class, religion, able-bodiedness, sexual orientation, gender identity, immigration status, language factors such as accents, and whether or not the scholar is a parent. More research is needed to examine the interplay of these important variables.

A Note on Impact Metrics

Before leaving the topic of differential assessment of research, we would like to highlight a factor that is absent in most discussions of the quality of an academic candidate's research: the societal impact of a scholar's work. Societal impact is often a big part of the work of historically marginalized scholars, but societal impact is not always recognized by others. This point was powerfully made by the observation that Mamie and Kenneth Clark, whose research on Black children's responses to black and white dolls was integral to the Brown versus Board of Education ruling, were not included in a compendium of prominent psychologists (Zárate et al., 2017).

Teaching Assessment

Another significant challenge in increasing representation of women of color in the professoriate arises from evaluations of teaching quality. Student evaluations of teaching play a big role in hampering careers, as illustrated by this comment to a *Chronicle of Higher Education* article on Black women and tenure: "If the subjective opinions of 18 year-olds continue to weigh in on our career paths, then tenure will remain not only elusive, but destabilizing" (Chambers, 2011, p. 244). Disparities in student-teacher interactions further burden historically marginalized faculty. Bias affects many aspects of teaching quality assessment.

Disparity in Student Evaluations of Teaching

The primary tool for teaching assessment is student evaluations of teaching (SETs). SETs are important because they give all students in a class an opportunity to flag important concerns

that might otherwise not be noted, such as whether an instructor has used biased materials in their lectures. At the same time, student evaluations of teaching are known to reflect gender and racial biases of the evaluators (for a review, see Heffernan, 2021). In one convincing study, an on-line class was taught by a male and female instructor with either male or female on-line identities; the students rated both the actual and perceived female instructors lower (MacNell et al., 2015). The authors provided this compelling example of the bias: "For example, when the actual male and female instructors posted grades after 2 days as a male, this was considered by students to be a 4.35 out of 5 level of promptness, but when the same two instructors posted grades at the same time as a female, it was considered to be a 3.55 out of 5 level of promptness" (p. 300). Bias is also observed for faculty of color. Across 14 on-line sections with nearly identical instruction, women and faculty of color got worse student evaluations (Chávez and Mitchell, 2020). The only interaction with students in this study was a welcome video.

Some of this bias may stem from *role incongruity*: women are expected to be nurturing, but it is hard to be nurturing on an individual level with a large lecture class, so their performance is downgraded for failure to meet expectations (Martin, 2016). In support of this, a comparison of SETs at two research universities with data from 2007 to 2014 revealed greater gender disparities with larger class sizes (Martin, 2016).

A large-scale study of almost 20,000 evaluations in the Netherlands documented that the bias against women faculty was driven by male students (Mengel et al., 2019). The bias against women instructors extends to course materials: in an online course where the materials were constant, courses taught by women had materials rated lower than courses taught by men (Mengel et al., 2019). The researchers argued that poorer SETs could lead to women faculty re-allocating their time to improving their courses, even when the evaluations are lower because of bias, not because they are worse teachers. This could result in fewer research publications for women, or more women leaving academia because of demoralization (Mengel et al., 2019).

Mismatch Between Evaluations and Learning

In addition to being biased, there is evidence that SETs do not even measure teaching quality. In a study comparing 23,000 French university SETs to performance on a standard exam (stratified by course subject), researchers observed no relationship between students' ratings of learning and their actual learning in four subjects (Macroeconomics, Microeconomics, Political Science, and Sociology; Boring et al., 2016). There was a relationship in History, however (Boring et al., 2016). Despite their much higher SETs, male instructors' students did not perform better on the exams than female instructors' students, a finding that was also found in a United States dataset (Boring et al., 2016). Of note, male students rated male history instructors as much more effective, but actually learned more from female instructors (Boring et al., 2016).

Mismatches arise because SETs are affected by many factors besides teaching quality. One of the primary things SETs measure is the expectation of a good grade, but they also measure how science and math-oriented a course is, with worse evaluations for science and math courses (for review, see Boring et al., 2016; Heffernan, 2021). SETs are also affected by the room students take the class in; students thought instructors were more organized and coherent, and that they learned more new things, when they were in an upgraded classroom as opposed to a standard classroom (Hill and Epps, 2010).

Disparity in Student-Teacher Interactions

SETs are not the only problem. Students often bring their biases to the classroom, making teaching harder for historically marginalized faculty. An analysis of 17 interviews with women faculty of color at a predominantly White institution revealed that White male students had trouble accepting the faculty members as instructors with skill and wisdom, including offering advice to the faculty members about how they should do their jobs (Pittman, 2010). Other researchers found that students asked female professors to do more for them than male professors and were more upset with female professors who failed to comply with special requests (El-Alayli et al., 2018). The extra work included expected work, like asking course questions before or after class, as well as emotional labor, like discussing personal issues. Special favors included requests for personal lecture notes, requests for exceptions to course requirements, and expectations for an issue to be dealt with during an unscheduled office visit. We suspect that women faculty of color would experience even more extra workload as well as more negative responses for lack of compliance (see Carter-Sowell et al., 2019, for further discussion of this issue).

Service Assessment

Another challenge in increasing representation of women of color in the professoriate is in evaluating service quality. Service comprises a sizeable chunk of what faculty are expected to do, yet faculty are rarely rewarded based on their service alone. Compared to readily available and widely consulted metrics that quantify research productivity and impact, efforts to quantify service contributions of faculty have proved elusive. Faculty engage in service in a variety of ways, e.g., through serving on department or university committees, on federal funding agency review panels, or on editorial boards. Service can also involve community engagement and formal or informal mentoring of students or other faculty. In recent years service has also come to include expectations for doing diversity related service. Bias affects many aspects of service quality assessment.

Disparity in Service Loads

Service loads are inequitably distributed across gender, making it harder for women to become promoted to full professor because they often end up, particularly after tenure, in service-heavy roles that leave little time for research (see Misra et al., 2011). In two surveys, one from 140 institutions and another from two campuses of a multi-campus institution, of over 20,000 faculty combined, women reported spending more hours per week in service activities as well as contributing to a wider range of service activities (Guarino and Borden, 2017). Differences in service can be largely attributed to women doing more internal service than men, and was described as "taking care of the academic family"

(Guarino and Borden, 2017, p. 690). In another study, twenty-six faculty in five departments (including social science, natural science, and humanities) kept track of their time spent on service activities in weeks three and eight of a 10-week quarter in 2009 (Social Sciences Feminist Network Research Interest Group, 2017). In this small sample of faculty who agreed to participate in the service activity of keeping track of service activities (a point made by the authors, Social Sciences Feminist Network Research Interest Group, 2017, p. 240), assistant professor women spent more time on service than assistant professor men. But marginalized faculty (including faculty of color, queer faculty, and faculty from working class backgrounds, who made up 14 respondents) did four times the service work of White faculty.

Shifting Criteria

A lack of consistency or transparency in the criteria used in any kind of assessment of faculty work is another source of bias that may adversely impact women of color. Shifting criteria is a problem that begins during the hiring process. In a series of experiments, researchers showed that bias creeps into hiring processes after knowledge of a candidate's personal attributes, such as gender (Uhlmann and Cohen, 2005). The requirements for a job were redefined to fit the stereotypical applicant. For example, education was evaluated as important for applicants to the male-stereotypical job of police chief, but if the male candidate was not educated the importance of this variable was discounted; there was no difference for female applicants. In addition, the more objective evaluators thought they were, the more biased their judgements. The researchers showed that determining the importance of a criterion, such as education level, *before* evaluating candidates can eliminate bias (Uhlmann and Cohen, 2005). In practical terms, however, it can be hard to get down on paper exactly what search committees are looking for, and candidate preferences are often idiosyncratic (White-Lewis, 2020).

Shifting criteria can also affect careers in a long term sense. Interviews with academic medicine faculty revealed that criteria changed as women advanced through the ranks (Murphy et al., 2021). For example, one woman described fulfilling a requirement only to discover a new requirement; another described not being rewarded for an achievement that would have been rewarded elsewhere, receiving an R01 grant (Murphy et al., 2021).

POSSIBLE FIXES

In the remainder of this paper we consider possible solutions to counter the biases we have identified. These are drawn from both evidence-based strategies and from our own experiences as longstanding faculty. Our list is not intended to be definitive but simply a starting point. We also acknowledge the importance of fixes that others have brought up, such as social support networks, and equitable and transparent distribution of workloads (Liu et al., 2019).

Before we get into our proposed fixes we would like to bring up an issue that is relevant here. Among senior scholars we have talked to, those who have raised issues about gender or race-related disparities in evaluation or workload have been told various versions of "this is in your head." For example, in response to the feeling that the publication bar is set higher for them, or that students are not evaluating their teaching fairly, or that they are doing more service work than others, scholars of color have been told that what they are experiencing is not the case. They are told that instead of complaining, they should focus on improving the quantity or quality of their research, redesign their courses to please students, and continue their service activities without grumbling—or even to engage in more service activities.

Relatedly, another common response to pointing out racism and sexism is for scholars from majority groups who are just being made aware of the racism or sexism to interpret the comments about institutional practices as *ad hominem* attacks. This effectively has a silencing effect on any further discussion, particularly discussion that might have been initiated by scholars of color. Similarly, when women (particularly women of color) file formal complaints (against sexual harassment by a colleague, for example), the complaints are often trivialized and the women are seen as trouble makers (Ahmed, 2021). Thus, one thing that institution leaders could do is to regularly seek feedback from women or scholars of color in their university and not respond to it in a defensive way. Validating the lived experiences of women scholars of color is an important step in addressing equity issues. We turn next to our other possible fixes.

Use Structured Free Recall in Assessment

One way evaluators can gird themselves against biased thinking when assessing graduate school candidates, postdoctoral candidates, or faculty candidates is by using *structured free recall* in assessment: Using the evaluation criteria as a guide, evaluators spend five minutes noting the positives of a candidate and five minutes noting the negatives (in either order), and then use these lists when discussing candidates (Baltes and Parker, 2000; Bauer and Baltes, 2002). In laboratory experiments, structured free recall reduced bias against female professors' teaching quality (Bauer and Baltes, 2002). It has also been successfully demonstrated to reduce bias against female leaders (Anderson et al., 2015), as well as bias against Black male managers (Baltes et al., 2007). The technique has also shown promise in reducing other kinds of bias, such as bias against people who weigh more (Rudolph et al., 2012).

What structured free recall does is that it forces evaluators to recall both biased-consistent memories as well as bias-inconsistent memories, which allows for a fairer assessment (Baltes et al., 2007). Avoiding idiosyncratic feelings is important, so evaluators should work to remember specific examples of candidate's behavior (Anderson et al., 2015). Evaluators should also recall both positive and negative information, as merely recalling details about candidates (unstructured recall) does not successfully reduce bias (Baltes et al., 2007).

Ethics precludes testing this method experimentally with actual faculty hiring; in real hiring, all candidates must be evaluated with the least biased method possible. A before-and-after field method might prove informative, but has not been

carried out to date. Given the potential utility of this technique and the variety of biases evaluators can hold—with a range of strengths—we believe it is worth considering employing this technique when making hiring decisions.

Look Beyond the Standard Metrics of Impact (But Also Be More Mindful of Whose Work is Being Erased by Not Being Cited)

Standard metrics of impact (such as journal impact factor or the scholar's *h* index) are, ultimately, proxy indicators of impact and operationalize impact in a specific way (number of citations). They should not be taken as the final word on a scholar's impact in a field. At the same time, given the importance that citation impact is typically given in promotion decisions, professional societies should establish formal guidelines or rubrics to promote equity in who gets cited. Further, journal editors and reviewers should hold authors accountable for their citation choices. Placing more emphasis on the originality or creativity of the work instead of on its number of citations is another way to level the playing field in evaluating a researcher's record (cf. Hofstra et al., 2020). Other informative indicators could be to ask candidates for faculty positions about how they see their work addressing broader issues in the field (Bhalla, 2019). Encouraging a broader scope of research approaches and topics could be explicitly noted in the job ad. In addition, valuing a scholar's impact on public policy or presence as a public intellectual could also help redress the undervaluing of minoritized scholars' work. One alternative metric that has been looked at was how often people read articles using Mendeley bibliographic software (Thelwall, 2018). Looking across 82 fields in 2014, Thelwall found that female first-authored papers were more read than male first-authored papers in the United States. Other metrics like Altmetric and PlumX may also help properly reward research that has a public impact.

Ensure a Broad Applicant Pool and Frame Job Ads More Inclusively

Ensuring the applicant pool is more broadly representative may also improve hiring decisions. When MBA students judged applicants for a managerial position, if the applicant pool had 12.5% or 25% female applicants (1 or 2 in a set of 8), the applicants were evaluated as less suitable and were thought of in more gender-stereotypical ways than when the female applicant represented 37.5, 50, or 100% of the pool (Heilman, 1980). Good practice would be to review the candidate pool for an advertised position and allow a search to go forward only if there is sufficient evidence that the job has been widely advertised and has a sufficiently diverse pool of applicants. Proactively reaching out to job candidates is essential, such as reaching out to professional societies for women or people of color (Wingfield, 2020).

Reward Mentoring and Other Forms of Service

Creating effective mentoring matches is another way to enhance equity and potentially avoid some of the pitfalls of low publication rates. There is some evidence that matching a historically marginalized graduate student with a historically marginalized faculty member improves the graduate student's productivity: Women graduate students at Caltech in the late 2000s published more with female advisors than with male advisors (Pezzoni et al., 2016). To support the retention of women of color faculty, an effective university-wide mentoring program was instituted at Texas A&M University as part of an NSF-funded ADVANCE Center grant. In this program, women faculty were assigned an internal advocate (a senior faculty member who could help them navigate the tenure process within the university) and an external eminent scholar in their field who mentored them on how to achieve professional visibility (see Carter-Sowell et al., 2019). Relatedly, rewarding faculty on the basis of the number of students they have mentored is also important (Zárate et al., 2017).

Service should be considered seriously in hiring and promotion. For example, diversity statements could be evaluated early in the hiring process, even as the first step before other material is evaluated (Bhalla, 2019). As another example, the ability to balance research, teaching, and service could be treated as a plus (Bhalla, 2019). An idea offered by a reviewer of this paper was to compensate internal service with course buyouts.

The Value of Workshops

Attending diversity workshops has been shown to improve equity on campuses. In two studies from 2012 to 2016 at the same university, researchers assessed how attending a 2 hour equity workshop affected endorsement of strategies that promote equity, such as deciding on evaluation criteria before beginning a search and creating a more diverse search committee (Sekaquaptewa et al., 2019). Not only did faculty who attended workshops endorse the strategies more, departments with a higher percentage of faculty who had attended the workshops endorsed the strategies more—even if the faculty members themselves did not attend a workshop. Although attitudes towards some strategies were harder to change than others [most notably those that dealt with bias more directly, such as "Avoid interviewing only one candidate from a particular social group (e.g. gender or race)"], change could be achieved with increasing endorsement of social science principles, such as "Our assumptions about a person's traits and abilities can subconsciously influence hiring decisions" (Sekaquaptewa et al., 2019; p. 199; p. 200).

In another study, researchers used a three-step process to improve hiring of women in STEM, including strategies for broadening searches, a 30-min talk on implicit bias, and availability of a faculty mentor who also helped answer applicant questions about family policies (Smith et al., 2015). The interventions were tested by randomly assigning search committees to an intervention or no intervention group. The no intervention group received training from HR on topics such as avoiding a discrimination lawsuit. Not only were women candidates more likely to get job offers, they were also more likely to accept job offers when their search committees had been in the intervention group (Smith et al., 2015).

Sometimes, Any Fix is Better Than No Fix

There is reason to believe that any policy change will improve things for female scholars and scholars of color. Researchers looked at how often articles in the top twenty law review journals were cited from 1960 to 2018 (Chilton et al., 2022). They discovered that the implementation of a diversity policy at the journal resulted in higher-cited articles (Chilton et al., 2022). The policies implemented were diverse, such as thinking about diversity when constructing an editorial board or considering diversity statements in selecting law review members. The fact that the policy itself did not matter suggests that at least sometimes any fix is better than no fix. In the case of the law review journals, all authors saw citations benefits, regardless of whether they were women scholars of color or not.

GENERAL DISCUSSION

There are many challenges to the hiring of historically marginalized faculty. Bias can creeps into all aspects of assessment—research, teaching, and service. It can also affect retention and how respected and valued scholars feel about their research, teaching, and service.

Our analysis of the challenges to attracting, advancing, and keeping women of color in academia has special relevance for our field, psychology. While gender parity in psychology is good (American Psychological Association, 2006), the percentage of women full professors in psychology is not on par with men (American Psychological Association, 2014). Furthermore, the social sciences lag other fields in racial diversity (Hur et al., 2017); psychology faculty are 78% White (American Psychological Association, 2019). Extrapolating from this data, we conclude that women of color are underrepresented in psychology, especially at higher ranks. We have described in the current report some of the challenges faced by women of color in academia. By acknowledging and addressing these challenges, we can improve women faculty of color's representation among faculty, their equity in treatment, and the recognition of their work.

Bias in research assessment can arise from the uncritical use of proxy indicators of productivity and impact and from the lack of access to cauthorship networks or mentoring relationships that enhance a scholar's professional visibility. It is hard to escape the observation that historically marginalized faculty have to work harder to achieve the same level of professional visibility as non-marginalized faculty. One of the most disheartening findings with respect to research recognition is that despite their contributions that moved their fields along, women and people of color did not see commensurate professional rewards (Hofstra et al., 2020). We believe that rewarding innovation and considering alternative metrics of success can help faculty reap the professional rewards of their work.

Bias in teaching assessment arises both from the uncritical reliance on student teaching evaluations as well as from students challenging the legitimacy of their instructor in the classroom. Historically marginalized faculty in particular experience devaluing of their skills and knowledge from their students. Once again, it is hard to escape the observation that despite a mountain of documentation that they are biased instruments, and that they do not even measure how well students learn material, student evaluations of teaching are nonetheless routinely used in hiring and promotion decisions. Given that the hiring of women faculty and faculty of color has stayed stagnant over the last decade (e.g., Bennett et al., 2020), relying on biased teaching assessment can come across to historically marginalized faculty as a feature rather than a bug—a way to not promote women and faculty of color. Being required to read and address comments in biased evaluations can also be seen as inequitably detrimental to careers, both because of the hurtful things students write to historically marginalized faculty, but also because marginalized faculty will expend more energy fixing classes that don't need fixing—energy that could be spent on research. Proposals to optionally include additional information alongside SETs (e.g., see Center for Innovations in Teaching and Learning, 2018) do not fix these inequalities. The faculty who will feel the need to do extra work documenting that they can in fact teach are the same faculty who are compelled to do so because of biased SETs. Like fixing classes that don't need fixing, assembling and preparing optional materials documenting teaching quality drains faculty members' time for research. The continued use of a biased tool gives the tool legitimacy that it does not merit. We believe that faculty will feel less demoralized by teaching if institutions recognize that SETs are biased and that students bring their biases to the classroom.

Service bias includes greater expectations for doing diversity work (Guillaume and Apodaca, 2020; Joseph and Hirshfield, 2010). In addition, women bear more responsibility for the academic family, and getting the necessary service work done for universities to run (Guarino & Borden, 2017). We believe that faculty will have more time to complete their research and work on their teaching when they have more balanced service loads or when service is given more weight in their evaluations.

Faced with the barriers we have reviewed, it is no surprise that women and people of color feel discrimination in their jobs. About two out of five Latina/o/x scholars and three out of five Black scholars have faced some form of discrimination in their academic jobs (Pew Research Center, 2018). Women of color are particularly subject to different forms of bias, as described in a large scale interview study (Williams, 2014; see also; Chambers, 2011; Drame et al., 2012; Settles et al., 2021; Zimmerman et al., 2016). Focused effort will be required to make hiring and promotion equitable. In addition to implementing corrective action to counteract the effect of bias, widespread knowledge of bias in the academic system can help in supporting historically marginalized scholars. The processes that make hiring and promotion harder for historically underrepresented scholars have been operating for generations. Yet research documenting the biases is weighted towards more recent years.

The good news is that biases can be faced head-on and efforts can be made to counteract them. Acknowledging and validating the experiences of women faculty of color is a first step. Using hiring strategies shown to mitigate bias is another step. Recognizing the research achievements of women of color is yet another step, such as through greater attention to their

research work and more professional recognition. Perhaps the most difficult change is to implement corrective action for unjust practices, such as by prizing research innovation over research training locale (Hofstra et al., 2020; Way et al., 2019), removing reliance on SETs in evaluating teaching (as recommended by Boring et al., 2016), and distributing service work more equitably (Guarino and Borden, 2017).

Efforts to correct unjust practices would go a long way to addressing retention of women and faculty of color which, in turn, will benefit future generations of scholars and students. With better retention, historically marginalized scholars are less likely to be the only representative of their group in a department. People are happier when their identities are more represented in a department. In a survey of faculty in STEM departments in the same university, women were less happy with their jobs than men in departments where they made up less than 25% of the faculty; where they were closer to 50%, there was no difference in job satisfaction (Griffith and Dasgupta, 2018). Greater representation in a department may also help lessen stress due to discrimination, which is particularly noteworthy for faculty of color (Eagan and Garvey, 2015). Researchers studied about 20,000 faculty across over 400 institutions who completed the Higher Education Research Institute's survey that included measures of faculty stress and productivity (Eagan and Garvey, 2015). Black and Native American faculty had the lowest research productivity (a third of a standard deviation below White productivity) and women also had lower research productivity compared to men (a 10th of a standard deviation below). The more stressed faculty of color felt, the more their research productivity declined. In addition to improved faculty morale with greater representation, more diverse role models are likely to attract more diverse people into academia. When a student sees a professor who looks like her, she may be more likely to consider becoming a professor herself.

The pace of institutional change is notoriously slow, and academic institutions in the United States have been especially slow to respond to the growing diversity of the student body and to its demands that the university diversify its professoriate. The resistance to change on the part of senior faculty in gatekeeping positions may reflect an uncritical adoption of standards of merit that were set in place by and for a once dominant and still highly influential segment of the professoriate. Yet it is important to recognize that merit, like many other aspects of life, is a social construction. Diversifying the professoriate will require an examination of how the rhetoric of meritocracy has been used to maintain racial and gender hierarchies and inequities.

AUTHOR CONTRIBUTIONS

JFT and JV both contributed to the conception of the paper through discussion of relevant studies and of shared experiences in the academy as women of color. JFT wrote the first draft of the manuscript. JV contributed additional writing. Both authors contributed to manuscript revision, read, and approved the submitted version.

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REFERENCES

Agunsoye, A. (2020). Is Career Mentoring a Panacea for Gender Inequality? the London School of Economics and Political Science. Available at: https://blogs.lse.ac.uk/highereducation/2020/06/12/is-career-mentoring-a-panacea-for-gender-inequality/, June 12

Ahmed, S. (2021). *Complaint!*. Durham, NC: Duke University Press.

Aisenberg, N., and Arrington, M. (1988). *Women of Academe: Outsiders in the Sacred grove*. Amherst: University of Massachusetts Press.

American Psychological Association (2014). *How Is the Gender Composition of Faculty in Graduate Psychology Departments Changing*. Washington, DC: APA Monitor: News from APA's Center for Workforce Studies.

American Psychological Association (2019). *The Academic Psychology Workforce: Characteristics of Psychology Research Doctorates in Faculty Positions (1995-2015*. Washington, DC: American Psychological Association.

American Psychological Association (2006). *Women in the American Psychological Association*. Washington, D.C.: American Psychological Association.

Anderson, A. J., Ahmad, A. S., King, E. B., Lindsey, A. P., Feyre, R. P., Ragone, S., et al. (2015). The Effectiveness of Three Strategies to Reduce the Influence of Bias in Evaluations of Female Leaders. *J. Appl. Soc. Psychol.* 45 (9), 522–539. doi:10.1111/jasp.12317

Baltes, B. B., Bauer, C. B., and Frensch, P. A. (2007). Does a Structured Free Recall Intervention Reduce the Effect of Stereotypes on Performance Ratings and by what Cognitive Mechanism. *J. Appl. Psychol.* 92 (1), 151–164. doi:10.1037/0021-9010.92.1.151

Baltes, B. B., and Parker, C. P. (2000). Reducing the Effects of Performance Expectations on Behavioral Ratings. *Organ. Behav. Hum. Decis. Process.* 82 (2), 237–267. doi:10.1006/obhd.2000.2897

Bartolone, J., Halverson, M. L., Hoffer, T. B., Wolniak, G., Setlak, L. E., Hedberg, E. C., et al. (2014). *Evaluation of the National Science Foundation's Graduate Research Fellowship Program*. Chicago, IL: NORC at the University of Chicago.

Bauer, C. C., and Baltes, B. B. (2002). Reducing the Effects of Gender Stereotypes on Performance Evaluations. *Sex Roles* 47 (9), 465–476. doi:10.1023/a:1021652527696

Bazner, K. J., Vaid, J. J., and Stanley, C. A. (2021). Who Is Meritorious? Gendered and Racialized Discourse in Named Award Descriptions in Professional Societies of Higher Education. *Int. J. Qual. Stud. Edu.* 34 (2), 108–124. doi:10.1080/09518398.2020.1735559

Bendels, M. H. K., Müller, R., Brueggmann, D., and Groneberg, D. A. (2018). Gender Disparities in High-Quality Research Revealed by Nature Index Journals. *PloS one* 13 (1), e0189136. doi:10.1371/journal.pone.0189136

Bennett, C. L., Salinas, R. Y., Locascio, J. J., and Boyer, E. W. (2020). Two Decades of Little Change: An Analysis of U.S. Medical School Basic Science Faculty by Sex, Race/ethnicity, And academic Rank. *PloS one* 15 (7), e0235190. doi:10.1371/journal.pone.0235190

Bhalla, N. (2019). Strategies to Improve Equity in Faculty Hiring. *Mol. Biol. Cel* 30 (22), 2744–2749. doi:10.1091/mbc.E19-08-0476

Boring, A., Ottoboni, K., and Stark, P. B. (2016). *Student Evaluations of Teaching (Mostly) Do Not Measure Teaching Effectiveness*. ScienceOpen Res., 11–11. doi:10.14293/S2199-1006.SOR-EDU.AETBZC.v1

Buchanan, N. T., Perez, M., Prinstein, M. J., and Thurstone, I. (2020). *Upending Racism in Psychological Science: Strategies to Change How Our Science Is Conducted, Reported, Reviewed, and Disseminated*. American Psychologist.

Buchanan, N. T. (2020). Researching while Black (And Female). *Women Ther.* 43 (1-2), 91–111. doi:10.1080/02703149.2019.1684681

Budden, A. E., Tregenza, T., Aarssen, L. W., Koricheva, J., Leimu, R., and Lortie, C. J. (2008). Double-blind Review Favours Increased Representation of Female Authors. *Trends Ecol. Evol.* 23 (1), 4–6. doi:10.1016/j.tree.2007.07.008

Burmeister, J. M., Kiefner, A. E., Carels, R. A., and Musher-Eizenman, D. R. (2013). Weight Bias in Graduate School Admissions. *Obesity (Silver Spring)* 21 (5), 918–920. doi:10.1002/oby.20171

Busetta, G., Campolo, M. G., and Panarello, D. (2020). Weight-based Discrimination in the Italian Labor Market: an Analysis of the Interaction with Gender and Ethnicity. *J. Econ. Inequal* 18 (4), 617–637. doi:10.1007/s10888-020-09456-5

Caplar, N., Tacchella, S., and Birrer, S. (2017). Quantitative Evaluation of Gender Bias in Astronomical Publications from Citation Counts. *Nat. Astron.* 1 (6), 1–5. doi:10.1038/s41550-017-0141

Carter-Sowell, A. R., Vaid, J., Stanley, C. A., Petitt, B., and Battle, J. S. (2019). ADVANCE Scholar Program: Enhancing Minoritized Scholars' Professional Visibility. *Edi* 38 (3), 305–327. doi:10.1108/edi-03-2018-0059

Center for Innovations in Teaching and Learning (2018). *A Guide to Providing Evidence of Excellence in Teaching*. Santa Cruz: University of California.

Chakravarty, P., Kuo, R., Grubbs, V., and McIlwain, C. (2018). #CommunicationSoWhite. *J. Commun.* 68 (2), 254–266. doi:10.1093/joc/jqy003

Chambers, C. R. (2011). Candid Reflections on the Departure of Black Women Faculty from Academe in the United States. *Negro Educ. Rev.* 62 (1-4), 233–265.

Chávez, K., and Mitchell, K. M. (2020). Exploring Bias in Student Evaluations: Gender, Race, and Ethnicity. PS. *Polit. Sci. Polit.* 53 (2), 270–274. doi:10.1017/s1049096519001744

Chilton, A., Driver, J., Masur, J. S., and Rozema, K. (2022). Assessing Affirmative Action's Diversity Rationale. *Columbia L. Rev.* 122 (2).

Chin, J. L. (2020). Successfully Navigating Career Paths. *Women Ther.* 43 (1-2), 182–196. doi:10.1080/02703149.2019.1684677

Chronicle Almanac, 2007–2008 (2008). Number of Fulltime Faculty Members by Sex, Rank, and Racial and Ethnic Group. *Chronicle. Higher Edu.* 54 (1), 25, 2008 . Fall 2005.

CITL (2018) Guide-to-Providing-Evidence-of-Excellence-in-Teaching Available at: https://citl.ucsc.edu/wp-content/uploads/2018/09/CITL_Guide-to-Providing-Evidence-of-Excellence-in-Teaching_updated-June-2018.pdf

Clauset, A., Arbesman, S., and Larremore, D. B. (2015). Systematic Inequality and Hierarchy in Faculty Hiring Networks. *Sci. Adv.* 1 (1), e1400005. doi:10.1126/sciadv.1400005

Comas-Dias, L. (2020). Journey to Psychology: A Mujerista Testimonio. *Women Ther.* 43 (1-2), 157–169.

Corneille, M., Lee, A., Allen, S., Cannady, J., and Guess, A. (2019). Barriers to the Advancement of Women of Color Faculty in STEM. *Edi* 38 (3), 328–348. doi:10.1108/edi-09-2017-0199

Crandall, C. S. (1995). Do parents Discriminate against Their Heavyweight Daughters. *Pers Soc. Psychol. Bull.* 21 (7), 724–735. doi:10.1177/0146167295217007

DeJesus, J. M., Callanan, M. A., Solis, G., and Gelman, S. A. (2019). Generic Language in Scientific Communication. *Proc. Natl. Acad. Sci. U S A.* 116 (37), 18370–18377. doi:10.1073/pnas.1817706116

DeJesus, J. M., Umscheid, V. A., and Gelman, S. A. (2021). When Gender Matters in Scientific Communication: The Role of Generic Language. *Sex Roles* 85 (9), 577–586. doi:10.1007/s11199-021-01240-7

Dimmick, A. A., and Callahan, J. L. (2021). Racial and Ethnic Diversity Among Clinical Psychology Doctoral Students Applying for Internship. *Train. Edu. Prof. Psychol.* doi:10.1037/tep0000382

Dion, M. L., Sumner, J. L., and Mitchell, S. M. (2018). Gendered Citation Patterns across Political Science and Social Science Methodology fields. *Polit. Anal.* 26 (3), 312–327. doi:10.1017/pan.2018.12

Drame, E., Mueller, J., Oxford, R., Toro, S., Wisneski, D., and Xu, Y. (2012). 'We Make the Road by Walking': a Collaborative Inquiry into the Experiences of Women in Academia. *Reflective Pract.* 13 (6), 829–841. doi:10.1080/14623943.2012.732939

Dutt, K., Pfaff, D. L., Bernstein, A. F., Dillard, J. S., and Block, C. J. (2016). Gender Differences in Recommendation Letters for Postdoctoral Fellowships in Geoscience. *Nat. Geosci* 9 (11), 805–808. doi:10.1038/ngeo2819

Eagan, M. K., and Garvey, J. C. (2015). Stressing Out: Connecting Race, Gender, and Stress with Faculty Productivity. *J. Higher Edu.* 86 (6), 923–954. doi:10.1353/jhe.2015.0034

El-Alayli, A., Hansen-Brown, A. A., and Ceynar, M. (2018). Dancing Backwards in High Heels: Female Professors Experience More Work Demands and Special Favor Requests, Particularly from Academically Entitled Students. *Sex Roles* 79 (3), 136–150. doi:10.1007/s11199-017-0872-6

Erosheva, E. A., Grant, S., Chen, M. C., Lindner, M. D., Nakamura, R. K., and Lee, C. J. (2020). NIH Peer Review: Criterion Scores Completely Account for Racial Disparities in Overall Impact Scores. *Sci. Adv.* 6 (23), eaaz4868. doi:10.1126/sciadv.aaz4868

Ford, H. L., Brick, C., Azmitia, M., Blaufuss, K., and Dekens, P. (2019). Women from Some Under-represented Minorities Are Given Too Few Talks at World's Largest Earth-Science Conference. *Nature* 576, 32–35. doi:10.1038/d41586-019-03688-w

Ford, H. L., Brick, C., Blaufuss, K., and Dekens, P. S. (2018). Gender Inequity in Speaking Opportunities at the American Geophysical Union Fall Meeting. *Nat. Commun.* 9 (1358), 1–6. doi:10.1038/s41467-018-03809-5

Fox, C. W., and Paine, C. E. T. (2019). Gender Differences in Peer Review Outcomes and Manuscript Impact at Six Journals of Ecology and Evolution. *Ecol. Evol.* 9 (6), 3599–3619. doi:10.1002/ece3.4993

Ginther, D. K., Schaffer, W. T., Schnell, J., Masimore, B., Liu, F., Haak, L. L., et al. (2011). Race, Ethnicity, and NIH Research Awards. *Science* 333 (6045), 1015–1019. doi:10.1126/science.1196783

Griffith, E., and Dasgupta, N. (2018). How the Demographic Composition of Academic Science and Engineering Departments Influences Workplace Culture, Faculty Experience, and Retention Risk. *Soc. Sci.* 7 (5), 71. doi:10.3390/socsci7050071

Guarino, C. M., and Borden, V. M. H. (2017). Faculty Service Loads and Gender: Are Women Taking Care of the Academic Family. *Res. High Educ.* 58 (6), 672–694. doi:10.1007/s11162-017-9454-2

Guillaume, R., and Apodaca, E. (2020). Early Career Faculty of Color and Promotion and Tenure: the Intersection of Advancement in the Academy and Cultural Taxation. Race, Ethnicity and Education. Available at: https://www.tandfonline.com/doi/full/10.1080/13613324.2020.1718084?src=recsys

Gutierrez y Muhs, G. Niemann, Y. F. Gonzales, C. G., and Harris, A. P. (2012). *Presumed incompetent:The Intersections of Race and Class for Women in Academia*. Boulder: University Press of Colorado.

Heffernan, T. (2021). Sexism, Racism, Prejudice, and Bias: a Literature Review and Synthesis of Research Surrounding Student Evaluations of Courses and Teaching. *Assess. Eval. Higher Edu.*, 1–11. doi:10.1080/02602938.2021.1888075

Heilman, M. E. (1980). The Impact of Situational Factors on Personnel Decisions Concerning Women: Varying the Sex Composition of the Applicant Pool. *Organizational Behav. Hum. Perform.* 26 (3), 386–395. doi:10.1016/0030-5073(80)90074-4

Hill, M. C., and Epps, K. K. (2010). The Impact of Physical Classroom Environment on Student Satisfaction and Student Evaluation of Teaching in the university Environment. *Acad. Educ. Leadersh. J.* 14 (4), 65.

Hofstra, B., Kulkarni, V. V., Munoz-Najar Galvez, S., He, B., Jurafsky, D., and McFarland, D. A. (2020). The Diversity-Innovation Paradox in Science. *Proc. Natl. Acad. Sci. U S A.* 117 (17), 9284–9291. doi:10.1073/pnas.1915378117

Hoppe, T. A., Litovitz, A., Willis, K. A., Meseroll, R. A., Perkins, M. J., Hutchins, B. I., et al. (2019). Topic Choice Contributes to the Lower Rate of NIH Awards to African-American/black Scientists. *Sci. Adv.* 5 (10), eaaw7238. doi:10.1126/sciadv.aaw7238

Hur, H., Andalib, M. A., Maurer, J. A., Hawley, J. D., and Ghaffarzadegan, N. (2017). Recent Trends in the U.S. Behavioral and Social Sciences Research (BSSR) Workforce. *PLoS ONE* 12 (2), e0170887. doi:10.1371/journal.pone.0170887

Joseph, T., and Hirshfield, L. (2010). 'Why Don't You Get Somebody New to Do it?' Race and Cultural Taxation in the Academy. *Ethnic Racial Stud.* 34 (1), 121–141.

King, M. M., Bergstrom, C. T., Correll, S. J., Jacquet, J., and West, J. D. (2017). Men Set Their Own Cites High: Gender and Self-Citation across fields and over Time. *Socius* 3, 2378023117738903. doi:10.1177/2378023117738903

Lerchenmueller, M. J., Sorenson, O., and Jena, A. B. (2019). Gender Differences in How Scientists Present the Importance of Their Research: Observational Study. *BMJ* 367, l6573. doi:10.1136/bmj.l6573

Lewis, J. (2019). A Brief History of Women in Higher Education. ThoughtCo. Available at: https://www.thoughtco.com/history-women-higher-ed-4129738

Liu, S.-N. C., Brown, S. E. V., and Sabat, I. E. (2019). Patching the "Leaky Pipeline": Interventions for Women of Color Faculty in STEM Academia. *Arch. Scientific Psychol.* 7, 32–39. doi:10.1037/arc0000062

MacNell, L., Driscoll, A., and Hunt, A. N. (2015). What's in a Name: Exposing Gender Bias in Student Ratings of Teaching. *Innov. High Educ.* 40 (4), 291–303. doi:10.1007/s10755-014-9313-4

Madera, J. M., Hebl, M. R., and Martin, R. C. (2009). Gender and Letters of Recommendation for Academia: Agentic and Communal Differences. *J. Appl. Psychol.* 94 (6), 1591–1599. doi:10.1037/a0016539

Madera, J. M., Hebl, M. R., Dial, H., Martin, R., and Valian, V. (2019). Raising Doubt in Letters of Recommendation for Academia: Gender Differences and Their Impact. *J. Bus Psychol.* 34 (3), 287–303. doi:10.1007/s10869-018-9541-1

Martell, R. F., Lane, D. M., and Emrich, C. (1996). Male-female Differences: A Computer Simulation. *Am. Psychol.* 51, 157–158. doi:10.1037/0003-066x.51.2.157

Martin, L. L. (2016). Gender, Teaching Evaluations, and Professional success in Political Science. *PS: Polit. Sci. Polit.* 49 (2), 313–319. doi:10.1017/s1049096516000275

Maton, K. I., Kohout, J. L., Wicherski, M., Leary, G. E., and Vinokurov, A. (2006). Minority Students of Color and the Psychology Graduate Pipeline: Disquieting and Encouraging Trends, 1989-2003. *Am. Psychol.* 61, 117–131. doi:10.1037/0003-066X.61.2.117

Maton, K. I., Wimms, H. E., Grant, S. K., Wittig, M. A., Rogers, M. R., and Vasquez, M. J. (2011). Experiences and Perspectives of African American, Latina/o, Asian American, and European American Psychology Graduate Students: A National Study. *Cultur Divers. Ethnic Minor. Psychol.* 17, 68–78. doi:10.1037/a0021668

Mengel, F., Sauermann, J., and Zölitz, U. (2019). Gender Bias in Teaching Evaluations. *J. Eur. Econ. Assoc.* 17 (2), 535–566. doi:10.1093/jeea/jvx057

Misra, J., Lundquist, J. H., Holmes, E., and Agiomavritis, S. (2011). The Ivory Ceiling of Service Work. *Academe* 97 (1), 22–26. *No.*

National Science Foundation (2015). *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2015*, 15-311. Arlington, VA: Special Report NSF.

Niemann, Y. F., Gutierrez y Muhs, G., and Gonzalez, C. G. (2020). *Presumed Incompetent II: Race, Class, Power, and Resistance of Women in Academia*. Logan: Utah State University Press.

Nittrouer, C. L., Hebl, M. R., Ashburn-Nardo, L., Trump-Steele, R. C. E., Lane, D. M., and Valian, V. (2018). Gender Disparities in Colloquium Speakers at Top Universities. *Proc. Natl. Acad. Sci. U S A.* 115 (1), 104–108. doi:10.1073/pnas.1708414115

Orchowski, L. M., Bogen, K. W., and Bhuptani, P. H. (2021). Representation of Women in 10 Recognition Awards from the American Psychological Association, 1956-2019. *Prof. Psychol. Res. Pract.*, 1–10. doi:10.1037/pro0000420

Pew Research Center (2018). *Women and Men in STEM Often at Odds over Workplace Equity*. Washington, DC: Pew Research Center. January.

Pezzoni, M., Mairesse, J., Stephan, P., and Lane, J. (2016). Gender and the Publication Output of Graduate Students: A Case Study. *PLoS One* 11 (1), e0145146. doi:10.1371/journal.pone.0145146

Pico, T., Bierman, P., Doyle, K., and Richardson, S. (2020). First Authorship Gender Gap in the Geosciences. *Earth Space Sci.* 7, e2020EA001203. doi:10.1029/2020ea001203

Pingitore, R., Dugoni, B. L., Tindale, R. S., and Spring, B. (1994). Bias against Overweight Job Applicants in a Simulated Employment Interview. *J. Appl. Psychol.* 79 (6), 909–917. doi:10.1037/0021-9010.79.6.909

Pittman, C. T. (2010). Race and Gender Oppression in the Classroom: The Experiences of Women Faculty of Color with White Male Students. *Teach. Sociol.* 38 (3), 183–196. doi:10.1177/0092055x10370120

Quadlin, N. (2018). The Mark of a Woman's Record: Gender and Academic Performance in Hiring. *Am. Sociol. Rev.* 83 (2), 331–360. doi:10.1177/0003122418762291

Roberts, S. O., Bareket-Shavit, C., Dollins, F. A., Goldie, P. D., and Mortenson, E. (2020). Racial Inequality in Psychological Research: Trends of the Past and Recommendations for the Future. *Perspect. Psychol. Sci.* 15, 1295–1309. doi:10.1177/1745691620927709

Rollock, N. (2019). Staying Power: The Career Experiences and Strategies of UK Black Female Professors. Report. University and College Union. Available at: https://www.ucu.org.uk/media/10075/Staying-Power/pdf/UCU_Rollock_February_2019.pdf

Rudolph, C. W., Baltes, B. B., Zhdanova, L. S., Clark, M. A., and Bal, A. C. (2012). Testing the Structured Free Recall Intervention for Reducing the Impact of Bodyweight-Based Stereotypes on Performance Ratings in Immediate and Delayed Contexts. *J. Bus Psychol.* 27 (2), 205–222. doi:10.1007/s10869-011-9240-7

Sekaquaptewa, D., Takahashi, K., Malley, J., Herzog, K., and Bliss, S. (2019). An Evidence-Based Faculty Recruitment Workshop Influences Departmental Hiring Practice Perceptions Among University Faculty. *Edi* 38 (2), 188–210. doi:10.1108/edi-11-2018-0215

Settles, I. H., Jones, M. K., Buchanan, N. C. T., and Brussel, S. T. (2021). Epistemic Exclusion of Women Faculty and Faculty of Color: Understanding Scholar(ly) Devaluation as a Predictor of Turnover Intentions. *J. Higher Edu.* 1-25. https://www.tandfonline.com/doi/abs/10.1080/00221546.2021.1914494. doi:10.1080/00221546.2021.1914494

Sheppard, E., Rutledge, J., and Johnson, J. (2001). "June). Merit Criteria, Eligibility and Diversity in the NSF Graduate Research Fellowships," in Proceedings of the 2001 American Society for Engineering Education Annual Conference & Exposition.

Smith, C. A., Williams, E. L., Wadud, I. A., and Pirtle, W. N. L. (2021). Cite Black Women: A Critical Praxis (A Statement). *Feminist Anthropol.* 2 (1), 10–17. https://anthrosource.onlinelibrary.wiley.com/doi/10.1002/fea2.12040. doi:10.1002/fea2.12040

Smith, J. L., Handley, I. M., Zale, A. V., Rushing, S., and Potvin, M. A. (2015). Now Hiring! Empirically Testing a Three-Step Intervention to Increase Faculty Gender Diversity in STEM. *BioScience* 65 (11), 1084–1087. doi:10.1093/biosci/biv138

Social Sciences Feminist Network Research Interest Group (2017). The burden of Invisible Work in Academia: Social Inequalities and Time Use in Five university Departments. *Humboldt J. Soc. Relations* 39, 228–245.

Steinpreis, R. E., Anders, K. A., and Ritzke, D. (1999). The Impact of Gender on the Review of the Curricula Vitae of Job Applicants and Tenure Candidates: A National Empirical Study. *Sex Roles* 41, 509–528. doi:10.1023/a:1018839203698

Stewart, A., and Valian, V. (2018). *An Inclusive Academy: Achieving Diversity and Excellence*. Cambridge, MA: MIT Press.

Thelin, J. R., Edwards, J. R., and Moyen, E. (2021). Higher Education in the United States: Historical Development. Education Encyclopedia. StateUniversity.Com Available at: https://education.stateuniversity.com/pages/2044/Higher-Education-in-United-States.html

Thelwall, M. (2018). Do females Create Higher Impact Research? Scopus Citations and Mendeley Readers for Articles from Five Countries. *J. Informetrics* 12 (4), 1031–1041. doi:10.1016/j.joi.2018.08.005

Thelwall, M. (2020). Female Citation Impact Superiority 1996-2018 in Six Out of Seven English-speaking Nations. *J. Assoc. Inf. Sci. Tech.* 71 (8), 979–990. doi:10.1002/asi.24316

Thomas-Hunt, M. C., and Phillips, K. W. (2004). When what You Know Is Not Enough: Expertise and Gender Dynamics in Task Groups. *Pers Soc. Psychol. Bull.* 30 (12), 1585–1598. doi:10.1177/0146167204271186

Titone, D., Tiv, M., and Pexman, P. M. (2018). The Status of Women Cognitive Scientists in Canada: Insights from Publicly Available NSERC Funding Data. *Can. J. Exp. Psychol.* 72 (2), 81–90. doi:10.1037/cep0000150

Treviño, L. J., Gomez-Mejia, L. R., Balkin, D. B., and Mixon, F. G., Jr (2018). Meritocracies or Masculinities? the Differential Allocation of Named Professorships by Gender in the Academy. *J. Manage.* 44 (3), 972–1000.

Trix, F., and Psenka, C. (2003). Exploring the Color of Glass: Letters of Recommendation for Female and Male Medical Faculty. *Discourse Soc.* 14 (2), 191–220. doi:10.1177/0957926503014002277

Uhlmann, E., and Cohen, G. L. (2005). Constructed Criteria: Redefining merit to Justify Discrimination. *Psychol. Sci.* 16 (6), 474–480. doi:10.1111/j.0956-7976.2005.01559.x

Vaid, J., and Fox Tree, J. E. (2020). *The Chosen Few—Representation and Professional Visibility of Scholars of Color in Cognitive Psychology*. Virtual Psychonomics: 61st Annual Meeting of the Psychonomic Society. Nov.

Vaid, J., and Geraci, L. (2016). V. An Examination of Women's Professional Visibility in Cognitive Psychology. *Feminism Psychol.* 26 (3), 292–319. doi:10.1177/0959353516641139

Valian, V. (1998). *Why So Slow? the Advancement of Women*. Cambridge, MA: M.I.T. Press.

Way, S. F., Morgan, A. C., Larremore, D. B., and Clauset, A. (2019). Productivity, Prominence, and the Effects of Academic Environment. *Proc. Natl. Acad. Sci. U S A.* 116 (22), 10729–10733. doi:10.1073/pnas.1817431116

West, J. D., Jacquet, J., King, M. M., Correll, S. J., and Bergstrom, C. T. (2013). The Role of Gender in Scholarly Authorship. *PloS one* 8 (7), e66212. doi:10.1371/journal.pone.0066212

White-Lewis, D. K. (2020). The Facade of Fit in Faculty Search Processes. *J. Higher Edu.* 91 (6), 833–857. doi:10.1080/00221546.2020.1775058

Wilder, C. S. (2013). *Ebony & Ivy: Race, Slavery and the Troubled History of America's Universities*. New York: Bloomsbury Press.

Williams, J. (2014). Double Jeopardy? an Empirical Study with Implications for the Debates over Implicit Bias and Intersectionality. *Harv. J. L. Gend.* 37, 186–242.

Wingfield, A. H. (2020,). We Built a Diverse Academic Department in 5 years. Here's How. Harvard Business Review. Available at: https://hbr.org/2020/07/we-built-a-diverse-academic-department-in-5-years-heres-how

Zárate, M. A., Hall, G. N., and Plaut, V. C. (2017). Researchers of Color, Fame, and Impact. *Perspect. Psychol. Sci.* 12 (6), 1176–1178.

Zimmerman, C., Carter-Sowell, A., and Wu, X. (2016). Examining Workplace Ostracism Experiences in Academia: Understanding How Differences in the Faculty Ranks Influence Inclusive Climates on Campus. *Front. Psychol.* https://www.frontiersin.org/articles/10.3389/fpsyg.2016.00753/full. doi:10.3389/fpsyg.2016.00753

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"Broad" Impact: Perceptions of Sex/Gender-Related Psychology Journals

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Because men are overrepresented within positions of power, men are perceived as the default in academia (androcentrism). Androcentric bias emerges whereby research by men and/or dominated by men is perceived as higher quality and gains more attention. We examined if these androcentric biases materialize within fields that study bias (psychology). How do individuals in close contact with psychology view psychology research outlets (i.e., journals) with titles including the words women, gender, sex, or feminism (sex/gender-related) or contain the words men or masculinity (men-related; Study 1) versus psychology journals that publish other-specialized research, and do these perceptions differ in the general public? While the men-related journal was less meritorious than its other-specialty journal, evidence emerged supporting androcentric bias such that the men-related journal was more favorable than the other sex/gender-related journals (Study 1). Further, undergraduate men taking psychology classes rated sex/gender-related versus other-specialty journals as less favorable, were less likely to recommend subscription (Studies 1–2), and rated the journals as lower quality (Study 2 only). Low endorsement of feminist ideology was associated with less support for sex/gender-related journals versus matched other-specialty journals (Studies 1–2). Decreased subscription recommendations for sex/gender-related journals (and the men-related journal) were mediated by decreased favorability and quality beliefs, especially for men (for the sex/gender-related journals) and those low in feminist ideology (Studies 1–2). However, we found possible androcentric-interest within the public sphere. The public reach of articles (as determined by Altmetrics) published in sex/gender-related was greater than other-specialty journals (Study 3). The consequences of these differential perceptions for students versus the public and the impact on women's advancement in social science and psychological science are discussed.

Keywords: gender, androcentrism, sexism, perceptions of sex/gender research, psychological research

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INTRODUCTION

In his treatise, *Truth,* Protagoras declares "of all things the measure is man," which very explicitly centers on the experiences of men (Bonazzi, 2020). This tendency to see men and what men value as the default yields androcentric bias (Bailey et al., 2019) such as being more likely to hire and support *cis*-gendered men versus women within the academy (e.g., Moss-Racusin et al., 2012).

Although the demographics of faculty at academic institutions have shifted from 66.8% men (1970) to 50% men (2018) (National Center for Education Statistics, 2020), the artifacts of androcentrism remain within academia. For instance, men, especially white straight men, are overrepresented among top academic administrators (Bichsel and McChesney, 2017; Moghimi et al., 2019), men are more likely to occupy prestigious research positions within academia (Greenbaum et al., 2018; Lobl et al., 2020; Pinho-Gomes et al., 2021), and (*cis*-white) men receive more research funding than all other groups (Witteman et al., 2019). Even within the same subfields, research associated with men is viewed as higher quality (Knobloch-Westerwick et al., 2013). Indeed, when asked to "picture a scientist" people from across generations defer to a male exemplar (Miller et al., 2018). But is this robust norm true within fields that study androcentrism, like psychology? We ask whether androcentrism extends to research *about* women, gender, and sex. The current study examines whether androcentrism is present in the evaluations and public reach of sex/gender-related research within the field of psychology.

Androcentrism

Androcentrism is a system justifying ideology that recasts the advantages of men as a gender-neutral standard (i.e., Bem, 1993). It is the perception of men and anything related to men as default, foundational, and of focus and the perception of women and anything related to women as other and a special case (i.e., Bem, 1993). Even within an environment where women and men are equally represented, women's gender is noticed more than men's gender (Thomas et al., 2014), resulting in women being perceived in more gendered ways (i.e., Smith and Zarate, 1992). Because men possess higher power and status within society, we engage in categorization processes that privilege men's experiences and values and result in androcentric bias (Bailey et al., 2019).

Androcentrism manifests in the evaluations of categories that are primarily associated with men (Bem, 1993). For instance, when job advertisements and titles contain more androcentric information, women are less likely to apply to Stout and Dasgupta (2011) and are perceived as less qualified for Hovarth and Sczesny (2016) the positions.

Androcentrism Norms Within Research Spaces

Women within academic research face pervasive bias. For instance, women versus men science faculty are more likely to experience sexual harassment as well as gender-based discrimination, which hurts job outcomes (Settles et al., 2006). A woman as opposed to a man applying for a job as a lab manager is also less likely to be hired and is viewed as less competent (Moss-Racusin et al., 2012). Although women often research more novel topics, their research is associated with having less overall impact on the field (Hofstra et al., 2020). Thus, with few exceptions (Ceci et al., 2014), the gender bias within research output persists regardless of a country's score on gender equity measures (Sugimoto et al., 2015). Research *by* women authors is judged as lower in quality (Knobloch-Westerwick et al., 2013) and is less likely to be: cited (Larivière et al., 2013), receive conference air time (Johnson et al., 2017), and featured in on-campus presentations (Nittrouer et al., 2018). Further, individuals from minoritized groups (e.g., white, Black, and Latinx women) are more likely to be overrepresented in research topics that have disproportionately lower citation counts (Kozlowski et al., 2022).

Also, men are more likely to be used as a baseline by which to generalize and evaluate academic tasks (see Bailey et al., 2019). This means that areas of study dominated by men (research; science; business) as compared with areas of study dominated by women (teaching; education) are more valued (Gutièrrez y Muhs et al., 2012), more prestigious (Liben et al., 2001; Watt et al., 2012), and perceived as more challenging (Liben et al., 2001; Watt et al., 2012). As such, research on other biases, as compared with research on gender bias, is more likely to be funded and appears more often in high-impact journals (e.g., Cislak et al., 2018). All told, androcentric biases emerge such that research *by* women and tasks and domains *associated with* women are marginalized. Most troubling, androcentric bias remains as a vestige even when a field becomes representationally more gender-equal because (*cis*-gendered white) men continue to be over-represented within high-ranking or highly visible roles (Klatzky et al., 2015; Vaid and Geraci, 2016).

The Case of Psychology

Psychology has been dominated by women at the undergraduate level since the 1970s {52.7% in 1975 (National Science Foundation [NSF], 1993); 78.1% in 2012 (National Science Foundation [NSF], 2015)}. An increasing number of women with master's degrees {42.9% in 1975 (National Science Foundation [NSF], 1993); 79.1% in 2012 (National Science Foundation [NSF], 2015)} and doctorates {31.7% in 1975 (National Science Foundation [NSF], 1993); 72.6% in 2012 (National Science Foundation [NSF], 2015)} has transformed psychology from a men-dominated field to a women-dominated field. However, notwithstanding psychological research examining androcentric bias, psychology research is deeply rooted in androcentric bias (Shields, 1975). Despite progress in gender representation, women in psychology remain underrepresented on first author publications in top journals (Brown and Goh, 2016), in awards received by divisions (Eagly and Riger, 2014; Brown and Goh, 2016), in eminence (Diener et al., 2014; Eagly and Miller, 2016), and in tenure-track positions (40.6% in 2010–2011; Oklahoma State University [OSU], 2011; see American Psychological Association Center for Workforce Studies, 2014). Further, research on the psychology of gender is often perceived by personality and/or social psychology researchers as less rigorous and mainstream than other subfields (i.e., attitudes and persuasion; judgment and decision making), and researchers who pursue research on the psychology of gender are stereotyped as being "female" (Rios and Roth, 2020).

We advance research on androcentrism by examining whether the androcentric bias materializes in the evaluation of journals that *specialize in publishing psychological research related* to women, sex, gender, and feminism (sex/gender-related). Are sex/gender-related psychology journals considered less important, impactful, and deserving of subscription

recommendation than other-specialty psychology journals? Does androcentric bias look different among people within the field of psychology compared to the public writ large?

Androcentrism and a Person's Gender and Ideology

There is mixed evidence for whether androcentric bias changes depending on a person's binary gender identity (Harding, 1991). *Cis*-gendered men as compared with women hold more traditional gender role attitudes (Bolzendahl and Meyers, 2004; Fodor and Balogh, 2010) and are more likely to respond negatively to or discount evidence showing gender bias (Handley et al., 2015). Due to in-group favoritism (Tajfel and Turner, 2001) and self-relevance (van Veelan et al., 2015), men compared to women are often more likely to have androcentric preferences (i.e., Bruckmüller et al., 2012; Bailey and LaFrance, 2016). On the other hand, men and women are equally likely to hold (Nosek et al., 2009) and apply implicit gender associations in discriminatory ways (Moss-Racusin et al., 2015) and often show similar levels of androcentrism (i.e., Hegarty and Buechel, 2006; Gaetano et al., 2016). We add to this literature by examining whether a person's gender identity results in the application of androcentric biases such that research outlets related to sex/gender are perceived as less important, impactful, and deserving of a library subscription.

Research has also demonstrated individual and ideological differences in the expression of androcentrism. For example, androcentric bias is minimized to the extent that an individual is motivated to be egalitarian (Plant and Devine, 1998; Crandall et al., 2002). In contrast, when people endorse sexist ideologies, they are more likely to display androcentric bias within their language use (i.e., Swim et al., 2004; Sczesny et al., 2015). In Studies 1–2 we extend the literature on androcentrism by examining whether a different type of egalitarian belief (endorsement of feminist ideology) moderates the evaluation of sex/gender-related versus other-specialty psychology journals.

Project Overview

Because journal impact factor implies prestige (Garfield, 2006) and quality (Saha et al., 2003), we first selected psychology research outlets related to sex/gender (and, in Study 1, a men-related journal) and other-specialty journals and matched them on impact factor. To examine whether androcentrism emerges within the field of psychology, where students and academics study androcentrism, we used a matched within-participants survey of undergraduate students enrolled in psychology classes to experimentally test how sex/gender-related (and men-related for Study 1) versus other-specialized journals faired on evaluative and behavioral expressions of bias (Studies 1–2). Next, we examined whether these androcentric biases occurred in people more distal from the field of psychology by documenting the reach of psychology research outlets through popular press metrics (Altmetrics; Study 3).

We tested several hypotheses in this series of studies. First, we tested the overall *androcentric bias hypothesis* such that the sex/gender-related psychology journals versus the matched other-specialty psychology journals (Studies 1 and 2) or men-related psychology journal (Study 1) would be perceived as less favorable, lower quality, and less recommended for subscription (Studies 1–2), and/or have less public reach (Study 3). We also examined whether the men-related journal was seen as equally or less favorable than its matched other-specialty journal. We also tested the *gender differences in androcentric bias hypothesis*, such that men would perceive sex/gender-related journals as less meritorious than matched other-specialty psychology journals or the men-related psychology journal. Women were predicted to either favor sex/gender-related journals or show no differences in meritoriousness as compared to matched other-specialty journals or the men-related journal (Studies 1–3). We also examined whether gender differences in the perception of the men-related journal versus its matched other-specialty journal emerged. We tested the *personal ideology differences in androcentric bias hypothesis*, by examining whether participants who were lower on endorsement of feminist ideologies were especially less favorable toward sex/gender-related and men-related journals as opposed to their matched other-specialty journals (Studies 1–2). We also examined whether these same ideological differences emerged for evaluations of the men-related versus its other-specialty journal comparison. Lastly, we tested the *subscription recommendation explained by androcentric evaluative bias hypothesis* such that sex/gender-related journals versus other-specialty journals would be less likely to be recommended because they are seen as less favorable and of lower quality, especially among men and those low in feminist ideology. We also tested whether these same differences emerged for the men-related journal comparison.

STUDIES 1 AND 2

Because the experimental study design and the dependent variables were similar, the methods and results of Studies 1–2 are presented together.

Method

Participants

Participants believed the study was spearheaded by the university library and psychology department to establish social science journal subscriptions and determine which psychology journals to prioritize. All participants were recruited from an undergraduate psychology pool in exchange for course credit (Study 1: a Mountain West University in the United States; Study 2: a Mountain West and a Southeastern University in the United States). In Study 1, one hundred ten participants (52.73% women; 84.27% white; ages 17–32, median age = 19; 10% psychology majors) were recruited, whereas in Study 2, four hundred twenty-six participants (70.10% women; 69.5% white, 8.54% Latino, 8.53% Black, 4.38% Asian, 3.38% Mixed; ages 18–60, median age = 20; 33.34% majoring in psychology [first or second major]) were recruited.

Journal Selection

In Study 1, we identified 31 sex/gender-related or men-related psychology journals indexed by PsycINFO with titles

TABLE 1 | Psychology journals selected for studies 1, 2, and 3 matched on impact.

Studies 1 and 3: matched impact factors as of March 2014			
Sex/gender-related journals		**Other-specialty journals**	
Title	***Impact factor***	***Title***	***Impact factor***
Women and therapy	0.111	*Journal of psychology in Africa*	0.109
Feminism and psychology	0.831	*Military psychology*	0.831
Sex roles	0.531	*Group processes and intergroup relations*	0.528
Psychology of women quarterly	0.818	*Personality and individual differences*	0.807
Men-related journals		**Other-specialty journal**	
Title	***Impact factor***	***Title***	***Impact factor***
Psychology of men and masculinity	0.679	*The clinical neuropsychologist*	0.678
Study 2 and 3: matched five-year impact factors as of January 2016			
Sex/gender-related journals		**Other-specialty journals**	
Title	***Five-year impact factor***	***Title***	***Five-year impact factor***
Women and therapy	0.191	*Psychologia*	0.168
Feminism and psychology	0.920	*Journal of classification*	0.929
Sex roles	2.067	*Thinking and reasoning*	2.062
Psychology of women quarterly	2.142	*European journal of psychological assessment*	2.124

referring to women, sex, gender, feminism, or men. The list was filtered for psychology and/or journals that psychologists frequently publish in, based on expertise and verified by psychological researchers; we selected 4 sex/gender-related and one men-related journal. We recorded each journal's current impact factor using Journal Citation Reports (**Table 1**) and identified other psychology journals indexed by PsycINFO with similar impact factors (within ± 0.011 points). When more than one journal met our criteria, the more specialized journal was selected. For instance, we matched *Feminism and Psychology* (impact factor = 0.831) with *Military Psychology* (impact factor = 0.831) versus *Social Justice Research* (impact factor = 0.829).

In Study 2, we selected the same 4 sex/gender-related journals as Study 1, recorded their 5-year impact factor using Journal Citation Reports (**Table 1**), and determined all psychology journals in the Journal Citation Reports with similar 5-year impact factors (within ± 0.023). Given that Study 1 conflated race and class (i.e., *Journal of Psychology in Africa*), which muddles the effects as race and class are also marginalized topics of study (e.g., Kozlowski et al., 2022), in Study 2 we did not select journals that conflated race and class when more than one journal met our 5-year impact factor criteria. For instance, we chose the match for *Women and Therapy* (5-year impact factor = 0.191) to be *Psychologia* (5-year impact factor = 0.168) as opposed to the *Journal of Psychology in Africa* (5-year impact factor = 0.18).

Journal Type

Participants read the title and a description of each journal before completing the dependent measures. In Study 1, journal descriptions (45–324 words) were taken directly from the journal's publication website, which replicated the naturalistic experience of participants seeking journal information (across journal comparisons word counts were within 60 words). In Study 2, journal descriptions were edited to control for word count (45–63 words).

The presentation of sex/gender-related/men-related (for Study 1) and other-specialty journals alternated using a Latin squares design. Study 1 had 10 presentation orders; Study 2 had 8 presentation orders (as there was no men-related journal comparison). Every journal had the opportunity to be reviewed first. To prevent disengagement, after rating half of the journals, participants completed a neutral break activity (word creation task and maze).

Androcentrism Measures: Favorability, Quality, and Subscription Recommendations

Participants rated their favorability toward the journals on six items (modified from Handley et al., 2015; i.e., "To what extent is this journal important to have in our [university initials] library"; **Table 2**) on scales ranging from 1 (*not at all*) to 6 (*very much*). Ratings were averaged for each journal (α's ≥ 0.86; **Table 2**).

Participants ranked the quality of the journals ("I would rank this journal in the _____ percentile on quality") by choosing a number ranging from the 5th (l*owest*) to the 99th (*highest*) quality. In Study 1, participants also ranked how other students would rank the quality of the journals ("I predict _____ that other students at [university initials] would likely rank this journal in the _____ percentile on quality") by choosing a number ranging from the 5th (l*owest*) to the 99th (*highest*) quality. Ratings for Study 1 were averaged for each journal (α's ≥ 0.91; **Table 2**).

TABLE 2 | Favorability items and Cronbach's alphas for studies 1 and 2.

Favorability Items (Handley et al., 2015)

To what extent is this journal important to have in our [university initials] library?

To what extent would you expect that the research in this journal would be of high quality?

To what extent would you expect the articles in this journal to make significant contributions to advancing the field of psychology?

To what extent do the contents of this journal sound interesting?

To what extent would reading research published in this journal be useful to you?

Overall, my evaluation of this journal is favorable.

Cronbach's alphas for studies 1 and 2

	Women and therapy		*Feminism and psychology*		*Sex roles*		*Psychology of women quarterly*		*Psychology of men and masculinity*
	Study 1	**Study 2**	**Study 1**	**Study 2**	**Study 1**	**Study 2**	**Study 1**	**Study 2**	**Study 1**
Favorability	0.89	0.93	0.90	0.93	0.91	0.93	0.92	0.93	0.89
Quality	0.98	–	0.96	–	0.97	–	0.98	–	0.91
	Matched other-specialty		**Matched other-specialty**		**Matched other-specialty**		**Matched other-specialty**		**Matched other-specialty**
Favorability	0.89	0.90	0.87	0.87	0.88	0.89	0.91	0.90	0.86
Quality	0.98	–	0.98	–	0.97	–	0.99	–	0.91

Feminist ideology items (Fisher et al., 2000; original items taken from Bargad and Hyde (1991), Reid and Purcell (2004); study 1: α=0.94; study 2: α=0.93).

I am very committed to a cause that I believe contributes to a more fair and just world for all people.

I want to work to improve women's status.

I am willing to make certain sacrifices to effect change in this society in order to create a nonsexist, peaceful place where all people have equal opportunities.

It is very satisfying to me to be able to use my talents and skills in my work in the women's movement.

I care very deeply about men and women having equal opportunities in all respects.

I choose my "causes" carefully to work for great equality for all people.

I feel that I am very powerful and effective spokesperson for the women's issues I am concerned with right now.

One some level, my motivation for almost every activity I engage in is my desire of an egalitarian world.

I owe it not only to women but to all people who work for greater opportunity and equality for all.

I am a feminist.

Being a feminist is central to who I am.

I would be proud to be identified as a feminist.

Participants also made journal subscription recommendations. In Study 1, participants took "everything into consideration" and determined the percentile ranking of the likelihood [university initials] library should maintain this journal subscription from 0% (*no chance*) to 100% (*definitely*). In Study 2, participants rated the likelihood that the [university initials] library would maintain this journal subscription from 0% (*no chance*) to 100% (*definitely*) relative to all journals in psychology.

Ideological Measure: Feminist Ideology

Participants completed nine feminist identity items on scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*; Fisher et al., 2000; original items taken from Bargad and Hyde, 1991). Items included: "I am very committed to a cause that I believe contributes to a more fair and just world for all people" (**Table 2**). Participants also completed 3 items on scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) about whether they self-identified as a feminist taken from the Social Identity subscale of the Social Identity Specific Collectivism scale (Reid and Purcell, 2004). Items included "I am a feminist" (**Table 2**). All 12 items were averaged to create a feminist ideology composite (α's $\geq$ 0.93; **Table 2**).

Results

Given that there were four sex/gender-related journals and 1 men-related journal, the sex/gender-related journals could not be submitted to the same mixed analysis of variance (ANOVA) as the men-related journal. Thus, participants' evaluations of journal comparisons for sex/gender-related (versus matched other-specialty) were separately examined through 2 (journal type: sex/gender-related versus matched other-specialty) $\times$ 4 (matched comparisons at the level of the journal) $\times$ 2 (participant gender) mixed ANOVAs with journal type and matched comparisons at the level of the journal as within-participants variables. Participants' evaluations of the journal comparisons for the men-related journal (versus its matched other-specialty journal) were examined through 2 (journal type: men-related versus matched other-specialty) $\times$ 2 (participant gender) mixed

ANOVAs with journal type as a within-participants variable. Comparisons for sex/gender-related journals (combined) versus the men-related journal were separately examined through 2 [journal type: sex/gender-related journals (combined) versus men-related journal] × 2 (participant gender) mixed ANOVAs with journal type as a within-participants variable. For both Studies 1 and 2, we completed *post hoc* power analyses using G*Power to determine whether the analyzed samples had sufficient power to detect the main effects of journal and the moderation by gender.

To examine whether feminist ideology moderated our effects, first we examined whether gender differences emerged in participants' ratings of feminist ideology, then we examined the relationship between the ratings of each journal type and feminist ideology, and finally we used Fisher's *r*-to-*z* test to examine the differences between the correlation coefficients.

We employed regressions to examine whether the differential journal subscription recommendations were mediated by decreased favorability and quality beliefs toward sex/gender-related journals and the men-related journal.

Across both studies, we only report the main effects of journal type and interactions between journal type and gender. Other main effects, interactions, means, and standard deviations are detailed in **Tables 3–6**. In Studies 1–3, effect sizes with positive numbers indicate differences favoring other-specialty journals and the men-related journal.

Favorability and Subscription Recommendations

Testing the Androcentric Bias Hypothesis and post hoc Power Analyses

Sex/gender-related and the men-related journal [versus their matched other-specialty journal(s)] were perceived less favorably [Sex/gender-related, Study 2: $F(1,411) = 19.93$, $p < 0.001$, $d = 0.06$; Men-related, Study 1: $F(1,107) = 19.92$, $p < 0.001$, $d = 0.52$], as lower quality [Sex/gender-related, Study 2: $F(1,406) = 23.18$, $p < 0.001$, $d = 0.08$; Men-related, Study 1: $F(1,105) = 31.08$, $p < 0.001$, $d = 0.42$], and having lower subscription recommendations [Sex/gender-related, Study 2: $F(1,407) = 21.42$, $p < 0.001$, $d = 0.12$; Men-related, Study 1: $F(1,107) = 13.68$, $p < 0.001$, $d = 0.47$]. No significant effects of journal type emerged between sex/gender-related versus other-specialty journals in Study 1 [favorability: $F(1,106) = 0.26$, $p = 0.612$, $d = 0.03$; quality: $F(1,104) = 0.00$, $p = 0.958$, $d = -0.001$; subscription recommendations: $F(1,104) = 0.32$, $p = 0.574$, $d = 0.03$]. Although the men-related journal was perceived more favorably than the sex/gender-related journals [$F(1,107) = 8.02$, $p = 0.006$, $d = 0.22$], no differences emerged when comparing the men-related journal to the sex/gender-related journals for quality [$F(1,105) = 1.69$, $p = 0.197$, $d = 0.08$] and subscription recommendations [$F(1,107) = 2.51$, $p = 0.116$, $d = 0.12$].

While the analyzed sample in Study 2 had sufficient power to detect the main effect of journal for sex/gender-related journal comparisons and the analyzed sample in Study 1 had sufficient power to detect the main effect of journal for the men-related journal comparisons, the analyzed sample in Study 1 did not have sufficient power to detect the main effect of journal for the sex/gender-related journal comparisons (see **Table 7**).

Testing the Gender Differences in Androcentric Bias Hypothesis and post hoc Power Analyses

When examining the sex/gender-related journals versus the other-specialty psychology journals, significant Journal Type × Participant Gender interactions emerged for favorability [Study 1: $F(1,106) = 25.01$, $p < 0.001$; Study 2: $F(1,411) = 58.82$, $p < 0.001$], quality [Study 2: $F(1,406) = 23.18$, $p < 0.001$], and subscription recommendations [Study 1: $F(1,104) = 8.43$, $p = 0.005$; Study 2: $F(1,407) = 20.97$, $p < 0.001$; **Figure 1**]. Men viewed sex/gender-related versus other-specialty journals less favorably (Study 1: $p < 0.001$, $d = 0.37$; Study 2: $p < 0.001$, $d = 0.57$), of lower quality (Study 2: $p < 0.001$, $d = 0.49$), and were less likely to be recommended for subscription (Study 1: $p = 0.032$, $d = 0.23$; Study 2: $p < 0.001$, $d = 0.40$). Although women viewed sex/gender-related versus other-specialty journals more favorably (Study 1: $p = 0.001$, $d = -0.33$; Study 2: $p = 0.004$, $d = -0.13$), no differences between sex/gender-related and other-specialty journals emerged for quality (Study 2: $p = 0.172$, $d = -0.05$) and subscription recommendations (Study 1: $p = 0.070$, $d = -0.17$; Study 2: $p = 0.963$, $d = 0.002$) (**Figure 1**).

No Journal Type × Participant Gender interaction emerged when examining the sex/gender-related journals versus the other-specialty journals for quality [Study 1, $F(1,104) = 3.84$, $p = 0.053$] or when examining the men-related journal versus its matched other-specialty journal [favorability: $F(1,107) = 0.36$, $p = 0.551$; quality: $F(1,105) = 0.03$, $p = 0.859$; subscription recommendations: $F(1,107) = 0.33$, $p = 0.564$].

However, when comparing the men-related journal to the sex/gender-related journals, a Participant Gender × Journal Type interaction emerged for favorability [$F(1,107) = 12.50$, $p < 0.001$] but not quality [$F(1,105) = 1.25$, $p = 0.266$] or subscription recommendations [$F(1,107) = 2.51$, $p = 0.116$]. Men were less favorable ($p < 0.001$, $d = 0.49$) but women were equally favorable ($p = 0.606$, $d = -0.06$) when comparing the sex/gender-related journals to the men-related journal.

Most importantly, the analyzed samples in both Studies 1 and 2 had the power to detect simple main effects of the journal comparisons (sex/gender-related and men-related) for men and women participants with the exception of women's subscription recommendations in Study 2 (see **Table 7**).

Testing the Personal Ideology Differences in Androcentric Bias Hypothesis

Although women (Study 1: $M = 4.57$, $SD = 1.30$; Study 2: $M = 4.82$, $SD = 1.20$) were more likely to endorse a feminist ideology than men (Study 1: $M = 4.03$, $SD = 1.12$; Study 2: $M = 4.13$, $SD = 1.13$) [Study 1: $F(1,101) = 5.07$, $p = 0.027$, $d = -0.45$ (95% CI 3.66–4.04); Study 2: $F(1,416) = 30.01$, $p < 0.001$, $d = -0.59$ (95% CI 0.444 –0.940)], we examined whether participants who were lower on endorsement of feminist ideologies were especially less favorable toward sex/gender-related and men-related journals as opposed to their matched other-specialty journals. In both Studies 1 and 2, the correlation between feminist ideology and the journal type was weaker for other-specialty versus sex/gender-related journals (see **Table 8**). For the men-related journal, while the correlation between feminist ideology and journal type was weaker for other-specialty

TABLE 3 | ANOVAs comparing sex/gender-related to other matched specialty journals: study 1.

	Favorability (*df*: 3, 106)					Quality (*df*: 3, 104)					Subscription recommendations (*df*: 3, 104)				
	F	***p***	***d***	***M***	***SD***	***F***	***p***	***d***	***M***	***SD***	***F***	***p***	***d***	***M***	***SD***
Gender	3.37	0.069	−0.35	–	–	0.52	0.472	0.19	–	–	0.40	0.531	−0.14	–	–
Men	–	–	–	3.85	0.73	–	–	–	56.97	21.89	–	–	–	50.40	18.18
Women	–	–	–	4.09	0.64	–	–	–	52.50	25.01	–	–	–	52.86	17.49
Journal	0.26	0.612	0.03	–	–	0.00	0.958	−0.001	–	–	0.32	0.574	0.03	–	–
Sex/gender-related	–	–	–	3.96	1.12	–	–	–	55.29	29.55	–	–	–	51.33	30.20
Matched other-specialty	–	–	–	3.99	1.00	–	–	–	55.26	29.21	–	–	–	52.16	29.43
Type	6.65	<0.001	0.06–0.22	–	–	2.88	0.036	0.003–0.17	–	–	6.28	<0.001	0.01–0.27	–	–
Women and Therapy Comparisons	–	–	–	3.92	1.02	–	–	–	55.92	29.43	–	–	–	48.91	30.25
Feminism and Psychology Comparisons	–	–	–	3.98	1.04	–	–	–	57.14	29.16	–	–	–	52.97	28.30
Sex Roles Comparisons	–	–	–	3.85	1.05	–	–	–	52.22	28.21	–	–	–	48.51	29.43
Psychology of Women Quarterly Comparisons	–	–	–	4.15	1.10	–	–	–	55.83	30.58	–	–	–	56.60	30.65
Gender × Journal	25.01	<0.001	–	–	–	3.84	0.053	–	–	–	8.43	0.005	–	–	–
Men's evaluations	12.78	<0.001	0.37	–	–	1.63	0.208	0.11	–	–	4.88	0.032	0.23	–	–
Sex/gender-related	–	–	–	3.65	1.13	–	–	–	55.44	29.44	–	–	–	46.99	30.64
Matched other-specialty	–	–	–	4.05	1.02	–	–	–	58.50	28.55	–	–	–	54.16	31.06
Women's evaluations	12.11	0.001	−0.33	–	–	2.32	0.134	−0.10	–	–	3.40	0.070	−0.17	–	–
Sex/gender-related	–	–	–	4.26	1.03	–	–	–	55.16	29.71	–	–	–	55.21	29.32
Matched other-specialty	–	–	–	3.93	0.97	–	–	–	52.26	29.57	–	–	–	50.38	27.84
Gender × Type	2.36	0.071	–	–	–	2.80	0.040	–	–	–	1.68	0.172	–	–	–
Men's evaluations	6.93	<0.001	0.10–0.36	–	–	4.90	0.003	0.01–0.36	–	–	4.90	0.003	0.13–0.38	–	–
Women and Therapy Comparisons	–	–	–	3.76	1.08	–	–	–	57.87	29.56	–	–	–	49.02	31.77
Feminism and Psychology Comparisons	–	–	–	3.96	1.08	–	–	–	60.99	28.05	–	–	–	52.99	29.58
Sex Roles Comparisons	–	–	–	3.65	1.11	–	–	–	50.75	28.28	–	–	–	44.20	30.85
Psychology of Women Quarterly Comparisons	–	–	–	4.04	1.08	–	–	–	58.27	29.62	–	–	–	56.10	31.02
Women's evaluations	2.44	0.066	0.04–0.23	–	–	0.02	1.00	0.00–0.02	–	–	2.72	0.046	0.02–0.28	–	–
Women and Therapy Comparisons	–	–	–	4.08	0.95	–	–	–	54.10	29.42	–	–	–	48.82	28.96
Feminism and Psychology Comparisons	–	–	–	4.00	1.01	–	–	–	53.58	29.85	–	–	–	52.96	27.23
Sex Roles Comparisons	–	–	–	4.04	0.97	–	–	–	53.59	28.21	–	–	–	52.36	27.68
Psychology of Women Quarterly Comparisons	–	–	–	4.25	1.12	–	–	–	53.57	31.41	–	–	–	57.04	30.45
Journal × Type	23.93	<0.001	–	–	–	14.12	<0.001	–	–	–	28.65	<0.001	–	–	–
Sex/gender-related	12.00	<0.001	0.09–0.49	–	–	7.12	<0.001	0.05–0.32	–	–	11.27	<0.001	0.15–0.56	–	–
Women and Therapy Comparisons	–	–	–	4.18	1.02	–	–	–	61.44	29.46	–	–	–	58.28	29.86
Feminism and Psychology Comparisons	–	–	–	3.67	1.08	–	–	–	51.99	28.91	–	–	–	42.31	27.19

(Continued)

TABLE 3 | (Continued)

	Favorability (*df*: 3, 106)					Quality (*df*: 3, 104)					Subscription recommendations (*df*: 3, 104)				
	F	***p***	***d***	***M***	***SD***	***F***	***p***	***d***	***M***	***SD***	***F***	***p***	***d***	***M***	***SD***
Sex Roles Comparisons	–	–	–	3.95	1.14	–	–	–	53.12	28.71	–	–	–	50.09	30.40
Psychology of Women Quarterly Comparisons	–	–	–	4.06	1.18	–	–	–	54.61	30.58	–	–	–	54.66	31.23
Matched other-specialty	17.98	<0.001	0.04–0.65	–	–	9.03	<0.001	0.03–0.42	–	–	25.58	<0.001	0.18–0.91	–	–
Women and Therapy Comparisons	–	–	–	3.67	0.97	–	–	–	50.39	28.48	–	–	–	39.55	27.75
Feminism and Psychology Comparisons	–	–	–	4.28	0.90	–	–	–	62.29	28.64	–	–	–	63.63	25.31
Sex Roles Comparisons	–	–	–	3.75	0.95	–	–	–	51.32	27.81	–	–	–	46.92	28.49
Psychology of Women Quarterly Comparisons	–	–	–	4.24	1.02	–	–	–	57.05	30.67	–	–	–	58.54	30.08
Gender × Journal × Type	2.75	0.043	–	–	–	1.52	0.208	–	–	–	2.19	0.089	–	–	–
Men's evaluations	16.47	<0.001	–	–	–	11.23	<0.001	–	–	–	18.08	<0.001	–	–	–
Sex/gender-related	4.97	0.003	0.06–0.41	–	–	5.15	0.002	0.005–0.47	–	–	7.78	<0.001	0.06–0.65	–	–
Women and Therapy Comparisons	–	–	–	3.92	1.12	–	–	–	63.89	29.07	–	–	–	58.56	31.36
Feminism and Psychology Comparisons	–	–	–	3.47	1.10	–	–	–	53.75	28.89	–	–	–	39.41	27.75
Sex Roles Comparisons	–	–	–	3.54	1.19	–	–	–	50.20	29.67	–	–	–	41.12	30.79
Psychology of Women Quarterly Comparisons	–	–	–	3.65	1.07	–	–	–	53.90	29.20	–	–	–	48.88	29.62
Matched other-specialty	16.75	<0.001	0.01–0.92	–	–	10.01	<0.001	0.02–0.64	–	–	16.64	<0.001	0.12–0.99	–	–
Women and Therapy Comparisons	–	–	–	3.59	1.02	–	–	–	51.85	28.87	–	–	–	39.48	29.51
Feminism and Psychology Comparisons	–	–	–	4.44	0.81	–	–	–	68.22	25.45	–	–	–	66.56	24.93
Sex Roles Comparisons	–	–	–	3.75	1.02	–	–	–	51.30	27.11	–	–	–	47.28	30.92
Psychology of Women Quarterly Comparisons	–	–	–	4.43	0.96	–	–	–	62.64	29.68	–	–	–	63.32	30.98
Women's evaluations	9.77	<0.001	–	–	–	4.26	0.006	–	–	–	12.27	<0.001	–	–	–
Sex/gender-related	9.56	<0.001	0.02–0.53	–	–	3.25	0.023	0.02–0.30	–	–	5.90	<0.001	0.25–0.82	–	–
Women and Therapy Comparisons	–	–	–	4.41	0.86	–	–	–	59.17	29.90	–	–	–	39.61	26.35
Feminism and Psychology Comparisons	–	–	–	3.85	1.04	–	–	–	50.36	29.09	–	–	–	61.02	25.58
Sex Roles Comparisons	–	–	–	4.33	0.95	–	–	–	55.84	27.78	–	–	–	46.61	26.42
Psychology of Women Quarterly Comparisons	–	–	–	4.43	1.16	–	–	–	55.27	32.07	–	–	–	54.27	28.86

(Continued)

TABLE 3 | (Continued)

	Favorability (*df*: 3, 106)					Quality (*df*: 3, 104)					Subscription recommendations (*df*: 3, 104)				
	F	***p***	***d***	***M***	***SD***	***F***	***p***	***d***	***M***	***SD***	***F***	***p***	***d***	***M***	***SD***
Matched other-specialty	3.71	0.013	0–0.42	–	–	1.50	0.216	0.02–0.26	–	–	9.37	<0.001	0.003–0.51	–	–
Women and Therapy Comparisons	–	–	–	3.75	0.92	–	–	–	49.04	28.30	–	–	–	58.03	28.74
Feminism and Psychology Comparisons	–	–	–	4.14	0.96	–	–	–	56.79	30.50	–	–	–	44.89	26.65
Sex Roles Comparisons	–	–	–	3.75	0.90	–	–	–	51.34	28.71	–	–	–	58.11	27.94
Psychology of Women Quarterly Comparisons	–	–	–	4.07	1.06	–	–	–	51.86	30.93	–	–	–	59.81	31.98

TABLE 4 | ANOVAs comparing the men-related to the matched other-specialty journal: study 1.

	Favorability (*df*: 1, 107)					Quality (*df*: 1, 105)					Subscription recommendations (*df*: 1, 107)				
	F	***p***	***d***	***M***	***SD***	***F***	***p***	***d***	***M***	***SD***	***F***	***p***	***d***	***M***	***SD***
Gender	0.64	0.426	−0.15	–	–	0.86	0.355	0.18	–	–	0.17	0.685	−0.08	–	–
Men	–	–	–	4.36	0.80	–	–	–	65.39	24.26	–	–	–	60.19	23.77
Women	–	–	–	4.47	0.68	–	–	–	60.68	27.78	–	–	–	61.82	18.03
Journal	19.92	<0.001	0.52	–	–	31.08	<0.001	0.42	–	–	13.68	<0.001	0.47	–	–
Men-related	–	–	–	4.18	0.99	–	–	–	56.96	28.03	–	–	–	54.52	28.62
Matched other-specialty	–	–	–	4.66	0.86	–	–	–	68.89	28.68	–	–	–	67.57	26.76
Gender × Journal	0.36	0.551	–	–	–	0.03	0.859	–	–	–	0.33	0.564	–	–	–
Men's evaluations	7.86	0.007	0.44	–	–	13.75	<0.001	0.43	–	–	4.54	0.038	0.36	–	–
Men-related	–	–	–	4.15	1.03	–	–	–	59.62	27.20	–	–	–	54.72	31.43
Matched other-specialty	–	–	–	4.57	0.89	–	–	–	71.16	26.14	–	–	–	65.65	28.75
Women's evaluations	12.40	<0.001	0.61	–	–	17.54	<0.001	0.41	–	–	9.81	0.003	0.59	–	–
Men-related	–	–	–	4.20	0.96	–	–	–	54.53	28.80	–	–	–	54.33	26.08
Matched other-specialty	–	–	–	4.75	0.83	–	–	–	66.83	30.91	–	–	–	69.32	24.94

TABLE 5 | ANOVAs comparing men-related to the sex/gender-related journals: study 1.

	Favorability (*df*: 1, 107)					Quality (*df*: 1, 105)					Subscription recommendations (*df*: 1, 107)				
	F	***p***	***d***	***M***	***SD***	***F***	***p***	***d***	***M***	***SD***	***F***	***p***	***d***	***M***	***SD***
Gender	3.78	0.055	−0.36	–	–	0.41	0.525	0.12	–	–	0.84	0.363	−0.16	–	–
Men	–	–	–	3.91	0.92	–	–	–	57.53	23.89	–	–	–	50.99	22.59
Women	–	–	–	4.22	0.79	–	–	–	54.48	26.65	–	–	–	54.47	20.48
Journal	8.02	0.006	0.22	–	–	1.69	0.197	0.08	–	–	1.57	0.213	0.12	–	–
Men-related	–	–	–	4.18	0.99	–	–	–	56.96	28.03	–	–	–	54.52	28.62
Sex/gender-related	–	–	–	3.97	0.94	–	–	–	54.80	25.83	–	–	–	51.42	22.07
Gender × Journal	12.50	<0.001	–	–	–	1.25	0.266	–	–	–	2.51	0.116	–	–	–
Men's evaluations	18.70	<0.001	0.49	–	–	2.30	0.136	0.16	–	–	3.29	0.075	0.28	–	–
Men-related	–	–	–	4.15	1.03	–	–	–	59.62	27.20	–	–	–	54.72	31.43
Sex/gender-related	–	–	–	3.66	0.97	–	–	–	55.44	24.40	–	–	–	47.27	21.69
Women's evaluations	0.27	0.606	−0.06	–	–	0.02	0.885	0.01	–	–	0.07	0.795	−0.04	–	–
Men-related	–	–	–	4.20	0.96	–	–	–	54.53	28.80	–	–	–	54.33	26.08
Sex/gender-related	–	–	–	4.25	0.81	–	–	–	54.22	27.28	–	–	–	55.21	21.91

TABLE 6 | ANOVAs comparing sex/gender-related to other matched specialty journals: study 2.

	Favorability (*df*: 3, 411)					Quality (*df*: 3, 406)					Subscription recommendations (*df*: 3, 407)				
	F	***p***	***d***	***M***	***SD***	***F***	***p***	***d***	***M***	***SD***	***F***	***p***	***d***	***M***	***SD***
Gender	8.83	0.003	−0.33	–	–	2.19	0.140	0.16	–	–	0.94	0.333	−0.11	–	–
Men	–	–	–	3.80	0.65	–	–	–	62.31	17.97	–	–	–	63.02	15.43
Women	–	–	–	4.03	0.73	–	–	–	59.00	23.49	–	–	–	64.76	15.67
Journal	19.93	<0.001	0.06	–	–	23.18	<0.001	0.08	–	–	21.42	<0.001	0.12	–	–
Sex/gender-related	–	–	–	3.92	1.19	–	–	–	58.42	30.20	–	–	–	62.34	26.47
Matched other-specialty	–	–	–	3.99	1.14	–	–	–	60.97	30.82	–	–	–	65.51	27.28
Type	134.49	<0.001	0.09–0.78	–	–	56.01	<0.001	0.05–0.49	–	–	68.67	<0.001	0.12–0.63	–	–
Women and Therapy Comparisons	–	–	–	3.99	1.16	–	–	–	60.38	30.33	–	–	–	64.81	26.83
Feminism and Psychology Comparisons	–	–	–	3.53	1.14	–	–	–	52.57	30.39	–	–	–	56.17	27.55
Sex Roles Comparisons	–	–	–	4.41	1.07	–	–	–	67.07	29.25	–	–	–	73.02	26.27
Psychology of Women Quarterly Comparisons	–	–	–	3.88	1.13	–	–	–	58.78	30.43	–	–	–	61.71	27.05
Gender × Journal	58.82	<0.001	–	–	–	39.45	<0.001	–	–	–	20.97	<0.001	–	–	–
Men's evaluations	55.15	<0.001	0.57	–	–	39.49	<0.001	0.49	–	–	26.26	<0.001	0.40	–	–
Sex/gender-related	–	–	–	3.50	1.12	–	–	–	56.07	28.40	–	–	–	57.63	27.08
Matched other-specialty	–	–	–	4.09	0.95	–	–	–	69.25	25.16	–	–	–	67.98	24.27
Women's evaluations	8.39	0.004	−0.13	–	–	1.88	0.172	−0.05	–	–	0.00	0.963	0.002	–	–
Sex/gender-related	–	–	–	4.10	1.18	–	–	–	59.44	30.90	–	–	–	64.39	25.94
Matched other-specialty	–	–	–	3.94	1.22	–	–	–	57.83	32.47	–	–	–	64.44	28.43
Gender × Type	3.13	0.025	–	–	–	0.67	0.573	–	–	–	5.82	<0.001	–	–	–
Men's evaluations	47.59	<0.001	0.04–0.71	–	–	18.41	<0.001	0.03–0.47	–	–	17.29	<0.001	0.05–0.46	–	–
Women and Therapy Comparisons	–	–	–	3.78	1.09	–	–	–	62.21	26.98	–	–	–	61.79	26.89
Feminism and Psychology Comparisons	–	–	–	3.47	1.01	–	–	–	56.25	28.13	–	–	–	58.82	25.88
Sex Roles Comparisons	–	–	–	4.20	1.06	–	–	–	68.90	25.73	–	–	–	70.28	23.35
Psychology of Women Quarterly Comparisons	–	–	–	3.74	1.02	–	–	–	61.26	27.78	–	–	–	60.31	27.20
Women's evaluations	131.12	<0.001	0.13–0.85	–	–	53.43	<0.001	0.06–0.49	–	–	83.45	<0.001	0.14–0.74	–	–
Women and Therapy Comparisons	–	–	–	4.09	1.17	–	–	–	59.59	31.66	–	–	–	66.12	26.73
Feminism and Psychology Comparisons	–	–	–	3.55	1.20	–	–	–	50.98	31.20	–	–	–	55.02	28.19
Sex Roles Comparisons	–	–	–	4.51	1.06	–	–	–	66.28	30.64	–	–	–	74.21	23.15
Psychology of Women Quarterly Comparisons	–	–	–	3.94	1.17	–	–	–	57.70	31.47	–	–	–	62.32	26.99
Journal × Type	44.60	<0.001	–	–	–	19.07	<0.001	–	–	–	32.32	<0.001	–	–	–
Sex/gender-related	17.37	<0.001	0.05–0.29	–	–	9.25	<0.001	0.03–0.21	–	–	10.39	<0.001	0.04–0.27	–	–
Women and Therapy Comparisons	–	–	–	3.85	1.23	–	–	–	56.79	30.41	–	–	–	59.80	27.57

(Continued)

TABLE 6 | (Continued)

	Favorability (*df*: 3, 411)					Quality (*df*: 3, 406)					Subscription recommendations (*df*: 3, 407)				
	F	***p***	***d***	***M***	***SD***	***F***	***p***	***d***	***M***	***SD***	***F***	***p***	***d***	***M***	***SD***
Feminism and Psychology Comparisons	–	–	–	3.79	1.19	–	–	–	56.02	30.34	–	–	–	60.79	26.92
Sex Roles Comparisons	–	–	–	4.13	1.14	–	–	–	62.22	29.81	–	–	–	66.94	24.42
Psychology of Women Quarterly Comparisons	–	–	–	3.91	1.18	–	–	–	58.66	29.96	–	–	–	61.82	26.39
Matched other-specialty	154.45	0<.001	0.56–1.47	–	–	60.55	<0.001	0.17–0.44	–	–	87.39	<0.001	0.31–1.14	–	–
Women and Therapy Comparisons	–	–	–	4.14	1.06	–	–	–	63.97	29.86	–	–	–	69.82	25.13
Feminism and Psychology Comparisons	–	–	–	3.27	1.03	–	–	–	49.11	30.07	–	–	–	51.54	27.44
Sex Roles Comparisons	–	–	–	4.69	0.90	–	–	–	71.92	27.89	–	–	–	79.10	20.34
Psychology of Women Quarterly Comparisons	–	–	–	3.86	1.08	–	–	–	58.89	30.93	–	–	–	61.60	27.73
Gender × Journal × Type	8.47	<0.001	–	–	–	3.48	<0.001	–	–	–	5.98	<0.001	–	–	–
Men's evaluations	9.42	<0.001	–	–	–	3.39	0.018	–	–	–	6.91	<0.001	–	–	–
Sex/gender-related	12.01	<0.001	0–0.44	–	–	4.87	0.003	0.08–0.31	–	–	5.06	0.002	0.07–0.35	–	–
Women and Therapy Comparisons	–	–	–	3.33	1.07	–	–	–	54.33	27.90	–	–	–	53.48	27.52
Feminism and Psychology Comparisons	–	–	–	3.33	1.07	–	–	–	52.07	28.60	–	–	–	56.11	27.04
Sex Roles Comparisons	–	–	–	3.82	1.15	–	–	–	60.85	28.20	–	–	–	62.79	25.11
Psychology of Women Quarterly Comparisons	–	–	–	3.52	1.12	–	–	–	57.02	28.49	–	–	–	58.12	28.03
Matched other-specialty	45.38	<0.001	0.29–1.12	–	–	16.96	<0.001	0.18–0.69	–	–	19.92	<0.001	0.04–0.75	–	–
Women and Therapy Comparisons	–	–	–	4.23	0.91	–	–	–	70.10	23.63	–	–	–	70.10	23.56
Feminism and Psychology Comparisons	–	–	–	3.60	0.93	–	–	–	60.43	27.12	–	–	–	61.52	24.49
Sex roles comparisons	–	–	–	4.58	0.81	–	–	–	76.95	20.09	–	–	–	77.77	18.75
Psychology of Women Quarterly Comparisons	–	–	–	3.97	0.86	–	–	–	65.51	26.49	–	–	–	62.51	26.27
Women's evaluations	65.44	<0.001	–	–	–	29.06	<0.001	–	–	–	46.80	<0.001	–	–	–
Sex/gender-related	6.86	<0.001	0.008–0.24	–	–	4.79	0.003	0.004–0.17	–	–	6.60	<0.001	0.01–0.24	–	–
Women and Therapy Comparisons	–	–	–	4.08	1.22	–	–	–	57.86	31.42	–	–	–	62.55	27.18
Feminism and Psychology Comparisons	–	–	–	3.99	1.19	–	–	–	57.73	30.95	–	–	–	62.83	26.65
Sex Roles Comparisons	–	–	–	4.27	1.12	–	–	–	62.81	30.51	–	–	–	68.75	23.93

(Continued)

TABLE 6 | (Continued)

	Favorability (*df*: 3, 411)					Quality (*df*: 3, 406)					Subscription recommendations (*df*: 3, 407)				
	F	*p*	*d*	*M*	*SD*	*F*	*p*	*d*	*M*	*SD*	*F*	*p*	*d*	*M*	*SD*
Psychology of Women Quarterly Comparisons	–	–	–	4.07	1.17	–	–	–	59.38	30.60	–	–	–	63.42	25.53
Matched other-specialty	174.09	<0.001	0.25–1.64	–	–	68.31	<0.001	0.17–0.84	–	–	115.02	<0.001	0.31–1.33	–	–
Women and Therapy Comparisons	–	–	–	4.10	1.12	–	–	–	61.33	31.86	–	–	–	69.69	25.83
Feminism and Psychology Comparisons	–	–	–	3.12	1.03	–	–	–	44.23	30.01	–	–	–	47.20	27.55
Sex Roles Comparisons	–	–	–	4.74	0.94	–	–	–	69.74	30.42	–	–	–	79.67	21.00
Psychology of Women Quarterly Comparisons	–	–	–	3.82	1.16	–	–	–	56.03	32.29	–	–	–	61.21	28.38

Note for ***Tables 3–6****. The convention of Cohen's d was used: <0.20 a small effect, 0.20 to 0.80 a moderate effect, >0.80 a large effect. Effect sizes with positive numbers indicate differences favoring other-specialty journals and men.*

versus men-related journals for favorability, no differences between correlations emerged for quality and subscription recommendations (see **Table 8**).

Testing the Subscription Recommendations Explained by Androcentric Evaluative Bias Hypothesis?

Following Judd et al.'s (2001) mediational recommendations for within-participants designs, we examined whether the computed difference between sex/gender-related or men-related versus matched other-specialty psychology journals for subscription recommendations was predicted by the computed difference for favorability/quality ratings. Higher numbers favor the men or other-specialty journals. Participants' decreased favorability/quality beliefs about sex/gender-related and men-related journals versus their matched other-specialty psychology journal(s) were associated with decreased subscription recommendations [Sex/gender-related, Study 1: favorability: $b = 22.57$, $\beta = 0.86$, $t(108) = 17.66$, $p < 0.001$ (95% CI 20.038 – 25.104), quality: $b = 0.91$, $\beta = 0.80$, $t(106) = 13.54$, $p < 0.001$ (95% CI 0.779 – 1.046), Study 2: favorability: $b = 17.97$, $\beta = 0.81$, $t(422) = 27.95$, $p < 0.001$ (95% CI 16.708 – 19.235), quality: $b = 0.79$, $\beta = 0.79$, $t(421) = 26.28$, $p < 0.001$ (95% CI 0.729 – 0.847); Men-related, Study 1: favorability: $b = 25.07$, $\beta = 0.78$, $t(107) = 12.78$, $p < 0.001$ (95% CI 21.177 – 28.954), quality: $b = 0.90$, $\beta = 0.62$, $t(105) = 8.03$, $p < 0.001$ (95% CI 0.676–1.119)].

Gender Effects

We examined whether these patterns emerged for the interactions between journal type and gender (0 = women, 1 = men) for sex/gender-related versus their matched other-specialty journals.[1] Men's decreased favorability/quality beliefs were associated with decreased subscription recommendations for sex/gender-related versus other-specialty psychology journals [Study 1: favorability: $b = 23.67$, $\beta = 0.86$, $t(108) = 17.63$, $p < 0.001$ (95% CI 21.006 – 26.327), quality: $b = 0.99$, $\beta = 0.79$, $t(106) = 13.43$, $p < 0.001$ (95% CI 0.842 – 1.134); Study 2: favorability: $b = 18.50$, $\beta = 0.78$, $t(414) = 25.51$, $p < 0.001$ (95% CI 17.075 – 19.926), quality: $b = 0.83$, $\beta = 0.83$, $t(413) = 30.77$, $p < 0.001$ (95% CI 0.782 – 0.888)].

Feminist Ideology Effects

We also examined whether these patterns emerged for feminist ideology. For people low in feminist ideology, decreased favorability/quality beliefs were associated with decreased subscription recommendations for sex/gender-related and men-related versus their matched other-specialty psychology journal(s) [Sex/gender-related, Study 1: favorability: $b = 19.07$, $\beta = 0.78$, $t(107) = 12.86$, $p < 0.001$ (95% CI 16.134 – 22.014), quality: $b = 0.98$, $\beta = 0.80$, $t(105) = 13.67$, $p < 0.001$ (95% CI 0.835 – 1.112), Study 2: favorability: $b = 17.08$, $\beta = 0.78$, $t(419) = 25.75$, $p < 0.001$ (15.777 – 18.385), quality: $b = 0.80$, $\beta = 0.81$, $t(418) = 27.83$, $p < 0.001$ (95% CI 0.745 – 0.858); Men-related, Study 1: favorability: $b = 23.31$, $\beta = 0.81$, $t(107) = 14.45$, $p < 0.001$ (95% CI 20.11 – 26.51), quality: $b = 0.84$, $\beta = 0.69$, $t(105) = 9.76$, $p < 0.001$ (95% CI 0.671 – 1.013)].

Summary of Findings

Despite a narrow content focus and equal impact ratings, undergraduate students enrolled in psychology classes demonstrated androcentric evaluations of sex/gender-related psychology journals. Partially consistent with the overall *androcentric bias hypothesis*, in Study 2 sex/gender-related psychology journals were judged as less meritorious (as Study 2 was the only sample with sufficient power to detect this effect). Further, the men-related journal was rated as less meritorious than its matched other-specialty journal but was perceived more favorably than the other sex/gender-related

[1]Because no significant Participant Gender × Journal Type interaction emerged for the men-related versus matched other-specialty journal comparisons, we did not test whether gender moderated the mediation for men-related journal comparisons.

TABLE 7 | *Post hoc* power analyses for the main effects and interactions for studies 1 and 2.

	Study 1			Study 2		
	Partial η^2	Repeated measures *rs*	Power	Partial η^2	Repeated measures *rs*	Power
Main effect of Journal						
Sex/gender-related						
Favorability	0.002	0.147–0.294	0.140–0.163	0.046	0.121–0.346	1.00
Quality	0.000	0.567–0.616	0.052–0.052	0.054	0.369–0.369	1.00
Subscription Recommendations	0.003	0.117–0.312	0.171–0.241	0.050	0.149–0.284	1.00
Men-related						
Favorability	0.157	0.263	1.00	–	–	–
Quality	0.228	0.700	1.00	–	–	–
Subscription Recommendations	0.113	0.136	1.00	–	–	–
Journal Type × Participant Gender						
Men						
Sex/gender-related						
Favorability	0.200	0.158–0.439	1.00	0.310	0.003–0.334	1.00
Quality		0.431–0.605	0.96–1.00	0.245	0.266–0.447	1.00
Subscription Recommendations		0.015–0.403	1.00	0.176	0.093–0.248	1.00
Men-related						
Favorability	0.134	0.376	1.00	–	–	–
Quality	0.216	0.654	1.00	–	–	–
Subscription Recommendations	0.082	0.247	1.00	–	–	–
Women						
Sex/gender-related						
Favorability	0.180	0.101–0.487	1.00	0.028	0.222–0.278	1.00
Quality	0.041	0.566–0.714	1.00	0.007	0.440–0.606	0.99–1.00
Subscription Recommendations	0.058	0.191–0.361	1.00	0.000	0.124–0.308	0.08–0.09
Men-related						
Favorability	0.181	0.142	1.00	–	–	–
Quality	0.242	0.731	1.00	–	–	–
Subscription Recommendations	0.149	−0.001	1.00	–	–	–

journals (no differences emerged for quality or subscription recommendations) suggesting a smaller penalty against men-related research outlets (Study 1 had sufficient power to detect effects for the men-related journal).

Most importantly, both samples had sufficient power to test the *gender differences in androcentric bias hypothesis*. Partially consistent with the gender differences in androcentric bias hypothesis, sex/gender-related psychology journals were judged by undergraduate men as less favorable, expressed lower subscription recommendations (Studies 1–2), and of lower quality (Study 2) than other-specialty journals. In Studies 1–2, undergraduate women perceived sex/gender-related journals more favorably than other-specialty journals but equally on quality and subscription recommendations. No gender differences emerged in the evaluation of the men-related psychology journal (in comparison to its other-specialty journal). Gender differences only emerged for favorability when comparing the men-related psychology journal to the sex/gender-related psychology journals with undergraduate men evaluating the sex/gender-related journals less favorably than the men-related psychology journal (no differences emerged for undergraduate women).

Not only were women more likely than men to endorse feminist ideology, but, consistent with the *personal ideology differences in androcentric bias hypothesis,* the other-specialty journals had a weaker correlation with feminist ideology than the sex/gender-related journals (and the men-related journal for favorability only). Thus, individuals who were high in feminist ideology were also more likely to perceive the sex/gender-related journal as more favorable, of higher quality, and were more likely to recommend subscription maintenance.

Importantly, consistent with the *subscription recommendation explained by androcentric evaluative bias hypothesis,* decreased favorability/quality beliefs about sex/gender-related or men-related journals versus their other-specialty journals predicted decreased library subscription recommendations. This pattern was especially pronounced for men (for sex/gender-related journals only) and people low in feminist ideology (Studies 1–2).

Despite critical limitations in Study 1 [e.g., underpowered to detect the main effect of journal for the sex/gender-related journal comparisons, the journals were chosen based on the 1-year impact factor, and the matched journals confounded gender with class (*Military Psychology*) and race (*Journal of Psychology in Africa*)], our results were generally replicated in Study 2. In Study 2, we tripled our participant population, chose journals based on their 5-year impact factor (a less variable measure of journal quality/prestige), and controlled for race and class in our selection of other-specialty journals.

Results suggest the existence of at least some androcentric biases among undergraduate men in psychology. What might people outside the field of psychology perceive? On the one hand, the overall androcentric bias hypothesis would predict the same

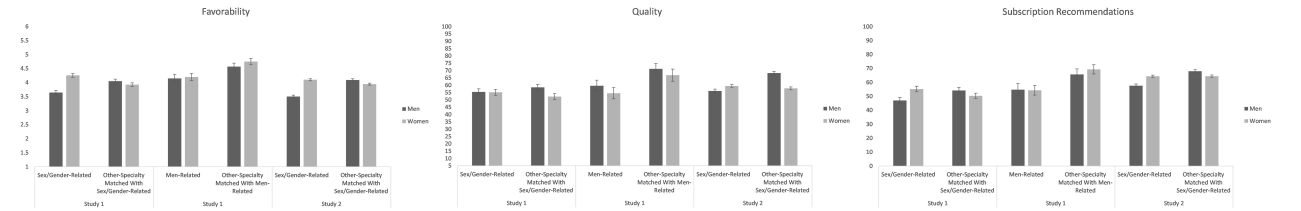

FIGURE 1 | Students reactions toward sex/gender-related versus other-specialty and men-related versus other-specialty psychology publications (Studies 1 and 2). Error bars represent standard errors. Favorability was rated on scales ranging from 1 (*not at all*) to 6 (*very much*); quality was rated on scales ranging from 5th (*lowest*) to 99th (*highest*); subscription maintenance recommendations were made on scales ranging from 0% (*no chance*) to 100% (*definitely*).

TABLE 8 | Examining feminist ideology effects: correlations between feminist ideology and journal type.

	Study 1			Study 2		
	Sex/gender-related Fisher's *z*	**Matched other-specialty Fisher's *z***	***p***	**Sex/gender-related Fisher's *z***	**Matched other-specialty Fisher's *z***	***p***
Sex/gender-related journal comparisons						
Favorability	0.804	0.257	0.001	0.652	0.166	<0.001
Quality	0.349	0.094	0.003	0.430	0.085	<0.001
Subscription Recommendations	0.419	−0.010	<0.001	0.341	0.005	<0.001
Men-related journal comparisons						
Favorability	0.394	0.216	0.049	–	–	–
Quality	0.164	0.053	0.145	–	–	–
Subscription Recommendations	0.170	0.024	0.134	–	–	–

expressions of bias no matter the audience; sex/gender-related journals would be devalued. However, perhaps people outside of psychology, who do not experience the gendered power-difference within psychology, only see a field that is now dominated by women, and therefore do not distinguish the different types of psychology journals from one another but instead assume all psychology-related topics are "feminine." On the other hand, it is also possible that public engagement with sex/gender-related journal articles would be greater than other-specialty journal articles as a form of androcentric interest; anything confirming or challenging androcentrism might be more likely to capture public attention. We examined these hypotheses in Study 3, by analyzing popular press metrics using Altmetrics. Altmetrics is a unique index of research impact (Kwock, 2013) because of the ever-growing role that social media plays in research dissemination (Sugimoto et al., 2017). While research article visibility on social media has a small positive correlation with citation count, visibility and citation count are distinct metrics (Costas et al., 2015). However, the same gender biases that emerge in traditional article metrics (like citation count; Larivière et al., 2013) also emerge for online visibility. For instance, male-identified scientists received more attention than female-identified scientists among the top 25% of online scholars, regardless of the research area and the proportion of female-identified scientists in the research area (Vasarhelyi et al., 2021). Thus, androcentric biases occur overall in the dissemination of online scholarship because people pay more/less attention to research based on the authors' characteristics (gender, race, university affiliation, e.g., Vasarhelyi et al., 2021). But what we do not know is will research within psychology about sex/gender similarly be ignored or, perhaps, receive extra interest because it confirms or challenges the *status quo*. With this ambiguity in mind, Study 3 documented the public reach of articles published in sex/gender-related versus matched other-specialty psychology journals.

STUDY 3

Articles Selected From Journals

The top 50 articles published between the date the journal was created and July 2021 were selected from all of the sex/gender-related psychology journals and the other-specialized journals used in Studies 1–2.

Article Reach

Altmetrics examines the social impact of a journal through mentions of the journal in the popular press at the level of the article (Wee and Chia, 2014) and includes "peer reviews on Faculty of 1000, citations on Wikipedia and in public policy documents, discussions on research blogs, mainstream media coverage, bookmarks on reference managers like Mendeley, and mentions on social networks such as Twitter" (Altmetric, 2018). A higher Altmetrics score (any number between 0 to ∞) suggests an article has more public reach. Altmetrics excludes shares when the original research is not linked or inconsistent hashtags are used (Taylor, 2013). Though particular sources (e.g., tweets, blogs, etc.) can be analyzed separately, the inflation of alpha and the

sheer number of sources, warranted the examination of only the overall Altmetrics score.

RESULTS

First, we analyzed the Altmetrics score of the top 50 articles from the four matched journals grouped by Study 1 and Study 2 by submitting the articles to one-way between-articles ANOVAs. Next, we separately analyzed the top 50 articles from each of the four sex/gender-related journals in comparison with their respective matched journal from Studies 1 and 2 by submitting articles to one-way between-articles ANOVAs contrasting each sex/gender-related journal with each of its two comparable journals (**Table 9**).

Study Level Article Reach Journal Comparisons

Although for the Study 1 comparisons no differences on Altmetrics score emerged between the top 50 articles from sex/gender-related psychology journals and other-specialty psychology journals, $F(1,398) = 1.09$, $p = 0.275$, $d = 0.109$ (95% CI −75.636 – 21.616), for the Study 2 comparisons, the top 50 articles in sex/gender-related journals were more likely to have higher Altmetrics scores than their matched top 50 articles in other-specialty journals, $F(1,398) = 95.59$, $p < 0.001$, $d = -0.978$ (95% CI 92.599 – 139.211).

Comparisons Between the Sex/Gender Journal and Its Matched Journals

Given the inconsistent results when other-specialty journals were collapsed into a single category, we conducted follow-up analyses comparing each sex/gender-related journal to each corresponding other-specialty journal comparison.

Women and Therapy Comparisons

Contrasting the article results from *Women and Therapy* compared with *Journal of Psychology in Africa* (matched 1-year impact factor) and *Psychologia* (matched 5-year impact factors), a main effect emerged for Altmetrics score [$F(2,147) = 12.58$, $p < 0.001$]. Articles in *Women and Therapy* received higher Altmetrics scores than articles in the *Journal of Psychology in Africa* [$p = 0.002$, $d = -0.523$ (95% CI 4.233 – 18.327)] and *Psychologia* [$p < 0.001$, $d = -0.999$ (95% CI 10.613 – 24.707)]. Articles in the *Journal of Psychology in Africa* and *Psychologia* did not differ on Altmetrics score [$p = 0.076$, $d = 0.482$ (95% CI −0.667 – 13.427)].

Feminism and Psychology Comparisons

Contrasting the article results from *Feminism and Psychology* compared with *Military Psychology* (matched 1-year impact factor) and *Journal of Classification* (matched 5-year impact factors), a main effect emerged for Altmetrics score [$F(2,147) = 33.18$, $p < 0.001$]. Articles in *Feminism and Psychology* received higher Altmetrics scores than articles in the *Journal of Classification* [$p < 0.001$, $d = -1.326$ (95% CI −73.825 to −43.535)] and *Military Psychology* [$p < 0.001$, $d = -1.020$ (95% CI 32.655 – 62.945)]. Articles in the *Journal of Classification* and

TABLE 9 | ANOVAs comparing articles published in sex/gender-related versus other matched specialty journals: Study 3.

Overall Comparisons																				
	Journal Comparisons from Study 1 (*df*: 1, 398)					**Journal Comparisons from Study 2 (*df*: 1, 398)**														
	F	***p***	***d***	***M***	***SD***	***F***	***p***	***d***	***M***	***SD***										
Journal type	1.19	0.276	0.109	–	–	95.59	<0.001	−0.978	–	–										
Sex/gender-related	–	–	–	134.67	154.43	–	–	–	134.67_a	154.43										
Other-specialty	–	–	–	161.68	313.86	–	–	–	18.77_b	65.26										
Comparisons by Journal																				
	***Women and Therapy* Comparisons (*df*: 2, 147)**					***Feminism and Psychology* comparisons (*df*: 2, 147)**					***Sex Roles* Comparisons (*df*: 2, 147)**					***Psychology of Women Quarterly* Comparisons (*df*: 2, 147)**				
	F	***p***	***ds***	***M***	***SD***	***F***	***p***	***ds***	***M***	***SD***	***F***	***p***	***ds***	***M***	***SD***	***F***	***p***	***ds***	***M***	***SD***
Journal Type	12.58	<0.001	−0.523 to 0.482	–	–	33.18	<0.001	−1.326 to 0.690	–	–	32.92	<0.001	−1.541 to 0.113	–	–	50.35	<0.001	−2.300 to 1.610	–	–
Sex/gender-related	–	–	–	20.10_a	24.57	–	–	–	63.32_a	62.51	–	–	–	303.28_a	195.34	–	–	–	151.98_a	79.28
Study 1 other-specialty	–	–	–	8.82_b	18.11	–	–	–	15.52_b	22.06	–	–	–	104.50_b	163.81	–	–	–	517.88_b	440.41
Study 2 other-specialty	–	–	–	2.44_b	4.67	–	–	–	4.64_b	3.24	–	–	–	52.44_b	121.92	–	–	–	15.54_c	27.49

Different subscripts within a dependent measure differ from each other, $p < 0.05$. The convention of Cohen's d was used: <0.20 a small effect, 0.20 to 0.80 a moderate effect, >0.80 a large effect. Effect sizes with positive numbers indicate differences favoring other-specialty journals.

Military Psychology did not differ on Altmetrics score [$p = 0.158$, $d = 0.690$ (95% CI –26.025 – 4.265)].

Sex Roles Comparisons

Contrasting the article results from *Sex Roles* compared with *Group Processes and Intergroup Relations* (matched 1-year impact factor) and *Thinking and Reasoning* (matched 5-year impact factors), a main effect emerged for Altmetrics score [$F(2,147) = 32.92$, $p < 0.001$]. Articles in *Sex Roles* received a higher Altmetrics score than articles in *Group Processes and Intergroup Relations* [$p < 0.001$, $d = -1.103$ (95% CI 134.294 – 263.266)] and *Thinking and Reasoning* [$p < 0.001$, $d = -1.541$ (95% CI 186.354 – 315.326)]. *Group Processes and Intergroup Relations* did not differ from *Thinking and Reasoning* on Altmetrics score [$p = 0.113$, $d = 0.361$ (95% CI –12.426 – 116.546)].

Psychology of Women Quarterly Comparisons

Contrasting the article results from *Psychology of Women Quarterly* compared with *Personality and Individual Differences* (matched 1-year impact factor) and *European Journal of Psychological Assessment* (matched 5-year impact factors), a main effect emerged for Altmetrics score [$F(2,147) = 50.35$, $p < 0.001$]. Articles in *Psychology of Women Quarterly* received a higher Altmetrics score than articles in the *European Journal of Psychological Assessment* [$p = 0.009$, $d = -2.300$ (95% CI –238.748 to –34.132)]. Articles in *Personality and Individual Differences* received a higher Altmetrics score than articles in the *European Journal of Psychological Assessment* [$p < 0.001$, $d = 1.610$ (95% CI –604.64 to –400.032)]. Interestingly, *Psychology of Women Quarterly* received a lower Altmetrics score than articles in *Personality and Individual Differences* [$p < 0.001$, $d = 1.156$ (95% CI –468.208 to –263.592)].

Discussion

Findings from Study 3 illustrate that, despite being perceived as lower quality by undergraduate men within psychology (Studies 1–2), articles in sex/gender-related psychology journals have, on average, greater public reach through shares in social media and the popular press. For the most part, articles from sex/gender-related journals were more likely to have higher Altmetrics scores than their matched other-specialty journals with one exception: articles published in *Personality and Individual Differences* did have a higher Altmetrics score when compared with articles published in the *Psychology of Women Quarterly*. These results suggest a possible novel conceptualization of what might be called *androcentric-interest*; greater attention to sources or topics that may confirm or challenge androcentrism. It is difficult to know why an article is shared (or cited for that matter); it could be for example that articles about sex/gender might provoke extra scrutiny because of findings that are challenging the (androcentric) *status quo* and that extra scrutiny takes the shape of public sharing. Or it could be that an article is shared because the findings are exciting or unexpected – even when the finding fails to replicate (O'Grady, 2021). In both cases, an androcentric-interest proclivity could be in play, but for very different reasons. Of course, this is a very preliminary interpretation of the current results and much more future research is needed to flush out this concept.

GENERAL DISCUSSION

Our research advances knowledge about androcentrism (e.g., Bailey et al., 2019) by examining whether androcentric bias emerges in perceptions of research outlets within a field that studies androcentrism. The result is a complicated picture that depends on the audience (if the person is in close contact with the field versus the general public) and the method of evaluation.

The androcentric bias against sex/gender-related psychological research was clearer when evaluators were enrolled in psychology coursework. When examining judgments by undergraduate students, sex/gender-related (and, to some degree, men-related) journals were viewed as less meritorious. This was mostly driven by the biases held by undergraduate men (for sex/gender-related journals) and people low in feminist ideology (Studies 1–2). Undergraduate women and people high in feminist ideology were generally more favorable toward sex/gender-related psychology journals (Studies 1–2). Interestingly, undergraduate students also judged the men-related journal as less meritorious than its matched other-specialty journal but more favorably than the sex/gender-related journals (Study 1). Favorability and quality judgments accounted for the low subscription recommendations for the sex/gender-related journals and the men-related journal, especially among men (for the sex/gender-related journals) and people low in feminist ideology (Studies 1–2). Importantly, androcentric bias emerged regardless of whether participants read the actual or modified descriptions from the journals' websites.

However, when looking at a very different form of engagement with sex/gender journals within psychology, Altmetrics, results showed that the top 50 articles published in sex/gender-related journals received more public attention (sharing, news reports) on average than their matched other-specialty journals (Study 3). Though these data are only descriptive, the results set up a fruitful line of future work to understand why people share certain articles over others. We speculate that perhaps something akin to an androcentric-interest proclivity is operating such that people are especially attuned to research about sex/gender because the results may either support or refute the very nature of androcentric tendencies.

Implications

We know that when a person is in an environment where they are frequently exposed to more men in power, such as academia, androcentric bias is especially likely to emerge (Bailey et al., 2019). Though psychology as a field is more women-dominated over time (National Science Foundation [NSF], 1993, 2015), the levers of men's privilege and power are still evident (Klatzky et al., 2015; Vaid and Geraci, 2016). As a field that studies androcentrism, stereotypes, and prejudice, it is ironic that people learning about psychology would reproduce

the very bias it studies. Though we only studied students engaging in psychology coursework, the implication for the faculty teaching and mentoring those students, working in those universities, and indeed the next generation of scholars is worrisome. For example, likely, these patterns would also emerge in populations with greater academic training in psychology (graduate students, postdoctoral researchers, and junior faculty; Nylenna et al., 1994; Kliewer et al., 2005; Borsuk et al., 2009). The presence of the bias within the very field that studies it, also speaks to the importance of integrating content and training related to diversity, equity, and inclusion (including intersectional feminism) within the curriculum even when that curriculum on the surface should already include such topics. Indeed, previous research demonstrates that exposure to feminism results in increased feminist identification (Henderson-King and Stewart, 1999; Reid and Purcell, 2004). As undergraduate psychology students are the future of psychology, our study provides an initial critical exposure point and identifies another important form of androcentric bias; research outlet favoritism.

We anticipate that androcentric bias against psychology journals specializing in sex/gender research is problematic for students who complete work related to the psychology of women and gender studies. Not only might women and gender studies degrees be perceived as less valuable, an important question for future research, but the relative dismissal or neglect of the psychology of sex/gender research is disconcerting to the extent that such knowledge is informative and useful to advancing discovery, innovation, and creativity in other disciplines. The exclusion of one type of knowledge, especially by those higher in social standing, such as men, feeds into the *status quo* of what "counts" as knowledge (e.g., Harding, 1991).

This androcentric bias might even be problematic at the faculty level. Since hiring and tenure decisions are, in part, based on the (perceived) prestige of a candidate's publications (Steinpreis et al., 1999), our findings potentially paint a troubling picture for social scientists who study sex/gender, who are disproportionately women (American Psychological Association [APA], 2006). Men, albeit undergraduate students in our study, were especially likely to disparage sex/gender-related journals but women more favorably evaluated sex/gender-related journals. Might these preferences cancel out men's disparaging tendencies? The answer is likely no, as men are overrepresented as tenure-track and tenured psychology professors in the United States (Oklahoma State University [OSU], 2011). Some of the undergraduates evaluating these journals will 1 day be in tenure-track and tenured positions. If men reviewing job applications and tenure dossiers are unaware of their androcentric biases, we anticipate they might undervalue research published in sex/gender-related journals. The cumulative negative downstream implications of undervaluing these journals could include employment, graduate school enrollment, retention in faculty positions, promotion, awards, raises, other resources, and accolades for students and psychological scholars of sex and gender.

However, our findings do point to a way to decrease this androcentric bias. By including Altmetrics data (or other data about public reach) within evaluation materials and giving this public reach data equal weight, topics published in sex/gender-related journals will be evaluated as more meritorious since articles published in sex/gender-related journals received on average more public reach than articles published in matched other-specialty journals. Our findings also highlight that androcentric-interest might occur within the general public which points to an avenue of potentially educating and exposing the public to this type of androcentric bias research to help decrease androcentrism more broadly.

Limitations and Future Directions

The current research examined two undergraduate student samples' evaluations of sex/gender-related (and men-related, Study 1) journals and the Altmetrics of articles published in sex/gender-related journals. Although the current studies found that subscription recommendations were accounted for by low favorability and quality perceptions, especially for men (for sex/gender-related journals) and individuals low on feminist ideology, it is unclear what is driving these low favorability and quality ratings. Future research should address whether these decreased favorability and quality perceptions occurred because it is assumed that the researchers are women, the participants are women, or because the findings are assumed to be pro-woman or feminist. If the researchers are assumed to be women they might be subject to stereotypes that researchers are engaging in "me-search" (Rios and Roth, 2020) or that women are scientifically less competent (Moss-Racusin et al., 2012). If participants are assumed to be women or if the findings are assumed to be pro-woman/feminist the findings might be subject to the belief that the results are not broadly generalizable (which would be further evidence of androcentric bias). Only future research will help answer these important questions.

Further, we predict the marginalization of knowledge is especially pronounced when people are within environments where men are overrepresented within positions of power (Bailey et al., 2019) and within personally meaningful situations (Petty and Cacioppo, 1986). Future research could also examine when knowledge related to sex and gender is most likely to be marginalized among people within other domains that are also men-dominated, at different career stages within an academic domain (undergraduate, graduate, postdoctoral, junior faculty, and senior faculty), and at different stages of knowledge about feminism. Does knowledge about the field of study, previous exposure to sex/gender-related journals, as well as education about feminism moderate the effect?

In Studies 1–2 we found that the correlation between the ratings of the other-specialty journals and feminist ideology was weaker than the correlation between the ratings of sex/gender-related journals (and for the men-related journal's favorability ratings) and feminist ideology. However, a critical limitation of this finding was that we also found that women were more likely to endorse feminist ideology than men. Previous research suggests that ideological differences such as egalitarianism (Plant and Devine, 1998; Crandall et al., 2002)

and sexist ideology (i.e., Swim et al., 2004; Sczesny et al., 2015) moderate findings of androcentrism. However, it is unclear from our finding whether men are less favorable toward sex/gender-related journals because they scored lower in feminist ideology. We suspect that this is not the case as past research on androcentrism does not consistently show participant gender effects (Harding, 1991) and in our sample there was only small correlation between gender and feminist ideology [Study 1: $r(109) = -0.22$, $p = 0.020$; Study 2: $r(417) = -0.26$, $p < 0.001$]. Future research would do well to further unpack these findings by examining the relationship between gender, feminist ideology, and androcentric bias.

It is important to point out that while Studies 2 and 3 controlled for race and class within the journal titles, we did not control for nationalism. Studies 1 and 3 included the *Journal of Psychology in Africa* while Studies 2 and 3 included the *European Journal of Psychological Assessment*. The word "Africa" might evoke racial stereotypes and nationalism whereas the word "European" might evoke nationalism. Because most psychological research is done in Western societies (Henrich et al., 2010), perhaps among U.S. participants, journals with the term "European" evoked similar nationalism to journals with no geographical references among our U.S. study samples.

It is also possible that because the undergraduate students in Studies 1 and 2 were not experts in psychology, they perceived the other-specialty journals as being more generalized than the more obviously "specialized" sex/gender-related journals. While we did not ask the undergraduate students about how specialized they perceived the journals to be, differential perceptions of specialization may be part of the marginalization process. Future research could examine under what conditions journals and knowledge related to sex and gender is more likely to be considered equally or more "specialized" than other types of journals and knowledge.

It is true that we only examined responses to and the public reach of sex/gender-related journals in psychology and did not examine whether sex/gender-related articles published in non-gender journals or non-psychology-related journals suffer similar fates. We suspect that they might as when scientists, especially men, read an abstract about gender bias within science, they perceived the research less favorably and of lower quality (Handley et al., 2015). When journals specialize in diversity research and when research on similar topics is published, key findings on social change likely have reduced impact within a field but could have more impact within the public. Future research should examine whether research on gender published in non-gender journals and/or in non-psychology-related journals is perceived as less meritorious in an area of study but as of more interest within the general public.

There are many explanations for why the marginalization of knowledge related to sex and gender exists primarily among undergraduate men and people low in feminist ideology. Future research should uncover whether hindsight bias (Hawkins and Hastie, 1990), lay-theories about feminine fields requiring less innate talent (Leslie et al., 2015), and/or lower quality evaluations of research that does not support scientists' prior beliefs (Koehler, 1993) underlie these processes. Future research should consider ways of making knowledge related to sex and gender more highly respected within psychology by examining the role of introductory psychology curriculum as well as diversity, equity, and inclusion curriculum requirements in this bias and comparing other sex/gender-related publications in other disciplines, such as sociology, history, and political science, with those of psychology.

In Study 1, we found that sex/gender-related journals but also, in some cases, the men-related journal was viewed by undergraduate students as less meritorious than their matched other-specialty journals. These differential journal evaluations were particularly pronounced for people low in feminist ideology, which supports the idea that if a journal focuses on any aspect of sex or gender, it is marginalized to some degree. Consistent with the movement to think about gender issues in a less binary matter (Croft et al., 2015), future research should more robustly examine how men-related journals fare against matched other-specialty journals and other sex/gender-related journals to examine whether these journals are believed to be more, less, or equivalently meritorious in comparison with sex/gender-related journals as well as what topics within sex/gender-related and men-related journals are especially marginalized. Moreover, there is likely compounded bias within sex/gender research scholarship that focuses on intersectionality, where different vectors of power and access are analyzed as a function of the lived experiences of people with multiple identities (e.g., Hill Collins and Bilge, 2020).

CONCLUSION

As psychological scientists, we are experts at studying, teaching, and sometimes translating to the public the complexities of explicit and subtle bias. College men and people low in feminist ideology marginalized these sex/gender-related psychology journals. Yet, the public was also much more interested in sharing research from these very journals. Such findings give name and perspective to a possibly emerging problem that serves as a call to action for publishers, students, faculty, and change agents who we hope will realize this androcentric bias exists and actively work to overcome it, including rethinking citation counts as an index for quality. Does the androcentric bias subside over time? Or does it intensify only for those for whom the topic is most relevant (Handley et al., 2015)? Why does the public have more interest in sharing sex/gender research and yet it is denounced among the people studying within the field itself? The current project lays the groundwork for more research on perceptions of sex/gender-related knowledge production and dissemination that impact the full participation and appreciation of scholars within the social sciences.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Institutional Review Board at Montana State University and the Institutional Review Board at the University of North Florida. The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

EB took the lead on all tasks related to the manuscript. EB and JS were involved with the study design, data collection, data analysis, and drafting of the manuscript. DR was involved in the data collection of the Altmetrics data and editing the document. All the authors contributed to the article and approved the submitted version.

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REFERENCES

Altmetric (2018). *What are Altmetrics?*. London: Altmetric.

American Psychological Association Center for Workforce Studies (2014). How is the gender composition of faculty in graduate psychology departments changing? *News APA's Center Workforce Stud.* 45:11.

American Psychological Association [APA] (2006). *Women in the American Psychological Association:* 2006. Washington, DC: American Psychological Association.

Bailey, A. H., and LaFrance, M. (2016). Who counts as human? Antecedents to androcentric behavior. *Sex Roles* 76, 682–693. doi: 10.1007/s11199-016-0648-4

Bailey, A. H., LaFrance, M., and Dovidio, J. (2019). Is man the measure of all things? A social cognitive account of androcentrism. *Personal. Soc. Psychol. Rev.* 23, 307–331. doi: 10.1177/1088868318782848

Bargad, A., and Hyde, J. S. (1991). Women's studies: a study of feminist identity development in women. *Psychol. Women Quart.* 15, 181–201. doi: 10.1111/j.1471-6402.1991.tb00791.x

Bem, S. L. (1993). *The lenses of gender: Transforming the debate on sexual inequality*. New Haven, CT: Yale University Press.

Bichsel, J., and McChesney, J. (2017). *The gender pay gap and the representation of women in higher education administrative positions: The century so far. A CUPA-HR research Brief*. Knoxville: CUPA-HR.

Bolzendahl, C. I., and Meyers, D. J. (2004). Feminist attitudes and support for gender equality: Opinion change in women and men, 1974-1998. *Soc. Forces* 83, 759–789. doi: 10.1353/sof.2005.0005

Bonazzi, M. (2020). "Protagoras," in *Stanford Encyclopedia of Philosophy*, ed. E. N. Zalta. Stanford, CA: Stanford University.

Borsuk, R. M., Aarssen, L. W., Budden, A. E., Koricheva, J., Leimu, R., Tregenza, T., et al. (2009). To name or not to name: The effect of changing author gender on peer review. *BioScience* 59, 985–989. doi: 10.1525/bio.2009.59.11.10

Brown, A. J., and Goh, J. X. (2016). Some evidence for a gender gap in personality and social psychology. *Soc. Psychol. Personal. Sci.* 7, 437–443. doi: 10.1177/1948550616644297

Bruckmüller, S., Hegarty, P., and Abele, A. E. (2012). Framing gender differences: Linguistic normativity affects perceptions of power and gender stereotypes. *Eur. J. Soc. Psychol.* 42, 210–218. doi: 10.1002/ejsp.858

Ceci, S. J., Ginther, D. K., Kahm, S., and Williams, W. M. (2014). Women in academic science: A changing landscape. *Psychol. Sci. Public Int.* 15, 75–141. doi: 10.1177/1529100614541236

Cislak, A., Formanowicz, M., and Saguy, T. (2018). Bias against research on gender bias. *Scientometrics* 115, 189–200. doi: 10.1007/s11192-018-2667-0

Costas, R., Zahedi, Z., and Wouters, P. (2015). Do "altmetrics" correlate with citations? Extensive comparison of altmetric indicators with citations from a multidisciplinary perspective. *J. Assoc. Inform. Sci. Technol.* 66, 2003–2019. doi: 10.1002/asi.23309

Crandall, C. S., Eshleman, A., and O'Brien, L. (2002). Social norms and the expression and suppression of prejudice: The struggle for internalization. *J. Personal. Soc. Psychol.* 82, 359–378. doi: 10.1037/0022-3514.82.3.359

Croft, A., Schmader, T., and Block, K. (2015). An underexamined inequality: Cultural and psychological barriers to men's engagement with communal roles. *Personal. Soc. Psychol. Rev.* 19, 343–370. doi: 10.1177/1088868314564789

Diener, E., Oishi, S., and Park, J. (2014). An incomplete list of eminent psychologists of the modern era. *Arch. Sci. Psychol.* 2, 20–31. doi: 10.1037/arc0000006

Eagly, A. H., and Miller, D. I. (2016). Scientific eminence: Where are the women? *Persp. Psychol. Sci.* 11, 899–904. doi: 10.1177/1745691616663918

Eagly, A. H., and Riger, S. (2014). Feminism and psychology: Critiques of methods and epistemology. *Am. Psychol.* 69, 685–702. doi: 10.1037/a0037372

Fisher, A. R., Tokar, D. M., Mergl, M. M., Good, G. E., Hill, M. S., and Blum, S. A. (2000). Assessing women's feminist identity development: Studies of convergent, discriminant, and structural validity. *Psychol. Women Quart.* 24, 15–29. doi: 10.1111/j.1471-6402.2000.tb01018.x

Fodor, E., and Balogh, A. (2010). Back to the kitchen? Gender role attitudes in 13 East European countries. *Zeitschrift für Familienforschung* 22, 289–307.

Gaetano, J., van der Zwan, R., Oxner, M., Hayward, W. G., Doring, N., Blair, D., et al. (2016). Converging evidence of ubiquitous male bias in human sex perception. *PLoS One* 2016:148623. doi: 10.1371/journal.pone.0148623

Garfield, E. (2006). The history and meaning of the journal impact factor. *JAMA* 295, 90–93. doi: 10.1001/jama.295.1.90

Greenbaum, H. K., Goodsir, H. L., Smith, M. C., and Robinson, D. H. (2018). Female participation as top-producing authors, editors, and editorial board members in Educational Psychology Journals from 2009 to 2016. *Edu. Psychol. Rev.* 30, 1283–1289. doi: 10.1007/s10648-018-9452-8

Gutièrrez y Muhs, G., Niemann, Y. F., Gonzales, C. G., and Harris, A. P. (2012). *Presumed incompetent: The intersections of race and class for women in academia*. Boulder: University Press of Colorado.

Handley, I. M., Brown, E. R., Moss-Racusin, C. A., and Smith, J. L. (2015). Quality of evidence revealing subtle gender biases in science is in the eye of the beholder. *Proc. Nat. Acad. Sci.* 112, 13201–13206. doi: 10.1073/pnas.1510649112

Harding, S. (1991). *Whose science? Whose knowledge?: Thinking from women's lives*. Ithaca, NY: Cornell University Press.

Hawkins, S. A., and Hastie, R. (1990). Hindsight: Biased judgments of past events after the outcomes are known. *Psychol. Bullet.* 107, 311–327. doi: 10.1037/0033-2909.107.3.311

Hegarty, P., and Buechel, C. (2006). Androcentric reporting of gender differences in APA journals: 1965-2004. *Rev. Gen. Psychol.* 10, 377–389. doi: 10.1037/1089-2680.10.4.377

Henderson-King, D., and Stewart, A. J. (1999). Educational experiences and shifts in group consciousness: Studying women. *Personal. Soc. Psychol. Bullet.* 25, 390–399. doi: 10.1177/0146167299025003010

Henrich, J., Heine, S., and Norsenzayan, A. (2010). Most people are not WEIRD. *Nature* 466:29. doi: 10.1038/466029a

Hill Collins, P., and Bilge, S. (2020). *Intersectionality*. Cambridge: Polity Press.

Hofstra, B., Kulkarni, V. V., Munoz-Najar Galvez, S., He, B., Jurafsky, D., and McFarland, D. A. (2020). The diversity-innovation paradox in science. *Proc. Nat. Acad. Sci.* 117, 9284–9291. doi: 10.1073/pnas.1915378117

Hovarth, L. K., and Sczesny, S. (2016). Reducing women's lack of fit with leadership positions? Effects of the wording of job advertisements. *Eur. J. Work Org. Psychol.* 25, 316–328. doi: 10.1080/1359432X.2015.1067611

Johnson, C. S., Smith, P. K., and Wang, C. (2017). Sage on the stage: Women's representation at an academic conference. *Personal. Soc. Psychol. Bullet.* 43, 493–507. doi: 10.1177/0146167216688213

Judd, C. M., Kenny, D. A., and McClelland, G. H. (2001). Estimating and testing mediation and moderation in within-subject designs. *Psychol. Methods* 6, 115–134. doi: 10.1037/1082-989X.6.2.115

Klatzky, R., Holt, L., and Behrmann, M. (2015). The representation of women in cognition. *Cognition* 141, 170–171. doi: 10.1016/j.cognition.2015.03.010

Kliewer, M. A., Freed, K. S., DeLong, D. M., Pickhardt, P. J., and Provenzale, J. M. (2005). Reviewing the reviewers: Comparison of review quality and reviewer characteristics at the *American Journal of Roentgenology*. *Am. J. Roentgenol.* 184, 1731–1735. doi: 10.2214/ajr.184.6.01841731

Knobloch-Westerwick, S., Glynn, C. J., and Huge, M. (2013). The Matilda effect in science communication: An experiment on gender bias in publication quality perceptions and collaboration interest. *Sci. Commun.* 35, 603–625. doi: 10.1177/1075547012472684

Koehler, J. J. (1993). The influence of prior beliefs on scientific judgments of evidence quality. *Org. Behav. Human Dec. Proc.* 56, 28–55. doi: 10.1006/obhd.1993.1044

Kozlowski, D., Lariviere, V., Sugimoto, C. R., and Monroe-White, T. (2022). Intersectional inequalities in science. *Proc. Nat. Acad. Sci.* 2022:119. doi: 10.1073/pnas.2113067119

Kwock, R. (2013). Research impact: altmetrics make their mark. *Nature* 500, 491–493. doi: 10.1038/nj7463-491a

Larivière, V., Ni, C., Gringas, Y., Cronin, B., and Sugimoto, C. R. (2013). Global gender disparities in science. *Nature* 504, 211–213. doi: 10.1038/504211a

Leslie, S., Cimpian, A., Meyer, M., and Freeland, E. (2015). Expectations of brilliance underlie gender distributions across academic disciplines. *Science* 347, 262–265. doi: 10.1126/science.1261375

Liben, L. S., Bigler, R. S., and Krogh, H. R. (2001). Pink and blue collar jobs: Children's judgments of job status and job aspirations in relation to sex of worker. *J. Exp. Child Psychol.* 79, 346–363. doi: 10.1006/jecp.2000.2611

Lobl, M., Grinnell, M., Higgins, S., Yost, K., Grimes, P., and Wysong, A. (2020). Representation of women as editors in dermatology journals: A comprehensive review. *Int. J. Dermatol.* 6, 20–24. doi: 10.1016/j.ijwd.2019.09.002

Miller, D. I., Nolla, K. M., Eagly, A. H., and Uttal, D. H. (2018). The development of children's gender-science stereotypes: A meta-analysis of 5 decades of U.S. draw-a-scientist studies. *Child Dev.* 89, 1943–1955. doi: 10.1111/cdev.13039

Moghimi, S., Khurshid, K., Jalal, S., Qamar, S. R., Nicolaou, S., Farima, K., et al. (2019). Gender differences in leadership positions among academic nuclear medicine specialists in Canada and the United States. *Health Care Policy Qual.* 212, 146–150. doi: 10.2214/AJR.18.20062

Moss-Racusin, C. A., Dovidio, J. F., Brescoll, V. L., Graham, M. J., and Handelsman, J. (2012). Science faculty's subtle gender biases favor male students. *Proc. Nat. Acad. Sci.* 109, 16474–16479. doi: 10.1073/pnas.1211286109

Moss-Racusin, C. A., Molenda, A. K., and Cramer, C. R. (2015). Can evidence impact attitudes? Public reactions to evidence of gender bias in STEM fields. *Psychol. Women Quart.* 39, 194–209. doi: 10.1177/0361684314565777

National Center for Education Statistics (2020). *Table 315.10. Number of faculty in degree-granting postsecondary institutions, by employment status, sex, control, and level of institution: Select years, fall 1970 through fall 2018*. Washington, DC: National Center for Education Statistics.

National Science Foundation [NSF] (1993). *Science and Engineering Indicators*. Arlington, VA: National Science Foundation.

National Science Foundation [NSF] (2015). *Women, Minorities, and Persons with Disabilities in Science and Engineering*. Arlington, VA: NSF, 15–311. Retrieved from: http://www.nsf.gov/statistics/2015/nsf15311/start.cfm

Nittrouer, C. L., Hebl, M. R., Ashburn-Nardo, L., Trump-Steele, R. C. E., Lane, D., and Valian, V. (2018). Gender disparities in colloquium speakers at top universities. *Proc. Nat. Acad. Sci.* 115, 104–108. doi: 10.1073/pnas.1708414115

Nosek, B. A., Smyth, F. L., Sriram, N., Linder, N. M., Devos, T., Ayala, A., et al. (2009). National differences in gender-science stereotypes predict national sex differences in science and math achievement. *Proc. Nat. Acad. Sci.* 106, 10593–10597. doi: 10.1073/pnas.0809921106

Nylenna, M., Riis, P., and Karlsson, Y. (1994). Multiple blinded reviews of the same two manuscripts. Effects of referee characteristics and publication language. *JAMA* 272, 149–151. doi: 10.1001/jama.1994.03520020075021

O'Grady, C. (2021). Unreliable social science research gets more attention than solid studies: Failed replications rack up more citations than studies that hold up over time. *Science* 2021:5865. doi: 10.1126/science.abj5865

Oklahoma State University [OSU] (2011). *Faculty Distribution Survey of Selected Criteria*. Stillwater, OK: Office of Institutional Research and Information Management.

Petty, R. E., and Cacioppo, J. T. (1986). *The elaboration likelihood model of persuasion. Communication and Persuasion Springer Series in Social Psychology*. New York, NY: Springer, doi: 10.1007/978-1-4612-4964-1_1

Pinho-Gomes, A., Vassallo, A., Thompson, K., Womersley, K., Norton, R., and Woodward, M. (2021). Representation of women among editors in chief of leading medical journals. *JAMA Network Open* 4:26. doi: 10.1001/jamanetworkopen.2021.23026

Plant, A. E., and Devine, P. G. (1998). Internal and external motivation to respond without prejudice. *J. Personal. Soc. Psychol.* 75, 811–832. doi: 10.1037/0022-3514.75.3.811

Reid, A., and Purcell, N. (2004). Pathways to feminist identification. *Sex Roles* 50, 759–769. doi: 10.1023/B:SERS.0000029095.40767.3c

Rios, K., and Roth, Z. C. (2020). Is "me-search" necessarily less rigorous research? Social and personality psychologists' stereotypes of the psychology of religion. *Self Ident.* 19, 825–840. doi: 10.1080/15298868.2019.1690035

Saha, S., Saint, S., and Christakis, D. A. (2003). Impact factor: A valid measure of journal quality? *J. Med. Library Assoc.* 91, 42–46.

Sczesny, S., Moser, F., and Wood, W. (2015). Beyond sexist beliefs: How do people decide to use gender-inclusive language? *Personal. Soc. Psychol. Bullet.* 41, 943–954. doi: 10.1177/0146167215585727

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

Shields, S. (1975). Functionalism, darwinism, and the psychology of women. *Am. Psychol.* 30, 739–754. doi: 10.1037/h0076948

Smith, E. R., and Zarate, M. A. (1992). Exemplar-based model of social judgement. *Psychol. Rev.* 99, 3–21. doi: 10.1037/0033-295X.99.1.3

Steinpreis, R. E., Anders, K. A., and Rizke, D. (1999). The impact of gender on the review of the curricula vitae of job applicants and tenure candidates: A national empirical study. *Sex Roles* 41, 509–528. doi: 10.1023/A:1018839203698

Stout, J. G., and Dasgupta, N. (2011). When *he* doesn't mean *you*: Gender-exclusive language as ostracism. *Personal. Soc. Psychol. Bullet.* 37, 757–769. doi: 10.1177/0146167211406434

Sugimoto, C. R., Ni, C., and Larivière, V. (2015). On the relationship between gender disparities in scholarly communication and country-level development indicators. *Sci. Public Policy* 42, 789–810. doi: 10.1093/scipol/scv007

Sugimoto, C. R., Work, S., Lariviere, V., and Haustein, S. (2017). Scholarly use of social media and Altmetrics: A review of the literature. *J. Assoc. Inform. Sci. Technol.* 68, 2037–2062. doi: 10.1002/asi.23833

Swim, J. K., Mallett, R., and Stangor, C. (2004). Understanding subtle sexism: Detection and use of sexist language. *Sex Roles* 51, 117–128. doi: 10.1023/B:SERS.0000037757.73192.06

Tajfel, H., and Turner, J. (2001). "An integrative theory of intergroup conflict," in *Intergroup relations: Essential readings*, eds M. A. Hogg and D. Abrams (Hove: Psychology Press), 94–109.

Taylor, M. (2013). The challenges of measuring social impact using Altmetrics. *Res. Trends* 33, 11–15.

Thomas, E. L., Dovidio, J. F., and West, T. V. (2014). Lost in the categorical shuffle: Evidence for the social non-prototypicality of black women. *Cult. Divers. Ethnic Minor. Psychol.* 20, 370–376. doi: 10.1037/a0035096

Vaid, J., and Geraci, L. (2016). V. An examination of women's professional visibility in cognitive psychology. *Femin. Psychol.* 26, 292–319. doi: 10.1177/0959353516641139

van Veelan, R., Otten, S., Cadinu, M., and Hansen, N. (2015). An integrative model of social identification: Self-stereotyping and self-anchoring as two cognitive pathways. *Personal. Soc. Psychol. Rev.* 20, 3–26. doi: 10.1177/1088868315576642

Vasarhelyi, O., Zakhlebin, I., Milojevic, S., and Horvat, E. (2021). Gender inequities in the online dissemination of scholars' work. *Proc. Nat. Acad. Sci.* 2021:118. doi: 10.1073/pnas.2102945118

Watt, H. M. G., Shapka, J. D., Morris, Z. A., Durik, A. M., Keating, D. P., and Eccles, J. S. (2012). Gendered motivational processes affect high school mathematics participation, educational aspirations, and career plans: A comparison of Samples from Australia, Canada, and the United States. *Dev. Psychol.* 48, 1594–1611. doi: 10.1037/a0027838

Wee, J. J. F., and Chia, Y. B. (2014). "Altmetrics is an indication of quality research or just HOT topic. Paper presented," in *Proceedings of the International Association of Scientific and Technological University Libraries Annual Conference*. West Lafayette, IN: Purdue University.

Witteman, H. O., Hendricks, M., Straus, S., and Tannenbaum, C. (2019). Are gender gaps due to evaluations of applicants or the science? A natural experiment at a national funding agency. *Lancet* 393, 531–540. doi: 10.1016/S0140-6736(18)32611-4

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Equal Representation Does Not Mean Equal Opportunity: Women Academics Perceive a Thicker Glass Ceiling in Social and Behavioral Fields Than in the Natural Sciences and Economics

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In the study of women in academia, the focus is often particularly on women's stark underrepresentation in the math-intensive fields of natural sciences, technology, and economics (NTE). In the non-math-intensive of fields life, social and behavioral (LSB) sciences, gender issues are seemingly less at stake because, on average, women are well-represented. However, in the current study, we demonstrate that equal gender representation in LSB disciplines does not guarantee women's equal opportunity to advance to full professorship—to the contrary. With a cross-sectional survey among $N = 2{,}109$ academics at mid-level careers (i.e., assistant and associate professors) in the Netherlands, we test the hypothesis that in LSB (more than NTE), female academics perceive to hit a "thicker" glass ceiling—that is, they see a sharper contrast between the high representation of women at the lower compared to the top levels. We test whether this predicts female academics' lower estimated chances to reach full professorship relative to men in LSB (but not NTE). We introduce a novel perceived glass ceiling index (GCI), calculated based on academics' perceptions of the share of women and men in their direct work environment minus their perceptions of gender ratio among full professors in their field. Results confirm that the perceived glass ceiling is thicker in the non-math-intensive LSB compared to math-intensive NTE fields. Furthermore, only in LSB (but not NTE), women perceived a thicker glass ceiling than men. Moreover, only among female academics, the thicker the perceived glass ceiling, the lower their estimated chances to become full professor 1 day. Combined, a moderated mediation showed that for women only, a thicker perceived glass ceiling in LSB compared to NTE disciplines predicted their lower estimated chances to advance to full professor level. No such mediation occurred for men. We conclude that women's higher numerical representation in LSB disciplines does not negate a male-dominant normative standard about academic leadership and success. Paradoxically, the perceived odds for female academics to reach the top

of their field are lower in fields where they are relatively highly represented, and this may pose unique barriers to women's perceived opportunities for career success.

Keywords: women in academia, perceived glass ceiling, gender inequality, social identity, career advancement

INTRODUCTION

Problem Definition

While women are obtaining academic degrees at greater proportions than ever before (54% of BSc/MSc students and 48% of PhD's in the EU are women), they remain vastly underrepresented in math-intensive fields of Natural Science, Technology[1] and Economics (NTE; European Commission, 2019; Catalyst, 2020). Without question, this is problematic for gender parity and diversity in these fields. A large body of work has thus already examined the causes and consequences of women's minority position in NTE fields, such as economics, engineering, and computer science (e.g., Cheryan et al., 2009; Cech, 2015; Hall et al., 2015; Fouad et al., 2016). By contrast, women make up a large and growing proportion of the non-math-intensive fields of Life, Social and Behavioral sciences (LSB). As such, gender issues are seemingly less at stake—and therefore less studied—in LSB disciplines because *on average* gender parity is achieved. Importantly however, following Ceci et al.'s (2014) seminal article on women's representation across the academic sciences, a complex picture emerges when breaking down the representation of women in math-intensive NTE versus non-math-intensive LSB fields at different career stages. In math-intensive NTE fields, we see a vast underrepresentation of women already at the undergraduate level (≈30% bachelor level) which remains relatively constant further up the ranks in the academic hierarchy (≈25% assistant professors). Yet we see quite a different picture for the LSB fields, such as psychology, where women are heavily overrepresented at an undergraduate level (>70%) and then are less well-represented with every step up in academic rank (≈50% assistant professor level), ultimately ending up a minority at the leadership level (<30% full professor level; Ceci et al., 2014).

The phenomenon whereby women's odds to advance to higher positions in the organizational hierarchy are lower than men's is called the *glass ceiling effect* (e.g., Cotter et al., 2001; Elacqua et al., 2009; Kulik and Rae, 2019). The metaphor of a glass ceiling stands for a barrier that is difficult to detect but that nevertheless limits opportunities to climb the organizational ladder. In the current research, we investigate academics' *perceptions* of a glass ceiling in NTE versus LSB disciplines with the aim to deepen our understanding of how women (compared to men) academics at mid-level careers perceive the social hierarchy in LSB (compared to NTE) fields. We expect women in LSB fields to see a starker contrast in women's overrepresentation at the lower, yet underrepresentation at the top levels in the hierarchy compared to in NTE fields. We expect the perception of a "thicker" glass ceiling in LSB to lower women's (but not men's) perceived opportunities to attain leadership themselves some day. That is, we test the premise that in LSB fields where—on average—gender parity is achieved, a thicker perceived glass ceiling poses a unique barrier for women's upward career mobility toward academic leadership that, paradoxically, we may not observe in the male-dominated NTE fields.

Research Goals

Prior US studies show that while only few women opt for a math-intensive NTE education, once they are "in" the glass ceiling they face in advancing their academic careers is relatively thin, at least until the assistant professor level (Ceci et al., 2014; Miller and Wai, 2015). Since the 1990s the odds for women in the US in math-intensive studies to advance from bachelor to PhD level are similar to men's (Miller and Wai, 2015). Since 2007, the odds for women in math-intensive NTE fields to advance from PhD to assistant professor level are also similar to men's (Ceci et al., 2014). Yet to the contrary, in non-math-intensive LSB fields the odds for women to proceed from PhD to assistant professorship are significantly lower (22 percent points) compared to men's (Ceci et al., 2014). This supports the idea that while well-represented at the undergraduate and early career level, women in LSB fields are likely to face a thick glass ceiling in advancing their academic careers toward leadership.

Expanding from the US studies described above, the current study focuses on glass ceiling effects in academia in the Netherlands. Our target population is further up the career ladder, namely, mid-level career academics (i.e., assistant and associate professors) and their perceptions about career advancement to leadership (i.e., full professorship). Following Ceci et al. (2014), we focus on three academic fields that can be categorized as math-intensive (Natural Sciences, Technology and Economics; NTE) and three fields that can be characterized as less math-intensive (Life, Social and Behavioral Sciences; LSB). Mid-level career academics are sampled from all 14 universities in the Netherlands (N ≈ 2000). The Netherlands ranks relatively low on the representation of women in academic leadership compared to other European countries (European Commission, 2019). In 2017 (the year of data collection in this study) a mere 21% of full professors in the Netherlands were women (LNVH, 2018). Moreover, investigations from over 10 years ago show that, on average, women in Dutch academia had lower promotion probabilities than men, particularly at the highest academic ranks (e.g., Groeneveld et al., 2012). Yet in the Dutch context, research offering a disaggregated view on gender differences in promotion probabilities across academic fields is, to our knowledge, largely absent.

In **Figure 1**, a graph is displayed with the representation of women (in %) per NTE and LSB field and per academic rank in the Netherlands in 2017. With each step higher in

[1]Natural Sciences and Technology are also often abbreviated with the term STEM (Science, Technology, Engineering and Math; see also Ceci et al., 2014).

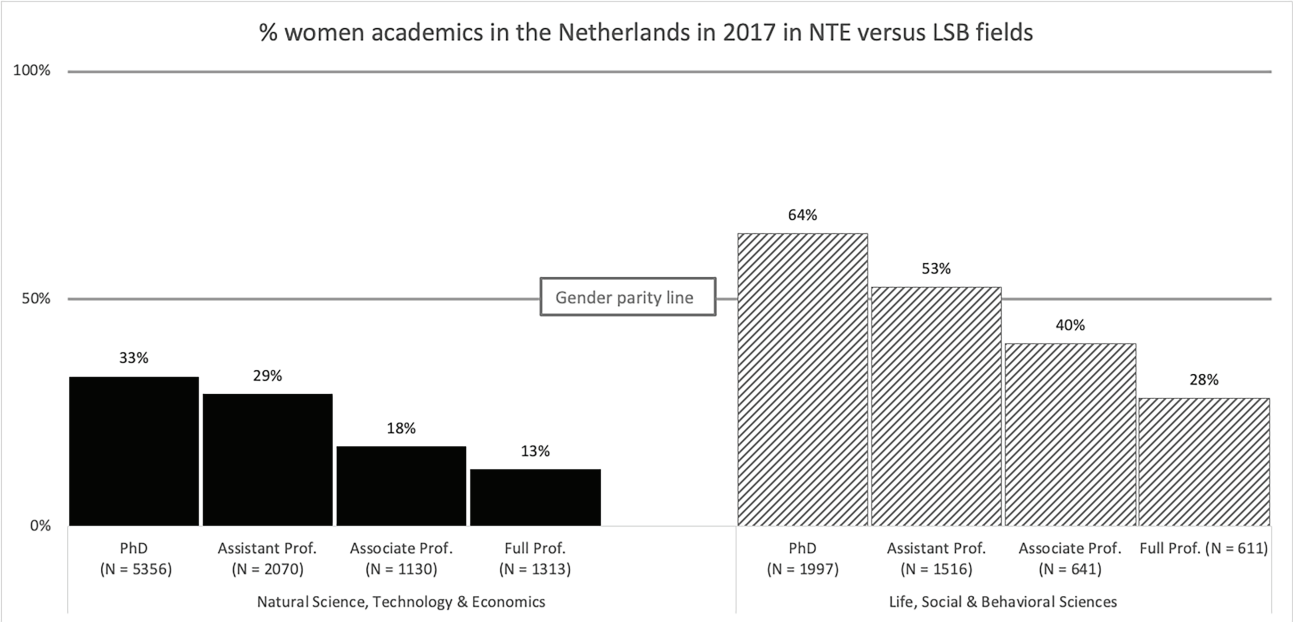

FIGURE 1 | Percentage (%) women academics in the Netherlands in 2017, per scientific discipline [total numbers per Rank × Field displayed below the bars (*N*)]. Note: Based on VSNU/WOPI data 2017.

academic rank, the representation of female academics is lower, with female full professors ultimately being a minority in all fields. Although the percentage of female full professors is higher in the LSB compared to the NTE fields, and relatively, women's drop in representation with every step up in rank is comparable, the psychological meaning of this drop may be different in the LSB compared to the NTE disciplines. To illustrate, in NTE fields women are underrepresented at all levels, making up about 1/3rd of academics at PhD (33%) and assistant professor (29%) level and 18% (associate professor) and 13% (full professor) further up the career ladder. By contrast, women in LSB disciplines are still (slightly) overrepresented at PhD (64%) and assistant professor level (53%) yet drop vastly under the gender parity line at associate (40%) and full professor (28% level).

Moving beyond attempts to locate or identify an "actual" glass ceiling (Cotter et al., 2001), this research examines the glass ceiling as a social construct, described by the term *perceived glass ceiling* (e.g., Foley et al., 2002). Female academics in NTE fields are likely to perceive women to be a minority overall, irrespective of their status position in the academic hierarchy. Female academics in LSB fields, however, are likely to see that women are overall well-represented, yet *not* in leadership positions, thus seeing a gender inequality in positions of high status. We take a socio-psychological approach and rely on social role and social identity theory (Tajfel and Turner, 1979; Eagly, 1987) as a novel theoretical approach to understand these glass ceiling perceptions. Specifically, we argue that when women see that their very group membership as a woman puts them at risk for facing barriers in upward mobility, this has negative consequences for their perceived future career prospects. To this end, investigating *perceptions* of a glass ceiling is important because when women perceive that a glass ceiling exists (i.e., perceive that men have more access to higher status positions than women) they may also be less likely to pursue career promotions (Powell and Butterfield, 1994). A perceived glass ceiling may thus create a confirmatory behavioral pattern that perpetuates gender inequality at the highest levels of power and decision-making.

Thus far, most research on the perceived glass ceiling was conducted in male-dominated organizations (e.g., finance, business management, law firms, science, and technology) and with a sole focus on women (e.g., Cech and Blair-Loy, 2010; Downes et al., 2014; Cohen et al., 2020; Babic and Hansez, 2021; but see Foley et al., 2002 for exception). These studies typically identify cultural (e.g., masculine work climate) and structural (e.g., family unfriendly policies) factors in male-dominated organizations as important antecedents of women's glass ceiling perceptions. The current study adds to this knowledge base in several ways. First, we focus on work contexts where—on average—gender parity is achieved (i.e., in LSB fields), test whether women are perceptive of gender inequality in upward mobility in these fields, and whether sharp contrasts in gender representation at the top versus at lower ranks may, paradoxically, be even more pronounced in feminized LSB fields, relative to male-dominated NTE fields. Second, different from most other studies, we directly compare women academics to their male peers, to show how perceptions about the gender hierarchy in academia may differ depending on one's gender identity, and to show how seeing a "thick" glass ceiling may have more

detrimental consequences for women's perceived career prospects toward leadership compared to men's. Finally, in academia, there is a strong belief that career promotion and success hinges on meritocratic principles (i.e., individual ability; Cech and Blair-Loy, 2010), rather than contextual factors. As such, women in academia are often held individually accountable for their lower career success (e.g., women choose to "opt out" of ambitious careers themselves; Belkin, 2003). Our last goal is to refute this "choice rhetoric" (Vinkenburg et al., 2015), by testing the alternative hypothesis that women's lower perceived career prospects toward leadership could also be explained by lower levels of career commitment among women compared to men.

Theorizing and Hypotheses Formation

The glass ceiling can be defined as a structural, discriminatory barrier that women (but not men) face when advancing to the highest ranks in an organizational hierarchy. Compared to other forms of gender discrimination, the glass ceiling is a particular form of inequality following a specific set of criteria (see also Babic and Hansez, 2021). First, the glass ceiling refers specifically to *discrimination against women for leadership* positions and therefore exists beyond potential other gender differences in for example the level of education, tenure, experience, or skill (Cotter et al., 2001; Kulik and Rae, 2019). Second, the glass ceiling also refers to an *accelerating inequality*, meaning that the gender gap in men's overrepresentation relative to women increases when moving further up to the higher echelons of management in an organization (Cotter et al., 2001). We see this in Dutch academia too such that relative to career progression at lower ranks (e.g., from PhD to assistant professor) women face the largest barriers when progressing from associate to full professor (i.e., the highest level; **Figure 1**; LNVH, 2018). Third, scholars agree that a glass ceiling is *difficult to establish objectively* or in absolute terms because the barriers that individual women face when trying to reach the highest levels of leadership are often intangible and difficult to attribute to gender discriminatory processes (Elliott and Smith, 2004; Babic and Hansez, 2021).

A large body of research has identified key antecedents of the glass ceiling in organizations for example, inadequate mentoring and network opportunities (Elacqua et al., 2009), a lack of transparency and fairness in performance criteria and promotion procedures (Lyness and Heilman, 2006) and differential treatment of women compared to men by upper management (Blau and Kahn, 2007; Kiaye and Singh, 2013). Moreover, academic cultures with a highly masculine vision of what successful leadership means (e.g., authoritarian, competitive, assertive, and individualistic; Van Vianen and Fischer, 2002; Babic and Hansez, 2021; Van Veelen and Derks, 2021) and with an ideal worker norm that is presumed incompatible with women's work–life balance and care responsibilities (Morgenroth et al., 2021) contributes to women's career stagnation and exit from academia. At the heart of these antecedents are biased-centered theories that argue that a glass ceiling exists because of (often unconscious) gender bias against promoting women for leadership positions.

Following social role theory, people hold gendered expectations about the roles men and women should fulfill in society (Eagly, 1987). Men are expected to be agentic "breadwinners" (e.g., assertive, ambitious, and competitive) and women are expected to be communal "homemakers" (e.g., modest, nurturing, and cooperative). We tend to associate leadership roles with the agentic characteristics we attribute more to men (Eagly and Karau, 2002; i.e., think manager and think male), while the communal characteristics we attribute more to women are seen as better suited for domestic roles (e.g., caregiver), and less fitting to ambitious leadership roles (Heilman and Parks-Stamm, 2007; Koenig et al., 2011). In the context of academia too, academics hold a highly agentic notion of the successful academic. Another project based on the same dataset ($N \approx 4{,}000$ academics in the Netherlands) showed that irrespective of field or rank (i.e., assistant/associate/full professor), academics perceived the occupational stereotype of the successful academic as highly agentic (e.g., competitive, self-focused, and performance-oriented) while communal traits (e.g., collaborative, devoted teacher, and team player) were considered less important for academic success (Van Veelen and Derks, 2021). These findings point to the incompatibility between the agentic qualities deemed important for academic leadership on the one hand, and women's gender identity being stereotyped as communal on the other. The incompatibly between gender and work roles likely contributes to women's lower promotion probabilities in Dutch academia (van den Brink et al., 2010; Groeneveld et al., 2012) and suggests that academics are likely to see a glass ceiling, in the sense that in general, they see a contrast in women's lower representation at the leadership level relative to the ranks below.

A key question is whether academics are still perceptive of the pervasive barriers that women face in advancing to leadership, when—on average—women have become well-represented in an academic field. One could argue that since women have become well-represented in LSB over the past decades, people have started to believe that gender bias in leadership is now becoming a thing of the past. In line with this idea, Kanter's (1977) theory on tokenism would posit that as women become better represented in an organization, gender differences become less pronounced, gender stereotypes become less salient, and thus women's promotion probabilities may increase. Recent empirical work also shows that in work contexts where the proportion of women is higher, women report to feel less stigmatized or discriminated against on the basis of their gender (Alt et al., 2019; Van Veelen et al., 2019). This could suggest that in the LSB fields, where women are well-represented overall, people might be less perceptive of the gendered status inequality that still exists in women's representation in the academic hierarchy. By contrast, in the NTE fields, where gender ratios are highly skewed in favor of men, people may expect women to face more difficulty overall, and thus also in their upward career mobility. Indeed, arguments for a "thicker" perceived glass ceiling in male-dominated academic fields have been put forward in past research (Sanders et al., 2009; Groeneveld et al., 2012). However, their empirical evidence did not corroborate this idea, showing no effects of gender ratio in

the field on female professors' reported ease with which they obtained leadership themselves (Sanders et al., 2009), nor evidence for gender differences in female and male academics' promotion probabilities depending on gender ratio of the field (Groeneveld et al., 2012).

In fact, we would argue that mere "strength in numbers" is likely not enough for gender bias in leadership to disappear in LSB fields—to the contrary. Empirical evidence on implicit associations shows that in sciences where the proportion of women has increased, the unconscious gender–science stereotype that favors men over women as being more fitting to a scientific career still prevails (Smyth and Nosek, 2015). Furthermore, in biological (i.e., life) sciences, where women are now a majority at undergraduate level, social network analysis provides evidence for gender bias in male undergraduates' peer evaluations, with lower competence ratings attributed to female (versus male) students (Grunspan et al., 2016). In veterinary medicine, where women are now well-represented, experimental field research shows compelling evidence for gender bias, such that evaluators rated a male employee as more competent and more deserving of an—on average—8% higher salary than a female employee (Begeny et al., 2020). In psychological sciences too, while women are attracted in record numbers, gender gaps in pay, promotion, funding allocation, and eminence prevail (see Gruber et al., 2021 for an overview). In fact, with respect to NTE fields there is even evidence to suggest a *hiring advantage for women* over men (Ceci and Williams, 2015). Specifically, this experimental research showed a 2:1 preference for female compared to (equally qualified) male candidates for an assistant professor position. Furthermore, field research on the gender pay gap in Dutch academia suggests a higher gender pay gap in those fields where women are relatively well-represented (that is, lowest pay gaps were found in natural sciences and technology; De Goede et al., 2016). The latter findings are further substantiated by sociological research on labor market segregation in Europe showing that women are more likely to enter a leadership position in male-dominated compared to female-dominated occupations (Dämmrich and Blossfeld, 2017; Malin and Wise, 2018). Based on this evidence, we expect that despite being well-represented on average, academics will perceive the glass ceiling to be "thicker" in LSB compared to NTE sciences.

Furthermore, building from a social identity framework (Tajfel and Turner, 1979) we argue that female academics will be more perceptive of the thick glass ceiling in LSB sciences compared to their male peers. Social identities are those aspects of the self-concept that we derive from the groups we belong to, and that provide us with a sense of meaning and self-esteem (Abrams and Hogg, 1990; Brewer, 1991). Social identities acquire significance *via* the comparison of the ingroup with relevant outgroups (Turner et al., 1987), *via* internalization of ingroup norms and stereotypes (self-stereotyping; Spears et al., 1997; Van Veelen et al., 2016) and when in contexts where an ingroup's status position is relatively low (Ely, 1995; Spears et al., 1997; Cadinu et al., 2013). Social identities drive our cognitions, emotions, and behaviors to the extent that these factors are salient in a given context (Hogg and Turner, 1987; Onorato and Turner, 2004). Women's gender identity is generally one of the most chronically salient social identities in many contexts (Deaux et al., 1987). Specific to the academic context, the masculine culture (e.g., Bleijenbergh et al., 2013), the agentic stereotype of success (Van Veelen and Derks, 2021), and—particularly in LSB fields—the skewed representation of gender groups across academic ranks (Ceci et al., 2014; **Figure 1**), all make women's gender identity highly salient and emphasize their low status position in academia. As such, for female (more than for male) academics their gender identity likely serves as a lens through which the social hierarchy in academia is perceived and understood (see Kteily and Richeson, 2016; Xiao et al., 2016 for a more in-depth discussion on how social identity shapes perception). Therefore, we expect female academics to be more perceptive of a glass ceiling such that, particularly in LSB sciences female academics are likely to see a sharper contrast in women being well-represented at the lower ranks yet underrepresented at the top, relative to their male peers.

Different from previous research, rather than operationalizing the perceived glass ceiling by directly asking people's subjective opinions about whether they believe that in their organization women are disadvantaged in promotion for leadership relative to men (e.g., Foley et al., 2002; Elacqua et al., 2009; Downes et al., 2014; Cohen et al., 2020; Babic and Hansez, 2021), we introduce a novel, more indirect operationalization, namely, a perceived Glass Ceiling Index (GCI). We asked two separate questions: First academics were asked to think about the people in their direct working environment, and to estimate the ratio of women to men among their direct colleagues. Subsequently, academics were asked to estimate the gender ratio for at the full professor level in their department. We subtracted the perceived gender ratio at the colleague level from the perceived gender ratio at the top level (i.e., full professor level). This creates a GCI index where a score of 0 indicates similar gender representation at both levels, and a score GCI > 0 indicates a perceived glass ceiling (i.e., the proportion of women is lower in academic leadership relative to ranks below). The GCI is more indirect than other self-report measures in the sense that we did not directly ask participants to report on the difference in female representation at the leadership level versus at levels below themselves, but distilled this measure more indirectly. This indirect measure captures the perceived glass ceiling as a cognitive perceptual process rather than tapping into people's, motivated belief systems.

There are several advantages to this GPI index relative to self-report glass ceiling scales used in prior research. First, items in perceived glass ceiling scales often conceptually conflate the extent to which people *perceive* a glass ceiling to exist, with their *beliefs* as to why it exists (Foley et al., 2002; Elacqua et al., 2009; Cohen et al., 2020; Babic and Hansez, 2021). Items in glass ceiling scales are for example "Do you believe that the glass ceiling exists in your company?"; "In my company, with equal experience and expertise, men have access to higher positions in the hierarchy than women"; "I believe our company is serious about eliminating barriers that prevent women from reaching their potential" (reverse-scored). This is problematic with regards to common method bias in cross-sectional research, because glass ceiling perceptions are often investigated in relation to self-reported differential treatment, gender discrimination and

distributive justice measures (e.g., "promotion decisions [ ] in this organization are fair"; Foley et al., 2002; Babic and Hansez, 2021). The intercorrelations between these concepts are indeed very high in these studies (>0.80). Our GPI index focusses merely on the perceived size of the glass ceiling (i.e., how sharp is the contrast in gender representation at the top and below?), which ensures discriminant validity between glass ceiling perceptions and subsequent self-report measures about work and career-related variables. Second, since the GPI index does not directly refer to gender discriminatory practices, it circumvents socially desirable or biased answer tendencies, particularly observed among high-status groups (i.e., men), due to self-representational concerns or as a way of coping with negative topics, such as gender inequality by downplaying or denying its impact (Becker and Barreto, 2014; Scheepers and Ellemers, 2019). As such, the GCI index allows us to reliably interpret potential gender differences in glass ceiling perceptions as men and women observing a different *social reality* in the gender hierarchy in academia (rather than a different motivated response to interpret that reality). Taken together, we hypothesize that:

> *H1:* Female academics in Life, Social and Behavioral fields (LSB) perceive a "thicker" glass ceiling toward leadership relative to their male peers and relative to academics in Natural Sciences, Technology and Economics (NTE).

Consequences of Seeing a Thick Glass Ceiling for Perceived Odds to Break Through It

While there are many studies on antecedents of the glass ceiling, relatively few investigate the relation between glass ceiling perceptions and how women and men perceive their own future career prospects (see Babic and Hansez, 2021). When female academics see a "thick" glass ceiling ahead of them, this likely goes hand in hand with lower estimated chances to break through the glass ceiling, and become a full professor themselves some day. Prior research on identity fit already shows that the more women in their early careers report lack of fit with a masculine occupational stereotype of success, the stronger their disengagement and turnover intentions from the field, for example in the royal navy (Peters et al., 2015) at the academy of royal surgeons (Peters et al., 2012); and among assistant professors in Dutch academia (Van Veelen and Derks, 2021). With respect to the perceived glass ceiling, what women in LSB fields see is that those who embody success are mostly male, while those who represent the rest of the field are mostly female. The observation that women are now becoming a numerical majority in LSB fields, yet men still predominantly hold positions of power and decision-making, sets a normative standard on who is to lead (men) and who is to follow (women; Braun et al., 2017). Particularly in academia's *up-or-out* system where promotion practices are highly salient (Malos and Campion, 1995), this standard is likely discouraging for female academics' perceived career prospects. Foley et al. (2002) showed in their study among ethnic minorities in law firms (also an up-or-out system) that self-reported glass ceiling perceptions were negatively related to perceived fairness of promotion decision outcomes in the firm. Building from this work we expect that for female academics in LSB fields, a higher glass ceiling index coincides with lower perceived career prospects to attain full professorship.

For male academics, glass ceiling perceptions are likely less impactful for their career prospects. Typically, high-status group members (i.e., men in academia) attribute less importance to their group identity and consider it less self-defining compared to low status group members (e.g., Spears et al., 1997; Cadinu et al., 2013). This would imply that in general, for male academics the gender ratio in their field, or variations therein across academic ranks, may have less implications for their own perceived career prospects. In addition, there is research to suggest that in feminized fields there is a male advantage in promotion for leadership, coined by the term the *glass escalator effect* (Williams, 1992). For example, men in female-dominated occupations (e.g., nursing) have been shown to report good relations with their—often male—supervisors (Williams, 1992; Allan, 1993), and to perceive their "male token status" as an advantage to hiring and promotion procedures (Evans, 1997; Kleinman, 2004; Torre, 2018). Men in feminized professions are also more often recruited for higher paying and higher status positions, even without actively searching for them (Kmec et al., 2010). Nevertheless, the empirical evidence for the glass escalator is not irrefutable, and contingent upon labor market changes (Price-Glynn and Rakovski, 2012; Williams, 2013). To this end, we arrive at the following hypotheses about gender differences in the consequences of seeing a thicker glass ceiling in LSB versus NTE fields:

> *H2:* The thicker female academics perceive the glass ceiling to be in their field, the lower their estimated chances to become full professor themselves (while no effect or the reverse may be true for male academics).

Combining Hypothesis 1 and 2, we arrive at the following moderated mediation hypothesis, where we test the relationship between seeing a thicker glass ceiling in LSB compared to NTE sciences and women's future career prospects in academia:

> *H3:* Female (but not male) academics' perception of a thicker glass ceiling in LSB compared to NTE fields explains their lower perceived chances to advance to academic leadership in LSB compared to NTE fields.

Alternative Explanations: Are Women in LSB Sciences Less Career-Committed?

The perceived glass ceiling effect offers a contextual explanation for women's lower perceived promotion probabilities toward academic leadership, such that sharp perceived contrasts in women's underrepresentation at the top versus overrepresentation at lower levels in LSB fields dampens women's own leadership prospects at university. Oftentimes however, women are held individually accountable for their underrepresentation in leadership on the basis of their own (lack of) merit and career aptitude. Indeed, a common belief in academia (held by both men and women) is that academia is a meritocratic system

and women just do not have the aptitude, motivation, or commitment required to attain full professorship as much as men do (Cech and Blair-Loy, 2010). Such rhetoric puts the onus on women for resolving gender gaps in pay and promotion in professional settings (Morgenroth and Heilman, 2017; Meeussen et al., 2021). We would contend that contextual barriers, rather than person-based career motivations, explain female academics' lower perceived prospects to attain academic leadership (see also Cotter et al., 2001). Yet following research on career theory (Lent et al., 1999) it could well be true that aside from contextual conditions that support or hinder one's career goals, personal factors such as a lack of career commitment account for women's lower perceived odds to attain academic leadership relative to men's. Career commitment refers to people's "individual goal of advancing in their personal careers" (Ellemers et al., 1998, p. 718). Thus, apart from testing the effect of a perceived glass ceiling in LSB compared to NTE fields on male and female academics' estimated odds to attain full professorship (Hypothesis 1–3), we also test the following alternative hypothesis:

> *H_ALT*: Women's individual levels of career commitment are lower than men's, explaining their lower estimated chances to become full professor.

TABLE 1 | Sample Characteristics.

	Men	Women	Total
Age[a] (chronological); *M (SD)*	45.37 (9.47)	41.92 (8.09)	43.87 (9.06)
Academic age[b] (years since PhD); *M (SD)*	13.71 (8.31)	10.44 (6.65)	12.28 (7.79)
Rank *N (%)*			
Assistant Prof.	739 (61.9%)	686 (74.9%)	1,425 (67.6%)
Associate Prof.	454 (38.1%)	230 (25.1%)	684 (32.4%)
Contract size[c]; *M (SD)*	38.34 (5.26)	37.06 (5.15)	37.70 (5.24)
Contract type[d] *N (%)*			
Permanent	917 (77.6%)	645 (71.5%)	1,562 (75.0%)
Fixed	265 (22.4%)	257 (28.5%)	522 (25.0%)
Academic discipline[e] *N (%)*			
Natural Sciences and Technology	501 (42.0%)	190 (20.7%)	691 (32.8%)
Economics	222 (18.6%)	101 (11.0%)	323 (15.3%)
Life Sciences	200 (16.8%)	158 (17.2%)	358 (17.0%)
Social Sciences	146 (12.2%)	197 (21.5%)	343 (16.3%)
Behavioral Sciences	124 (10.4%)	270 (29.5%)	394 (18.7%)

[a]*N = 42 (2.0%) participants did not indicate their date of birth.*
[b]*N = 80 (3.8%) did not indicate their date of obtaining PhD.*
[c]*N = 132 (6.3%) did not indicate contract size.*
[d]*N = 25 (1.2%) did not indicate contract type.*
[e]*Note that the Dutch Medical University Institutes were not included in this investigation, because they have a different collective labor market agreement system compared to the Universities.*

MATERIALS AND METHODS

Participants and Design

In the academic year 2017/18, 12.414 academic staff at assistant, associate, and full professor level from all 14 Universities in the Netherlands were invited to participate in an online survey called "Working in Academia." A total of $N = 4{,}295$ academics completed the questionnaire (response rate of 35%). For the current investigation, the following inclusion criteria were applied: (1) participants who provided active informed consent or permission to use the data for scientific purposes (2) academics who self-identified as man or woman, (3) academics who were in the academic rank of assistant professor or associate professor (4) and academics who could be categorized in one of five classifications to indicate their scientific field as either highly math-intensive (NARCIS classification scheme,[2] i.e., Natural Science and Technology[3]; Economics and Business) or non-math-intensive (i.e., Life Sciences, Social Sciences; Behavioral and Educational Sciences) following Ceci et al. (2014). After applying these criteria, $N = 2{,}109$ participants remained for further analyses (See **Table 1** for Sample Characteristics).

The sample consisted of $N = 1{,}193$ men (57%) and $N = 916$ women (43%). In terms of academic rank, $N = 1{,}425$ (68%) were assistant professor and $N = 684$ (32%) were associate professor. Among the women, 75% were assistant professor (relative to 62% of men) and 25% were associate professor (relative to 38% of men), signaling women's underrepresentation at the higher rank. On average men in the sample were older ($M = 45.37$, $SD = 9.47$) than women ($M = 41.92$, $SD = 8.09$), $F(1, 2065) = 79.14$, $p < 0.001$, $\eta^2_p = 0.036$, also in terms of academic age (i.e., years since obtaining a PhD degree; $M_{men} = 13.71$, $SD = 8.31$; $M_{women} = 10.44$, $SD = 6.65$); $F(1, 2027) = 91.87$, $p < 0.001$, $\eta^2_p = 0.043$. Most academics ($N = 1{,}562$; 75%) held a permanent contract; women (29%) more often held a fixed-term contract than men (22%), χ^2 (1) = 10.05, $p = 0.002$. The vast majority ($N = 1{,}631$; 83%) of academics worked fulltime (36 h a week or more); women more often held part-time contracts ($N = 224$, 27%) than men ($N = 122$, 11%), χ^2 (1) = 84.98, $p < 0.001$. Finally, as stated before, academics from five academic disciplines were included in the sample[4]; the largest discipline represented in the sample was Natural Sciences and Technology ($N = 691$; 33%), followed by Behavioral and Educational Sciences ($N = 394$; 19%), Life Sciences ($N = 358$, 17%), Social Sciences ($N = 343$; 16%). The smallest discipline was Economics and Business ($N = 323$; 15%). Note that female and male academics were indeed not equally represented across disciplines (see **Table 1**).

The research had a cross-sectional design. In testing our hypotheses, our independent variables were gender (man/woman) and field [math-intensive (NTE) versus non-math-intensive (LSB)]. Since there are *a priori* differences in academics' employment conditions across genders and fields (**Tables 1**, **2**),

[2]www.narcis.nl

[3]Note that in the NARCIS classification of academic disciplines in the Netherlands, Natural Sciences and Technology are grouped into one category.

[4]Participants from the disciplines Humanities and Law & Governance were not included in the analysis, as they do not fall within the scope of Ceci et al.'s (2014) classification of sciences as math-intensive (NTE) and non-intensive (LSB).

TABLE 2 | Descriptive statistics model variables (*M, SD* Pearson's *r*).

	N	*M*	*SD*	Pearson's *r*											
				1	2	3	4	5	6	7	8	9	10	11	12
1. Academic age$_{linear}$	2,109	12.28	7.65	1	0.961***	−0.049*	−0.466***	0.432***	−0.204***	−0.053*	0.082***	0.014	−0.068***	−0.309***	−0.041
2. Academic age$_{quadratic}$	2,109	211.55	244.30		1	−0.049*	−0.370***	0.367***	−0.203***	−0.069*	0.084***	0.010	−0.073***	−0.338***	−0.045*
3. Contract size	2,109	37.80	5.08			1	0.023	0.071**	−0.117***	−0.113***	0.168***	0.034	−0.130***	0.149***	0.146***
4. Contract type[a]	2,109	0.26	0.44				1	−0.362***	0.067**	−0.075***	0.068**	0.069**	−0.012	−0.111***	−0.067**
5. Rank[b]	2,109	0.32	0.47					1	−0.137***	−0.083***	0.102***	0.033	−0.071**	0.207***	0.073**
6. Gender[c]	2,109	0.43	0.50						1	0.286***	−0.241***	0.032	0.260***	0.011	−0.019
7. Field[d]	2,109	0.52	0.50							1	−0.555***	−0.240***	0.337***	−0.109***	−0.065**
8. Gender Ratio$_{direct}$	1926	3.28	0.73								1	0.391***	−0.642***	−0.108***	−0.095***
9. Gender Ratio$_{leadership}$	1923	3.97	0.63									1	0.455***	0.070**	0.068**
10. GCI	1922	0.70	0.75										1	−0.047*	−0.035
11. %Chance Full Prof.	1916	41.53	31.66											1	0.352***
12. Career commitment	1923	3.57	0.90												1

*Mean's (M), Standard deviation's (SD), and correlations (Pearson's r). Covariates corrected for missing values *p < 0.05; **p < 0.01; ***p < 0.001.*

[a]*Contract type: 0 = permanent; 1 = fixed-term.*

[b]*Rank level: 0 = assistant professor; 1 = associate professor.*

[c]*Gender: 0 = men; 1 = women.*

[d]*Field: 0 = Natural Sciences, Technology, and Economics (NTE); 1 = Life Sciences, Social Sciences and Behavioral Sciences (LSB).*

in testing hypotheses on the perceived glass ceiling we included rank (assistant/associate professor), academic age (both linear and quadratic effects), contract type (permanent versus fixed-term) and contract size (hours per week) as covariates in the model. Our dependent variables where the perceived GCI, perceived chance to become a full professor and career commitment.

Procedure

The study was approved by the Ethics Committee of the Faculty of Social and Behavioral Sciences of the university (FETC17-010). Participants were approached *via* their university email address through the university's internal HR communication system. The invitation was signed by either the rector or HR director of the university. The survey was available both in Dutch and in English and online for 2–3 weeks; after 1 week a reminder email was send out. Participants first provided informed consent, ensuring among others, anonymity, voluntary nature of participation, safety of data storage, the right to withdraw, and contact information, followed by questions about demographic and job characteristics. Then, questions about work circumstances (e.g., time for research, availability of resources) and professional self-perceptions and stereotypes were measured (Van Veelen and Derks, 2019, 2021), as part of the larger project. Subsequently, questions about career perceptions and future career opportunities in academia were answered as well as questions about the perceived gender ratio in the direct work environment and at the full professor level in the field. It took 15–20 min to complete the survey. Respondents were thanked for their participation but did not receive an actual reward.

Measures

Below we report the measures in order of appearance in the survey. Note that our two questions regarding the gender ratio at different levels to calculate the GCI index measured completely at the end of the survey, after career commitment and estimated chances to become full professor. We did this to avoid priming effects that would make gender issues at work salient prior to measuring outcome variables. Herewith we further circumvent motivated response bias.

Math-Intensive vs. Non-intensive Field

Following Ceci et al. (2014), the five disciplines included in the current study are classified as either highly math-intensive (i.e., Natural Science and Technology, Economics; NTE) or non-math-intensive (i.e., Life Sciences, Social Sciences and Behavioral Sciences; LSB). We created a dichotomous variable to distinguish between highly math-intensive (NTE) and non-math-intensive fields (LSB).

Career Commitment in Academia

Two items measured career commitment, namely: "*I see my academic career as one of the most important things in my life*" and "*I consider it important to be successful in academia*"

adapted from Ellemers et al. (1998). The inter-item correlation was high: $r\ (1920) = 0.63,\ p < 0.001$.[5]

Perceived Chances to Become a Full Professor

A one-item measure assessed perceived chances to become a full professor, namely: "*You indicated that you are currently an assistant [associate] professor. On a scale of 0–100%, how likely do you think it is that during your career you will become a full professor?*" Participants were asked to drag a slider to the percentage that would fit their answer best.

Perceived Glass Ceiling Index

We first asked academics to estimate the ratio of women relative to men in their direct work environment on a 5-point Likert scale (1 = only women, no men; 2 = mainly women, a few men; 3 = as many women as men; 4 = A few women, mainly men; 5 = no women, only men). Subsequently, we asked academics to make the same estimation on the same scale, this time about the gender ratio at the top level (i.e., full professor) in their department. We subtracted the perceived gender ratio in the direct work environment from the perceived gender ratio at the top level (i.e., full professor level). A GCI score of 0 indicates similar career advancement for men and women, a GCI > 0 indicates more difficulty for women to achieve the highest rank relative to men and a GCI < 0 indicates that it is easier for women to achieve the highest rank relative to men. The GCI could range from −4 to 4. For example, a score of 4 would indicate the thickest perceived glass ceiling possible, with a maximum contrast in the perceived proportion of women at the top rank (i.e., no women, only men; Likert score 5) relative to lower ranks (i.e., only women, no men, and Likert score 1).

Analytical Strategy

Because it was possible for participants to skip questions they did not want to answer, we dealt with missing data. With respect to the covariates, we controlled for *a priori* gender differences in academic age, both the linear and the quadratic effect (i.e., years since receiving PhD; $N_{missing} = 80$; 3.8% of the data), for contract hours ($N_{missing} = 132$; 6.8% of the data), and for contract type (i.e., permanent versus fixed-term/other; $N_{missing} = 25$; 1.2%), academic rank (i.e., assistant or associate professor; no missing values). To avoid losing a substantial number of participants due to missing data on covariates in the statistical models, we imputed the mean of academic age and contract hours per week (0–40) for the missing cases and categorized missing cases for contract type in the category fixed-term/other. For the dependent variables, data loss due to attrition varied between 8.7 and 9.2%, and cases were deleted listwise, resulting in a sample size of $N = 1908$ to test the full hypothesized model.

Since we rely on cross-sectional self-report data in our design, we investigated the presence of common method variance by using Harman's single factor test (Podsakoff et al., 2003). Here, all scale items [field, gender, gender $ratio_{directcolleagues}$, gender $ratio_{leadership.}$ Perceived odds to become full professor (1 item), career commitment (2 items)] were entered in an unrotated exploratory factor analysis (PCA) with the number of factors constrained to one. Common method bias is assumed be to present when the single factor explains over 50% of variance. Yet our resulting factor merely explained 30% of variance in the items, ensuring that our concepts were independent, and ruling out potential problems with common method bias.

The statistical software program SPSS 27 was used to analyze the data. In a first step, we inspected descriptive statistics and correlations among model variables (**Table 2**). To test Hypothesis 1–3, a moderated mediation model (Model 58) was tested with PROCESS (Hayes, 2012). The macro uses ordinary least squares (OLS) analysis for calculating the mediation and moderated mediation effects, and bootstrapping for calculating the confidence intervals (CI). We used bias-corrected bootstrap CIs based on 5,000 bootstrap samples with a 95% level of confidence. When the confidence intervals do not include zero, the effect is interpreted as significant. The independent variable (X) was Field (NTE vs. LSB), the moderating variable (W) was Gender (men/women), the mediating variable (M) was Perceived GCI and the outcome variable (Y) was the Perceived Chance to become Full Professor. Academic Age (linear and quadratic), rank (assistant/associate professor), Contract Size (0–40 h a week), and Contract Type (permanent/fixed-term) were included as covariates.

Our sampling strategy was to obtain a sample size as large and representative for the population as possible. Because of this strategy, no *a priori* power analysis was conducted, but rather sensitivity analysis was conducted using G*Power software tool (Faul et al., 2007) to test the minimal effect size that would render statistical significance at conventional error probability levels ($\alpha = 0.05$) to test our hypotheses (PROCESS moderated mediation Model 58; Hayes, 2012) given the sample size. In G*power (F-test family, regression analysis) we included 5 predictor variables (three main effects and two interaction terms: Field, Gender, GCI, Field x Gender, Gender x GCI) and 5 covariates (Academic Age (linear and quadratic), Rank, Contract Type, and Size), a minimal power requirement of 0.80, and a sample size of $N = 1908$, which demonstrated the ability to detect small effect sizes ($f^2 = 0.007$) at 2.22 critical F-test ratios.

In additional analyses, we inspected whether an alternative mediation model, namely, that women in LSB sciences would be less career-committed and therefore estimate their chances to become a full professor to be lower, was a viable alternative model.

[5]We are aware that the dependent variables in our model comprised only one or two items and that, psychometrically, using multiple items with validated scales is preferable. Yet we had a unique opportunity to access the entire Dutch population of (tenured) academics in the Netherlands. Thus for practical reasons (i.e., to ensure a large participation rate and by reducing participant burden) we needed to keep the online questionnaire as short as possible. Hence, we were very limited in the number of items we were able to include per variable. Given these practical constraints, there is a good case to make for including single-item measures for psychological constructs (like with the perceived chance to become a full professor on a slider scale from 0 to 100%; see also Fisher et al., 2016; JOHP). Specifically with regards to career commitment, the original scale (Ellemers et al., 1998) consisted of 6 items. We selected the two items that, based on scale validity analyses, showed highest factor loadings (>0.80) across the studies that tested the psychometric quality of this scale. The two items thus form the core elements of the psychological construct career commitment.

RESULTS

The current study investigated whether female (more than male) academics would perceive a thicker glass ceiling in non-math-intensive academic fields (LSB; where women are—on average—well-represented) compared to in math-intensive fields (NTE; where women are—on average—underrepresented; Hypothesis 1; moderation), whether for women (but not for men), perceiving a glass ceiling would lower their estimated odds to become full professor themselves (Hypothesis 2; moderation) and (combined), whether women's (but not men's) perception of a thicker glass ceiling in LSB compared to NTE fields would explain their lower perceived chances to advance to academic leadership (Hypothesis 3; moderated mediation). In addition, we tested the alternative hypothesis that rather than the perception of a glass ceiling (that is, a contextual explanation), women's lower individual career commitment than men's (person-based explanation), particularly in LSB sciences would mediate lower perceived chances to attain a leadership position.

Descriptive Statistics

Descriptive statistics are displayed in **Table 2**. The perceived glass ceiling index was $GCI_{average} = 0.70$ ($SD = 0.75$). This shows that on average, the assistant and associate professors in this sample perceived a glass ceiling, such that women face more difficulty to progress to full professorship compared to men. Moreover, assistant professors perceived a thicker glass ceiling ($GCI_{assistant} = 0.74$; $SD = 0.78$) compared to associate professors ($GCI_{associate} = 0.62$; $SD = 0.71$), $t\ (1293.94) = 3.23$, $p = 0.001$, $CI_{95\%} = 0.045$; 0.186 (corrected for equal variances not assumed). Correlational data showed that the more precarious academics' position was [that is, the more junior, $r\ (1922) = -0.07$, $p = 0.003$]; the lower in rank $r\ (1922) = -0.07$, $p = 0.002$; and the smaller the contract size, [$r\ (1922) = -0.130$, $p < 0.001$] the higher their perceived GCI. Resonating with Hypothesis 1, academics perceived the glass ceiling to be thicker in LSB ($M = 0.94$; $SD = 0.77$) compared to NTE disciplines ($M = 0.43$; $SD = 0.65$), $t\ (1920) = -11.81$, $p < 0.001$, $CI_{95\%} = -0.576$; -0.448. Moreover, women perceived a thicker glass ceiling ($M = 0.92$; $SD = 0.77$) than men ($M = 0.53$; $SD = 0.70$), $t\ (1920) = -11.81$, $p < 0.001$, $CI_{95\%} = -0.463$; -0.332.

Zooming in on the two levels of the gender ratio included in the GCI score (**Table 2**), academics saw more variation in the gender ratio in their direct work environment across field and gender compared to at the top (also evident from the correlational data). In NTE fields, both men ($M = 3.70$; $SE = 0.02$) and women ($M = 3.69$; $SE = 0.04$) reported to see overrepresentation of men in their direct work environment, $F(1, 1922) = 0.051$, $p = 0.821$, $\eta^2_p < 0.001$, in LSB fields men reported to see gender parity in their direct work environment ($M = 3.02$; $SE = 0.03$) and women in LSB fields reported to see a slight overrepresentation of women ($M = 2.79$; $SE = 0.03$), $F(1, 1922) = 36.26$ $p < 0.001$, $\eta^2_p = 0.019$. With regards to the gender ratio at the top, all academics scored around a 4 on the 5-point scale (i.e., perceiving mainly men at the full professor level). Women observed a slightly sharper overrepresentation of male full professors ($M = 4.06$; $SE = 0.02$) compared to men ($M = 3.92$; $SE = 0.02$; $F(1, 1919) = 22.46$, $p < 0.001$, $\eta^2_p = 0.012$), and the overrepresentation of men was perceived as more skewed in the NTE ($M = 4.16$; $SE = 0.02$) compared to the LSB ($M = 3.82$; $SE = 0.02$; $F(1, 1919) = 135.80$, $p < 0.001$, $\eta^2_p = 0.066$). The differences in the perceived gender ratio at the top were (significant, but) small and all boil down to the same conclusion; at the full professor level academics see a majority of men.

On average, academics in the sample estimated their chances to become full professor to be lower than chance, that is 41%. Moreover, assistant professors perceived lower chances ($M = 37.07$; $SD = 29.29$) compared to associate professors ($M = 51.11$; $SD = 34.35$), $t\ (1034.41) = -8.72$, $p < 0.001$, $CI_{95\%} = -17.197$; -10.877 (corrected for equal variances not assumed). Correlational data showed that the more precarious academics' position was (that is the lower in rank $r\ (1922) = 0.21$, $p < 0.001$; having a fixed-term instead of permanent contract, $r\ (1922) = 0.11$, $p < 0.001$; and the smaller the contract size, $r\ (1922) = 0.15$, $p < 0.001$, the lower their perceived chances to become full professor were. There was no statistical evidence for gender differences in perceived chances to become full professor 1 day ($M_{women} = 41.92$, $SD_{women} = 30.54$; $M_{men} = 41.23$; $SD_{men} = 32.51$; $t\ (1845.87) = -0.48$, $p = 0.632$, $CI_{95\%} = -3.532$; 2.1442 (corrected for equal variances not assumed). In LSB fields, perceived chances to become a full professor were lower ($M = 38.23$, $SD = 30.76$) compared to NTE fields ($M = 45.16$, $SD = 32.25$), $t\ (1876.47) = 4.81$, $p < 0.001$, $CI_{95\%} = 4.105$; 9.765 (corrected for equal variances not assumed).

Hypotheses Testing

Results of the moderated mediation model (Model 58, Hayes, 2012; **Figure 2**; **Table 3**) showed that with perceived GCI as an outcome variable, a main effect of Field was found, such that academics in LSB fields perceived a thicker glass ceiling compared to academics in NTE fields ($b = 0.35$, $SE = 0.02$, $p < 0.001$, $CI_{95\%} = 0.262$; 0.434). Moreover, the main effect of Gender revealed that female academics perceived a thicker glass ceiling compared to male academics ($b = 0.16$, $SE = 0.05$, $p = 0.002$, $CI_{95\%} = 0.050$; 0.259). These main effects were further qualified by a significant Field x Gender interaction ($b = 0.18$, $SE = 0.07$, $p < 0.001$, $CI_{95\%} = 0.044$; 0.311). Specifically, confirming Hypothesis 1 (see **Figure 3**) while both female ($b = 0.53$, $SE = 0.05$, $p < 0.001$, $CI_{95\%} = 0.422$; 0.628) and male ($b = 0.35$, $SE = 0.05$, $p < 0.001$, $CI_{95\%} = 0.262$; 0.434) academics perceived a thicker glass ceiling in LSB compared to NTE fields, the gender effect was more than two times larger in LSB ($b = 0.34$, $SE = 0.05$, $p < 0.001$, $CI_{95\%} = 0.246$; 0.424) compared to NTE fields ($b = 0.16$, $SE = 0.05$, $p = 0.002$, $CI_{95\%} = 0.057$; 0.259), with female academics in the LSB fields reporting the thickest glass ceiling: $GCI_{LSBFEMALE} = 1.08$.

Secondly, with regards to the perceived odds for academics to reach full professorship themselves, there was a main effect of Field such that the perceived odds to attain a full professorship position were lower in LSB sciences compared to NTE sciences ($b = -5.49$, $SE = 1.37$, $p < 0.001$, $CI_{95\%} = -8.170$; -2.806). While there were no significant main effects of Gender and perceived GCI on the odds to become full professor, there was a significant interaction effect of GCI × Gender ($b = -4.04$, $SE = 1.69$, $p = 0.018$, $CI_{95\%} = -7.356$; -0.694). Specifically, as depicted in **Figure 4**,

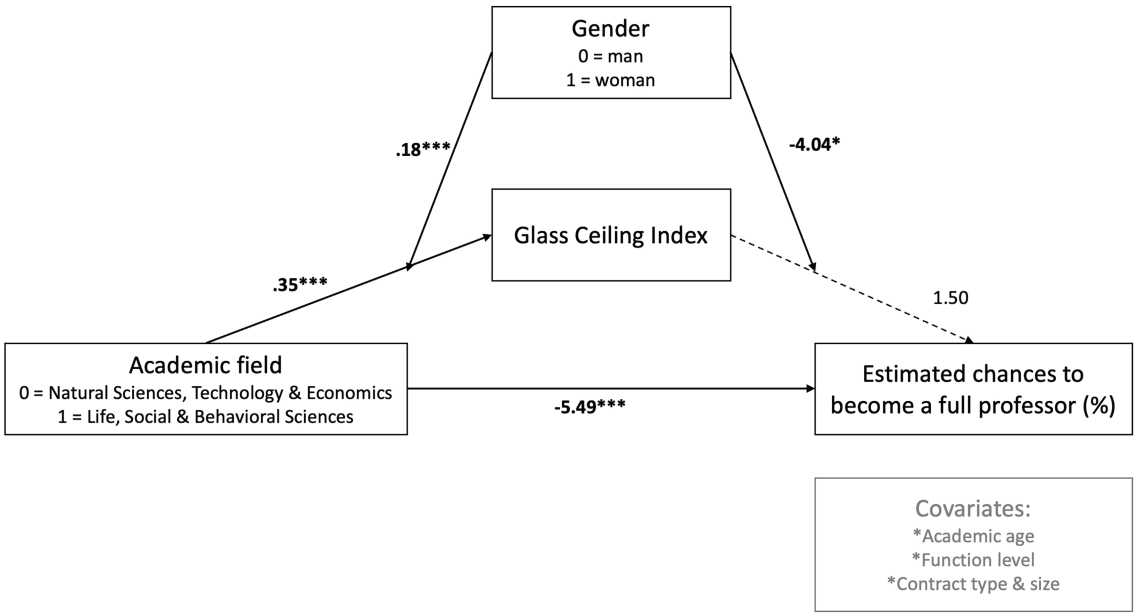

FIGURE 2 | Moderated Mediation model (Model 58 Process) with Academic Field as predictor (X), the Glass Ceiling Index as mediator (M), Estimated Change to become full professor as dependent variable (Y) and Gender as Moderator (Z). Covariates are regressed on both M and Y.

TABLE 3 | Moderated mediation results link between field, gender, perceived GCI and perceived odds to become full professor ($N = 1908$).

Moderated mediation results	Coefficient	SE	95% CI	
			Lower limit	Upper limit
Outcome: Perceived GCI:				
$R = 0.392$, $R^2 = 0.154$, $F(8,1899) = 43.12$, $p < 0.001$				
Field	**0.348**	**0.044**	**0.262**	**0.434**
Gender	**0.158**	**0.052**	**0.057**	**0.259**
Field x Gender	**0.177**	**0.068**	**0.044**	**0.311**
Academic age (linear)	−0.001	0.009	−0.018	0.016
Academic age (quadratic)	<0.001	<0.001	−0.001	0.001
Contract size	−0.011	0.003	−0.018	−0.005
Contract type	−0.021	0.048	−0.109	0.067
Function level	−0.028	0.040	−0.106	0.050
Outcome: Perceived odds (%) to full professor				
$R = 0.521$, $R^2 = 0.271$, $F(9,1898) = 78.446$, $p < 0.001$				
Field	**−5.488**	**1.367**	**−8.170**	**−2.807**
GCI	1.495	1.203	−0.864	3.855
Gender	2.782	1.838	−0.823	6.387
GCI × Gender	**−4.025**	**1.698**	**−7.356**	**−0.694**
Academic age (linear)	−0.434	0.331	−1.073	0.226
Academic age (quadratic)	−0.048	0.010	−0.067	−0.029
Contract size	0.576	0.126	0.329	0.824
Contract type	4.004	1.736	0.599	7.409
Function level	26.999	1.537	23.984	30.013
Conditional indirect effect at:				
Men	0.521	0.431	−0.327	1.380
Women	**−1.329**	**0.674**	**−2.698**	**−0.066**
Index of moderated mediation[a]				
Gender	**−1.849**	**0.788**	**−3.439**	**−0.339**

Statistically significant effects ($p < 0.05$) for predictor variables are marked in bold.
[a]*Difference between conditional indirect effects.*

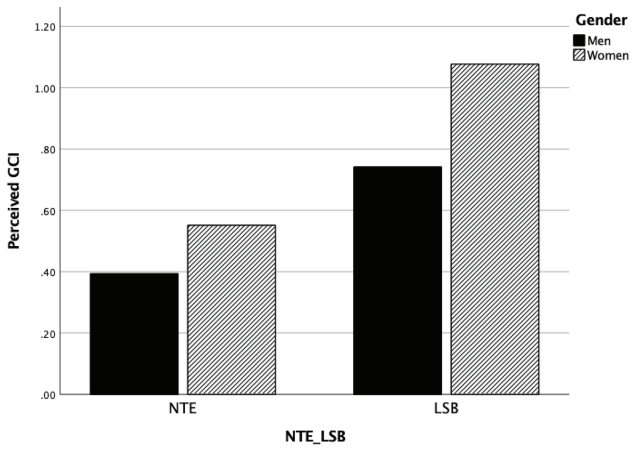

FIGURE 3 | Two-way interaction effect Field (NTE vs. LSB) × Gender (Men vs. Women) on Perceived GCI.

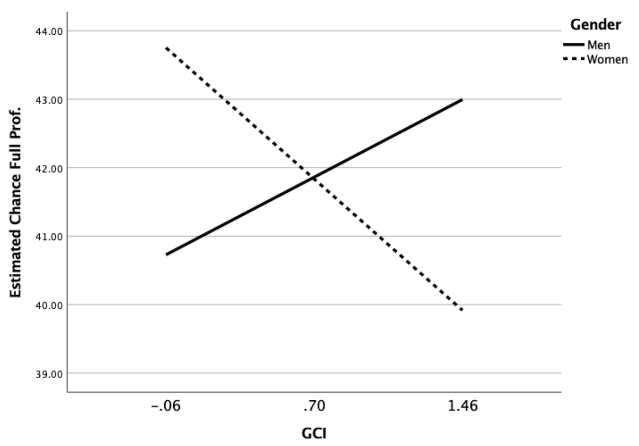

FIGURE 4 | Interaction effect Perceived GCI × Gender on Perceived odds (%) to become full professor (interaction points plotted at −1 SD and +1 SD values from the mean GCI index).

for women, the estimated odds to become full professor dropped significantly as the perceived glass ceiling increased ($b = 2.53$, $SE = 1.25$, $p = 0.044$, $CI_{95\%} = -4.991; -0.069$). For men glass ceiling perceptions were not significantly related to estimated odds to become full professor ($b = 1.495$, $SE = 1.20$, $p = 0.214$, $CI_{95\%} = -0.864; 3.855$)—if anything, the data pattern was reversed for men. Confirming Hypothesis 2, this interaction pattern suggests that a thicker perceived glass ceiling in LSB compared to NTE fields will work to disadvantage women's perceived chances of attaining academic leadership positions, but not men's perceived chances.

Third, bootstrap results showed a conditional indirect effect of Field (i.e., NTE vs. LSB fields) on perceived odds to become a full professor through perceived GCI. Specifically, confirming Hypothesis 3, only for female academics, perceiving a thicker glass ceiling in LSB compared to NTE disciplines led to lower perceived odds to attain a full professorship position *via* a thicker perceived GCI ($\text{Indirect}_{\text{women}}$: $b = -1.33$, $SE = 0.67$, $CI_{95\%} = -2.698; -0.0657$), while such indirect effect was not significant for men ($\text{Indirect}_{\text{men}}$: $b = 0.52$, $SE = 0.43$, $CI_{95\%} = -0.327; 1.380$). Note that the difference between these conditional indirect effects was significant (Index = −1.85, SE = 0.79, $CI_{95\%} = -3.490; -0.339$).

Finally, to test the alternative hypothesis that career commitment would serve as a mediating variable to explain women's lower perceived odds to attain academic leadership than men's, we inserted career commitment into in our moderated mediation model 58. Results showed no main effect of Gender ($b = -0.03$, $SE = 0.07$, $p = 0.665$, $CI_{95\%} = -0.156; 0.100$) nor a significant interaction effect of Field x Gender ($b = 0.07$, $SE = 0.09$, $p = 0.420$, $CI_{95\%} = -0.099; 0.238$) on perceived career commitment. Thus, based on the current data, we reject the alternative hypothesis that perhaps women are less career-committed compared to men in LSB fields and compared to in NTE fields. And while higher career commitment did contribute to higher perceived odds to attain full professorship ($b = 9.60$, $SE = 0.87$, $p < 0.001$, $CI_{95\%} = 7.891, 11.306$), this was not contingent upon Gender ($b = 1.45$, $SE = 1.32$, $p = 0.273$, $CI_{95\%} = -1.142, 4.044$) nor did bootstrap tests show there was a conditional indirect effect of Field (NTE vs. LSB) on perceived odds to reach full professorship *via* career commitment, neither for women ($\text{Indirect}_{\text{women}}$: $b = -0.348$, $SE = 0.76$, $CI_{95\%} = -1.834, 1.137$) nor men ($\text{Indirect}_{\text{men}}$: $b = -0.967$, $SE = 0.55$, $CI_{95\%} = -2.081, 0.097$).

DISCUSSION

Most research on the careers of women in academia focus on the math-intensive fields natural science, technology, and economics (NTE), where women are vastly underrepresented. In this research, we shift focus on women's academic careers in those fields where they have become well-represented: the life, social and behavioral sciences (LSB). Integrating theory on the glass ceiling (e.g., Cotter et al., 2001; Kulik and Rae, 2019; Cohen et al., 2020) with theory on social roles (Eagly, 1987) and social identities (Tajfel and Turner, 1979), we show that a mere strength in numbers does not shield women in LSB from perceiving gender inequality in women's representation in leadership positions—to the contrary. Specifically, our data show that even though, on average, gender parity is achieved in LSB fields, female (more than male) academics perceive a thicker glass ceiling in LSB than in NTE fields. The sharper the perceived contrast in women being well-represented at lower levels, but less so at the top of academia, the lower female academics' estimated chances to become full professor in LSB fields—a data pattern we do not see in male-dominated NTE fields, nor among male academics. Below we discuss implications and possible explanations for our findings.

Theoretical Implications

By studying perceived glass ceiling effects among both male and female academics at mid-level careers sampled from the entire Dutch population of academics in LSB and NTE science fields, this research operates at a unique interface between social psychology, organizational science, and sociology. While

inherently socio-psychological, in our literature review we relied on theory from all three disciplines to argue how gender roles and identities serve as a lens through which the social hierarchy in Dutch academia is observed, and how this shapes gender inequality in perceived career opportunities where we least expect it—in feminizing LSB fields. Such theoretical and empirical integration of theory to understand glass ceiling effects in academia is new and complements prior research that was unable to pinpoint the ambiguous relationship between gender ratios and promotion probabilities of women in academia (Sanders et al., 2009; Groeneveld et al., 2012). Specifically, our results show that in LSB fields, the *contrasts* that women see in the representation of men and women across academic ranks (rather than the gender ratio in general) introduce gender inequality in perceived career opportunities toward leadership.

With the current data, we can draw conclusions about how women's *perceptions* about future career success in academia are likely shaped by the current gender hierarchy they see in their field. We cannot draw conclusions about how glass ceiling perceptions relate to women's *actual* career advancement and success in academic fields. Why is it nevertheless important to learn what women's (and men's) career perceptions are in these fields? First, because we know from empirical studies that people's estimated odds to successfully attain a leadership position in organizations relate to their career decisions, for example in terms of the willingness to make sacrifices for their career (Meeussen et al., 2021) their career adaptability (to flexibly deal with change or setback) and their turnover intentions (Ng and Feldman, 2014; Guan et al., 2015). So, lower expectations of future career success may translate into relatively more women at mid-level career stages deciding to quit academia, especially in LSB fields. Second, literature on career theory provides a strong empirical basis that subjective career success (perceptions about career success) and objective career success (pay, promotion) are interrelated (e.g., Poole et al., 1993; Ng et al., 2005; Abele and Spurk, 2009; Ballout, 2009). This could imply that female academics' lower perceived odds to attain full professorship (cf. subjective career success) compared to men's in LSB fields, may relate to other gender inequalities priorly observed in academia regarding objective career success (e.g., salary, research time, and resources) as (De Goede et al., 2016; Van Veelen and Derks, 2019). We think it is important to reveal these hidden cost of perceived glass ceilings for the careers of women in academia.

Our research focused on academics' perceptions of women's representation, and not on their *belief systems* about gender inequality in leadership. One interesting line of further inquiry would be to examine how glass ceiling perceptions relate to women's beliefs about whether the current gender hierarchy in LSB and NTE fields is illegitimate or not. Given that women in NTE see a comparable underrepresentation of women around them as they see in positions of academic leadership, they may see the hierarchy as relatively open (permeable), and legitimate. However, although women in LSB are less likely to see the social hierarchy as permeable (because they see relatively few women at the top), this does not automatically mean that they will attribute the underrepresentation of women in leadership to gender discrimination, see it as illegitimate and fight for equal opportunities. Firstly, the narrative surrounding the social hierarchy in academia is one that is based strongly on meritocracy and individual mobility. Previous research had found that disadvantaged groups members are less likely to perceive group discrimination and to protest when meritocratic beliefs are activated (McCoy and Major, 2007; Jost et al., 2012). Secondly, the social setting in which men and women work together in LSB fields, with plenty of collaborative intergroup contact between the genders, is likely to undermine the likelihood that women will compare the outcomes of women to men's and notice that their gender group may not be receiving equal opportunities (Saguy et al., 2009; Saguy and Chernyak-Hai, 2012). When members of disadvantaged groups perceive the social hierarchy as impermeable yet legitimate, they are less likely to work for social change (Ellemers et al., 1993). Instead, they will either opt out or work toward individual mobility and start perceiving themselves as very different from other women (e.g., self-group distancing, Van Veelen et al., 2020), which will leave the social hierarchy unchanged. Raising awareness that despite being well-represented, illegitimacies in women's leadership advancement in LSB sciences are still prevalent is thus important.

Our study results lend further empirical support for the growing body of literature in social psychology showing that person-centered explanations for women's lower promotion probabilities to leadership should be largely refuted. Instead, contextual explanations (e.g., a glass ceiling) grounded in biased-centered theories (e.g., role incongruency, Eagly and Karau, 2002; social identity; Tajfel and Turner, 1979) form a more solid evidence base as to why women still face disproportionate barriers in attaining leadership relative to men (e.g., Ellemers, 2014; Van Laar et al., 2019; Meeussen et al., 2021; Morgenroth et al., 2021). Similar trends are observed in literature in organization science where career theorists' have been critiqued on their overemphasis on individual agency as important parameters to predict subjective and objective career success, and neglecting the role of contextual issues (Evetts, 1992; Brown, 2002). Our study findings contribute to the growing consideration of the organizational, societal and political context in gendered career trajectories (Mayrhofer et al., 2007; Järlström et al., 2020). It is not only how women see themselves, in terms of their own career commitment, but also how they see the social hierarchy in academia and how their gender identity is reflected in that hierarchy, that accentuates their low status position relative to men's. Gender differences in the perceptiveness to that invisible glass ceiling explain women's lower estimated chances to reach full professorship relative to men in LSB fields, not gender differences in career commitment.

The glass ceiling metaphor suggests that this is a barrier that can be broken or shattered (Kulik and Rae, 2019). As evidenced from our research however, a glass ceiling is not broken when a small group of women achieves the highest levels of academic leadership. Intuitively, a "broken" glass ceiling would mean that once women are entering leadership positions, there are more opportunities for women who follow. This is not the case in LSB sciences. Specifically, as research on the queen bee

phenomenon shows, women who have made it to top positions have had to make many sacrifices to attain that position, and have often socialized to "become one of the boys" themselves in order to fit to an agentic leadership prototype (Faniko et al., 2017, 2021). As such, women who paved the way toward academic leadership may not necessarily be advocates of social change. In future research, a further investigation of the role of gender identification in relation to glass ceiling perceptions in academia would be valuable. Experiences of gender discrimination in the work context are more strongly felt by women who strongly identify with their gender (Ellemers et al., 2002). In response to such discrimination, women who identify strongly with their gender are more likely to advocate for social change and to fight for equal rights, while less gender identified women are more likely to dissociate from, downplay or even deny issues with gender discrimination (Derks et al., 2016; Britton, 2017). Potentially, this latter individual mobility strategy has thus far been more fruitful for women to attain academic leadership. Further insight in social identity coping mechanisms in relation to views from below (e.g., assistant/associate professor) and above (e.g., full professors) the glass ceiling would deepen our understanding as to what motivates women (and men) to break glass ceilings and why women would opt for individual mobility to attain leadership, slipping through the cracks of the glass ceiling, rather than breaking it altogether.

Strengths, Limitations, and Practical Implications

A strength of our research is our new Glass Ceiling Index (GCI). Different from prior self-report measures we did not directly ask participants to estimate or interpret the difference in women's representation at the top relative to at lower ranks. Instead, we asked two questions about the gender ratio in the direct work environment and in leadership, and we did so at the very end of the survey. Therefore, even though academics in our sample were not actively made aware of gender discriminatory practices in leadership in their field, women's lower perceived chances to become full professor in LSB fields were nevertheless significantly related to the indirect observation of a "thick" glass ceiling. It thus seems that contextual factors that subtly signal women's unequal opportunity toward leadership thus inform women about their potential leadership success. Recent research shows how contextual cues that signal lower odds for women to attain leadership explain women's lower willingness to make sacrifices for their careers relative to men's (Meeussen et al., 2021). Thus, rather than a matter of individual choice, women's lower perceived opportunities and subsequent choices about leadership advancement are more likely the result of an informed decision-making process. As evidenced in our study, for female academics in LSB fields, a contextual constraint informing their future career prospects is their less opportune position in the status hierarchy relative to men's.

Our GCI index included two parameters, the perceived gender ratio in the direct environment and at the top, and from the *contrast* between the two we distilled the size of the perceived glass ceiling. In terms of interpretation of our findings, a thicker perceived glass ceiling in LSB (but not NTE) fields can be understood as women seeing a "lack of female leadership" as well as women seeing a "reservoir of women" stuck ad mid-level careers. With respect to the latter, one could speculate that apart from a "glass ceiling" other metaphors in the literature about "sticky floors" (Morgan, 2015) and "frozen middles" (McKinsey, 2012) may also apply to women in LSB fields. Glass ceilings, sticky floors or frozen middles can be regarded as similar since they all focus on barriers women face in upward mobility toward leadership (Shabsough et al., 2021). Yet the driving forces behind them may be different. A glass ceiling metaphor suggests that women are "pushed away" from leadership positions, while the sticky floor or the frozen middle suggests women being "pulled back" into low or middle management positions with lower pay and lower mobility for a longer period of time (Smith et al., 2012; Carli and Eagly, 2016). With regards to practical implications, in addition to a "think manager-think male" analogy to understand women's lower perceived propensity to attain leadership in feminized, social science fields, it is important to also take into account a "think follower-think female" analogy (Braun et al., 2017). Indeed, female academics are more often than men considered the "communal colleagues" the "devoted teachers" and more often receive requests for "administrative/non-promotable tasks" (Vesterlund, 2015; Babcock et al., 2017). In designing policy interventions to break gendered barriers toward academic leadership in LSB fields, universities should thus not only focus on reducing existing stigma and bias surrounding women's competence for leadership, but also focus on ensuring that women are not overburdened with non-promotable tasks that make it more difficult to self-promote, to stand out and to be noticed for leadership.

Increasingly, universities have diversity programs in place to facilitate (gender) diversity and inclusion of academic staff. Yet most diversity programs are only targeted at the influx of employees (Dobbin and Kalev, 2016; Vink et al., 2021, unpublished). For example, affirmative action programs or anti-bias trainings during recruitment and selection procedures explicitly aim to invite more women in positions at the point of entry in the academic pipeline (e.g., in a tenure track position and/or as assistant professor). Far fewer diversity measures follow-up on entry programs to ensure equitable promotion and retention of employees further up the career ladder (Bokern et al., 2021). While policies targeted at influx might (still) be fitting in male-dominated NTE fields, our study results inform us that particularly for women in LSB, a follow-up plan should be in place further up the academic pipeline to ensure that women see equal opportunities in their promotion for leadership relative to their male peers. On a symbolic level, one example of how to showcase more inclusive exemplars of (women in) academic leadership, is an initiative by a Dutch University who included 99 portraits of female professors on the walls of the Senate Chamber that originally contained 117 portraits of men and one woman (Athena's Angels, 2016), Visibility of women in academic leadership may help early career female academics to envision themselves in a full professor position.

On an institutional level, our study results contribute to current debates about the implementation of the gender quota in (academic) leadership. Gender quota have been shown to increase female representation in the board rooms, yet there is little evidence for spill-over to other areas of leadership (Wang and Kelan, 2013; Wauters et al., 2014; Geys and Sørensen, 2019). While diversity quota may not have the anticipated immediate trickle-down effects many institutions hoped for, this research shows that on a psychological level gender quota are likely to serve an important function for early career female academics perceived future career prospects. Our study results suggest that doing nothing about the skewed gender representation across academic ranks in LSB fields does negate women's perceived opportunities to career advancement in academia—something that may be avoided when gender quota are in place.

With a unique sample of around 2,000 academics at mid-level careers in the Netherlands the ecological validity of our field data is high. What's more, the investigation of perceptions of a glass ceiling in academia likely forms a powerful parameter in the psychology of junior and mid-level female academics and how they see and act with regards to their future career at university. While both our sample and psychological approach are unique, there are several limitations to the data. First, as pointed out above, the current data showed a negative relationship between women's GCI and their *perceived* odds of advancing to leadership, but we have no data on women's *actual* leadership advancement in academic fields where a "thick" glass ceiling is observed. To further substantiate and validate the importance of these findings, studying women's actual career behaviors in relation to their perceptions is pertinent. Such research could empirically corroborate whether seeing a glass ceiling ahead indeed act as a self-fulfilling prophecy with women (self-) selecting out of academia (Powell and Butterfield, 1994).

Second, due to the cross-sectional nature of the data, claims of causality should be made with caution. We could quite safely assume that relatively stable parameters (Field, Gender, Gender Ratio) are likely to correlate strongly with women's perception of a glass ceiling, and as such *precede* women's perceived odds to progress to full professorship. Also, in terms of third variable explanations, by inserting covariates (i.e., academic age, tenure, rank, and contract) we were at least partially able to rule out that gender differences found in perceived glass ceilings and career prospects are attributable to those aspects on which female and male academics at mid-level careers already differ. Nevertheless, also in relation to the previous point, only longitudinal data, following mid-level career academics as they transition to new career phases would allow for making actual claims about the effects of perceived gender differences in odds to advance to leadership, for example based on survival analyses techniques. Third, self-report data in the study may raise concerns about common method bias (Podsakoff et al., 2003), yet scale testing demonstrated that such was negligible. Moreover, a key element of our model was to test for moderation (e.g., Field x Gender), and moderation effects cannot be artifacts of common method bias (Siemsen et al., 2010). Finally, because this research was conducted in the Netherlands, a country that scores relatively low on female representation in academic leadership relative to other European countries (European Commission, 2019) we cannot generalize our findings to other countries. In future research, cross-cultural comparisons, for example connecting glass ceiling effects to endorsement of gender–science stereotypes across fields and nations will be valuable.

CONCLUSION

In the life, social and behavioral fields, women's representation has grown rapidly over the past decades such that, on average, gender parity is almost achieved. Therefore, gender issues are seemingly less at stake in these fields, compared to the male-dominated natural sciences, technology, and economics. The results from this research suggest that women's higher numerical representation in LSB fields does not negate a masculine normative standard about academic leadership and success—to the contrary. Compared to in NTE fields, women at mid-level careers in LSB sciences reported to perceive a thicker glass ceiling, such that they saw a sharper contrast between women being well-represented at the lower, yet underrepresented at the top positions. This sharper contrast was negatively related to women's, but not men's, estimated odds to become a full professor some day; a gender inequality we did not observe in NTE fields. We conclude that women assistant and associate professors in LSB deal with gender discrimination toward full professorship, perhaps more so than women in NTE fields do. For this awareness should be raised and tailor-made policy interventions should be designed.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because the data is not publicly available due to privacy or ethical restrictions, e.g., containing information that could compromise the privacy of research participants. Therefore, only the Principal Investigators have access to the raw datafiles. The anonymized dataset to support the findings of this study are available upon reasonable request from the corresponding author. Requests to access the dataset should be directed to r.vanveelen@uu.nl.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Committee of the Faculty of Social and Behavioral Sciences Utrecht University (FETC17-010). The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

RV contributed to conceptualization, formal analysis, investigation, methodology, project administration, visualization of data, writing—original draft, and writing—review and editing. BD contributed to conceptualization, funding acquisition, methodology, project administration, supervision, and

writing—review and editing. All authors contributed to the article and approved the submitted version.

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REFERENCES

Abele, A. E., and Spurk, D. (2009). How do objective and subjective career success interrelate over time? *J. Occup. Organ. Psychol.* 82, 803–824. doi: 10.1348/096317909X470924

Abrams, D. E., and Hogg, M. A. (1990). *Social Identity Theory: Constructive and Critical Advances.* New York, USA: Springer-Verlag Publishing.

Allan, J. (1993). "Male elementary teachers. Experiences and perspectives," in *Doing "women's Work": Men in Nontraditional Occupations*. ed. C. L. Williams (Newbury Park, CA: Sage), 113–127.

Alt, N. P., Goodale, B., Lick, D. J., and Johnson, K. L. (2019). Threat in the company of men: ensemble perception and threat evaluations of groups varying in sex ratio. *Soc. Psychol. Personal. Sci.* 10, 152–159. doi: 10.1177/1948550617731498

Athena's Angels (2016). Room for women! Available at: https://www.athenasangels.nl/en/angels-action/267-room-for-women (Accessed January 31, 2022).

Babcock, L., Recalde, M. P., Vesterlund, L., and Weingart, L. (2017). Gender differences in accepting and receiving requests for tasks with low promotability. *Am. Econ. Rev.* 107, 714–747. doi: 10.1257/aer.20141734

Babic, A., and Hansez, I. (2021). The glass ceiling for women managers: antecedents and consequences for work-family Interface and well-being at work. *Front. Psychol.* 12:618250. doi:10.3389/fpsyg.2021.618250

Ballout, H. I. (2009). Career commitment and career success: moderating role of self-efficacy. *Career Dev. Int.* 14, 655–670. doi: 10.1108/13620430911005708

Becker, J. C., and Barreto, M. (2014). Ways to go: Men's and women's support for aggressive and nonaggressive confrontation of sexism as a function of gender identification. *J. Soc. Issues* 70, 668–686. doi: 10.1111/josi.12085

Begeny, C. T., Ryan, M. K., Moss-Racusin, C. A., and Ravetz, G. (2020). In some professions women have become well represented, yet gender bias persists –perpetuated by those who think it is not happening. *Sci. Adv.* 6:eaba7814. doi: 10.1126/sciadv.aba7814

Belkin, L. (2003). The Opt-out Revolution. New York Times Magazine. Available at: https://www.nytimes.com/2003/10/26/magazine/the-opt-out-revolution.html (Accessed October 26, 2013).

Blau, F. D., and Kahn, L. M. (2007). The gender pay gap: have women gone as far as they can? *JSTOR* 21, 7–23.

Bleijenbergh, I. L., van Engen, M. L., and Vinkenburg, C. J. (2013). Othering women: fluid images of the ideal academic. *Equal. Divers. Incl.* 32, 22–35. doi: 10.1108/02610151311305597

Bokern, Y., Van den Berg, J., Jansen, W.S., Van der Toorn, J., and Ellemers, N. (2021). De Nederlandse InclusiviteitsMonitor. Inzichten uit 2019–2020 [English: The Netherlands Inclusivitity Monitor. Insights from 2019–2020. Available at: https://nederlandseinclusiviteitsmonitor.nl/wp-content/uploads/2021/04/Bokern-et-al.-2021_NIM-Inzichten-uit-2019-2020].pdf (Accessed January 31, 2022).

Braun, S., Stegmann, S., Hernandez Bark, A. S., Junker, N. M., and van Dick, R. (2017). Think manager—think male, think follower—think female: gender bias in implicit followership theories. *J. Appl. Soc. Psychol.* 47, 377–388. doi: 10.1111/jasp.12445

Brewer, M. B. (1991). The social self: On being the same and different at the same time. *Personal. Soc. Psychol. Bull.* 17, 475–482. doi: 10.1177/0146167291175001

Britton, D. M. (2017). Beyond the chilly climate: The Salience of Gender in Women's Academic Careers. *Gend. Soc.* 31, 5–27. doi: 10.1177/0891243216681494

Brown, D. (ed.) (2002). "Status of theories of career choice and development. Career choice and development," in *Career Choice and Development*. (San Fransisco, California, USA: Jossey-Bass, A Wiley Company), 109–127.

Cadinu, M., Latrofa, M., and Carnaghi, A. (2013). Comparing self-stereotyping with in-group-stereotyping and out-group-stereotyping in unequal-status groups: the case of gender. *Self Identity* 12, 582–596. doi: 10.1080/15298868.2012.712753

Carli, L., and Eagly, A. (2016). Women face a labyrinth: an examination of metaphors for women leaders. *Gend. Manag.* 31, 514–527. doi: 10.1108/GM-02-2015-0007

Catalyst (2020). Women in Science, Technology, Engineering, and Mathemahics (STEM) (Quick Take). Available at:: https://www.catalyst.org/research/women-in-science-technology-engineering-and-mathematics-stem/ (Accessed January 31, 2022).

Cech, E. (2015). Engineers and engineeresses? Self-conceptions and the development of gendered professional identities. *Sociol. Perspect.* 58, 56–77. doi: 10.1177/0731121414556543

Cech, E. A., and Blair-Loy, M. (2010). Perceiving glass ceilings? Meritocratic versus structural explanations of gender inequality among women in science and technology. *Soc. Probl.* 57, 371–397. doi: 10.1525/sp.2010.57.3.371

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

Ceci, S. J., and Williams, W. M. (2015). Women have substantial advantage in STEM faculty hiring, except when competing against more-accomplished men. *Front. Psychol.* 6:1532. doi: 10.3389/fpsyg.2015.01532

Cheryan, S., Plaut, V. C., Davies, P. G., and Steele, C. M. (2009). Ambient belonging: how stereotypical cues impact gender participation in computer science. *J. Pers. Soc. Psychol.* 97, 1045–1060. doi: 10.1037/a0016239

Cohen, J. R., Dalton, D. W., Holder-Webb, L. L., and McMillan, J. J. (2020). An analysis of glass ceiling perceptions in the accounting profession. *J. Bus. Ethics* 164, 17–38. doi: 10.1007/s10551-018-4054-4

Cotter, D. A., Hermsen, J. M., Ovadia, S., and Vanneman, R. (2001). The glass ceiling effect. *Soc. Forces* 80, 655–681. doi: 10.1353/sof.2001.0091

Dämmrich, J., and Blossfeld, H. P. (2017). Women's disadvantage in holding supervisory positions. Variations among European countries and the role of horizontal gender segregation. *Acta Sociol.* 60, 262–282. doi: 10.1177/0001699316675022

De Goede, M., Van Veelen, R., and Derks, B (2016). Financiële beloning van mannen en vrouwen in de wetenschap. [Financial rewards of men and women in Academia]. Commissioned by Dutch Network of Women Professors (LNVH). Available at: https://www.scienceguide.nl/wp-content/uploads/2019/03/fin-beloningen-lnvh-2016.pdf (Accessed January 31, 2022).

Deaux, K., Major, B., Ashmore, R., Branscombe, N., Crocker, J., Darley, J., et al. (1987). Putting gender Into context: an interactive model of gender-related behavior. *Psychol. Rev.* 94, 369–389. doi: 10.1037/0033-295X.94.3.369

Derks, B., van Laar, C., and Ellemers, N. (2016). The queen bee phenomenon: why women leaders distance themselves from junior women. *Leadersh. Q.* 27, 456–469. doi: 10.1016/j.leaqua.2015.12.007

Dobbin, F., and Kalev, A. (2016). Why diversity programs fail. *Harv. Bus. Rev.* 94, 52–60.

Downes, M., Hemmasi, M., and Eshghi, G. (2014). When a perceived glass ceiling impacts organizational commitment and turnover intent: the mediating role of distributive justice. *J. Divers. Manag.* 9, 131–146. doi: 10.19030/jdm.v9i2.8971

Eagly, A. H (1987). *Sex Differences in Social Behavior: A Social-Role Interpretation*. Lawrence Erlbaum.

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

Elacqua, T. C., Beehr, T. A., Hansen, C. P., and Webster, J. (2009). Managers' beliefs about the glass ceiling: interpersonal and organizational factors. *Psychol. Women Q.* 33, 285–294. doi: 10.1177/0361684309033003O4

Ellemers, N. (2014). Women at work: how organizational features impact career development. *Policy Insights Behav. Brain Sci.* 1, 46–54. doi: 10.1177/237273221454932

Ellemers, N., de Gilder, D., and van den Heuvel, H. (1998). Career-oriented versus team-oriented commitment and behavior at work. *J. Appl. Psychol.* 83, 717–730. doi: 10.1037/0021-9010.83.5.717

Ellemers, N., Spears, R., and Doosje, B. (2002). Self and social identity. *Annu. Rev. Psychol.* 53, 161–186. doi: 10.1146/annurev.psych.53.100901.135228

Ellemers, N., Wilke, H., and Van Knippenberg, A. (1993). Effects of the legitimacy of low group or individual status on individual and collective status-enhancement strategies. *J. Pers. Soc. Psychol.* 64, 766–778. doi: 10.1037/0022-3514.64.5.766

Elliott, J. R., and Smith, R. A. (2004). Race, gender, and workplace power. *Am. Sociol. Rev.* 69, 365–386. doi: 10.1177/000312240406900303

Ely, R. J. (1995). The power in demography: Women's social constructions of gender identity at work. *Acad. Manag. J.* 38, 589–634.

European Commission (2019). She Figures 2018. Available at: https://ec.europa.eu/info/publications/she-figures-2018_en (Accessed January 31, 2022).

Evans, J. (1997). Men in nursing: issues of gender segregation and hidden advantage. *J. Adv. Nurs.* 26, 226–231. doi: 10.1046/j.1365-2648.1997.1997026226.x

Evetts, J. (1992). Dimensions of career: avoiding reification in the analysis of change. *Sociology* 26, 1–21. doi: 10.1177/0038038592026001002

Faniko, K., Ellemers, N., and Derks, B. (2021). The Queen bee phenomenon in academia 15 years after: does it still exist, and if so, why? *Br. J. Soc. Psychol.* 60, 383–399. doi: 10.1111/bjso.12408

Faniko, K., Ellemers, N., Derks, B., and Lorenzi-Cioldi, F. (2017). Nothing changes, really: why women who break through the glass ceiling end Up reinforcing it. *Personal. Soc. Psychol. Bull.* 43, 638–651. doi: 10.1177/0146167217695551

Faul, F., Erdfelder, E., Lang, A. G., and Buchner, A. (2007). G* power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav. Res. Methods* 39, 175–191. doi: 10.3758/BF03193146

Fisher, G. G., Matthews, R. A., and Gibbons, A. M. (2016). Developing and investigating the use of single-item measures in organizational research. *J. Occup. Health Psychol.* 21, 3–23. doi: 10.1037/a0039139

Foley, S., Kidder, D. L., and Powell, G. N. (2002). The perceived glass ceiling and justice perceptions: an investigation of hispanic law associates. *J. Manag.* 28, 471–496. doi: 10.1177/014920630202800401

Fouad, N. A., Singh, R., Cappaert, K., Chang, W., and Wan, M. (2016). Comparison of women engineers who persist in or depart from engineering. *J. Vocat. Behav.* 92, 79–93. doi: 10.1016/j.jvb.2015.11.002

Geys, B., and Sørensen, R. J. (2019). The impact of women above the political glass ceiling: evidence from a Norwegian executive gender quota reform. *Elect. Stud.* 60:102050. doi: 10.1016/j.electstud.2019.102050

Groeneveld, S., Tijdens, K., and van Kleef, D. (2012). Gender differences in academic careers: evidence for a Dutch university from personnel data 1990-2006. *Equal. Divers. Incl.* 31, 646–662. doi: 10.1108/02610151211263487

Gruber, J., Mendle, J., Lindquist, K. A., Schmader, T., Clark, L. A., Bliss-Moreau, E., et al. (2021). The future of women in psychological science. *Perspect. Psychol. Sci.* 16, 483–516. doi: 10.1177/1745691620952789

Grunspan, D. Z., Eddy, S. L., Brownell, S. E., Wiggins, B. L., Crowe, A. J., and Goodreau, S. M. (2016). Males under-estimate academic performance of their female peers in undergraduate biology classrooms. *PLoS One* 11:e0148405. doi: 10.1371/journal.pone.0148405

Guan, Y., Zhou, W., Ye, L., Jiang, P., and Zhou, Y. (2015). Perceived organizational career management and career adaptability as predictors of success and turnover intention among Chinese employees. *J. Vocat. Behav.* 88, 230–237. doi: 10.1016/j.jvb.2015.04.002

Hall, W. M., Schmader, T., and Croft, E. (2015). Engineering exchanges: daily social identity threat predicts burnout among female engineers. *Soc. Psychol. Personal. Sci.* 6, 528–534. doi: 10.1177/1948550615572637

Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling [White paper]. Available at: http://www.afhayes.com/public/process2012.pdf (Accessed January 31, 2022).

Heilman, M. E., and Parks-Stamm, E. J. (2007). "Gender stereotypes in the workplace: obstacles to Women's career Progress," in *Social Psychology of Gender (Advances in Group Processes). Vol. 24*. ed. S. J. Correll (Bingley: Emerald Group Publishing Limited), 47–77.

Hogg, M. A., and Turner, J. C. (1987). Intergroup behaviour, self-stereotyping and the salience of social categories. *Br. J. Soc. Psychol.* 26, 325–340. doi: 10.1111/j.2044-8309.1987.tb00795.x

Järlström, M., Brandt, T., and Rajala, A. (2020). The relationship between career capital and career success among Finnish knowledge workers. *Balt. J. Manag.* 15, 687–706. doi: 10.1108/BJM-10-2019-0357

Jost, J. T., Chaikalis-Petritsis, V., Abrams, D., Sidanius, J., van der Toorn, J., and Bratt, C. (2012). Why men (and women) do and don't rebel: effects of system justification on willingness to protest. *Personal. Soc. Psychol. Bull.* 38, 197–208. doi: 10.1177/0146167211422544

Kanter, R. M. (1977). "Some effects of proportions on group life," in *The Gender Gap in Psychotherapy*. eds. P. P. Rieker and E. Carmen (Boston, MA: Springer).

Kiaye, E. R., and Maniraj Singh, M. A. (2013). The glass ceiling: a perspective of women working in Durban. *Gend. Manag.* 28, 28–42. doi: 10.1108/17542411311301556

Kleinman, C. S. (2004). Understanding and capitalizing on men's advantage in nursing. *J. Nurs. Adm.* 34, 78–82. doi: 10.1097/00005110-200402000-00005

Kmec, J. A., McDonald, S., and Trimble, L. B. (2010). Making gender fit and "correcting" gender misfits: sex segregated employment and the nonsearch process. *Gend. Soc.* 24, 213–236. doi: 10.1177/0891243209360531

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

Kteily, N. S., and Richeson, J. A. (2016). Perceiving the world Through hierarchy-shaped glasses: On the need to embed social identity effects on perception Within the broader context of intergroup hierarchy. *Psychol. Inq.* 27, 327–334. doi: 10.1080/1047840X.2016.1215212

Kulik, C. T., and Rae, B. (2019). "The Glass Ceiling in Organizations," in *Oxford Research Encyclopedia of Business and Management*. (Oxford, UK: Oxford University Press).

Lent, R. W., Hackett, G., and Brown, S. D. (1999). A social cognitive view of school-to-work transition. *Career Dev. Q.* 47, 297–311. doi: 10.1002/j.2161-0045.1999.tb00739.x

LNVH (2018). Women Professors Monitor 2018. Dutch Network of Female Professors (LNVH). Available at: https://www.lnvh.nl/a-2966/monitor2018 (Accessed January 31, 2022).

Lyness, K. S., and Heilman, M. E. (2006). When fit is fundamental: performance evaluations and promotions of upper-level female and male managers. *J. Appl. Psychol.* 91, 777–785. doi: 10.1037/0021-9010.91.4.777

Malin, L., and Wise, R. (2018). "Glass Ceilings, Glass Escalators and Revolving Doors," in *Sequence Analysis and Related Approaches. Life Course Research and Social Policies. Vol. 10.* eds. G. Ritschard and M. Studer. (Springer, Cham).

Malos, S. B., and Campion, M. A. (1995). An options-based model of career mobility in professional service firms. *Acad. Manag. Rev.* 20, 611–644. doi: 10.5465/amr.1995.9508080332

Mayrhofer, W., Meyer, M., and Steyrer, J. (2007). "Contextual issues in the study of careers," in *Handbook of Career Studies*. eds. H. Gunz and M. Peiper (Thousand Oaks, CA: Sage), 215–240.

McCoy, S. K., and Major, B. (2007). Priming meritocracy and the psychological justification of inequality. *J. Exp. Soc. Psychol.* 43, 341–351. doi: 10.1016/j.jesp.2006.04.009

McKinsey (2012). Unlocking the Full Potential of Women at Work. McKinsey & Company. Available at: https://www.mckinsey.com/business-functions/organization/our-insights/unlocking-the-full-potential-of-women-at-work (Accessed January 31, 2022).

Meeussen, L., Begeny, C. T., Peters, K., and Ryan, M. K. (2021). In traditionally male-dominated fields, women are less willing to make sacrifices for their career because discrimination and lower fit with people up the ladder make sacrifices less worthwhile. *J. Appl. Soc. Psychol.* doi: 10.1111/jasp.12750

Miller, D. I., and Wai, J. (2015). The bachelor's to Ph.D. STEM pipeline no longer leaks more women than men: A 30-year analysis. *Front. Psychol.* 6:37. doi: 10.3389/fpsyg.2015.00037

Morgan, M (2015) Glass ceilings and sticky floors: Drawing new ontologies. Economic History Working Papers No. 228/2015. London, UK: London School of Economics and Political Science.

Morgenroth, T., and Heilman, M. E. (2017). Should I stay or should I go? Implications of maternity leave choice for perceptions of working mothers. *J. Exp. Soc. Psychol.* 72, 53–56. doi: 10.1016/j.jesp.2017.04.008

Morgenroth, T., Ryan, M. K., Rink, F., and Begeny, C. (2021). The (in)compatibility of identities: understanding gender differences in work–life conflict through the fit with leaders. *Br. J. Soc. Psychol.* 60, 448–469. doi: 10.1111/bjso.12411

Ng, T. W., Eby, L. T., Sorensen, K. L., and Feldman, D. C. (2005). Predictors of objective and subjective career success: a meta-analysis. *Pers. Psychol.* 58, 367–408. doi: 10.1111/j.1744-6570.2005.00515.x

Ng, T. W., and Feldman, D. C. (2014). Subjective career success: a meta-analytic review. *J. Vocat. Behav.* 85, 169–179. doi: 10.1016/j.jvb.2014.06.001

Onorato, R. S., and Turner, J. C. (2004). Fluidity in the self-concept: The shift from personal to social identity. *Eur. J. Soc. Psychol.* 34, 257–278. doi: 10.1002/ejsp.195

Peters, K., Ryan, M. K., and Haslam, S. A. (2015). Marines, medics, and machismo: lack of fit with masculine occupational stereotypes discourages men's participation. *Br. J. Psychol.* 106, 635–655. doi: 10.1111/bjop.12106

Peters, K., Ryan, M., Haslam, S. A., and Fernandes, H. (2012). To belong or not to belong: evidence that women's occupational disidentification is promoted by lack of fit with masculine occupational prototypes. *J. Pers. Psychol.* 11, 148–158. doi: 10.1027/1866-5888/a000067

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., and Podsakoff, N. P. (2003). Commonmethod biases in behavioral research: a critical review of the literature andrecommended remedies. *J. Appl. Psychol.* 88, 879–903. doi: 10.1037/0021-9010.88.5.879

Poole, M. E., Langan-Fox, J., and Omodei, M. (1993). Contrasting subjective and objective criteria as determinants of perceived career success: a longitudinal study. *J. Occup. Organ. Psychol.* 66, 39–54. doi: 10.1111/j.2044-8325.1993.tb00515.x

Powell, G. N., and Butterfield, D. A. (1994). Investigating the "glass ceiling" phenomenon: an empirical study of actual promotions to top management. *Acad. Manag. J.* 37, 68–86.

Price-Glynn, K., and Rakovski, C. (2012). Who rides the glass escalator? Gender, race and nationality in the national nursing assistant study. *Work Employ. Soc.* 26, 699–715. doi: 10.1177/0950017012451634

Saguy, T., and Chernyak-Hai, L. (2012). Intergroup contact can undermine disadvantaged group members' attributions to discrimination. *J. Exp. Soc. Psychol.* 48, 714–720. doi: 10.1016/j.jesp.2012.01.003

Saguy, T., Tausch, N., Dovidio, J. F., and Pratto, F. (2009). The irony of harmony: intergroup contact can produce false expectations for equality. *Psychol. Sci.* 20, 114–121. doi: 10.1111/j.1467-9280.2008.02261.x

Sanders, K., Willemsen, T. M., and Millar, C. C. J. M. (2009). Views from above the glass ceiling: does the academic environment influence women professors' careers and experiences? *Sex Roles* 60, 301–312. doi: 10.1007/s11199-008-9547-7

Scheepers, D., and Ellemers, N. (2019). "Status stress: explaining defensiveness to the resolution of social inequality in members of dominant groups," in *The Social Psychology of Inequality*. eds. J. Jetten and K. Peters (Cham: Springer), 267–287.

Shabsough, T., Semerci, A. B., and Ergeneli, A. (2021). Women's entrepreneurial intention: The role of sticky floor perception and social networking. *Int. J. Entrep. Innov.* 22, 45–55. doi: 10.1177/1465750320927356

Siemsen, E., Roth, A., and Oliveira, P. (2010). Common method bias in regressionmodels with linear, quadratic, and interaction effects. *Organ. Res. Methods* 13, 456–476. doi: 10.1177/1094428109351241

Smith, P., Caputi, P., and Crittenden, N. (2012). A maze of metaphors around glass ceilings. *Gend. Manag.* 27, 436–448. doi: 10.1108/17542411211273432

Smyth, F. L., and Nosek, B. A. (2015). On the gender-science stereotypes held by scientists: explicit accord with gender-ratios, implicit accord with scientific identity. *Front. Psychol.* 6:415. doi: 10.3389/fpsyg.2015.00415

Spears, R., Doosje, B., and Ellemers, N. (1997). Self-stereotyping in the face of threats to group status and distinctiveness: The role of group identification. *Personal. Soc. Psychol. Bull.* 23, 538–553. doi: 10.1177/0146167297235009

Tajfel, H., and Turner, J. C. (1979). "An integrative theory of intergroup conflict," in *The Social Psychology of Intergroup Relations*. eds. S. Worchel and W. G. Austin (Monterey, CA: Brooks), 33–47.

Torre, M. (2018). Stopgappers? The occupational trajectories of men in female-dominated occupations. *Work. Occup.* 45, 283–312. doi: 10.1177/0730888418780433

Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D., and Wetherell, M. S. (1987). *Rediscovering the Social Group: A Self-Categorization Theory.* Oxford, UK: Basil Blackwell.

Van den Brink, M., Benschop, Y., and Jansen, W. (2010). Transparency in academic recruitment: a problematic tool for gender equality? *Organ. Stud.* 31, 1459–1483. doi: 10.1177/0170840610380812

Van Laar, C., Meeussen, L., Veldman, J., van Grootel, S., Sterk, N., and Jacobs, C. (2019). Coping with stigma in the workplace: understanding the role of threat regulation, supportive factors, and potential hidden costs. *Front. Psychol.* 10:1879. doi: 10.3389/fpsyg.2019.01879

Van Veelen, R., and Derks, B. (2019). Verborgen verschillen in werktaken, hulpbronnen en onderhandelingen over arbeidsvoorwaarden tussen vrouwelijke en mannelijke wetenschappers in Nederland. [Hidden differences between male and female academic staff at Dutch universities in terms of tasks, access to resources and negotiation of employment terms]. Commisioned by Dutch Network of Women Professors (LNVH). Available at: https://www.lnvh.nl/a-3041/rapport-lnvh:-verborgen-beloningsverschillen-in-de-wetenschap:-vrouwelijke-wetenschappers-do-ask-but-dont-get (Accessed January 31, 2022).

Van Veelen, R., and Derks, B. (2021). Academics as agentic superheroes: female academics' lack of fit with the agentic stereotype of success limits their career advancement. *Br. J. Soc. Psychol.* doi: 10.1111/bjso.12515

Van Veelen, R., Derks, B., and Endedijk, M. D. (2019). Double trouble: how being outnumbered and negatively stereotyped threatens career outcomes of women in STEM. *Front. Psychol.* 10:150. doi: 10.3389/fpsyg.2019.00150

Van Veelen, R., Veldman, J., van Laar, C., and Derks, B. (2020). Distancing from a stigmatized social identity: state of the art and future research agenda on self-group distancing. *Eur. J. Soc. Psychol.* 50, 1089–1107. doi: 10.1002/ejsp.2714

Van Vianen, A. E. M., and Fischer, A. H. (2002). Illuminating the glass ceiling: the role of organizational culture preferences. In. *J. Occup. Organ. Psychol.* 75, 315–337. doi: 10.1348/096317902320369730

Van Veelen, R., Otten, S., Cadinu, M., and Hansen, N. (2016). An integrative model of social identification: self-stereotyping and self-anchoring as two cognitive pathways. *Pers. Soc. Psychol. Rev.* 20, 3–26. doi: 10.1177/1088868315576642

Vesterlund, L. (2015). Breaking the Glass Ceiling with "No": Gender Differences in Accepting and Receiving Requests for Non-Promotable Tasks (No. 5663).

Vinkenburg, C. J., Van Engen, M. L., and Peters, C. P. (2015). "Promoting new norms and true flexibility: sustainability in combining career and care", in *Handbook of Research on Sustainable Careers*. eds. A. De Vos and B. I. J. M. Van der Heijden (Cheltenham, UK: Edward Elgar), 131–145.

Wang, M., and Kelan, E. (2013). The gender quota and female leadership: effects of the Norwegian gender quota on board chairs and CEOs. *J. Bus. Ethics* 117, 449–466. doi: 10.1007/s10551-012-1546-5

Wauters, B., Maddens, B., and Put, G. J. (2014). It takes time: the long-term effects of gender quota. *Representations* 50, 143–159. doi: 10.1080/00344893.2013.860911

Williams, C. L. (1992). The glass escalator: hidden advantages for men in the "female" professions. *Soc. Probl.* 39, 253–267. doi: 10.2307/3096961

Williams, C. L. (2013). The glass escalator, revisited: gender inequality in neoliberal times, SWS feminist lecturer. *Gend. Soc.* 27, 609–629. doi: 10.1177/0891243213490232

Xiao, Y. J., Coppin, G., and van Bavel, J. J. (2016). Perceiving the world through group-colored glasses: a perceptual model of intergroup relations. *Psychol. Inq.* 27, 255–274. doi: 10.1080/1047840X.2016.1199221

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The Social Science of Institutional Transformation: Intersectional Change in the Academy

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This article examines intersectional praxis as an approach to institutional transformation, arguing that intersectionality is both a catalyst for and outcome of gender equity efforts in the social sciences and other academic STEM fields. As such, approaching gender equity intersectionally can be understood as a way that theory and practice are co-constitutive in social science and hence an important aspect of transforming academic institutions. Through a case study of the US National Science Foundation (NSF) ADVANCE program for gender equity in STEM, I look at the development of ADVANCE from an effort to support women in scientific fields to becoming a program for institutional transformation grounded in an intersectional understanding of women's inequity in the academic labor force. I ask two related questions in the efforts to address gender inequities in STEM. First, what is the relationship between academic institutions (which are simultaneously sites for the discovery of knowledge and gender inequality) and the National Science foundation, as the premier American academic institutional funding agency? Second, how has this relationship, through those working on ADVANCE, fundamentally shifted the understanding of the social scientific tools and strategies necessary to advance equity for women in academia? In looking at these questions, I argue that, beyond women's representation in social sciences and academia broadly, intersectionality is an important scholarly advance in social science that offers a dialectical tool for change.

Keywords: intersectionality, academic institutions, social science, institutional transformation, STEM equity, knowledge

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INTRODUCTION

This article examines intersectional praxis as an approach to institutional transformation, arguing that intersectionality is both a catalyst for and outcome of gender equity efforts in the social sciences and other academic STEM fields. As such, approaching gender equity intersectionally can be understood as a way that theory and practice are co-constitutive in social science and hence an important aspect of transforming academic institutions. Through a case study of the US National Science Foundation (NSF) ADVANCE program for gender equity in STEM, I look at the development of ADVANCE from an effort to support women in scientific fields to becoming a program for institutional transformation grounded in an intersectional understanding of women's inequity in the academic labor force. I ask two related questions in the efforts to address gender inequities in STEM. First, what is the relationship between academic institutions (which are simultaneously sites for the discovery of knowledge and gender inequality), and the National Science foundation, as the premier American academic institutional funding agency?

Second, how has this relationship, through those working on ADVANCE, fundamentally shifted the understanding of the social scientific tools and strategies necessary to advance equity for women in academia?

In answering these questions, I argue that, beyond women's representation in social sciences and academia broadly, intersectionality is an important scholarly advance that offers a dialectical tool for change. More than just a buzzword (Davis, 2008) an intersectional approach simultaneously calls attention to multiple sites and processes of institutional oppression and privilege while still being attentive to the individuals that occupy disadvantaged structural locations (Cho et al., 2013). For social scientists, therefore, intersectionality offers a praxis or practice that attends to structural inequality as well as the representation of individuals in addressing social change. Indeed, faculty who have taken on much of the work of institutional transformation are, themselves, also the targets of the structural reform that ADVANCE seeks to achieve. Social science fields including psychology, sociology, political science, anthropology and economics are classified as sciences by NSF definitions (Congressional Research Service, 2012). Social scientists involved in ADVANCE thus seek to solve inequities on a structural level, but also reflexively understand these issues as reflected in their own experiences (see Laube, 2021; McQuillan and Hernandez, 2021).

Because of this focus on gender representation, in most ADVANCE programs, gender is generally treated as binary, and equity efforts entail adopting programs for inclusivity and women's access to academic STEM fields. While there has long been attention to women's representation in the natural and physical sciences, women's access in the social sciences is also unequal. Economics and political science are also dominated by white men, with women representing 32% of political scientists and 24% of economists (Hur et al., 2017). While sociology and psychology have achieved overall gender parity (National Science Foundation [NSF], 2019), both fields have fewer women full professors (American Psychological Association, 2014; American Sociological Association, 2016) giving rise to concerns over a leaky pipeline (National Science Foundation [NSF], 2019). Moreover, BIPOC (black, indigenous, people of color) women are significantly underrepresented in academic sociology and psychology (American Sociological Association, 2016; Hur et al., 2017; Stewart and Vailan, 2018; National Science Foundation [NSF], 2019).

Adopting intersectionality as part of the ADVANCE program, therefore, had implications for the social sciences as STEM disciplines, as these fields developed strategies of structural change to address the ways that gender inequality is intersectionally defined, and in particular, the ongoing underrepresentation of BIPOC women in the academy (DeAro et al., 2019; Fox Tree and Vaid, 2022; Gregory, 2001). Through the ADVANCE program, intersectional approaches to inequality recognize the contributions of underrepresented women, while also calling upon the social sciences to devise institutionally based strategies to increase the representation of all women throughout the academy (Carbado et al., 2013).

Because strategies for gender equity are designed by each individual NSF ADVANCE institutional awardee, this case study of ADVANCE draws on the websites, proposals, reports and publications of a random sample of institutional transformation programs, examining the strategies adopted by these institutions. Looking at ADVANCE historically, I also consider the changes in the calls for ADVANCE proposals that guided these programs. I discuss the feedback loop among social scientists who are working toward gender equity, the funding agency and academic institutions in advancing intersectional change to facilitate women's representation.

Approaching gender equity intersectionally engages theory and practice as co-constitutive in the process of transforming academic institutions. This defines intersectionality interactively, or as the interplay between and among social actors and social institutions as they give meanings to categories such as "race," "gender" and "class" (Ferree, 2009). Rather than something inherent in social structures, intersectionality emerges through a dynamic process that ensures that the role of social actors is not overlooked (Ferree, 2009). Intersectional analysis thus involves looking at the processes by which configurations of intersectional social relations and institutional sites arise (Choo and Ferree, 2010). By adopting intersectionality in programs to address equity in the academy, I argue that social sciences helped design strategies and inform notions of their own representation and overall mechanisms of institutional change (see Patton and Haynes, 2018).

I begin with a brief overview of NSF ADVANCE goals for gender equity through systemic change in academic STEM fields. I then discuss the evolution of the ADVANCE program in dialogue with institutional grantees, and the initiatives to address institutional inequity that the grantees implement. Next, I consider the explicit introduction of intersectionality into ADVANCE as an important discursive moment for fostering equity for women with intersectional identities, particularly BIPOC women. As social scientists adopted an intersectional lens, they furthered the possibilities of transformation through the intersectional production of knowledge and continue to move the academy to structural changes to generate a culture of equity through the recognition of minoritized women of color (Patton and Haynes, 2018).

CASE STUDY: NSF ADVANCE

Gender equity in Science, Technology, Engineering and Mathematics (STEM) fields is a primary policy and higher education goal in the US and across many countries (Kodate et al., 2010; Smith, 2011; Morimoto and Zajicek, 2014; Rimmer and Sawer, 2016). The National Science Foundation (NSF) began the ADVANCE program as an effort to foster gender equity by facilitating STEM women faculty's access to and advancement in US academic institutions (DeAro et al., 2019). In the United States, gender equity is often couched in this binary, and specifically to ensure the talent and participation of the full workforce in order to maintain a leadership position in innovation and technology (Zippel and Ferree, 2017). As

STEM fields are historically dominated by men, facilitating opportunities for women in STEM is critical to building the talent pool in technological fields and hence an important policy goal. The ADVANCE program was designed with the understanding that—for women to gain equity in the STEM workforce—they must also be teachers, mentors and leaders in scientific fields.

The US NSF ADVANCE program provides an important case study because the National Science Foundation is the primary funder of basic research and education in the social sciences in the US (Congressional Research Service., 2021) With one of NSF's primary goals being to "promote the progress of science," this independent federal funding agency is governed by a director and a National Science Board that also serves in an advisory capacity to the US Congress and President (Congressional Research Service, 2012). Accordingly, the NSF's approach to creating equity in STEM fields influences and enables the how US universities understand and tackle this issue. Moreover, demands for greater inclusion informs policy—not just in the United States, but also in the United Kingdom and the European Union (Elomäki, 2015; Ferree and Zippel, 2015).

To achieve more inclusive STEM fields, in the early days of ADVANCE, research on gender equity came from studies that showed that organizations were inherently gendered and unequal (Ferguson, 1984; Acker, 1990). These concepts were applied to academia in an 1999 MIT report (MIT Report, 1999) that stated that gender inequity is embedded in the broad environment of academic culture and reinforced through micro-level institutional processes (National Academy of Sciences (US), 2006). Therefore, as programs for equity developed, efforts shifted from enabling individual women to successfully navigate academia and defining gender equity in terms of the number of women in academic positions, to finding ways to transform educational institutions into more equitable environments.

In the discussion that follows, this article considers how social scientific theory about gender equity developed alongside these programs for institutional change. Accordingly, social science STEM disciplines—particularly psychology and sociology—engaged in the practice of dismantling gender inequality within their institutions and disciplines through designing and implementing ADVANCE equity strategies. Accordingly, social scientists argued that transformation requires attending to intersectionality, or the complex ways that multiple axes of ability and constraint—including race, class, sexuality and physical ability, among others—limit women's access to academic careers and success (Browne and Misra, 2003; Ong, 2011; Wu and Jing, 2011; Morimoto and Zajicek, 2014; Armstrong and Jovanovich, 2017).

DATA AND METHODS

Because ADVANCE programs are designed and implemented by individual institutions, I conducted content analysis of ADVANCE documents from two randomly selected institutions in each of the ADVANCE Institutional Transformation cohorts 1-7 (2001-2014), and all of the social science projects in cohorts 8 and 9 (2016 and 2019), as these most recent cohorts represent the period for which NSF required intersectionality as an additional criteria in ADVANCE proposals. Project analysis included a review of all of the documents and websites associated with the NSF ADVANCE grant, including research proposals, reports, publications and white papers. This study included analysis of all of the social science supplemental projects, where available. Alongside the analysis of proposals, I reviewed the ADVANCE calls for proposals for the years from 2005 to 2016 ($n = 5$) to document changes in the call and conceptualization of the ADVANCE project (see also Laursen and De Welde, 2019).

Content analysis was performed on documents, deriving codes related to intersectionality and generating themes (Boyatzis, 1998). Initial categories were developed according to the intervention or social science phenomenon that was the subject of the study. Subsequent codes examined the ways that intersectionality was implicated or studied in the research, according to identities that modified gender such as URM, BIPOC or LGBTQ (Armstrong and Jovanovich, 2017), as well as the theory or social phenomenon that the social science project was engaging. Documents were then reexamined with codes in mind to understand what type of intersectional approach the projects were taking. Specifically, we noted whether intersectionality was treated as counting the number of women in various categories (i.e., BIPOC women, Latinas, etc.) and/or if intersectionality was emergent (i.e., social phenomena of inclusion or exclusion arose within organizational contexts, or if those contexts gave meanings to penalties and privileges). To the extent that a specific category of women were being studied, we noted this as well, along with the level of analysis of the ADVANCE project, and how or whether the study included structural change. Coding was conducted by the author and a research assistant, to allow for a check on the quality of coding and reconcile differences in document analysis.

In reviewing these documents, I sought to gain insight into how issues of gender equity were framed and what the theories or strategies social scientists relied on in seeking gender equity in academic institutions. In contextualizing the documentation in terms of the literature on ADVANCE and the projects coming out of ADVANCE, I seek to understand how changing concepts of addressing equity are reflected in the social scientific discovery that has come out of NSF ADVANCE. In addition, I assess the extent to which the evolution of the social science coming out of ADVANCE paves the way for women's representation and success in the academy and continues to impact how social scientists understand strategies to increase equity. It is important to note that the content analysis does not provide a rigorous overview or assessment of ADVANCE projects or their accomplishments and relies on data that is self-reported through project websites and materials. Moreover, I do not assess BIPOC women's outcomes quantitively. Instead, my goal is to understand how social science continues to evolve in seeking equity, arguing that an intersectional framework is an emergent and central component of change for the social scientists working on these grants, as well as for the disciplinary contexts in which they pursued institutional transformation.

THE FIRST GENERATION OF ADVANCE: FROM A PROGRAM FOR WOMEN TO INSTITUTIONAL TRANSFORMATION

At its inception, NSF ADVANCE offered competitive opportunities for women scientists to advance in academic institutions through fellowships, grant funding, and similar opportunities that targeted individual scientists (Armstrong and Jovanovich, 2017; DeAro et al., 2019). With an approach that focused on representation, early ADVANCE programming sought to provide funding for STEM women and thereby offer a path to their success. While this strategy allowed for an impact on a handful of women, it also implied that navigating the academy was an individual pursuit, and that, with assistance, women could and would become successful within the constraints of the institution. More pejoratively referred to as a strategy of "fixing women," (Dalton, 2001; Stewart and Vailan, 2018) social science critics argued that the problems of inequity could not be resolved by supporting the careers of token experts, but instead the key to a more equitable scientific workforce entailed addressing the ways that academic institutions constrained and enabled faculty (Rosser and Lane, 2002; Rosser, 2017; DeAro et al., 2019).

Accordingly, to address inequality inherent in academic culture (MIT Report, 2010), ADVANCE also called for an institutional transformation (IT) track, which supported transforming the institutional contexts in which scientific and engineering knowledge is produced. Spurred by social science research indicating that institutional barriers can only be addressed by institutional-level solutions, the ADVANCE IT program was designed to effect change at the institutional level, rather than focusing on supporting careers of individual women (Rosser, 2006).

The decision to engage gender equity as a problem of transforming institutions derived from a long line of feminist thinking showing how gender—defined as a social relation, institution, and/or structure—is deeply embedded in the everyday operations of modern bureaucracies. Stemming from sociology, this scholarship showed the complexity of discriminatory structures, as well as the contradictory processes and the multiplicity of meanings and symbols permeating gendered organizations (Alvesson and Billing, 1992; Britton, 2000; Reskin, 2003; Ridgeway, 2009). Indeed, Acker's (1990) groundbreaking work on gendered organizations prompted the rapid development of scholarship on the organizational processes, practices, and mechanisms that create and reproduce gender inequalities. Consequently, feminist scholars replaced the notion that equity requires the abolition of bureaucracy (Firestone, 1970; Ferguson, 1984; Acker, 1990) with a sociological research that asserted that greater equity required the transformation of the bureaucratic institution (Britton, 2000; Britton and Logan, 2008; McQuillan and Hernandez, 2021). Thus, moving from an initial focus on women scientists and STEM disciplines, the ADVANCE IT program called for strategies to transform systematically the day-to-day operations of institutions of higher education in pursuit of gender equity (Rosser and Lane, 2002; DeAro et al., 2019) and ultimately, create a better workplace for all faculty (Stewart et al., 2007; Bilmoria and Liang, 2012; Laursen and Austin, 2020). Recognizing that structural barriers to gender equity are specific to institutional contexts, therefore, ADVANCE solicits grant proposals seeking to implement activities that will lead to greater gender equity in STEM fields by transforming those institutions.

Targeting these institutional barriers was thus borne from social science research, and a way for social scientists to address inequality in their own fields. As Valian and Stewart note, much of their ADVANCE work was informed by their experiences as academic psychologists (Stewart and Vailan, 2018; see also McQuillan and Hernandez, 2021). Accordingly, early ADVANCE grantees focused on social science research that corresponded with barriers to women's STEM equity such as lack of transparency and clarity in tenure and promotion and the absence of effective mentoring structures. For example, in the first IT cohort in 2001, Georgia Tech examined how gender affects mentoring and mentoring networks. Fox and Fonesca (2006) found that both women and men of higher rank are more likely to mentor, but men are more likely to mentor men only, while women are likely to mentor both men and women (Fox and Fonesca, 2006). Moreover, Fox and Fonesca (2006) show that mentoring is variable by institutional climate, but importantly, institutional climate varies by gender composition.

Also in an early cohort (2005), UNC Charlotte sought to address "the interplay between structural and social psychological factors that generate gender inequality" (University of North Carolina Charlotte, 2005). Through a number of initiatives aimed at recruitment, mentoring, leadership and salary equity, UNC Charlotte's ADVANCE team reported better climate and more women STEM faculty at the end of their granting period. At the same time, however, the number of underrepresented minority faculty declined during this time (Lorden et al., 2013). Consistent with NSF proposal requirements of this cohort, the initial Charlotte project used a social science framing that addressed gender inequity, and included analysis of underrepresented minority (URM) faculty. Importantly, their approach centered on identifying and solving inequities through institutional research rather than developing an underlying understanding of the mechanisms that created that inequality (Devine et al., 2017; Laursen and Austin, 2020).

In developing attention to multiple sites of inequality, ADVANCE social science researchers at University of Nebraska-Lincoln (cohort 2008) examined the networks of faculty in STEM to understand how faculty were connected and what these connections meant for long-term faculty success. Networks analysis provided insight into individual and departmental connections and isolation, as well as access to collaborative, mentorship and social networks for faculty members, finding that women and non-white faculty are more likely to be peripheral network actors (Falci, 2009; Falci and Watanabe, 2020).

Over time, the National Science Foundation became increasingly explicit about the social science aspect of the projects, and the use of social science theory and methods to investigate persistent inequalities (Laursen and De Welde, 2019). In addition to articulating the planned activities for

structural equity within institutions, starting in 2010, NSF called for a research project to accompany the main activities of the grant, indicating "IT projects must include a 5-page research component designed to study the effectiveness of the proposed innovations in order to contribute to the knowledge base informing academic institutional transformation" (National Science Foundation [NSF], 2010). In doing so, NSF incorporated social science into the ADVANCE program for institutional transformation.

These criteria became more explicit in their connection to social science research, when, in 2014, the solicitation was revised to indicate: "the supplemental document must include information relevant to the proposed study, such as: (1) the disciplinary and conceptual framework for the project; (2) a discussion of the theory or theories grounding the research and the testable hypotheses; (3) the proposed methods to test the hypotheses; (4) the expected findings; and (5) to what extent the results and data will be disaggregated for multiple characteristics such as race, ethnicity, sexual orientation and disability, in addition to gender" (National Science Foundation [NSF], 2014). In addition to requiring a disciplinary framework for the research project associated with the proposed grant supplement, the project had to include a theory of change, a testable hypothesis and, in foreshadowing the move toward intersectionality, the extent to which the project would address "multiple characteristics…in addition to gender" (National Science Foundation [NSF], 2014).

In an example of how institutions adapted to the changing requirements of the solicitation, Montana State examined barriers to women's careers and structured their ADVANCE project on self-determination theory, which is rooted in psychology and holds that meeting the psychological needs of autonomy, relatedness and competence provide motivation and lead to success (Deci and Ryan, 2012). Montana State structured the interventions at their institution to address these needs by focusing on building women's research capacity, creating supportive interactions and relationships and integrating work-life balance. Their projects showed improvements for women faculty and increased hiring of women on campus. The social science project supported self-determination theory as improving inclusivity on campus and garnering more participation for women in STEM (Smith, 2012).

Despite these successes, with ADVANCE projects primarily focused on theoretical frameworks to address gender equity, early ADVANCE projects were criticized for implicitly or de facto targeting and thus benefiting white women (Hunt et al., 2012; Armstrong and Jovanovich, 2017; Fox Tree and Vaid, 2022). Indeed, studies showed that while white women were beginning to make equity gains in academic STEM fields, women of color lagged behind (Hirshfield and Tiffany, 2012; McQuillan and Hernandez, 2021), particularly black women (Snyder et al., 2016; Buchanan, 2020; Fox Tree and Vaid, 2022). In the social sciences, this is quite noteworthy, with less racial and ethnic diversity in these fields than in men dominated fields of engineering and biomedicine (Hur et al., 2017).

Attentive to these issues, however, through their reliance on self-determination theory, programs like Montana State learned that structurally addressing the inequality of (white) women lead to improved outcomes for faculty of color and other marginalized faculty members. Likewise, Oregon State relied on systems oppression theory with the goal of "disrupting systems of oppression," addressing inequality intersectionally by encouraging administrators and faculty to develop a "critical consciousness" that would generate more inclusive interpersonal interactions and a more positive atmosphere. Importantly, the researchers at Oregon State argued that a critical consciousness is particularly important at predominantly white institutions, hence adding an intersectional element to shifting the climate in the study of structural gender inequality.

As these earlier projects demonstrated, even without an explicit call for intersectional research or an intersectional framework, intersectional concerns emerged in research that seeks to address structural inequalities. Indeed, an intersectional framework coincides with the multiple goals of ADVANCE to address systemic inequality while also being attentive to individuals that occupy locations of opportunity and constraint. With an approach that entails addressing empowerment of those at the margins through community engagement, social critique, coalition building and establishing resistance (Rosenthal, 2016) intersectionality also crosses social scientific disciplinary boundaries by considering both the individual and their context as paramount to changing outcomes and social transformation. Accordingly, intersectional concerns emerged in ADVANCE projects because they reflected reality. Such reality is consistent with intersectionality as the ways that the on-going renegotiation and reconceptualization of individual identities exposed how "systems of inequality grant or prohibit access to power" (Warner et al., 2018a, p. 526).

THE SECOND GENERATION OF ADVANCE: GENDER EQUITY AND INTERSECTIONALITY

Thus, supported by findings at ADVANCE schools such as Oregon State and Montana State, social scientists argued noted that gender inequity could not be addressed independent of addressing other penalties and privileges associated with identity (Hunt et al., 2012; Armstrong and Jovanovich, 2017; DeAro et al., 2019). Accordingly, in 2016, NSF revised the ADVANCE solicitation to indicate that intersectionality was an additional merit review criteria for addressing gender inequality in academic STEM fields and all proposals for ADVANCE grants were required to conceptualize their projects accordingly (National Science Foundation [NSF], 2016; DeAro et al., 2019).

With its roots in black feminist thought that was critical of second wave (white) feminism as exclusively concerned with the plight of white women (Davis, 1981; Lourde, 1984; Crenshaw, 1989) intersectionality as a framework for ADVANCE projects resonated with what some ADVANCE scholars were already advocating by showing that that oppression is linked—or intersects—on axes of race, class, gender, sexuality and other sites of social hierarchy (King, 1988; Crenshaw, 1989). Intersectional theorists examined this "matrix of domination" (Collins, 1990),

showing ways that systems of oppression "mutually construct one another" (Collins, 1998), while social scientists began unpacking how to operationalize and apply intersectionality in efforts for social change (McCall, 2005; Ferree, 2009; Cho et al., 2013).

The National Science Foundation's requirement of an intersectional component importantly signaled the NSF's endorsement of this orientation as pivotal to questions of equity. In doing so, intersectionality, as a critical concept, also became central to the way ADVANCE social science scholarship approached change and equity. With a focus on the academy, ADVANCE scholars revealed the complexity and the many dimensions of inequity in academic intersectional practices, policies, and authority structures, through the development of an intersectional approach to transformation of academic institutions. Illuminating how gender inequities were not independent of or simply additive to other barriers to success in the academy, research shows that BIPOC women are chronically underrepresented in academia generally, and particularly in STEM fields (Li and Koedel, 2017; National Science Foundation [NSF], 2019). Indeed, psychology has the highest proportion of White faculty of the social sciences (Fox Tree and Vaid, 2022).

The change in the ADVANCE program to include intersectionality in the call for proposals was therefore arguably inevitable because multiple dimensions of inequality emerged when ADVANCE programs addressed "gender only" equity in STEM. Moreover, scholars critiqued sublimating non-white identities in intersectional projects and thus voiced support for the revision of the ADVANCE solicitation guidelines to include a call for intersectionality (Hunt et al., 2012; Armstrong and Jovanovich, 2017). Doing so resulted in the development of a social science coming out of ADVANCE that was more multidimensional, allowing for more expansive insight into the workings of subtle power relationships in the day-to-day operations of academic institutions. In operationalizing intersectionality, therefore, ADVANCE scholars focused on "how things work, rather than who people are" (Cho et al., 2013; Warner et al., 2018b). Accordingly, in addition to giving voice to the marginalized, incorporating intersectionality into ADVANCE ensured attention was paid to how those in the dominant group access power (Warner et al., 2018a, p. 527). ADVANCE projects and related research thus identified social science phenomena such as cognitive and implicit biases, bystander impact and intervention, cumulative disadvantage and microaggressions as significant factors in gender inequality. Further, by focusing on equity in STEM, NSF ADVANCE became a locus for intersectional thinking among non-social science STEM fields (see Nielsen et al., 2017, 2018).

Florida International University (FIU), for example, implemented a project on bystander awareness, as a behavioral intervention aiming to make faculty more appreciative of diversity and less likely to harbor prejudicial attitudes as part of their early ADVANCE funding. FIU also sought to increase the affirmation of diversity by teaching the social skills necessary to intervene when confronted with bias and discrimination (Florida International University, 2021). Combining this approach with their social science project on microclimates and developing a network of other institutions in Florida, FIU's project explicitly targeted broad issues of diversity, equity and inclusion as a way to understand and address gender inequity intersectionally. By considering climate issues and educating and empowering all faculty about their role in creating more diverse and inclusive environments, FIU's program focuses on social phenomena that arise in microclimates and contribute to inequality on multiple levels.

Similarly, UMass Lowell addressed microaggressions in their social science project. This project sought to gain insight into how microaggressions constrained all faculty, with a particular focus on how faculty of color experience gendered microaggressions and the attitudes that study participants developed toward microaggressions. In addition, the UMass Lowell team sought to understand how identity (for both majority and underrepresented groups) affects barriers to intervening in microaggressions. Thus, at both UMass Lowell and FIU, social scientists examined the responsibility of both dominate and marginalized groups in bringing about social change.

In other recent ADVANCE cohorts, institutions seek to understand how inequities are embedded and emergent in the structure and development of the academy and academic careers. For example, Arizona State University takes a life course perspective in examining the structure of pathways to leadership at an interdisciplinary institution. Their approach allows them to see how gender, race, ethnicity, foreign-born status, sexual orientation and disability shape faculty career pathways and leadership opportunities. Approaching the problem holistically and structurally allows the researchers to highlight how categorical markers of inequality constrain and enable faculty throughout their scientific careers.

UMass Amherst ADVANCE, conversely, takes an approach that emphasizes on-going data collection and development of plans and progress across the institution. The ADVANCE team then leverages these largescale data to structure and inform change targeting the "relationships, resources and recognition" that create and promote successful faculty members. With both a baseline climate survey and the continual collection and examination of institutional data, the ADVANCE team is able to understand how faculty access to resources and development of inclusive communities emerge based on gender, race, sexuality, nationality, rank and other factors. Data collection such as this points the ADVANCE team in directions to help them understand problems as they emerge—and hence enabled the team to address, for example, the COVID crisis and its intersectional impact (University of Massachusetts Amherst, 2021). By examining data from the ground up, this ADVANCE team can see how intersectional concerns structurally emerge and tackle those concerns alongside their planned areas of intervention.

DISCUSSION AND CONCLUSIONS: OPERATIONALIZING INTERSECTIONALITY AND INSTITUTIONAL TRANSFORMATION

By operating at multiple levels of analysis, therefore, intersectionality addresses the complexity of both the barriers to equity and the ways to address inequity. Feminist scholars have long held that reflexivity about knowledge-intensive institutions and academic institutions in particular, is critical because—so long as academic institutions remain inequitable—the project of science and discovery of knowledge remain hegemonically masculine (Harding, 1986, 1991), white (Collins, 1990) and heterosexist (Foucault, 1978). Although the ideology of some academic disciplines, such as engineering, is more tightly coupled with the image of disembodied white heterosexual hegemonic masculinity (Bix, 2004; Leonard and Nicholls, 2013), the image of a scientist, scientific excellence, and hegemonic masculinity undergirds the broader organization of science and the discovery of knowledge (Harding, 1986, 1991, 2008; Ong, 2005; Allison, 2007; Wilcox, 2009).

Importantly, STEM researchers, particularly but not exclusively, those in sociology and psychology social sciences, became instrumental in designing and implementing the strategies to seek gender equity in their fields. Both from their own experiences of bias in the academy and drawing on findings of inequalities within institutions and organizations, social scientists—as STEM researchers, practitioners and women navigating their own academic careers—became key players in strategies for dismantling gender bias in academic settings (see McQuillan and Hernandez, 2021).

When putting ADVANCE projects with an intersectional component into practice, social science scholars demonstrate that IT is not an abstraction, but also intimately tied to *real embodied workers*. Thus, equating organizational success—both practically and symbolically—with real, embodied workers rather than a disembodied ideal can generate more equitable organizational practices in the academy as well as other organizations. Importantly, since transforming organizations involves being attentive to the ebb and flow of cross-constitutive organizational structures and practices (Holvino, 2010). Interactive intersectionality asks us to continually and actively be on guard to the ways that inequalities arise and must be addressed. Moreover, it forces us to continually consider the context and assumptions that give rise to those inequalities (Ferree, 2009; Choo and Ferree, 2010; Cho et al., 2013).

According to Ferree, "it is an empirical matter in any given context to see what concepts are important to the configuration of inequalities in discourse and in practices by people in many different social positions, and locational studies of intersectionality can contribute to this discovery process" (Ferree, 2009, p. 89). Therefore, by operationalizing intersectionality with the understanding that the meanings of gender, race, class and any number of other social categories are produced and reinforced in and through social organization, we can see how confronting and dismantling these structures in the academy necessarily leads to new knowledge and experiences.

As a theory or framework for action, therefore, intersectionality is less precise than other models of change. Concepts with clearer and more measurable outcomes are likely to be counted as more successful in garnering calculable progress (Britton, 2010; Springer, 2020). In particular, representation is the easiest way to identify success; if more women are in working and getting promoted in US academic institutions, then the NSF ADVANCE program is working (Bilmoria and Liang, 2012; McQuillan and Hernandez, 2021). Likewise, if more BIPOC women are in STEM, then including a call for intersectionality as a requirement for ADVANCE programs is also a success. As Nelson and Zippel (2021) point out, social science theoretical concepts that can be demonstrated and provide measurable remedies for change are likely to gain high traction in addressing inequalities, particularly if those inequalities are intersectionally located.

Yet intersectionality, in and of itself, is not measurable in such a clear way. Nor does it guarantee a quick—or perhaps even long term—change or turnaround in representation of BIPOC women on university faculties. But easy measurement, particularly of representation, has its limitations as well. As Ray (2019) explains, for change, we have to continually look at the organizational context and changes within those structures to see shifts. With this in mind, and as the expansion of the research on institutional change continues to make progress, current research looks toward institutional transformation as a process involving non-predominantly white institutions (PWI), since the majority of ADVANCE grants have gone to PWIs (Bird and Kowalski, 2022), which necessarily inhibits the ability to change either representation or organizational structure. Further, questions about equity and inclusion force a rethinking about inclusionary and exclusionary categories, as women-as-binary approaches exclude women identifying and trans faculty (t philosopher, 2019).

The success of social sciences to bring about change is harder to quantify but easier to see in the shifts in institutional culture (McQuillan and Hernandez, 2021). Laube (2021) finds that feminist sociologists have the field of vision and analytic tools to work toward institutional transformation, and the ability to adapt and expand those tools to continually promote change. Likewise, Settles et al. (2020) argue for structural changes in the field of psychology that allow for epistemic inclusion of intersectional scholarship and scholars. Embedding of practices and concepts that enable equity is also important to creating change, and likely more enduring (McQuillan and Hernandez, 2021). Moreover, when equity practices become "the way we do things around here" those practices are less likely to encounter resistance and concern (Bird and Lattimer, 2019).

Adopting intersectionality as a cornerstone of the ADVANCE program is part of the praxis of such a cultural shift in academic institutions. The NSF ADVANCE IT program began with the premise that the production of knowledge is rooted in an inequitable organizational structure. In conjunction with the funding agency, award grantees and social science discovery, the inception of an intersectional framework entails the production of knowledge that allows for academic institutions as a space for resistance and an opportunity for transformation. Accordingly, as an intersectional stance becomes part of the everyday business of equity within academics, it both facilitates equity efforts in the academy,

and is a cultural outcome of those efforts. While academic institutions often seem stuck in maintaining conventional paths to institutional power, an intersectional approach to equity forces a rethinking of social science knowledge. And it is through the diversity of knowledge that comes with intersectionality that new knowledge is most likely to emerge (Patton and Haynes, 2018; Laursen and De Welde, 2019; Hofstra et al., 2020).

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The author confirms being the sole contributor of this work and has approved it for publication.

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REFERENCES

Acker, J. (1990). Hierarchies, jobs, bodies: a theory of gendered organizations. *Gender Soc.* 4, 139–158. doi: 10.1177/089124390004002002

Allison, J. E. (2007). Composing a life in twenty-first century academe: reflections on a mother's challenge. *NWSA J.* 19, 23–46. Available online at: https://muse.jhu.edu/article/224742/pdf

Alvesson, M., and Billing, Y. D. (1992). Gender and organization: towards a differentiated understanding. *Organiz. Stud.* 13, 73. doi: 10.1177/017084069201300107

American Psychological Association. (2014). *How is the Gender Composition of Faculty in Graduate Psychology Departments Changing*. Washington, DC: APA Monitor: News from APA's Center for Workforce Studies.

American Sociological Association. (2016). *Workshop: Stratification in Acacemic Career Trajectories for Minority PHD Recipients*. Available online at: https://www.asanet.org/sites/default/files/asa2016_socecon.pdf (accessed February 27, 2022).

Armstrong, M. A., and Jovanovich, J. (2017). The intersectional matrix: rethinking institutional change for URM Women in STEM. *J. Diver. Higher Educ.* 10, 216–231. doi: 10.1037/dhe0000021

Bilmoria, D., and Liang, X. (2012). *Gender Equity in Science and Engineering: Advancing Change in Higher Education*. New York, NY: Routledge.

Bird, S., and Kowalski, B. (2022). "Higher education transformations for greater equity: geography, demography and the national science foundation's ADVANCE and AGEP programs," in *Paper presented at Sociologists for Women in Society, Winter Meeting (Virtual)*. February *5, 2022.*

Bird, S., and Lattimer,. M. (2019). examining models of departmental engagement for greater equity: a case study of two applications of the dual agenda approach. *Equality Diver. Inclus.* 38, 211–225. doi: 10.1108/EDI-09-2017-0182

Bix, A. S. (2004). From "Engineeresses" To "Girl Engineers" To "Good Engineers": a history of women's U.S. engineering education. *NWSA J.* 16, 27–49. doi: 10.2979/NWS.2004.16.1.27

Boyatzis, R. E. (1998). *Transforming Qualitative Information: Thematic Analysis and Code Development*. Thousand Oaks, CA: Sage.

Britton, D. M. (2000). The epistemology of the gendered organization. *Gender Soc.* 14, 418–434. doi: 10.1177/089124300014003004

Britton, D. M. (2010). "Engendering the university though policy and practice: Barriers to promotion to full professor for women in the science, engineering and math disciplines," in Gender Change in Academia, eds B. Riegraf, B. Aulenbacher, E. *Kirsch-Auwärter, and U. Müller VS Verlag für Sozialwissenschaften*, 15–26. doi: 10.1007/978-3-531-92501-1_2

Britton, D. M., and Logan, L. (2008). Gendered organizations: progress and prospects. *Sociol. Compass* 2, 107–121. doi: 10.1111/j.1751-9020.2007.00071.x

Browne, I., and Misra, J. (2003). The intersection of race and gender in the labor market. *Annu. Rev. Sociol.* 29, 487–513. doi: 10.1146/annurev.soc.29.010202.100016

Buchanan, N. T. (2020). Researching while black (and female). *Women Ther.* 43, 91–111. doi: 10.1080/02703149.2019.1684681

Carbado, D. W., Crenshaw, K. W., Mays, V. M., and Tomlinson, B. (2013). Intersectonality: mapping the movements of a theory. *DuBois Rev.* 10, 303–312. doi: 10.1017/S1742058X13000349

Cho, S., Crenshaw, K. W., and McCall, L. eds. (2013). Toward a field of intersectionality studies: theory, applications, and praxis. *Special Issue Intersect. Theorizing Power Empower. Theory Signs.* 38, 785–810. doi: 10.1086/669608

Choo, H. Y., and Ferree, M. M. (2010). Practicing intersectionality in sociological research: critical analysis of inclusions, interactions, and institutions in the study of inequalities. *Sociol. Theory.* 12, 129–149. doi: 10.1111/j.1467-9558.2010.01370.x

Collins, P. H. (1990). 2000. *Black Feminist Thought: Knowledge, Consciousness, and the Politics of Empowerment*. New York, NY: Routledge.

Collins, P. H. (1998). It's all in the family: intersections of race, gender and nation. *Hypatia* 13, 62–82. doi: 10.1111/j.1527-2001.1998.tb01370.x

Congressional Research Service. (2012). *Science, Technology, Engineering and Mathematics (STEM) Education: An Overview*. CSR Report. Availkable online at: https://sgp.fas.org/crs/misc/R42642.pdf (accessed March 4, 2022).

Congressional Research Service. (2021). *The National Science Foundation: An Overview*. CSR Report. Available online at: https://crsreports.congress.gov/product/pdf/R/R46753 (accessed February 27, 2022).

Crenshaw, K. W. (1989). *Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics*. University of Chicago Legal Forum, 139–167. Available online at: https://chicagounbound.uchicago.edu/uclf/vol1989/iss1/8 (accessed January 29, 2022).

Dalton, R. (2001). Grants to help women climb the academic ladder. *Nature* 413, 716. doi: 10.1038/35101732

Davis, A. Y. (1981). *Women, Race, and Class*. New York, NY: Random House.

Davis, K. (2008). Intersectionality as buzzword: a sociology of science perspective on what makes a feminist theory successful. *Feminist Theory* 9, 67–85. doi: 10.1177/1464700108086364

DeAro, J., Bird, S., and Ryan, S. M. (2019). NSF ADVANCE and gender equity: past, present and future of systemic insitiutional transformation strategies. *Equality Divers. Inclusion Int J.* 38, 131–139. doi: 10.1108/EDI-09-2017-0188

Deci, E. L., and Ryan, R. M. (2012). "Self-determination theory," in *Handbook of Theories of Social Psychology*, eds P. A. M. Van Lange, A. W. Kruglanski, and E. T. Higgins (London: Sage Publications Ltd.), 416–436. doi: 10.4135/9781446249215.n21

Devine, P. G., Forscher, P. S., Cox, W. T. L., Kaatz, A., Sheridan, J., and Carnes, M. (2017). A gender bias habit-breaking intervention led to increased hiring of female faculty in STEMM departments. *J. Exp. Soc. Psychol.* 73, 211–215. doi: 10.1016/j.jesp.2017.07.002

Elomäki, A. (2015). The economic case for gender equality in the eurpoean union: selling Gender Equality to decision-makers and neoliberalism to women's organizations. *Eur. J. Womens Stud.* 22, 288–302. doi: 10.1177/1350506815571142

Falci, C. (2009). *UNL STEM Faculty Networks. University of Nebraska Linclon*. Available online at: https://advance.unl.edu/Network%20study%20results

%20_Chairs%20and%20directors%20meeting%20Sept%2017%202009_falci.pdf (accessed October 21, 2021).

Falci, C. D., and Watanabe, M. (2020). Network marginalization of women in the workplace: a case in Acadmia. *J. Women Minorities Sci. Eng.* 26, 155–175. doi: 10.1615/JWomenMinorScienEng.2020029186

Ferguson, K. E. (1984). *The Feminist Case Against Bureaucracy*. Philadelphia, PA: Temple University Press.

Ferree, M. M. (2009). "Inequality, intersectionality and the politics of discourse:framing feminist alliances," in *The Discursive Politics of Gender Equality: Stretching, Bending and Policymaking*, eds E. Lombardo, P. *Meier*, and M.Verloo (New York, NY: Routledge Press), 86–104.

Ferree, M. M., and Zippel, K. (2015). Gender equality in the age of academic capitalism: cassandra and pollyanna interpret university restructuring. *Soc. Politics* 22, 561–584. doi: 10.1093/sp/jxv039

Firestone, S. (1970). *The Dialectic of Sex; the Case for Feminist Revolution*. New York, NY: Morrow.

Florida International University. (2021). *FIU ADVANCE*. Avaialble online at: https://advance.fiu.edu/index.html (accessed November 1, 2021).

Foucault,. M. (1978). *The History of Sexuality, Volume 1*. New York, NY: Vantage Books, Random House.

Fox Tree, J. E., and Vaid, J. (2022). Why so few, still? Challenges to attracting, advancing, and keeping women faculty of color in Academia. *Front. Sociol.* 6, 92–198. doi: 10.3389/fsoc.2021.792198

Fox, M. F., and Fonesca, C. (2006). Gender and mentoring of faculty in science and engineering: individual and organisational factors. *Int. J. Learn. Change* 1, 460–483. doi: 10.1504/IJLC.2006.013912

Gregory, S. T. (2001). Black faculty women in the academy: history, status and future. *J. Negro Educ*. 70, 124–138. doi: 10.2307/3211205

Harding, S. A. (2008). How many epistemologies should guide the production of scientific knowledge? A Response to Maffie, Mendieta, and Wylie. *Hypatia*. 23, 212–219. Available online at: https://www.jstor.org/stable/25483229

Harding, S. G. (1986). *The Science Question in Feminism*. Ithaca, NY: Cornell University Press.

Harding, S. G. (1991). *Whose Science? Whose Knowledge?: Thinking From Women's Lives*. Ithaca, NY: Cornell University Press.

Hirshfield, L. E., and Tiffany, D. J. (2012). 'We Need a Woman, We Need a Black Woman': gender, race, and identity taxation in the academy. *Gender Educ.* 24: 213–227. doi: 10.1080/09540253.2011.606208

Hofstra, B., Vivek, K. V., Munoz-Najar Galvez, S., He, B., and McFarland, D. A. (2020). The diversity-innovation paradox in science. *Proc. Natl. Acad. Sci. U. S. A*. 117, 9284–9291. doi: 10.1073/pnas.1915378117

Holvino, E. (2010). Intersections: the simultaneity of race, gender and class in organization studies. *Gender Work Organiz*. 17, 248–277. doi: 10.1111/j.1468-0432.2008.00400.x

Hunt, V. H., Morimoto, S. A., Zajicek, A., and Lisnic, R. (2012). Intersectionality and dismantling institutional privilege: the case of the NSF ADVANCE program. *Race Gender Class* 19, 266–290. Available online at: https://www.jstor.org/stable/43496873

Hur, H., Andalib, M. A., Maurer, J. A., Hawley, J. D., and Ghaffarzadegan, N. (2017). Recent trends in the U.S. behavioral and social science research (BSSR) workforce. *PLoS ONE* 12, e0170887. doi: 10.1371/journal.pone.0170887

King, D. K. (1988). Multiple jeopardy, multiple consciousness: the context of a black feminist ideology. *Signs* 14, 42–72. doi: 10.1086/494491

Kodate, N., Kodate, K., and Kodate, T. (2010). Mission Completed? Changing visibility of women's colleges in England and Japan and their roles in prompting gender equality in science. *Minerva* 48, 309–300. doi: 10.1007/s11024-010-9150-2

Laube, H. (2021), Outsiders within transforming the academy: the unique positonality of feminist sociologists. *Gender Soc*. 35, 476–500. doi: 10.1177/08912432211000329

Laursen, S. L., and Austin, A. E. (2020). *Building Gender Equity in the Academy: Institutional Strategies for Change*. Baltimore, MD: Johns Hopkins University Press.

Laursen, S. L., and De Welde, K. (2019). The changer and the changed: evolving theories and practices of change in ADVANCE calls for institutional transformation. *Equality Diver. Inclusion Int. J.* 38, 140–159. doi: 10.1108/EDI-09-2017-0192

Leonard, K. M., and Nicholls, G. M. (2013). History and status of female faculty in civil engineering. *J. Profess. Issues Eng. Educ. Pract.* 139, 218–225. doi: 10.1061/(ASCE)EI.1943-5541.0000152

Li, D., and Koedel, C. (2017). Representation and salary gaps by race-ethnicity and gender at selective public universities. *Educ. Res*. 46, 343–354. doi: 10.3102/0013189X17726535

Lorden, J., Huet, Y., Wemlinger, E., Dulin, A., and Grant, S. (2013). *ADVANCE: Instituitonal Transofmations for the Future of the Fauclty. Final Report*. ADVANCE UNC Charlotte. Available online at: https://advance.charlotte.edu/sites/advance.charlotte.edu/files/media/UNCC%20Final%20Report%20Complete.pdf (accessed January 29, 2022).

Lourde, A. (1984). *Sister Outsider*. Berkeley, CA: Crossing Press.

McCall, L. (2005). The complexity of intersectionality. *Signs* 30, 1771–1800. doi: 10.1086/426800

McQuillan, J., and Hernandez, N. (2021). Real-life conundrums in the struggle for institutional transformation. *Gender Soc*. 35, 300–329. doi: 10.1177/08912432211013147

MIT Report. (1999). *A Study on the Status of Women Faculty in Science – An Update of the 1999 Reports of the Committees on the Status of Women Faculty*. Cambridge, MA: Massachusetts Institute of Technology.

MIT Report. (2010). *Report on the Initiative for Faculty Race and Diversity*. Cambridge, MA. Available online at: https://web.mit.edu/provost/raceinitiative/report.pdf (accessed January 29, 2022).

Morimoto, S. A., and Zajicek, A. M. (2014). Dismantling the master's house: feminist reflections on institutional transformation. *Crit. Sociol*. 40, 135–150. doi: 10.1177/0896920512460063

National Academy of Sciences (US), National Academy of Engineering (US), and Institute of Medicine (US) Committee on Maximizing the Potential of Women in Academic Science and Engineering. (2006). *Biological, Social, and Organizational Components of Success for Women in Academic Science and Engineering*. National Academies Press (US).

National Science Foundation [NSF]. (2010). *ADVANCE: Organizational Change For Gender Equity in STEM Academic Professions. Program Solicitation NSF 10-593*. VAilable online at: https://www.nsf.gov/pubs/2010/nsf10593/nsf10593.pdf (accessed February 13, 2022).

National Science Foundation [NSF]. (2014). *ADVANCE: Organizational Change For Gender Equity in STEM Academic Professions. Program Solicitation NSF 14-573*. Available online at: https://www.nsf.gov/pubs/2014/nsf14573/nsf14573.htm (accessed February 13, 2022).

National Science Foundation [NSF]. (2016). *ADVANCE: Organizational Change For Gender Equity in STEM Academic Professions. Program Solicitation NSF 20-554*. Available online at: https://www.nsf.gov/pubs/2016/nsf16594/nsf16594.htm?org=NSF (accessed February 12, 2022).

National Science Foundation [NSF]. (2019). *Women, Minorities, and Persons with Disabilities in Science and Engineering*. NSF. Special Report no. 19-304. Available online at: https://ncses.nsf.gov/pubs/nsf21321/report (accessed October 21, 2021).

Nelson, L. K., and Zippel, K. (2021). From theory to practice and back: how the concept of implicit bias was implemented in acadme, and what this means for gender theories of organizational change. *Gender Soc*. 35, 330–357. doi: 10.1177/08912432211000335

Nielsen, M. W., Alegria, S., Börjeson, L., and Schiebinger, L. (2017). Opinion: gender diveristy leads to better science. *Proc. Natl. Acad. Sci. U. S. A*. 114:1740–1742. doi: 10.1073/pnas.1700616114

Nielsen, M. W., Bloch, C. W., and Schiebinger, L. (2018). Making gender diversity work for scientific discovery and innovation. *Nat. Hum. Behav*. 2, 726–734. doi: 10.1038/s41562-018-0433-1

Ong, M. (2005). Body projects of young women of color in physics: intersections of gender, race, and science. *Soc. Probl*. 52, 593–617. doi: 10.1525/sp.2005.52.4.593

Ong, M. (2011). The status of women of color in computer science. *Commun. ACM* 54, 32–34. doi: 10.1145/1965724.1965737

Patton, L. D., and Haynes, C. (2018), Hidden in plain sight: the black women's bluepring for institutional transformation in higher education. *Teachers Coll. Record* 120, 1–18. doi: 10.1177/016146811812001405

Ray, V. (2019). A theory of racialized organizations. *Am. Sociol. Rev*. 84, 26–53. doi: 10.1177/0003122418822335

Reskin, B. F. (2003). Including mechanisms in our models of ascriptive inequality: 2002 presidential address. *Am. Sociol. Rev*. 68, 1–21. doi: 10.2307/3088900

Ridgeway, C. L. (2009). Framed before we know it. *Gender Soc.* 23, 145–160. doi: 10.1177/0891243208330313

Rimmer, S. H., and Sawer, M. (2016). Neoliberalism and gender equality policy in Australia. *Austral. J. Polit. Sci.* 51, 742–758. doi: 10.1080/10361146.2016.1222602

Rosenthal,. L. (2016). Incorporating intersectionality into psychology: an opportunity to promote social justice and equity. *Am. Psychol.* 71, 474–485. doi: 10.1037/a0040323

Rosser, S. V. (2006). Institutional barriers for women scientists and engineers. Are women achieving equity in chemistry? *Am. Chem. Soc.* 929, 45–62. doi: 10.1021/bk-2006-0929.ch005

Rosser, S. V. (2017). *Academic Women in STEM Faculty: Views Beyond a Decade After POWRE*. Cham: Plagrave Macmillan. doi: 10.1007/978-3-319-48793-9

Rosser, S. V., and Lane, E. O. (2002). A history of funding for women's programs at the national science foundation: from individual power approaches to the advance of insitutional approaches. *J. Women Minorit. Sci. Eng.* 8, 327–346. doi: 10.1615/JWomenMinorScienEng.v8.i3-4.50

Settles, I. H., Warner, L. R., Buchanan, N. T., and Jones, M. K. (2020). Understanding psychology's resistance to intersectionality theory using a framework of epistemic exclusion and invisibility. *J. Soc. Issues* 76, 796–813. doi: 10.1111/josi.12403

Smith, E. (2011). Women into science and engineering? Gendered participation in higher education STEM subjects. *Br. Educ. Res. J.* 37 993–1014. doi: 10.1080/01411926.2010.515019

Smith, J. L. (2012). *Project Outcomes Report*. Bozeman, MT. Available online at: https://www.montana.edu/nsfadvance/documents/MSUProjectTRACS_FinalProjectOutcomesRport.pdf. (accesed October 22, 2021).

Snyder, T. D., de Brey, C., and Dillow, S. A. (2016). *Digest of Education Statistics 2015 (NECS 2016-014)*. Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Springer, E. (2020). Bureaucratic tools in (gendered) organizations: performance metrics and gender advisors in international development. *Gender Soc.* 34, 56–80. doi: 10.1177/0891243219874058

Stewart, A. J., Malley, J. E., and LaVaque-Manty, D. (2007). *Transforming Science and Engineering: Advancing Academic Women*. Ann Arbor, MI: University of Michigan Press. doi: 10.3998/mpub.178866

Stewart, A. J., and Vailan, V. (2018). *An Inclusive Academy: Achieving Diversity and Excellence*. Cambridge, MA: MIT Press. doi: 10.7551/mitpress/9766.001.0001

t philosopher. (2019). *I Am Leaving Acacemic Philosophy Because of its Transphobic Problem*. Medium. Available online at: https://medium.com/@transphilosopher33/i-am-leaving-academic-philosophy-because-of-its-transphobia-problem-bc618aa55712 (accessed February 27, 2022).

University of Massachusetts Amherst. (2021). *ADVANCE Program*. Available online at: https://www.umass.edu/advance/research (accessed November 1, 2021).

University of North Carolina Charlotte. (2005). *ADVANCE Program, Original Proposal to NSF ADVANCE IT Program*. Avaialble online at: https://advance.charlotte.edu/advance-fado-research/advance-fado-annual-reports (accessed January 29, 2022).

Warner, L. R., Settles, I. H., and Shields, S. A. (2018a). "Intersectionality theory in the psychology of women," in *Handbook of the Psychology of Women*, eds C. B. Travis and J. W. White (Washington, DC: American Psychlogical Association).

Warner, L. R., Settles, I. H., and Shields, S. A. (2018b). "Intersectionality theory in 1095 the psychology of women," in *Handbook of the Psychology of Women*, eds C. B. Travis and J. W. White (Washington, DC: American Psychological Association), 521–539. doi: 10.1037/00000 59-027

Wilcox, N. H. (2009). Embodied ways of knowing, pedagogies, and social justice: inclusive science and beyond. *NWSA J.* 21, 104–120. Available online at: https://www.jstor.org/stable/20628176

Wu, L., and Jing, W. (2011). Asian women in STEM Careers: an invisible minority in a double bind. *Issues Sci. Technol.* 28, 82–87. Available online at: https://issues.org/realnumbers-asian-women-stem-careers/

Zippel, K., and Ferree, M. M. (2017). Organizational interventions and the creation of gendered knowledge: US universities and NSF ADVANCE. *Gender Work Organiz.* 26, 805–821. doi: 10.1111/gwao.12290

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Women Academics' Intersectional Experiences of Policy Ineffectiveness in the European Context

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Despite policy efforts targeted at making universities more inclusive and equitable, academia is still rife with harassment and bullying, and opportunities are far from equal for everyone. The present preregistered survey research ($N = 91$) aimed to explore whether an intersectional approach can be useful to examine the tangible effects of policy ineffectiveness, even when legislative and ideologic constraints limit the possibility to conduct a full-fledged intersectional analysis. Policy ineffectiveness was operationalized as experiences of harassment, discrimination, institutional resistance to gender equality, and retaliation against reporters of misconduct in universities. Policy ineffectiveness was negatively related to women academics' inclination to pursue an academic career. This relationship was mediated by lower levels of psychological safety associated with policy ineffectiveness. Importantly, women academics who differ from the majority on multiple dimensions show a stronger and more negative relationship between policy ineffectiveness and psychological safety. The study further shows that self-report measures are useful to uncover intersectional privilege afforded to overrepresented groups in academia. The study discusses the benefits of intersectional approaches for designing and implementing effective policies to tackle harassment and inequality in academia, even when the available methodologies are constrained by legislation and ideology. Overall, self-report measurement can have an important function for signalling areas that warrant further intersectional inquiry to ensure that policies serve everyone.

Keywords: academia, policy ineffectiveness, psychological safety, voice, intersectional inequality, intersectional privilege

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INTRODUCTION

> *"Everybody talks about equality in science, but it does not actually happen," … "There are so many articles, so much discussion, but over my 30 years it's gotten worse" (quote by a researcher interviewed for a Nature survey on discrimination, cf. Woolton, 2021).*

Policies aiming to make higher education institutions more inclusive, equitable, and safe environments have been around for decades. However, scholars and practitioners are becoming more vocal about the pervasive ineffectiveness of such policies. For instance, there is growing consensus that anti-harassment and non-discrimination policies have been ineffective in

making academia a more inclusive and safe working environment (Bondestam and Lundqvist, 2018, 2020; Abbott, 2020; Bull et al., 2021; Woolton, 2021; Hilton and Täuber, 2022). On the contrary, non-discrimination policies and laws have led to an epidemic of subtle and selective discrimination (Cortina et al., 2013; Jones et al., 2017). Relatedly, despite efforts to formulate concrete and implementable zero-tolerance policies (e.g., Halkitis et al., 2020), scholars criticize that such documents often end up being purely performative (Ahmed, 2007b; Kimura, 2014). For instance, in the context of fighting racism in higher education in the United Kingdom, Ahmed (2007b) observes that universities committed to the Race Relations Amendment Act "end up doing the document rather than doing the doing."

Building on the above, in the current research, policy ineffectiveness is operationalized as women academics' experiences of harassment and discrimination, retaliation against reporters of harassment and discrimination, as well as institutional resistance against gender equality. This operationalization covers ineffective anti-harassment and non-discrimination policies, ineffective complaints procedures, and ineffective interventions and measures to achieve gender equality. The current research explores the tangible effects of policy ineffectiveness on women in academia by examining how it appears to be related to female scholars' psychological safety and voice. Moreover, female scholars who differ from the majority on multiple dimensions within their respective university context might be harmed by policy ineffectiveness more than their counterparts. The most influential approach for thinking about how differing from the majority on a number of dimensions affects individuals and groups is intersectional theory (Crenshaw, 1989), which I will elaborate below. Psychological safety and voice both relate to speaking up and sharing experiences, thereby enabling ineffective policies and interventions to be improved. If psychological safety and voice are undermined, a vicious circle might result where especially the most vulnerable scholars are hurt by policy ineffectiveness, diminishing their willingness to speak up for change, thereby perpetuating and reproducing working environments that undermine the effectiveness of policies.

The European Context: Intersectionality and Data Gaps in Higher Education Policy

Before introducing the theoretical background, a reflection on the use of intersectionality in the context of European higher education policy seems useful, because it highlights a discrepancy between scholarly insight concerning intersectionality and the implementation of such insight in policy making. The concept of intersectionality was developed and introduced by legal scholar and civil rights activist Kimberlé Crenshaw (1989). She criticized the traditional accounts of feminism and antiracism, which, by focusing on White women and Black men, respectively, effectively erase the lived experiences of Black women. Crenshaw introduced intersectionality to go beyond these accounts, stating "Because the intersectional experience is greater than the sum of racism and sexism, any analysis that does not take intersectionality into account cannot sufficiently address the particular manner in which Black women are subordinated," (1989, p. 140). Intersectionality makes visible how multiple axes of oppression interact and sheds light on unique experiences of inequality and injustice felt by people with intersecting identities (Cath et al., 2014; Atewologun, 2018). While intersectionality is important to Black American feminist intellectual heritage (Wekker, 2021), a side-effect of the great success of Crenshaw's work is that the term intersectionality has become a "travelling concept" (Jouwe, 2015).

This results in intersectionality being used in different ways when it permeates other cultural and demographic contexts (Bowleg and Bauer, 2016; Bauer et al., 2021). Intersectionality is also used differently across disciplines, with psychological research in particular being associated with "weak" approaches to intersectionality (Grzanka, 2018). The distinction between "weak" and "strong" intersectionality is that the former focuses more on multiple identities, a core area of interest in psychological research, while the latter focuses on the co-constitution of these identities and how these are embedded in systems of power (Dill and Kohlman, 2012). Weak approaches to intersectionality often fail to investigate "the intersections of identities or the ways in which those intersections produce unique subjectivities, privilege-oppression nexuses, and lived experiences" (Grzanka, 2018, p. 20). In other words, rather than truly exploring the intersections of identities, weak approaches will yield additive insights that treat identities as if they were separate, independent and could be ranked (Bowleg, 2008). This is at odds with Crenshaws definition which highlights that intersectional experiences are greater than the sum of separate axes of oppression such as racism or sexism.

Importantly, quantitative research methods are most likely to use "weak" intersectionality (Bauer et al., 2021), but are also the most prevalent input for policy-making. This is reflected in leading publications into European higher education neglecting intersectionality, as illustrated for instance by the SHE figures (2021), which only collects data on gender. The relative neglect of intersectionality in European higher education policy appears to result from two issues in particular. First, Europe has implemented the world's strictest data privacy law, the EU General Data Protection Regulation (GDPR). Data protection is seen as a fundamental human right (Goddard, 2017), owing to the horrors of the Second World War: the registration of names, maiden names, residence, gender, birthday, religion, mother tongue, ethnicity, occupation, and number of children in the respective household in the German census formed the bureaucratic prerequisite for the deportation and murdering of millions of Jews (Aly and Roth, 2004). Due to its specific historic context, European higher education institutions cannot register data that could reliably demonstrate structural and systemic disadvantages resulting from intersecting categories such as race, religious affiliation, and disability status. As a consequence, the option to ask scholars to self-identify their minority status in surveys is currently explored, not just in the European context (Else and Perkel, 2022).

Second, different from the US context, "Europe's depoliticization of race and its relation to power as an analytical dimension" (Rose, 2022, p. 7) ultimately results in Black women, for instance, "being erased from projects of intersectionality despite their knowledge production and contributions" (Rose, 2022, p. 7). When more categories than gender are taken into consideration (e.g., race, ability, race, ethnicity, gender, nationality, politics, citizenship, or socioeconomic status, Perlman, 2018), the framing is often in terms of disadvantages and challenges rather than oppression and discrimination. This leads to intersectionality being used in ways that might be less threatening and more self-serving for those comparatively privileged individuals using the term—as described, for instance, by Robin Diangelo in "White fragility" (2018): where there are no oppressed, there is no oppressor, and if multiple axes of disadvantage are considered, almost everyone is a minority in some way. In Netherlands, Cath et al. (2014) refer to this approach as 'Dutchifying intersectionality', criticizing that the term is used as a lip-service to underrepresented groups. The authors attribute this partly to views of activism as violating academics' objectivity, resulting in weak links between academia and activism.

The legislative and ideologic pretexts described above result in policy-making largely devoid of intersectional approaches, despite the impressive intersectional scholarship that is created and shared in Europe (e.g., Essed, 2001; Ahmed, 2007a, 2012; Özbilgin et al., 2011; Atewologun et al., 2016; Wekker, 2016; Tariq and Syed, 2017; Atewologun, 2018; Jordan-Zachery, 2019; Liu, 2019; Showunmi, 2020; Bhatti and Ali, 2021).

In addition, a systematic review of quantitative research methodologies into intersectionality from 1989 to 2020 (Bauer et al., 2021) finds that quantitative methods are often simplistic, misapplied, or misinterpreted. In light of the practical limitations with data collection outlined above, the current paper aims to explore the potential of the survey method for flagging areas that should prompt more sophisticated research to uncover intersectional inequalities. One recommendation resulting from the current paper might be to engage in a stepwise process where initially, methods are used which are suboptimal and simplistic, yet available, affordable and pragmatic. These could be instrumental for signalling areas that need to be followed up with more suitable, designed-for-purpose methodologies to uncover intersectional inequalities, such as in-depth interviews (Atewologun, 2018; Windsong, 2018). Ultimately, a stepwise approach that embraces imperfections in the initial phase might assist in designing and developing more effective policies to tackle inequalities in higher education. In sum, I investigate intersectionality here within the legislative and ideologic constraints present in the European policy context. I explore whether women scholars' self-reported minority status on a variety of axes—reflecting an additive approach to intersectionality—might fulfil a signalling function regarding policy ineffectiveness and its relation to women scholars' psychological safety, voice, and career choices.

THEORETICAL BACKGROUND

Harassment and Policy Ineffectiveness

As disciplines, the social and organizational sciences have the means and capacities to understand, analyse, and describe phenomena that undermine gender equality in higher education, such as discrimination and harassment. However, we appear less well equipped to practice what we preach: like other organizations, universities fail to live up to their expressed egalitarian and social justice goals (e.g., Naezer et al., 2019; Abbott, 2020). Academia has the second-highest rate of reported sexual harassment (in comparison with military, which has the highest rate, the private sector, and government; Ilies et al., 2003). Accordingly, harassment and bullying are described as epidemic in academia (Mahmoudi, 2019, 2020; Gewin, 2021; Moss and Mahmoudi, 2021; Täuber and Mahmoudi, 2022) and retaliation against reporters of misconduct is a key contributing factor (Bergman et al., 2002; Cortina and Magley, 2003).

In the social sciences, sexual harassment is used as an umbrella term comprised of unwanted sexual attention, sexual coercion, and gender harassment (Cortina and Areguin, 2021). While unwanted sexual attention and sexual coercion can be legally addressed, the third category, gender harassment, has been recognized as being the least acknowledged yet most pervasive form of sexual harassment (Fairchild et al., 2018). Gender harassment does not aim at sexual favours or coercion. Rather, it aims at putting down and pushing out individuals who do not conform to the individualistic and competitive norms of the workplace, by hostile attitudes and derogating, demeaning, humiliating, and denigrating behaviours (Berdahl, 2007). Gender harassment is an expression of power and dominance, and as such well-suited to protect and enhance individual status in an existing gender hierarchy (Berdahl, 2007). The Iceberg model of sexual harassment (NASEM, 2018; Cortina and Areguin, 2021) clearly shows that the bulk of sexual harassment are 'put downs' (gender harassment). However, these are typically below the surface, while the comparatively rare 'come ons' (unwanted sexual attention and sexual coercion) are often more high-profile and media-prone.

In spite of universities' commitments to being inclusive, safe, and equitable working environments, the ineffectiveness of anti-harassment and non-discrimination policies in higher education has been demonstrated by numerous reports over the past years. Two reports in Netherlands show that harassment in Dutch academia is pervasive (Naezer et al., 2019; Young Academy Groningen Report, 2021). Both reports point to pervasive experiences by female scholars of their career being sabotaged and obstructed. Examples for this are vague and changing performance criteria used to deny promotion, being excluded from opportunities to professionalize or to develop relevant skills and being denied tenure. In addition, the report by the Young Academy Groningen Report (2021; see also Hilton and Täuber, 2022) points to the high prevalence of intersecting disadvantages among interviewees. Of the self-selected sample of 26 current and former members of staff, 22 were women and four men, 23 were international and three were Dutch. Importantly, all Dutch participants were female, and all internationals

participants were male. One scholar put their experiences like this: "It's the first time in my life that I think so strongly that I am a young woman in a university and also a migrant. And I have lived and worked in many other countries outside of the country where I was born. … I never had so many times in my life that I'm called international. I was always a colleague, nobody referred to me as an international woman." In the described context, "international" referred to anyone of non-Dutch origin. The qualitative approaches taken in the Dutch reports are complemented by a quantitative online survey on academic working culture in the United Kingdom, conducted by the Wellcome Trust (2020) among over 4,000 researchers. The survey showed that many respondents experienced bullying, discrimination, harassment, and exploitation, leading to a sense of isolation and loneliness, mental health problems, and anxiety. Importantly, here, too, researchers from underrepresented groups faced the most challenges.

These reports suggest that intersectional approaches would be of added value for examining academia as an organizational working environment. This aligns with observations that women belonging to several disadvantaged identities face more harassment (e.g., Oertelt-Prigione, 2020; Moss and Mahmoudi, 2021), whereas interventions to promote women in academia typically only cater to a narrowly defined range of white, cis-gender, straight, middle-class women, and therefore, often fail to realize the intended benefits for less privileged women (e.g., Täuber, 2019; Tzanakou, 2019). However, while intersectionality could be a useful policy tool for academia as an institution, it has not been widely used to examine inequality production and reproduction in academia (Jouwe, 2015). Especially in quantitative research, intersectional approaches are still relatively uncommon (NASEM, 2018; Bondestam and Lundqvist, 2020; Cortina and Areguin, 2021).

Intersectionality

As outlined in the introduction, European higher education policy largely ignores intersectional approaches. When intersectionality is considered at all, it often refers to weak intersectionality and additive approaches (Bowleg, 2008; Grzanka, 2018; Bauer et al., 2021), which differ from intersectional analysis rooted in Black feminist movements (Crenshaw, 1989, 1991; Wekker, 2016). Statements about the lack of an intersectional approach to anti-harassment and non-discrimination policy in academia (Bondestam and Lundqvist, 2020) point to policies that indiscriminately focus on women, neglecting the heterogeneity of "women scholars" (Atewologun and Sealy, 2014; Atewologun et al., 2016). Śliwa and Johansson (2014) examined the career trajectories of foreign women—a term respondents used to self-describe "a relational, heterogeneous category of workers, for whom depending on the situation and the individual, career trajectories will be influenced by different factors, not always affecting exclusively foreign women" (p. 829)—and found that the career trajectories and progressions of that group were affected by multiple bases of organisational inequalities. These inequalities could be based on gender, on affiliation with a particular nationality or religion, but also on accent.[1] Similarly, members of minoritized groups in organizations are disproportionately confronted with sexual harassment (Healy et al., 2019; Oertelt-Prigione, 2020), discrimination (Young Academy Groningen Report, 2021), and bullying (Moss and Mahmoudi, 2021). Clancy et al. (2017), for instance, show that in astronomy and planetary science, women of colour face greater risks of gendered and racial harassment.

Prior research has criticized the lack of studies that consider how inequalities related to gender, race, and class mutually reinforce or contradict each other (Acker, 2006). Intersectional approaches can help to disentangle and make visible interacting systems of inequality (Boogaard and Roggeband, 2010), but might be constrained by pragmatic, legislative, or ideologic considerations. In such cases, quantitative approaches, although being suboptimal by engaging weak and additive approaches to intersectionality (Bowleg, 2008; Grzanka, 2018; Bauer et al., 2021), might fulfil a signalling function for areas requiring follow-up research employing better suited approaches. Arguably, in academic contexts, where career progress is typically contingent on scholars' visibility, ignoring intersectional disadvantages will contribute to policy-practice gaps. Importantly, intersectionality also creates specific privileges. In an academic context, Miller and Roksa (2019) showed how combined racial and gender privilege places white men in the most advantaged, and racial/ethnic minority women in the most disadvantaged, position in terms of protected research time, opportunities for collaborations, and building networks. Similarly, research in a Dutch business school demonstrated higher salary and rank of Dutch men compared to non-Dutch women (Bago D'Uva and Garcia-Gomez, 2020). The intersectional aspect is under-researched but important to consider because it can be both a cause and a consequence of policy ineffectiveness (Moughalian and Täuber, 2020), especially because it might be associated with psychological safety and voice.

Psychological Safety

Psychological safety denotes individuals' positive assumptions about how the other party might react when asking something or reporting a problem. Roussin and Webber (2011), for instance, define psychologically safe working environments as high in trust, encouraging risk-taking and thus vulnerability, such that employees do not need to be concerned about their jobs or reputation. Thus, experiencing an open environment, for instance, contributes to feelings of psychologically safety

[1]Sliwa and Johansson (2014) explain that their use of the label 'foreign woman' reflected "the most common descriptor mobilized by our participants in referring to themselves." They further explain that they do not "apply the label 'foreign woman' in an essentialist sense." Instead, they consider the label as an "umbrella term to describe a relational, heterogeneous category of workers, for whom depending on the situation and the individual, career trajectories will be influenced by different factors, not always affecting exclusively foreign women. Sometimes this might be gender alone, on other occasions the fact of belonging to a particular nationality or religious group, on yet other the intersection of, for example, gender, ethnicity and accent. What our research participants have in common is the fact of belonging to an organizational minority which is growing in numbers as the drive towards internationalization and globalization continues in United Kingdom higher education."

(Edmondson, 2003). On the other hand, employees feel abandoned in organizations that fail to 'walk the talk'. This is due to a perceived violation of the psychological contract between the employee and the organization (Cartwright and Cooper, 1996; Morrison and Robinson, 1997). For instance, when harassment is frequent despite anti-harassment policies, employees' expectation that the institution protects them is violated. In order to feel psychologically safe, employees need to trust their institution, which is more difficult when decoupling indicates word-deed discrepancies (Zhang et al., 2010). Being mistreated and discriminated against can harm the target's psychological safety (e.g., Castaneda et al., 2015).

Voice

Women scholars' willingness to voice their experiences is important, not only for them individually to claim their space, but also for organizations to learn about possible discrepancies between policy and practice. Gender equality interventions, for instance, are typically designed with white middle-class women in mind (e.g., Clavero and Galligan, 2021) and often neglect the specific disadvantages faced by women scholars with intersecting disadvantages. If these scholars are not feeling safe to share their experiences and how the interventions let them down, improvement of such programs and interventions is unlikely. Testifying to this, a feminist disability rights activist states (MamaCash, 2022), "if you stay quiet, you stay invisible."

Liang et al. (2012) refer to employees' voice as raising ideas and speaking up about problems. In addition to attitudes, McLaughlin et al. (2012) point out that women experiencing harassment are more likely to leave their career and look for different jobs elsewhere. Fear of retaliation is a strong inhibitive force to voicing experiences of mistreatment (e.g., Cortina and Magley, 2003). Institutions are often permissive of retaliation against reporters of harassment because retaliation helps to retain hierarchical power systems (Near et al., 1993; Svensson and Genugten, 2013). After all, harassment is typically intended to dominate and assert control over the target (McLaughlin et al., 2012; Medeiros and Griffith, 2019). When voicing such experiences, for instance through reporting them, targets of harassment undermine the mechanism intended to submit them. Because strongly hierarchical organizations such as academia (NASEM, 2018) endow power and privilege to those at the top of the hierarchy, typically majority members, reporting harassment will often be seen as a threat to the hierarchy.

Supporting this proposition, institutions—including academia—have been found to engage in various ways to silence targets of harassment. Fernando and Prasad (2018), for instance, show that various organizational actors such as HR, line managers, and colleagues, mobilize various discourses to persuade reporters not to voice their discontent. Ultimately, these authors find that many targets of harassment at universities are tricked into 'reluctant acquiescence' and self-silence. As a result, targets of harassment can feel betrayed by the institution, which often is related to complex trauma and damage to mental health (Harsey et al., 2017). Even without the involvement of additional organizational actors besides the perpetrator, not speaking up about unfair treatment and harassment can negatively affect employees' mental health (Cortina and Magley, 2003). Thus, voicing experiences of mistreatment is important for individual mental health as well as for signalling to organizations that change is necessary.

Intersectionality, Psychological Safety, and Voice

Intersectional approaches to psychological safety seem warranted given that members of sexual minority groups often are exposed to more harassment and feel less psychologically safe (Silverschanz et al., 2007). Feeling psychologically safe is essential for voicing experiences of mistreatment (Walumbwa and Schaubroeck, 2009; Singh et al., 2013). Indeed, employees who feel psychologically safe are more likely to report institutional misconduct such as sexual harassment, unfair treatment or other unethical incidents (Walker et al., 2019; Edmondson, 2020). Intersectional approaches are relevant for voice, too. Women of colour are often dismissed as the "angry black women" because they are seen as masculine and aggressive, which can undermine their willingness to voice experiences of harassment in an attempt to not confirm these stereotypes (Hall et al., 2019). When it comes to harassment in the workplace, women belonging to minority groups are targeted more than women belonging to the majority (Berdahl and Moore, 2006). In an attempt to complement the "put downs" associated with silencing women scholars with the "push outs," women scholars' career choices will be accounted for in the survey, too. Thus, policy ineffectiveness is expected to relate negatively to women academics' willingness to be vocal about their experience because it undermines their feelings of psychological safety.

THE CURRENT STUDY

Given that especially quantitative research into sexual harassment is sparse (Healy et al., 2019; Cortina and Areguin, 2021), the present paper investigates how policy ineffectiveness—operationalized as experiences of harassment, discrimination, retaliation for reporting, and institutional resistance to gender equality—relates to women academics' feelings of psychological safety, voice and career choices, and whether these relationships are more pronounced for women facing intersectional disadvantage. The following hypotheses were tested: Policy ineffectiveness, operationalized as harassment, discrimination, retaliation after reporting, and institutional resistance, is expected to be negatively associated with feelings of psychological safety (*Hypothesis 1*). Policy ineffectiveness is expected to be negatively associated with voice and career choices favouring academia (*Hypothesis 2*). Psychological safety is expected to be positively associated with voice and career choices favouring academia (*Hypothesis 3*). Intersectionality is expected to strengthen the negative association between policy ineffectiveness and psychological safety (*Hypothesis 4*). Thus, the complete conceptual model (see **Figure 1**) to be tested predicts a moderated mediation, with intersectionality and policy ineffectiveness interactively affecting voice and career choice through psychological safety.

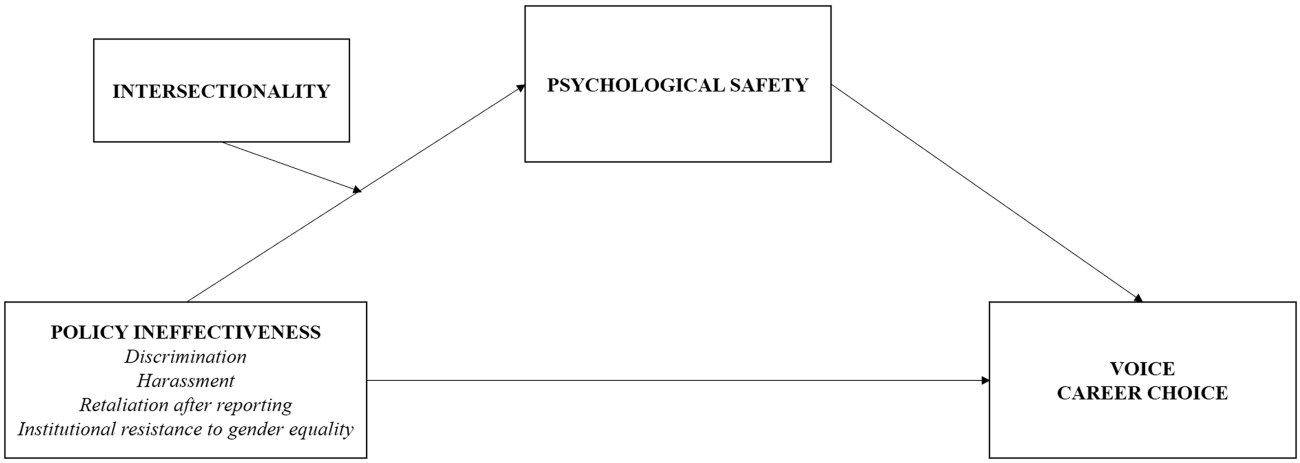

FIGURE 1 | Conceptual model tested in this research.

Methods

Power Analysis

The preregistration of the study in the Open Science Framework (OSF) explains how the number of required participants was calculated.[2] *A priori* power analysis conducted with G*Power Faul et al., 2009) revealed that a minimum of 54 participants were required, based on the three predictors of policy ineffectiveness, intersectionality, and psychological safety to test the hypotheses. The aim was to recruit as many participants as possible within a timeframe of 6 weeks, but a minimum of 54. Women from various international universities were contacted, including women from the Netherlands, Germany, Austria, and other countries through the author's professional network. Potential participants were contacted *via* email and were asked to participate in the survey. Before filling out the survey, participants filled in an informed consent form that was part of the survey.

Participants and Procedure

Potential respondents were invited through the author's professional networks, who sent an email explaining the goal of the research, inviting the addressee to participate, and provided a link to the Qualtrics survey. The research was introduced as an attempt to study academics experiences with gender inequality. Addressees were encouraged to share the survey link with other potentially interested people (snowballing). Before being presented with the survey questions, participants gave informed consent. Two-hundred-and-four people started the survey, but only 100 filled it out completely, of whom 91 were women. These were the 91 respondents included in the analyses presented below. Respondents worked at their current institution on average for 8.29 years ($SD = 6.97$). Forty-two respondents were tenured, 46 were not tenured, and three did not wish to disclose that information (46.2, 50.5, and 3.3%, respectively). Respondents had 28 different nationalities, with most from the Netherlands (28.7%), followed by Austria (13.2%), and Germany (12.1%). Respondents reported 20 different current countries of residence, most in the Netherlands (47.3%), Austria (14.3%), and the United Kingdom and Northern Ireland (6.6%). At the time of the survey, 43 respondents (52.7%) worked in a different country than their country of origin. No difference was observed in frequency of tenure as a function of whether a women scholar was foreign (tenured: $N = 20$, not tenured: $N = 22$) or domestic (tenured: $N = 22$, not tenured: $N = 24$), $\chi^2(2) = 0.05$, $p > 0.83$. Respondents worked in various universities and scientific fields, with most of them from Social and Behavioral Sciences (45.1%), followed by Business and Economics (22%), and Arts and Humanities (13.2%).

Measures

Unless indicated otherwise, all items were measured on 5-point Likert scales ranging from 1 (*not at all*/*completely disagree*) to 5 (*very much*/*completely agree*). The complete questionnaire can be found in the Appendix A.

In order to create an additive index of *intersectionality*, respondents were asked to indicate whether they differed from the majority of the people they work with at their current institution for a range of factors adopted from the Athena Survey of Science, Engineering and Technology (2016). These factors included, among others, race, ethnicity, sexual orientation, disability status, and religious affiliation. The perceived effects of these factors on respondents' careers were assessed with the question "Please rate the extent to which these dimensions have affected your career and career choices to date," ranging

[2]Note that the analyses presented here differ from the preregistration in a number of ways. First, the *a priori* power analysis was based on the expectation that the indicators of policy ineffectiveness would load onto one factor. The empirical data revealed that each loaded on a different factor, meaning that the power analysis should have been based on six instead of only three predictors. Further, the preregistration expected the components of the dependent variable Voice (voice and career choices) to load on one factor. The empirical data revealed that they loaded on different factors, resulting in two rather than one dependent variable. Together, the deviations from the preregistration warrant caution particularly with respect to the study's power.

from *extremely negative* to *extremely positive*. Complementing questions about disadvantage, respondents' understanding of the attributes that are associated with *privilege in resource allocation* was assessed with the question "In your academic environment, what kind of attributes would a person need to have in order to be most favoured/privileged in resource allocation?." Respondents could provide their answers using eight open answer text boxes.

Policy ineffectiveness was measured with the four constructs that indicate ineffectiveness of non-discrimination and anti-harassment policies, inadequacy of complaint management procedures, and lack of success in implementing gender equality interventions. These constructs were discrimination, harassment, retaliation after reporting, and institutional resistance to gender equality. In order to facilitate a shared understanding of the terms, definitions were provided before presenting the items. *Discrimination* was measured with 15 items ($\alpha = 0.90$) adapted from the Athena Survey of Science, Engineering and Technology (2016). Respondents were asked to indicate "In your main academic working environment, how common is resource allocation that favors men or other academics that are more similar to the majority group?," where low values reflect that discriminatory resource allocation is very uncommon, and higher values reflect that it is very common. Thus, different from traditional discrimination scales, these items did not ask for individual experiences of discrimination *per se*, but more for how normalized and common discrimination is in respondents' academic working environment. *Harassment* was measured with 6 items ($\alpha = 0.90$) adapted from different sources (Naezer et al., 2019; Cortina and Areguin, 2021). *Retaliation after reporting* was measured with 12 items ($\alpha = 0.95$) adapted from Svensson and Genugten (2013) to match the context of gender equality. This scale was preceded by the question "Have you ever complained about harassment or discrimination, or do you know of other who have done so?." *Institutional resistance to gender equality* was measured with 8 items ($\alpha = 0.87$) that were developed based on a recently developed model of institutional resistance towards initiatives to advance gender equality, ranging from passive to active forms of resistance (Flood et al., 2021).

Psychological safety was measured with seven items ($\alpha = 0.83$) adapted from Edmondson (1999). Higher values on this scale indicate that participants feel more psychologically safe in their institutions.

Voice was measured with 10 items ($\alpha = 0.92$) adapted from Liang et al. (2012) to match the context of gender equality (e.g., "I proactively develop and make suggestions for issues that may influence gender equality in my working environment"; "I dare to voice out opinions on gender inequality, even if that would embarrass others"). Higher values on this scale mean that respondents feel more at ease to letting themselves be heard.

Career choices were measured with four self-developed items (e.g., "I consider changing careers," reverse coded; $\alpha = 0.80$). Higher values on this scale indicate that respondents would like to continue their career in academia and would recommend this to other women, too.

Results

Intersectionality

Figure 2 provides an overview over the percentages with which the different dimensions were named. Respondents indicated not differing at all from the majority of people they worked with (23.1%), differing on one dimension (35.2%), on two (18.7%), on three (12.1%), four (7.7.%) and five dimensions (3.3%). On average, respondents indicated differing from the majority at their current university on 1.56 dimensions ($SD = 1.35$). For the correlation and moderation analyses, intersectionality has been calculated as a sum, with 0 indicating no difference from the majority, and 5 indicating differing from the majority on five dimensions.

Examining respondents' understanding of the impact of different factors on their career using a one-sample *t*-test shows that they are aware of privileges they have, too (see **Figure 3**). For instance, the predominantly white sample indicates that their race/ethnicity is an advantage for their career [$M = 3.57$, $SD = 0.93$, $t(87) = 5.72$, $p < 0.001$], as are their countries of origin [$M = 3.39$, $SD = 1.01$, $t(89) = 3.64$, $p < 0.001$], which are mostly Western, their social class [$M = 3.28$, $SD = 0.98$, $t(87) = 2.71$, $p = 0.008$], and the fact that they are able-bodied [$M = 3.25$, $SD = 0.77$, $t(86) = 3.08$, $p = 0.003$]. At the same time, sex ($M = 2.49$, $SD = 0.89$), age ($M = 2.75$, $SD = 0.76$), and gender identity ($M = 2.76$, $SD = 0.79$) were factors perceived as exerting significantly negative effects on respondents' academic careers (all t's > -2.80, all p's < 0.007). Factors not associated with significant disadvantage or privilege were sexual orientation, religious affiliation, caring responsibilities, and marital or civil status.

Descriptive Analyses

Table 1 provides an overview over means, standard deviations, and correlations of the constructs of interest. Means of constructs related to *Policy ineffectiveness* were all significantly above the mid-point of the respective scale, all t's > 5.00, all p's < 0.001. This suggests that women academics taking part in this research were rather familiar with discrimination, harassment, and institutional resistance to gender equality. Respondents were also familiar with retaliation after reporting harassment, which is concerning given that more than two-thirds of the study's respondents indicated having complained about harassment or discrimination themselves ($n = 31$), or knowing of others who have complained ($n = 55$). Only 25 respondents indicated not having complained themselves and not knowing others who have done so.

The correlation analysis suggests that intersectionality is associated with more discrimination, harassment, retaliation after reporting discrimination and harassment, and institutional resistance to gender equality. Intersectionality also relates to lower reported psychological safety. Regarding voice, women academics indicate speaking up more when confronted with higher levels of discrimination, harassment, retaliation after reporting and institutional resistance. However, when career choices are concerned, higher levels of discrimination, harassment, retaliation after reporting and institutional resistance

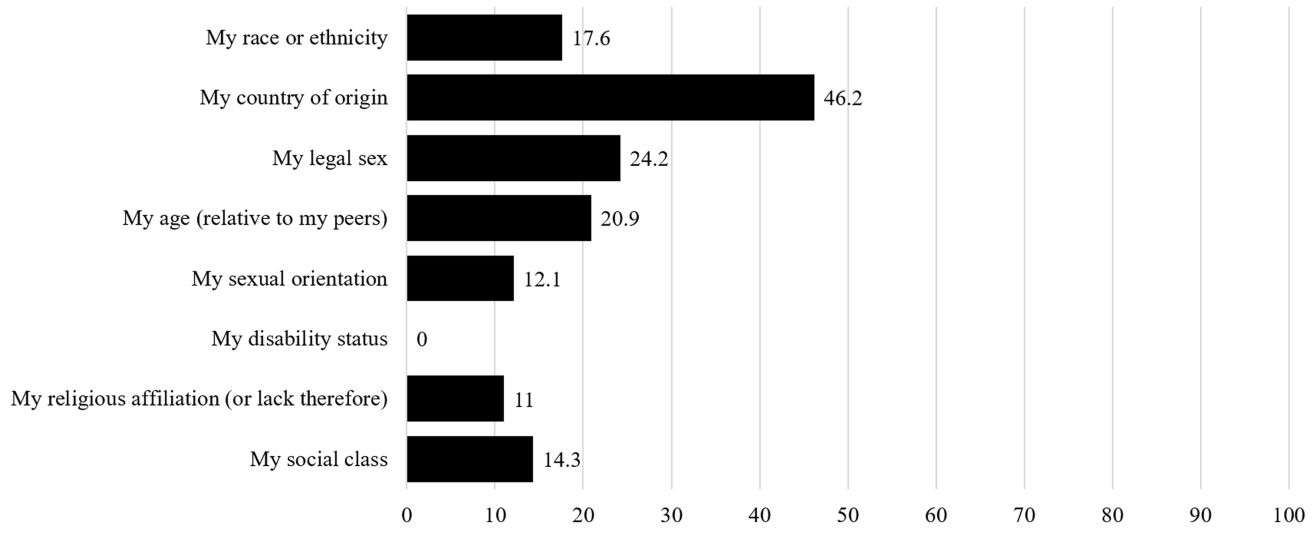

FIGURE 2 | Respondents' answers to the question "Regarding which attributes do you differ from the majority at your workplace?"

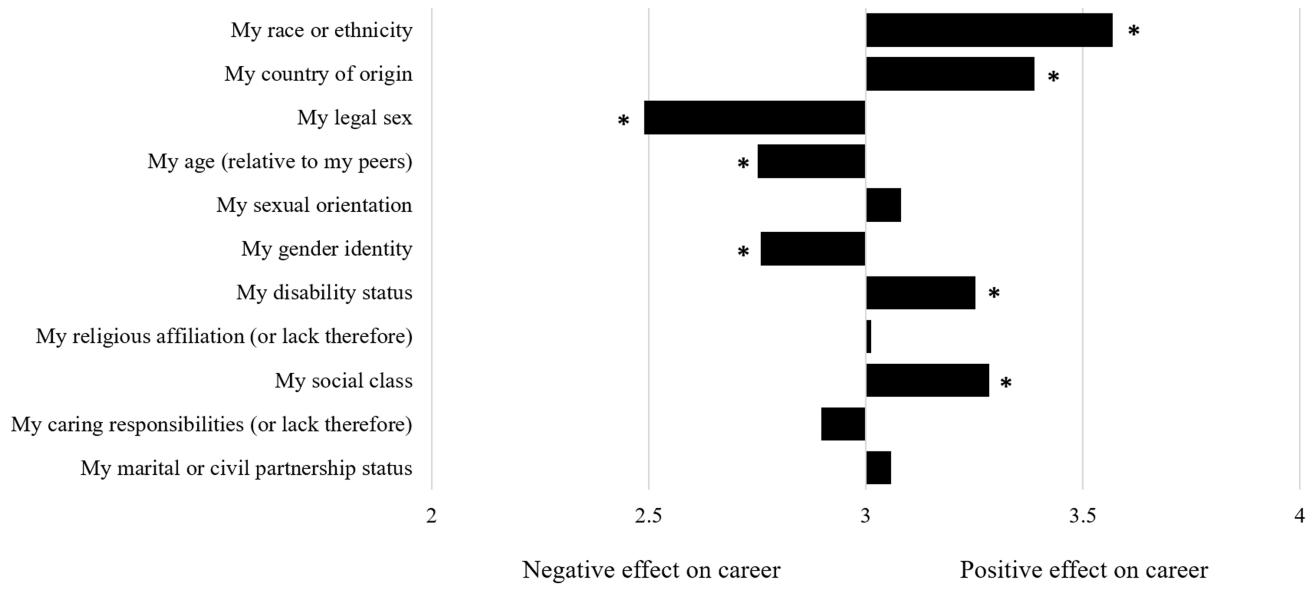

FIGURE 3 | Respondents' answers to the question "Please rate the extent to which these dimensions have affected your career and career choices to date." Asterisks (*) denote significant differences from the scale mean.

are associated with stronger considerations to change institutions and career.

Moderation Analysis

Based on the correlation patterns, moderation analyses were performed to test whether policy ineffectiveness is more strongly negatively related to psychological safety for women academics who indicated differing from the majority on multiple dimensions. The analyses reveal that in particular experiences of institutional resistance to gender equality are related to psychological safety more negatively for women academics who differ from the majority on more dimensions (**Table 2**), whilst the interaction is marginally significant for experiences of harassment. The patterns for experiences of discrimination and retaliation after reporting show the same direction, but are not significant. The simple slopes analyses presented in **Table 3** show that the associations between policy ineffectiveness and psychological safety are generally stronger and more negative for women academics with more (see column on the right) compared to less intersecting disadvantages.

Moderated Mediation Analysis

Moderated mediation analysis tests the conditional indirect effect of a moderating variable on the relationship between

TABLE 1 | Means, standard deviations, and correlation coefficients.

	1	2	3	4	5	6	7	8
1. Intersectionality	1.57 (1.35)							
2. Discrimination	0.35**	3.66 (0.63)						
3. Harassment	0.24**	0.44**	3.03 (1.00)					
4. Retaliation	0.30**	0.52**	0.72**	3.23 (0.95)				
5. Resistance	0.30**	0.54**	0.59**	0.61**	3.48 (0.82)			
6. Psychological Safety	−0.28**	−0.36**	−0.60**	−0.58**	−0.46**	3.20 (0.85)		
7. Voice	0.20	0.32**	0.32**	0.27**	0.43**	−0.09	3.63 (0.81)	
8. Career Choice	−0.19	−0.31**	−0.24*	−0.35**	−0.30**	0.40**	−0.15	3.18 (1.05)

*$p < 0.05$, **$p < 0.01$. Means and standard deviations are provided in the diagonal.*

TABLE 2 | Moderation of the association between resistance-related experiences and psychological safety by intersectionality.

	Dependent variable: Psychological safety				
Independent variables	**Effect (SE)**	***t***	**LLCI**	**ULCI**	**Model summary**
Discrimination	−0.29 (0.10)	−2.84*	−0.5004	−0.0885	Total $F(3,87) = 6.38$, $p < 0.001$,
Intersectionality	−0.15 (0.10)	−1.39	−0.3540	0.0627	$R^2 = 18.03\%$
Interaction	−0.15 (0.06)	−1.53	−0.3363	0.0437	Interaction $F(1,87) = 2.34$, $p = 0.130$
Harassment	−0.57 (0.09)	−6.63**	−0.7380	−0.3977	Total $F(3,87) = 6.38$, $p < 0.001$,
Intersectionality	−0.08 (0.09)	−0.86	−0.2598	0.1022	$R^2 = 40.11\%$
Interaction	−0.17 (0.09)	−1.94‡	−0.3495	0.0042	Interaction $F(1,87) = 3.77$, $p = 0.056$
Retaliation	−0.59 (0.09)	−6.49**	−0.7730	−0.4105	Total $F(3,87) = 17.62$, $p < 0.001$,
Intersectionality	−0.06 (0.09)	−0.69	−0.2492	0.1212	$R^2 = 37.79\%$
Interaction	−0.17 (0.09)	−1.69	−0.3613	0.0293	Interaction $F(1,87) = 2.85$, $p = 0.095$
Resistance	−0.40 (0.10)	−4.23**	−0.5917	−0.2135	Total $F(3,87) = 11.46$, $p < 0.001$,
Intersectionality	−0.07 (0.10)	−0.65	−0.2680	0.1366	$R^2 = 28.33\%$
Interaction	−0.26 (0.11)	−2.42‡‡	−0.4819	−0.0474	Interaction $F(1,87) = 5.86$, $p = 0.018$

‡$p = 0.056$, ‡‡$p = 0.018$, *$p < 0.01$, **$p < 0.001$.

TABLE 3 | Simple slopes analysis for different levels of intersectionality.

	Low intersectionality (−1 SD)		High intersectionality (+1 SD)	
	ß	***t***	***ß***	***t***
Discrimination	−0.15	−1.02	−0.44	−3.23**
Harassment	−0.40	−3.25**	−0.74	−5.92***
Retaliation	−0.43	−3.64***	−0.76	−5.08***
Resistance	−0.14	−0.93	−0.67	−4.75***

**$p < 0.01$, ***$p < 0.001$.

a predictor and an outcome variable *via* a mediator variable. The correlation matrix in **Table 1** shows that psychological safety is associated with career choices, but not with voice. The moderation analysis above shows that the association of institutional resistance with psychological safety is significantly, and the association of harassment with psychological safety is marginally moderated by intersectionality. Consequently, the moderated mediation hypothesis was tested with two separate models with harassment and institutional resistance as independent variables, respectively, psychological safety as mediator, and intersectionality as moderator. In both models, career choice is the dependent variable. Using PROCESS model 7 (Hayes, 2018; 5,000 bootstrap samples, predefined), this revealed that higher levels of *harassment* were related to lower levels of psychological safety (**Table 4**, left panel, mediator model). Higher levels of psychological safety, in turn, were associated with career choices in favour of academia (**Table 4**, left panel, dependent model). The conditional indirect effect of *harassment* on career choice *via* psychological safety was significant at all levels of the moderator, but was strongest at high, and weakest at low levels of intersectionality (**Table 5**, left panel). The overall moderated mediation model was supported by a reliable index of moderated mediation (−0.07) as indicated by zero not being included in the confidence interval ($CI_{95\%} = -0.1741; -0.0021$).

Similarly, higher levels of *institutional resistance* were related to lower levels of psychological safety (**Table 4**, right panel, mediator model). Higher levels of psychological safety, in turn, were associated with career choices in favour of academia (**Table 4**, right panel, dependent variable model). The conditional indirect effect of *institutional resistance* on career choice *via* psychological safety was strongest and significant at high levels of intersectionality, weaker but still significant at medium levels, and was non-significant at low levels of intersectionality (**Table 5**, right panel). The overall moderated mediation model was

TABLE 4 | Moderated mediation results for harassment (left panel) and resistance (right panel).

	Mediator model				Mediator model		
	DV=Psych. Safety, R^2 = 40.11%				DV=Psych. Safety, R^2 = 28.33%		
Predictor	***b***	***SE***	***t***		***b***	***SE***	***t***
Constant	0.04	0.09	0.40	Constant	0.07	0.10	0.80
Harassment	−0.57	0.09	−6.63***	Resistance	−0.40	0.10	−4.23***
Intersectionality	−0.08	0.09	−0.87	Intersectionality	−0.07	0.10	−0.65
Interaction	−0.17	0.09	−1.94‡	Interaction	−0.26	0.11	−2.42*
	Dependent variable model				**Dependent variable model**		
	DV=Career Choice, R^2 = 15.97%				DV=Career Choice, R^2 = 17.58%		
Constant	0.00	0.10	0.00	Constant	0.00	0.10	0.00
Harassment	−0.00	0.12	−0.03	Resistance	−0.14	0.11	−1.31
Psych. Safety	−0.40	0.12	3.26**	Psych. Safety	0.33	0.11	3.06*

‡$p = 0.056$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

supported by a reliable index of moderated mediation (−0.09) as indicated by zero not being included in the confidence interval ($CI_{95\%} = -0.1831; -0.0132$). Together, the analyses suggest that particularly for women academics who differ from the majority on multiple dimensions, experiences of harassment and institutional resistance undermine their feelings of psychological safety, making them consider to leave their institution or their career more strongly.

Who Enjoys Privilege in the University?

Respondents were asked to provide up to eight attributes that a person would need to have in order to be most favoured or privileged in respondents' academic environment. They produced almost 300 attributes which were summarized in thematically coherent clusters by the author and a research assistant. We each clustered 30 attributes and compared the theme we assigned to each attribute. Differences in clustering decisions were discussed and resolved. Overlapping themes were labelled consistently. **Table 6** provides an overview of the subtopics clustered in overarching themes. The generated attributes reflect the privilege that arises from belonging to majority on multiple dimensions. **Figure 4** shows that the most privileged individuals in respondents' academic environment are white, middle-aged, heterosexual males who display characteristics that are typically associated with individualism and competitiveness, such as being assertive, outspoken, and self-assured. Many respondents refer to networking skills and the willingness and ability to connect with powerful others, which is sometimes referred to as cronyism. A topic cross-cutting the thematic clusters is being embedded in local, close-knitted strategic and political networks, which seem instrumental for getting ahead. Only two codes referred to traits that are associated more strongly with collectivism, namely being a team player and caring. Freedom from care responsibilities was a theme in and of itself, as it enables academics to be always available, working fulltime, and be flexible, and hence to be more productive and visible. Academia as a system thus is seen as favouring people based on traits that hardly relate to actual academic merit. Indeed, qualities such as education or being an expert were named only 25 times (8.59%) as a reason for enjoying privilege in the university. However, 13 of those attributes are known to be heavily gendered, such as number of publications, external recognition and the ability to attract funding (e.g., Clavero and Galligan, 2021). In sum, of the entire range of attributes that respondents associate with being privileged in the academy, only about 4% were related to actual academic skills.

DISCUSSION

Policy ineffectiveness, operationalized as experiences of harassment, discrimination, retaliation for reporting misconduct, and institutional resistance against gender equality, is associated with lower levels of psychological safety and undermines women scholars' willingness to stay in their working environment. The negative association between policy ineffectiveness and psychological safety was stronger among women academics who indicated that they differed from the majority in their institution on multiple dimensions. Support for the moderated mediation hypothesis was found in particular for institutional resistance to gender equality, and marginally for harassment. Both components were more strongly negatively associated with psychological safety among women academics facing intersectional disadvantages. Psychological safety was positively associated with career choices in favour of academia, meaning that women who felt psychologically safe were more likely to recommend working in academia to other women and their daughters and were less inclined to leave their university or academia altogether. The negative effects of harassment and institutional resistance on career choices were fully mediated by perceived psychological safety. The study thus shows that ineffective policy is not just disappointing on an institutional level, but that it contributes to the reproduction of a rather homogenous academic community that does not do justice to the wealth of perspectives that women academics with diverse social positions can offer.

The approach to intersectionality explored here is conscious of its shortcomings and benefits. Shortcomings involve the weak conceptualization of intersectionality that is inherent to

TABLE 5 | Moderated mediation results examining conditional indirect effects of harassment (left panel) and resistance (right panel) on career choice *via* psychological safety at different levels of the moderator intersectionality.

	Harassment				Resistance			
Intersectionality	**Effect**	**BootSE**	**LLCI**	**ULCI**	**Effect**	**BootSE**	**LLCI**	**ULCI**
−1.16	−0.15	0.08	−0.3246	−0.0250	−0.03	0.07	−0.1889	0.0749
−0.42	−0.20	0.08	−0.3847	−0.0575	−0.10	0.06	−0.2369	−0.0191
1.06	−0.30	0.13	−0.5784	−0.0834	−0.23	0.08	−0.4177	−0.0848

TABLE 6 | Thematic clustering of attributes applying to those who are privileged in the academic environment, as generated by female scholars.

Factors	Count	% of factor	% of total
Appearances	**88**		**30.24**
Male	46	52.27	
White	26	29.55	
Seniority/age	12	13.64	
Able-bodied	2	2.27	
Slim	1	1.14	
Taller than average	1	1.14	
Network/cronyism	**59**		**20.27**
Political and local connections/cronyism	30	50.85	
General network skills	10	16.95	
Being seen by those in power	10	16.95	
Conforming with those in power/the majority	9	15.25	
(Ideological) background	**46**		**15.81**
Local nationality/ Western	17	36.96	
Speaks native language	10	21.74	
Heteronormative	8	17.39	
Middle or upper class	7	15.22	
Conservative	3	6.52	
Neurotypical	1	2.17	
Individualistic and competitive traits	**48**		**16.49**
Outspoken	13	27.08	
Assertive	12	25.00	
Confident	12	25.00	
Career-Minded	11	22.92	
Collectivist traits	**2**	100.00	**0.69**
Traits less compatible with caring responsibilities	**23**	100.00	**7.90**
Actual academic quality	**25**		**8.59**
Competence/ qualification	13	52.00	
Publications	7	28.00	
Funding	5	20.00	
	291		100

Bold values indicate overarching themes.

an additive approach to multiple identities as used here (Bowleg, 2008; Grzanka, 2018) and to quantitative research endeavours more generally (Bauer et al., 2021). Benefits pertain to demonstrated usefulness of the employed self-report measurements to signal intersectional disadvantage as well as awareness of own and others privilege, thereby creating valuable insights despite pragmatic, legislative, or ideologic constraints to studying intersectionality. Thus, the approach used here can be instrumental for pointing towards areas that require more in-depth research attention in order to design effective policy and implement it successfully. This applies to intersectional disadvantages experienced by women scholars, as well as to relationality (i.e., in comparison with whom am I privileged or disadvantaged?) and social constructionism (i.e., which traits and characteristics "make" an academic; Windsong, 2018). Participants were aware of their positionality in terms of benefitting from versus being disadvantaged in their respective academic working environment (see **Figure 3**).

I thus conclude that the approach that I have used here can be useful to combine the desire for intersectional approaches with reality constraints that might apply. In the European context, such constraints pertain primarily to very strict privacy laws (Goddard, 2017) and to the depoliticization of race and how it relates to power (Rose, 2022). In order to understand how oppression and privilege contribute to the perpetuation and reproduction of inequality in academia, and thus to design and implement effective policy, the approach I have used here needs to be follow-up by inquiries into strong intersectionality (Bowleg, 2008; Grzanka, 2018; Windsong, 2018). This is essential for optimally using intersectionality as a critical framework to understand "the ways in which heterogeneous members of specific groups (such as women) might experience the workplace differently depending on their ethnicity, sexual orientation, and/or class and other social locations" (Atewologun, 2018, p. 1). But how can such follow-up research be stimulated?

Change initiatives are often mandated to those in powerful positions. Particularly where policy aims to further progressive change, such as making academia a more inclusive, equitable, and safe working environment, the desire to maintain power and privilege might undermine effective policy implementation. Powerful groups are notoriously known for their opposition to change that might threaten their privileged position (Dixon et al., 2010; Blader and Chen, 2011; Marr and Thau, 2014; Dover et al., 2016). Unfortunately, the lack of strong approaches to intersectionality means that discourses of power, privilege, and system-supporting inaction are also missing in analyses of policy-practice gaps. The weak approach to intersectionality in higher education policy might therefore be an example of power exertion through discourse (Lukes, 2004; Cath et al., 2014; Rose, 2022) and co-optation (Gaventa, 2006). The term 'intersectionality' might then be used to suggest analytical and philosophical engagement with systemic injustice, but can neither

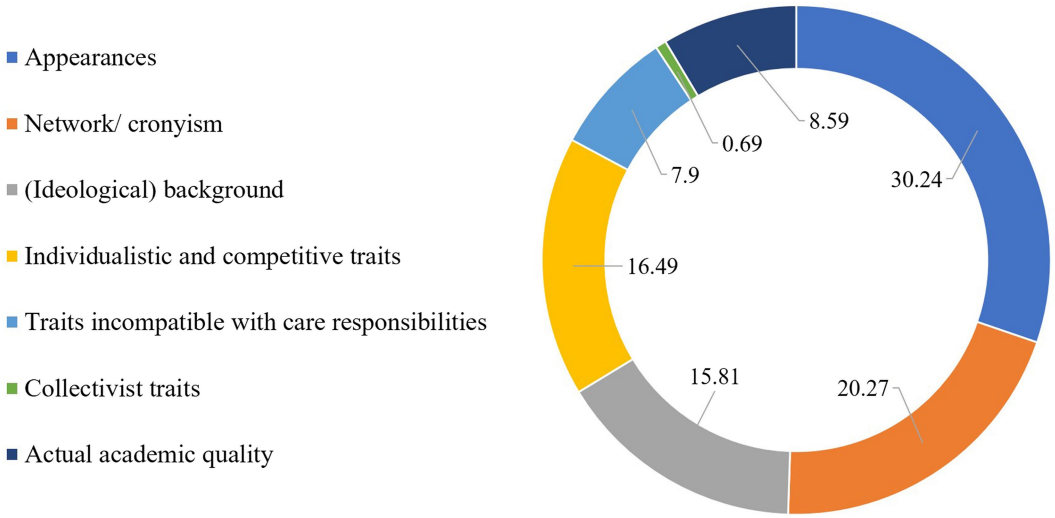

FIGURE 4 | Attributes affording privilege in academia.

address the co-constitution of multiple identities, nor contribute to meaningful analyses of power and privilege or social constructivism (Atewologun, 2018). Indeed, Cath et al. (2014) observed that the Dutch culture is both colour-blind and power-blind, and the same can likely be said for other academic cultures.

That considerations of power and privilege need to be included in the design, and implementation of policy in higher education was clear from women scholars' ability to clearly pinpoint intersectional privilege. Respondents produced a very clear prototype of who is enjoying privilege and power in the academic environment. This prototype combined a set of attributes that were not at all meritocratic, but rather arbitrary in relation to academic qualities and skills. The most privileged in respondents' academic environment are White, middle-aged, heterosexual men without care obligations and with good local, political, and informal connections. These findings show the potential of self-report measures to produce indications of relationality (e.g., where there is disadvantage, there is also favouritism and privilege; Atewologun and Sealy, 2014). In addition, the attributes that participants associated with being privileged and favoured in the academic workplace have little to do with academic skills and qualifications. Attributes that might be related more explicitly to one's standing as an academic were named 21 times. However, 14 of those attributes are known to be gendered rather than based purely on merit, such as number of publications and the ability to attract funding. The same holds for the category "being seen by those in power," which is more easily achieved when one is perceived as a "star academic" and "able to perform better than others," which both may be consequences of belonging to "the inner circle" in the first place (Täuber and Mahmoudi, 2022). Together, this shows that self-report measures can also be used to create initial insights into social constructivism (Atewologun, 2018), which may then be followed-up and analysed in more detail by methodological approaches better suited to explore strong intersectionality.

Limitations and Future Research

The research presented here largely aligns with prior research. But the relatively small sample size and the correlational nature of the data warrant some caution. In addition, although showing variance in intersectionality, the sample was still relatively homogenous and predominantly consisted of white women. Ideally, follow-up research would engage with larger and more heterogeneous samples. For policy-making, the suggested stepwise approach should be tested. Experimental studies might add insights about causality, allowing to better understand the associations between harassment, psychological safety, voice and career choice. In addition, future research might want to zoom in on the question what makes women in academia perceive policy as (in)effective. Here, policy ineffectiveness was operationalized as experiences of harassment, discrimination, retaliation after reporting, and institutional resistance to gender equality. Such experiences imply the ineffectiveness of anti-harassment policy and suggest inadequate complaint management. Another possibility would be to ask more directly about the perceived effectiveness of universities' commitments and policies, interventions and measures.

Moreover, the self-designed construct of career choice was intended to measure expressions of discontent, not by speaking up, but by leaving academic working environments. One of the reviewers of this manuscript suggested, for instance, that contemplating changing careers could suggest agency, point towards practicing self-preservation or even reflect a form of self-empowerment by resisting toxic academic cultures. On the other hand, women academics who do chose to stay in their academic environment might have felt that being vocal about the culture would make them more vulnerable and open to retaliation, which could explain the lacking association between

psychological safety and voice. These considerations suggest that follow-up research into voice, career choices, agency, and self-protection might be valuable.

Practical Implications

The ineffectiveness of anti-harassment and non-discrimination policy, the inadequacy of complaint procedures, and the lack of successful interventions to increase gender equality in academia are not just unfortunate. Policy ineffectiveness can have adverse associations with relevant constructs, especially for women academics who differ from the majority on various dimensions. Policy is in part ineffective because it fails to account for intersectional experiences of inequality (Clavero and Galligan, 2021; Cortina and Areguin, 2021) that could inform the force field of power, privilege and systemic injustice in which policies are designed and implemented. Employing intersectional approaches to design and implement policy will benefit a wide range of academics. This is because, although the present research focused on women academics in particular, many of the experiences they shared involve gender harassment (Fitzgerald et al., 1995; Berdahl, 2007; Cortina and Areguin, 2021). Gender harassment affects everyone who deviates from gender stereotypes, including men of colour, identifying as LGBTQ+, with care responsibilities, or without a strong local and powerful network.

Besides the toll that policy ineffectiveness takes on individual academics, universities and society suffer from the resulting lack of perspectives and innovation. This is excellently documented by the diversity-innovation paradox in science described Hofstra et al. (2020). Based on data from the near-complete population of roughly 1.2 million US doctoral recipients from 1977 to 2015, the authors show that members of underrepresented groups produce higher rates of scientific novelty, yet find their novel contributions devalued and discounted. As a result, in comparison with majority groups, the innovations and novel contributions of scholars from underrepresented groups are less likely to translate into successful scientific careers. Implementing effective policies to tackle systemic inequality in academia thus benefits individual scholars from groups that are underrepresented and marginalized on multiple dimensions, as well as the higher education sector and society as a whole.

Finally, besides intersectional disadvantage, intersectional privilege needs to be more present in research and policy making. Women academics' descriptions of the attributes someone needs to have in order to get ahead at their institutions show that intersectional privilege is seen very clearly. A stronger focus on those privileged in academia might be a useful complement to the more common focus on those experiencing disadvantage. The present research shows that the additive approach to intersectionality might offer a useful method to signal areas for further in-depth investigation. Ultimately, the mechanisms that maintain and reproduce inequality in academia can only be understood if privilege and power are on the research agenda—as a truly intersectional analysis would also suggest. The design of interventions and implementation of policies is often mandated to those benefitting from intersectional privilege, at the risk that unawareness of intersectional disadvantage and unwillingness to share power undermine the effectiveness of such measures.

CONCLUSION

The present research shows that higher education institutions' policy ineffectiveness contributes to the perpetuation and reproduction of inequality in academia, by driving especially groups out of the academy who are minoritized on multiple dimensions, while facilitating groups who are privileged on multiple dimensions. In the European context, it seems plausible that both lack of data and a weak, additive approach to intersectionality contribute to policy ineffectiveness. Equal and inclusive workplaces in higher education will not be achieved by relying on this co-optation approach. In this regard, much needed allyship for actual change must be achieved from those endowed with privilege and power by the unequal system that the higher education sector continues to be. Rather than having more workshops on unconscious bias and gender stereotypes, we need to have uncomfortable conversations about the power and privilege that is made possible for some by disadvantaging many others.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

ST conceptualized and designed the study, collected and analysed the data, and wrote the manuscript.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2022.810569/full#supplementary-material

REFERENCES

Abbott, A. (2020). Stress, anxiety, harassment: huge survey reveals pressures of scientists' working lives. *Nature* 577, 460–461. doi: 10.1038/d41586-020-00101-9

Acker, J. (2006). Inequality regimes: gender, class, and race in organizations. *Gender & Society* 20, 441–464. doi: 10.1177/0891243206289499

Ahmed, S. (2007a). The nonperformativity of antiracism. *Meridians* 7, 104–126. doi: 10.2979/MER.2006.7.1.104

Ahmed, S. (2007b). 'You end up doing the document rather than doing the doing': diversity, race equality and the politics of documentation. *Ethn. Racial Stud.* 30, 590–609. doi: 10.1080/01419870701356015

Ahmed, S. (2012). *On Being Included: Racism and Diversity in Institutional Life*. Durham, NC: Duke University Press.

Aly, G., and Roth, K. H. (2004). *The Nazi Census: The Nazi Census: Identification and Control in the Third Reich*. Temple University Press, Philadelphia (Originally published in German as Die restlose Erfassung: Volkszählen, Identifizieren, Aussondern im Nationalsozialismus. Fischer Taschenbuch Verlag GmbH, Frankfurt am Main).

Atewologun, D. (2018). "Intersectionality theory and practice," in *Oxford Research Encyclopedia of Business and Management.* Oxford University Press USA.

Atewologun, D., and Sealy, R. (2014). Experiencing privilege at ethnic, gender and senior intersections. *J. Manag. Psychol.* 29, 423–439. doi: 10.1108/JMP-02-2013-0038

Atewologun, D., Sealy, R., and Vinnicombe, S. (2016). Revealing intersectional dynamics in organizations: introducing 'intersectional identity work'. *Gender, Work Organ.* 23, 223–247. doi: 10.1111/gwao.12082

Athena Survey of Science, Engineering and Technology (2016). Gender Equality Survey. Available at: https://s3.eu-west-2.amazonaws.com/assets.creode.advancehe-document-manager/documents/ecu/ASSET_2016_final_survey_1579708777.pdf. (Accessed June 12, 2020).

Bago D'Uva, T., and Garcia-Gomez, P. (2020). At ESE females and non-Dutch are lagging behind in rank and earnings. Available at:https://esb.nu/esb/20060005/at-ese-females-and-non-dutch-are-lagging-behind-in-rank-and-earnings. (Accessed January 14, 2021).

Bauer, G. R., Churchill, S. M., Mahendran, M., Walwyn, C., Lizotte, D., and Villa-Rueda, A. A. (2021). Intersectionality in quantitative research: a systematic review of its emergence and applications of theory and methods. *SSM-Population Health* 14:100798. doi: 10.1016/j.ssmph.2021.100798

Berdahl, J. L. (2007). Harassment based on sex: protecting social status in the context of gender hierarchy. *Acad. Manag. Rev.* 32, 641–658. doi: 10.5465/amr.2007.24351879

Berdahl, J. L., and Moore, C. (2006). Workplace harassment: double jeopardy for minority women. *J. Appl. Psychol.* 91, 426–436. doi: 10.1037/0021-9010.91.2.426

Bhatti, A., and Ali, R. (2021). Women constructing leadership identities in academia: intersection of gender and culture. *Issues Educ. Res.* 31, 1–18.

Blader, S. L., and Chen, Y. R. (2011). What influences how higher-status people respond to lower-status others? Effects of procedural fairness, outcome favorability, and concerns about status. *Organ. Sci.* 22, 1040–1060. doi: 10.1287/orsc.1100.0558

Bondestam, F., and Lundqvist, M. (2018). Sexual harassment in academia. An international research review. Report commissioned by the Swedish Research Council. Available at: https://www.vr.se/download/18.77b9d6db16ce4de844718a/1567582948995/Sexual%20harassment%20in%20academia%20VR2018.pdf. (Accessed May 10 2019).

Bondestam, F., and Lundqvist, M. (2020). Sexual harassment in higher education–a systematic review. *Euro. J. High. Educ.* 10, 397–419. doi: 10.1080/21568235.2020.1729833

Boogaard, B., and Roggeband, C. (2010). Paradoxes of intersectionality: theorizing inequality in the Dutch police force through structure and agency. *Organization* 17, 53–75. doi: 10.1177/1350508409350042

Bowleg, L. (2008). When Black+ lesbian+ woman≠ Black lesbian woman: The methodological challenges of qualitative and quantitative intersectionality research. *Sex Roles* 59, 312–325. doi: 10.1007/s11199-008-9400-z

Bowleg, L., and Bauer, G. (2016). Invited reflection: quantifying intersectionality. *Psychol. Women Q.* 40, 337–341. doi: 10.1177/0361684316654282

Bull, A., Calvert-Lee, G., and Page, T. (2021). Discrimination in the complaints process: introducing the sector guidance to address staff sexual misconduct in UK higher education. *Perspect. Policy Pract. High. Educ* 25, 72–77. doi: 10.1080/13603108.2020.1823512

Cartwright, S., and Cooper, C. L. (1996). Public policy and occupational health psychology in Europe. *J. Occup. Health Psychol.* 1, 349–361. doi: 10.1037/1076-8998.1.4.349

Castaneda, A. E., Rask, S., Koponen, P., Suvisaari, J., Koskinen, S., Härkänen, T., et al. (2015). The association between discrimination and psychological and social well-being. *Psychol. Dev. Soc.* 27, 270–292. doi: 10.1177/0971333615594054

Cath, E., Ferrari, Y., and Vuković, D. (2014). Dutchifying Intersectionality: intersectional activism in the Netherlands (or the Lack Thereof?). Humanity in Action. Available at: https://www.humanityinaction.org/knowledge_detail/dutchifying-intersectionality-intersectional-activism-in-the-netherlands-or-the-lack-thereof/. (Accessed January 3, 2022).

Clancy, K. B., Lee, K. M., Rodgers, E. M., and Richey, C. (2017). Double jeopardy in astronomy and planetary science: women of color face greater risks of gendered and racial harassment. *J. Geophys. Res. Planets* 122, 1610–1623. doi: 10.1002/2017JE005256

Clavero, S., and Galligan, Y. (2021). Delivering gender justice in academia through gender equality plans? Normative and practical challenges. *Gender Work Organ.* 28, 1115–1132. doi: 10.1111/gwao.12658

Cortina, L. M., and Areguin, M. A. (2021). Putting people down and pushing them out: sexual harassment in the workplace. *Annu. Rev. Organ. Psych. Organ. Behav.* 8, 285–309. doi: 10.1146/annurev-orgpsych-012420-055606

Cortina, L. M., Kabat-Farr, D., Leskinen, E. A., Huerta, M., and Magley, V. J. (2013). Selective incivility as modern discrimination in organizations: evidence and impact. *J. Manag.* 39, 1579–1605. doi: 10.1177/0149206311418835

Cortina, L. M., and Magley, V. J. (2003). Raising voice, risking retaliation: events following interpersonal mistreatment in the workplace. *J. Occup. Health Psychol.* 8:247, –265. doi: 10.1037/1076-8998.8.4.247

Crenshaw, K. (1989). Demarginalizing the intersection of race and sex: a black feminist critique of antidiscrimination doctrine. *Univ. Chic. Leg. Forum*, 139–168.

Crenshaw, K. (1991). Mapping the margins: intersectionality, identity, and violence against women of color. *Stanford Law Rev.* 43, 1241–1300. doi: 10.2307/1229039

Dill, B. T., and Kohlman, M. H. (2012). Intersectionality: a transformative paradigm in feminist theory and social justice. *Handb. Feminist Res. Theory Praxis* 2, 154–174. doi: 10.4135/9781483384740.n8

Dixon, J., Durrheim, K., Tredoux, C. G., Tropp, L. R., Clack, B., Eaton, L., et al. (2010). Challenging the stubborn core of opposition to equality: racial contact and policy attitudes. *Polit. Psychol.* 31, 831–855. doi: 10.1111/j.1467-9221.2010.00792.x

Dover, T. L., Major, B., and Kaiser, C. R. (2016). Members of high-status groups are threatened by pro-diversity organizational messages. *J. Exp. Soc. Psychol.* 62, 58–67. doi: 10.1016/j.jesp.2015.10.006

Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Adm. Sci. Q.* 44, 350–383. doi: 10.2307/2666999

Edmondson, A. (2003). "Managing the risk of learning: psychological safety in work teams," in *International Handbook of Organizational Teamwork and Cooperative Working*. eds. M. A. West, D. Tjosvold, and K. G. Smith (Chichester: John Wiley & Sons), 255–275.

Edmondson, A. (2020). HR must build psychological safety so employees feel safe speaking up. Available at: https://www.hrmagazine.co.uk/article-details/hr-must-build-psychological-safety-so-employees-feel-safe-speaking-up. (Accessed June 13, 2020).

Else, H., and Perkel, J. M. (2022). The giant plan to track diversity in research journals. *Nature* 602, 566–570. doi: 10.1038/d41586-022-00426-7

Essed, P. (2001). "Towards a methodology to identify converging forms of everyday discrimination". in *45th Session of the United Nations Commission on the Status of Women*. New York: United Nations, 202.

Fairchild, A. L., Holyfield, L. J., and Byington, C. L. (2018). National academies of sciences, engineering, and medicine report on sexual harassment: making the case for fundamental institutional change. *JAMA* 320, 873–874. doi: 10.1001/jama.2018.10840

Faul, F., Erdfelder, E., Buchner, A., and Lang, A. G. (2009). Statistical power analyses using G* power 3.1: tests for correlation and regression analyses. *Behav. Res. Methods* 41, 1149–1160. doi: 10.3758/BRM.41.4.1149

Fernando, D., and Prasad, A. (2018). Sex-based harassment and organizational silencing: how women are led to reluctant acquiescence in academia. *Hum. Relat.* 72, 1565–1594. doi: 10.1177/0018726718809164

Fitzgerald, L. F., Gelfand, M. J., and Drasgow, F. (1995). Measuring sexual harassment: Theoretical and psychometric advances. *Basic and Applied Social Psychology* 17, 425–445.

Flood, M., Dragiewicz, M., and Pease, B. (2021). Resistance and backlash to gender equality. *Aust. J. Soc. Issues* 56, 393–408. doi: 10.1002/ajs4.137

Gaventa, J. (2006). Finding the spaces for change: a power analysis. *IDS Bull.* 37, 23–33. doi: 10.1111/j.1759-5436.2006.tb00320.x

Gewin, V. (2021). How to blow the whistle on an academic bully. *Nature* 593, 299–301. doi: 10.1038/d41586-021-01252-z

Goddard, M. (2017). The EU general data protection regulation (GDPR): European regulation that has a global impact. *Int. J. Mark. Res.* 59, 703–705. doi: 10.2501/IJMR-2017-050

Grzanka, P. R. (2018). "Intersectionality and feminist psychology: power, knowledge, and process," in *APA Handbook of the Psychology of Women: History, Theory, and Battlegrounds*. eds. C. B. Travis, J. W. White, A. Rutherford, W. S. Williams, S. L. Cook, and K. F. Wyche (Washington, DC: American Psychological Association), 585–602.

Halkitis, P. N., Alexander, L., Cipriani, K., Finnegan, J. Jr., Giles, W., Lassiter, T., et al. (2020). A statement of commitment to zero tolerance of harassment and discrimination in schools and programs of public health. *Public Health Rep.* 135, 534–538. doi: 10.1177/0033354920921816

Hall, E. V., Hall, A. V., Galinsky, A. D., and Phillips, K. W. (2019). MOSAIC: a model of stereotyping through associated and intersectional categories. *Acad. Manag. Rev.* 44, 643–672. doi: 10.5465/amr.2017.0109

Harsey, S. J., Zurbriggen, E. L., and Freyd, J. J. (2017). Perpetrator responses to victim confrontation: DARVO and victim self-blame. *J. Aggress. Maltreat. Trauma* 26, 644–663. doi: 10.1080/10926771.2017.1320777

Hayes, A. F. (2018). Partial, conditional, and moderated moderated mediation: quantification, inference, and interpretation. *Commun. Monogr.* 85, 4–40. doi: 10.1080/03637751.2017.1352100

Healy, G., Tatli, A., Ipek, G., Özturk, M., Seierstad, C., and Wright, T. (2019). In the steps of Joan acker: a journey in researching inequality regimes and intersectional inequalities. *Gender Work Organ.* 26, 1749–1762. doi: 10.1111/gwao.12252

Hilton, N. H., and Täuber, S. (2022). Harassment and discrimination are still rife within universities. Times Higher Education. Available at: https://www.timeshighereducation.com/depth/harassment-and-discrimination-are-still-rife-within-universities. (Accessed April 3, 2022).

Hofstra, B., Kulkarni, V. V., Galvez, S. M. N., He, B., Jurafsky, D., and McFarland, D. A. (2020). The diversity–innovation paradox in science. *Proc. Natl. Acad. Sci.* 117, 9284–9291. doi: 10.1073/pnas.1915378117

Ilies, R., Hauserman, N., Schwochau, S., and Stibal, J. (2003). Reported incidence rates of work-related sexual harassment in the United States: using meta-analysis to explain reported rate disparities. *Pers. Psychol.* 56, 607–631. doi: 10.1111/j.1744-6570.2003.tb00752.x

Jones, K. P., Arena, D. F., Nittrouer, C. L., Alonso, N. M., and Lindsey, A. P. (2017). Subtle discrimination in the workplace: a vicious cycle. *Ind. Organ. Psychol.* 10, 51–76. doi: 10.1017/iop.2016.91

Jordan-Zachery, J. S. (2019). Licking Salt: A Black Woman's Tale of Betrayal, Adversity, and Survival. *Feminist Formations* 31, 67–84. doi: 10.1353/ff.2019.0009

Jouwe, N. (2015). Intersectionality – A travelling concept. Available at: https://studiumgenerale.artez.nl/files/agd/00011/IntersectionalityAtravellingconceptOct15.pdf. (Accessed January 3, 2022).

Kimura, M. (2014). Non-performativity of university and subjectification of students: the question of equality and diversity in UK universities. *Br. J. Sociol. Educ.* 35, 523–540. doi: 10.1080/01425692.2013.777207

Liang, J., Farh, C. I. C., and Farh, J. L. (2012). Psychological antecedents of promotive and prohibitive voice: a two-wave examination. *Acad. Manag. J.* 55, 71–92. doi: 10.5465/amj.2010.0176

Liu, H. (2019). An embarrassment of riches: The seduction of postfeminism in the academy. *Organization* 26, 20–37. doi: 10.1177/1350508418763980

Lukes, S. (2004). *Power: A radical view*. Macmillan International Higher Education.

Mahmoudi, M. (2019). Academic bullies leave no trace. *BioImpacts* 9, 129–130. doi: 10.15171/bi.2019.17

Mahmoudi, M. (2020). A survivor's guide to academic bullying. *Nat. Hum. Behav.* 4:1091. doi: 10.1038/s41562-020-00937-1

MamaCash (2022). If you stay quiet, you stay invisible. Feminist disability rights activists share their stories of working for justice. Available at: https://www.mamacash.org/media/publications/if_you_stay_quiet_you_stay_invisible__mama_cash_disability_rights_report.pdf. (Accessed January 3, 2022).

Marr, J. C., and Thau, S. (2014). Falling from great (and not-so-great) heights: how initial status position influences performance after status loss. *Acad. Manag. J.* 57, 223–248. doi: 10.5465/amj.2011.0909

McLaughlin, H., Uggen, C., and Blackstone, A. (2012). Sexual harassment, workplace authority and the paradox of power. *Am. Sociol. Rev.* 77, 625–647. doi: 10.1177/0003122412451728

Medeiros, K. E., and Griffith, J. A. (2019). Double-edged scalpels: The trials and triumphs of women surgeons. *Narrative Inquiry Bioethics* 9, 221–227. doi: 10.1353/nib.2019.0057

Miller, C., and Roksa, J. (2019). Balancing research and service in academia: gender, race, and laboratory tasks. *Gend. Soc.* 34, 131–152. doi: 10.1177/0891243219867917

Morrison, E. W., and Robinson, S. L. (1997). When employees feel betrayed: a model of how psychological contract violation develops. *Acad. Manag. Rev.* 22:226. doi: 10.2307/259230

Moss, S. E., and Mahmoudi, M. (2021). STEM the bullying: an empirical investigation of abusive supervision in academic science. *EclinicalMedicine* 40:101121. doi: 10.1016/j.eclinm.2021.101121

Moughalian, C., and Täuber, S. (2020). When gender equality initiatives risk doing more harm than good. *EclinicalMedicine* 22:100330. doi: 10.1016/j.eclinm.2020.100330

Naezer, M. M., van den Brink, M. C. L., and Benschop, Y. W. M. (2019). Harassment in Dutch Academia: Manifestations, Facilitating Factors, Effects and Solutions. Commissioned by The Dutch Network of Women Professors (LNVH). Available at: https://www.lnvh.nl/uploads/moxiemanager/LNVH_rapport__lsquo_Harassment_in_Dutch_academia__Exploring_manifestations__facilitating_factors__effects_and_solutions_rsquo_.pdf. (Accessed January 7, 2019).

National Academies of Sciences, Engineering, and Medicine (NASEM) Committee on the Impacts of Sexual Harassment (2018). *Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine*. Washington, DC: NASEM.

Near, J. P., Dworkin, T. M., and Miceli, M. P. (1993). Explaining the whistle-blowing process: suggestions from power theory and justice theory. *Organ. Sci.* 4, 393–411. doi: 10.1287/orsc.4.3.393

Oertelt-Prigione, S. (2020). Sexual harassment is an occupational Hazard. Editorial. *J. Womens Health* 29, 1–2. doi: 10.1089/jwh.2019.8113

Özbilgin, M. F., Beauregard, T. A., Tatli, A., and Bell, M. P. (2011). Work–life, diversity and intersectionality: a critical review and research agenda. *Int. J. Manag. Rev.* 13, 177–198. doi: 10.1111/j.1468-2370.2010.00291.x

Perlman, M. (2018). The origin of the term 'intersectionality'. Columbia journalism review. Available at: https://www.cjr.org/language_corner/intersectionality.php. (Accessed January 3, 2022).

Rose, A. (2022). "Dutch racism is not like anywhere Else": refusing color-blind myths in black feminist otherwise spaces. *Gend. Soc.* 36, 239–263. doi: 10.1177/08912432221075098

Roussin, C. J., and Webber, S. S. (2011). Impact of organizational identification and psychological safety on initial perceptions of coworker trustworthiness. *J. Bus. Psychol.* 27, 317–329. doi: 10.1007/s10869-011-9245-2

She figures (2021). Gender in Research and Innovation: Statistics and Indicators. European Union. Available at: https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/67d5a207-4da1-11ec-91ac-01aa75ed71a1. (Accessed March 23, 2022).

Showunmi, V. (2020). The importance of Intersectionality in higher education and educational leadership research. *J. Higher Educ. Policy Leadersh. Stud.* 1, 46–63. doi: 10.29252/johepal.1.1.46

Silverschanz, P., Cortina, L. M., Konik, J., and Magley, V. J. (2007). Slurs, snubs, and queer jokes: incidence and impact of heterosexist harassment in academia. *Sex Roles* 58, 179–191. doi: 10.1007/s11199-007-9329-7

Singh, B., Winkel, D. E., and Selvarajan, T. T. (2013). Managing diversity at work: does psychological safety hold the key to racial differences in employee performance? *J. Occup. Organ. Psychol.* 86, 242–263. doi: 10.1111/joop.12015

Śliwa, M., and Johansson, M. (2014). The discourse of meritocracy contested/reproduced: Foreign women academics in UK business schools. *Organization* 21, 821–843. doi: 10.1177/1350508413486850

Svensson, J., and Genugten, M. V. (2013). Retaliation against reporters of unequal treatment. *Equality Divers. Inclusion Int. J.* 32, 129–143. doi: 10.1108/02610151311324370

Tariq, M., and Syed, J. (2017). Intersectionality at work: south Asian Muslim women's experiences of employment and leadership in the United Kingdom. *Sex Roles* 77, 510–522. doi: 10.1007/s11199-017-0741-3

Täuber, S. (2019). Undoing gender in academia: personal reflections on equal opportunity schemes. *J. Manag. Stud.* 57, 1718–1724. doi: 10.1111/joms.12516

Täuber, S., and Mahmoudi, M. (2022). How bullying becomes a career tool. *Nat. Hum. Behav.* doi: 10.1038/s41562-022-01311-z

Tzanakou, C. (2019). Unintended consequences of gender-equality plans. *Nature* 570, 277–278. doi: 10.1038/d41586-019-01904-1

Walker, S. S., Ruggs, E., Taylor, R., and Frazier, M. (2019). Reporting sexual harassment: the role of psychological safety climate. *Ind. Organ. Psychol.* 12, 106–109. doi: 10.1017/iop.2019.19

Walumbwa, F. O., and Schaubroeck, J. (2009). Leader personality traits and employee voice behavior: mediating roles of ethical leadership and work group psychological safety. *J. Appl. Psychol.* 94, 1275–1286. doi: 10.1037/a0015848

Wekker, G. (2016). *White Innocence*. Durham, NC: Duke University Press.

Wekker, G. (2021). Afropessimism. *Euro. J. Women's Stud.* 28, 86–97. doi: 10.1177/1350506820971224

Wellcome Trust (2020). What researchers think about the culture they work in. Available at: https://wellcome.org/sites/default/files/what-researchers-think-about-the-culture-they-work-in.pdf. (Accessed January 3, 2022).

Windsong, E. A. (2018). Incorporating intersectionality into research design: an example using qualitative interviews. *Int. J. Soc. Res. Methodol.* 21, 135–147. doi: 10.1080/13645579.2016.1268361

Woolton, C. (2021). Discrimination still plagues science. *Nature* 600, 177–179. doi: 10.1038/d41586-021-03043-y

Young Academy Groningen Report (2021). Harassment at the University of Groningen. Retrieved on November 30, 2021, from Available at: https://www.rug.nl/research/young-academy/files/yag-report-harassment-at-the-ug.pdf

Zhang, Y., Fang, Y., Wei, K., and Chen, H. (2010). Exploring the role of psychological safety in promoting the intention to continue sharing knowledge in virtual communities. *Int. J. Inf. Manag.* 30, 425–436. doi: 10.1016/j.ijinfomgt.2010.02.003

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Intersectional Invisibility in Women's Diversity Interventions

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Many diversity interventions for women are ineffective. One reason for this may be that the field that diversity interventions are usually based on, the social sciences, often do not consider intra-group differences among women. Specifically, differences by racialization may be excluded from such diversity interventions. The present research examines whether racially marginalized women have different diversity interventions needs than White women, and whether organizations are less likely to represent those needs (i.e., intersectional invisibility). Across an open-ended coding (n = 293) and a ranking study (n = 489), Black women noted a need to incorporate intersectional differences, Asian women prioritized methods to address challenges to their authority, and White women indicated a need to address agency perceptions. Improving work-life balance and networks was a shared concern among participants, though we theorized different racially gendered reasons for why these intervention needs are relevant to each group. In Study 3 (n = 92 organizations), we analyzed organizations' websites using word count and textual analysis. Organizations— including the Education, Science, and Research sector— most readily advocated for women through enhancing agency. They were also less likely to mention dealing with perceptions of excessive agency or addressing intersectional considerations. The organizations broadly mentioned other marginalized groups besides women, but rarely did they do so intersectionality. Taken together, our findings demonstrate different intervention priorities across differently racialized groups. We found evidence of intersectional invisibility where organizations were more likely to address agency-enhancing intervention needs while failing to include other intervention needs relevant for Black women and Asian women. We discuss the implications of these findings for organizations, in general, as well as potential implications for the field of academic social sciences.

Keywords: intersectionality, multiple identities, diversity intervention, inclusion, gender, race

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INTRODUCTION

More women are entering the labor market than ever before (Eurostat, 2020). Yet, gender disparities in career advancement remain. Compared to men, women are still underrepresented in the labor market, paid less, and relegated to traditionally lower-paid work sectors (European Commission, 2021). In academic social sciences, particularly, women are paid less and are highly underrepresented in tenured positions or positions of power, despite increased representation

in junior academic positions (e.g., Catalyst, 2020). These inequalities widen when considering racially marginalized women, who show lower rates of labor market participation, higher rates of unemployment, and more frequent experiences of discrimination than White women (ENAR, 2017; Gezici and Ozay, 2020).

In response to these inequities, organizations frequently implement diversity interventions (e.g., Shortland, 2011; Annabi and Lebovitz, 2018; Pietri et al., 2019). These diversity interventions aim to enhance participants' professional development and prominence, as well as make working conditions more inclusive and equitable (Leslie, 2020). Women are often the target of these diversity interventions, where the goal is to help women overcome the gendered barriers that they face. However, perceptions of gender and race are intertwined, where gender is often interpreted together with one's race and vice versa (Crenshaw, 1991; Chavez and Wingfield, 2018; Mukkamala and Suyemoto, 2018). Despite the co-constitution of gender and race, the differences in how racialization affects racially marginalized women and how it results in different needs for successful interventions, may not be incorporated in the content for these diversity interventions to fully support these women.

Indeed, even within the field of social sciences from which these diversity interventions are frequently based on, there are vulnerabilities that racially marginalized women uniquely experience that often remain at the margins. While there have been gains on the basis of gender in academia, less progress seems to have been made on the basis of race (Bhopal, 2018, 2020; Gause, 2021). Foreign women in academia strongly describe being hidden from view in academic studies and from the professional work floor (e.g., Strauβ and Boncori, 2020; Muradoglu et al., 2021). Even when these experiences come to light, they are often unaddressed due to the strong endorsement of meritocracy and colorblindness in academic institutions (Gvozdanović and Bailey, 2020; Azhar and McCutcheon, 2021). Therefore, overlooking the overlap between racialization and gender within the social sciences is presumably transferred onto the product of diversity intervention themselves.

Racially marginalized women may thus experience 'intersectional invisibility' in these diversity interventions for women, where a person with multiple subordinate group identities are rendered "invisible" relative to those with a single subordinate identity (Purdie-Vaughns and Eibach, 2008). In this research, we examine how a form of intersectional invisibility may be present in diversity interventions for women. We do this by first exploring whether there are racialized differences in what women consider to be beneficial for them in a diversity intervention, that is, if there are differences in their intervention needs. Second, we examine how these intervention needs are respectively represented among organizations.

Considering Multiple Marginalizations in Diversity Interventions for Women

The dominant approach to researching diversity views oppression unidimensionally, focusing on single dimensions of oppression at a time (e.g., racism, sexism; Gopaldas and DeRoy, 2015; Breslin et al., 2017; Moradi, 2017). When designing diversity interventions for women and monitoring their impact, this unidimensional focus on gender overlooks and perpetuates two problems: (1) racially marginalized women may be excluded from diversity interventions for women, because women are implicitly racialized as White (Ghavami and Peplau, 2013; Thomas et al., 2014), and (2) even when racially marginalized groups are considered, they are often seen as men or, if any intersectional praxis is taken, Black women are studied and other racially marginalized women are rendered invisible (Fernandez, 2007; Deliovsky and Kitossa, 2013).

The Prototypicality of White Women and Atypicality of Racially Marginalized Women

Diversity interventions for gender are intended to tackle gendered barriers and stereotypes. For women, these stereotypes are generally seen to involve being viewed as communal and not agentic, competent, or dominant (Rosette et al., 2016). However, stereotypes related to White women generally overlap highly with those associated with the superordinate category of "women," and not as much with stereotypes generated for other racialized groups of women(Ghavami and Peplau, 2013; Rosette et al., 2016).

Scholars have posited that the prototype of gender, removed from other social markers, is implicitly racialized as White. This sits within a more general tendency for practitioners and academics to intertwine the gendered category of women with Whiteness (Koenig and Eagly, 2014), due, in part, to the historical exclusion of racially marginalized women from major women's movements (e.g., suffrage movement; Simons, 1979). This historical exclusion, White supremacy, and racism has led to White women's experiences to be the center of the gender debate. Moreover, by not acknowledging the role of other social markers on gender, including that of racialization, the dominant culture with which Whiteness is such an aspect, becomes universalized. For example, organizational gender equality initiatives are often spearheaded, and almost exclusively involve White women, while scientific research are often conducted by and on White women (Remedios and Snyder, 2015; Rose-Redwood et al., 2017). Taking the academic field of Psychology as an example, there is growing evidence on how research in Europe and North America are run by, prioritize, and serve White people (e.g., scholarly Psychology publications on race being mostly edited by White editors; Roberts et al., 2020). The result of the prototypicality of White women amounts to a focus in gender research on White women, without considering how differing intersections might result in differences in encountered stereotypes, treatments, or outcomes.

While White women are generally cognitively representative of their gender (Ghavami and Peplau, 2013), racially marginalized women are rendered non-prototypical to their gender, and at times, their racial group too (Purdie-Vaughns and Eibach, 2008; Thomas et al., 2014; Schug et al., 2015). As a result, racially marginalized women are at risk of being intersectionality invisible. For example, White women are more quickly identified

as women compared to Black women (Johnson et al., 2012) and participants show the poorest memory in remembering Black women compared to White women or Black men (Sesko and Biernat, 2010). Intersectional invisibility also takes form in the underrepresentation of racially marginalized women, as seen among academic Sociology and Psychology staff (Spalter-Roth and William, 2007; Kohout et al., 2014; Leung and Rainone, 2018).

The intersectional invisibility of racially marginalized women may especially exclude them because their gendered experiences are not the same as those of White women. The double marginalization that racially marginalized women can experience may yield both additive and multiplicative effects of discrimination that White women do not face. People may for instance, negatively stereotype a Black woman as a *woman* (e.g., shy), or as a *Black person* (e.g., lazy). Racially marginalized women's experiences can thus be gendered and racialized. Additionally, racially marginalized women's experiences can be racially gendered. For example, "Black women are too aggressive" is not the same as "women are shy" and "Black people are lazy" (Bowleg, 2012; Ghavami and Peplau, 2013). This intersection of race and gender for Black women results in unique stereotypes that are not the sum of racial and gender stereotypes. Additive and multiplicative effects of discrimination are also found in other racialized groups, such as Asian women, who face racialized gender stereotypes (e.g., submissiveness) that may not equate to the sum of gender (e.g., shy) and racial stereotypes (e.g., competent) (Keum et al., 2018).

Heterogeneity Among Racially Marginalized Women

Intersectional invisibility of racially gendered experiences potentially plays itself out differently for different racially marginalized women. While there is research on the stereotypes that various racially marginalized women face, much of diversity intervention research often only focuses on Black women as a target group – if they look at racially marginalized women at all (e.g., Wilton et al., 2015; Apfelbaum et al., 2016). Yet, it is clear that there is a lot of heterogeneity among racially marginalized women.

As touched upon in the previous section, Black women often encounter stereotypes related to aggression and other high agency perceptions (e.g., strong, dominant). These perceptions are based in the notion that Black women are associated with masculinity more frequently than other racialized groups (Hall et al., 2019). These perceptions are different from the stereotypes that Asian women, for example, face. In our research, we additionally examine what Asian women would require in a diversity interventions, as they are one of the fastest growing racial groups in the United States (Bleiweis, 2021) and Europe (Hillman et al., 2005). Like Black women, Asian women are not prototypical of their gender and experience racial other-ness (Giscombe and Mattis, 2002; Zou and Cheryan, 2017). Unlike Black women, Asian women are stereotyped as relatively low in agency (Ghavami and Peplau, 2013), as hyper-feminine (Mukkamala and Suyemoto, 2018), and as highly competent. While Asian women may experience some benefits from being regarded as highly competent that Black or White women may not experience, they also contend with model-minority stereotypes. Moreover, being associated with docility and lower agency contribute to Asian women's frequent erasure in discussions about social inequality (Teranishi, 2010; Castro and Collins, 2021; Wong and McCullough, 2021) and lowered visibility in roles requiring assertive behavior.

Investigating and Incorporating Different Intervention Needs

Considering the reviewed literature, compared to White women, racially marginalized women likely perceive different tools and foci to be beneficial for them in a diversity intervention. In other words, racially marginalized women may possess different intervention needs compared to White women. For example, researchers have already well established that racially marginalized women in STEM fields struggle with different obstacles compared to White women (Reyes, 2011; Alfred et al., 2019); therefore, it is likely that the interventions that are designed to help racially marginalized women advance in their field should be different from those for White women. Yet, just as gender is implicitly racialized as White, diversity interventions for women are also most likely implicitly racialized as White and therefore, may not successfully fulfill the needs that racially marginalized women have. Even in institutions where diversity interventions for women co-exist with diversity interventions for racially marginalized groups, the multiple and intersectional stigmas that racially marginalized women contend with are unlikely to be encapsulated by a unidimensional approach to either gender (in which White women are prototypical and more likely to be targeted) or race (in which men are often prototypical and more likely to be targeted). To our knowledge, researchers have only examined broad classes of diversity interventions so far, while the assessment of the content of diversity interventions that may be particularly important for racially marginalized women is still needed.

Research on diversity ideologies and stereotypes point to some relative differences in intervention needs. To illustrate, Asian women face issues when they are in positions of authority that may be due to stereotypes that they are lower in agency. As a result, Asian women may require agency-enhancing interventions more than White women. The popularization of interventions that counteract stereotypes such as emotionality and submissiveness (e.g., via assertiveness training, confidence-building initiatives, and negotiation workshops) may then target these low agency stereotypes that Asian women face. At the same time, while Black women also encounter difficulties as authority figures at work (Rosette et al., 2018), they also are more likely than women from other racialized groups to be selected for leadership roles requiring demonstrations of agency (Galinsky et al., 2013). As a result, intervention needs based on enhancing agency may have lesser appeal for Black women.

Apart from agency-based intervention needs, there may be other requirements that diverge. For instance, members of racially marginalized groups strongly favor an acknowledgment of their racial and ethnic differences and marginalization in organizations (Gündemir et al., 2019).

Moreover, racially marginalized groups respond positively when this acknowledgment is the *status quo* (Arends-Tóth and Van De Vijver, 2003; Wolsko et al., 2006; Ryan et al., 2007). Indeed, racially marginalized women perform worse and anticipate higher risk of discrimination in environments when racial and ethnic differences are not acknowledged (Plaut et al., 2018). Thus, within the context of diversity interventions, acknowledging these intersectional differences among women may be an intervention need that racially marginalized women, contrary to White women, find especially important in a successful intervention.

Moreover, while women generally lack professional and informal networks at work (Fearfull and Kamenou, 2006; Kamenou and Fearfull, 2006), Black women and Asian women may be especially disconnected (e.g., Bell and Nkomo, 2003; Liang and Peters-Hawkins, 2017). Yet, the reasons why racially marginalized women may lack networks may not be addressed in diversity interventions designed for prototypical White women. Black women, for example, face negative stereotypes about their competence and face greater pressure to undergo impression management to be perceived as legitimate (Thomas and Hollenshead, 2001; Bell and Nkomo, 2003; Williams and Dempsey, 2014). As a result, they are less likely to share their non-work identities and engage in informal engagements (Hewlin, 2003, 2009; Phillips et al., 2009) that contribute to making informal contacts. Asian women, on the other hand, have reported a sense of invisibility because of expectations that they are hyper-competent and accomplish their work without challenges (Liang and Peters-Hawkins, 2017). Relatedly, Asian women have been found to rarely seek out mentorship, due to discomfort with approaching others for guidance and thereby, failing to meet the expectations of the model minority myth. The model minority myth suggests that Asians are more successful than any other racially marginalized group because of their supposedly strong values in hard work, perseverance, and belief in meritocracy (Cheng et al., 2017). Issues of embeddedness can especially be exacerbated academic settings where research work can be very autonomous and independent (Ahern, 2019), where there is much competition for resources (Marafioti and Perretti, 2006), and where relocating to new places is common to one's career trajectory (Richardson, 2009).

Present Research

The first aim of this research was to examine whether there are indeed racialized differences in intervention needs for women's diversity interventions. In Study 1 (n = 293), we coded participants' open-ended responses about the aspects of an intervention that would be beneficial for them. In Study 2 (n = 489) participants ranked a list of needs derived from Study 1 in order of their own preferences. The second aim of this research was to observe whether the intervention needs relevant to the different groups of racialized women are represented within actual organizations that advocate for women. In Study 3 (n = 92) we analyzed organizations' websites using textual analysis and content coding to examine whether and how the various intervention needs from the previous studies were included.

While we did not base our sample in the social sciences *per se*, we believe that the present research nonetheless contributes to insights that may apply to diversity intervention design in the social sciences and academia at large. Much of the gendered, racialized, and racially gendered barriers found outside of social sciences are very likely mirrored within this field. Moreover, studying biases and social inequity may lead social scientists to believe that gendered and racialized issues occur less frequently within their occupations or institutions (Matias et al., 2021). However, we must be vigilant of possibly falling into a bias blind spot (Pronin et al., 2002; Wang and Jeon, 2020) and engaging in ways that invisibilize these very inequalities (e.g., Bonilla-Silva and Baiocchi, 2001). In the meantime, this study is meant to be taken as a general start to undertake more attention to possible intersectional differences in diversity interventions for women.

STUDY 1

In Study 1, participants provided responses to open-ended questions on the components of a successful diversity intervention. From this, we identified any racialized group differences on the expressed needs in women's diversity interventions (Pre-registration[1]).

Method

Participants

We recruited employed women based in the U.S. who were over 25 years old and heterosexual, reasoning that other stigmatized identities might influence the intersectional experience of gender and race (Bowleg, 2008; Stragà et al., 2020). During recruitment, we deviated from the pre-registration to recruit enough participants to compare racially marginalized women and White women, as well as examine differences within racially marginalized women. Initially, we recruited 300 participants through Amazon Mechanical Turk (MTurk). We extended recruitment of Asian women on Prolific Academic as the initial recruitment did not meet the minimum sample size for this subgroup; additionally, the data quality of Prolific Academic has been evidence to be higher than MTurk (Pe'er et al., 2021)[2].

In total, we recruited 293 participants (X_{age}= 40.67, SD_{age} = 10.90). Of the participants, 161 identified as White women, 61 identified as Black women, 40 identified as non-White Latina[3] women, and 47 as Asian women. We did not pre-register data exclusions; however, after initial data screening, we excluded participants if they (a) did not respond to the open questions, (b) failed the attention check, (c) provided nonsensical answers to the open questions (i.e., responding with illogical

[1]https://osf.io/rqup9

[2]Between the two sample sources, no significant differences were found in Asian participants' outcome scores.

[3]We initially did not recruit as many participants as expected for Black women. For this reason, to obtain adequate sample size and enough power to run our analyses, we collapsed Latina women with Black women. We reasoned that both groups fall similarly under agency stereotypes. However, doing this downplays the racialized experiences and histories between these groups while dis-acknowledging the complexity of marginalization in the Latina and Hispanic community. Patterns regarding Black women were also found when Latina women were excluded.

words or phrases, "gajgkladjgg"), (d) used the same response for every item across the measures (even reverse-coded), or (e) did not indicate their racial identification; 8 participants were excluded, the results did not significantly differ with exclusions included. Of the participants, 55.3% reported occupying a leadership role in their workplace, with many participants indicating that they worked in management (27.6%), the service industry (17.7%), sales and office (16.4%), and education (13.0%).

Procedure

Participants imagined that they were an employee at a fictional company and read a brochure advertising a women's leadership program (see "Study 1 YesWomen's leadership intervention" for the brochure and "Study 1_Survey" for the survey set-up in the **Supplementary Materials**). In line with typical organizational diversity interventions for women, the brochure (1) only showed images of White women, (2) emphasized agency and empowerment [e.g., "Join Natalie White and her team to learn how to assert yourself into a leadership position," and (3) implied a monolithic experience among women (e.g., "Program objectives: (...) To share the challenges of tackling the typical workplace biases that all women face"]. After reading the brochure, the participants responded to open-ended questions reacting to the intervention. The questions involved asking participants what they found important in a diversity intervention, what they considered to be missing from the intervention presented to them, and the challenges, stereotypes, and experiences they would anticipate as a woman in a leadership position at work. The participants subsequently reported their demographic and occupational information[4].

Codebook Development

We used a qualitative content analysis on participants' open-ended responses (Elo and Kyngäs, 2008). Prior to receiving the qualitative data, we developed an initial codebook by deductively deriving codes from research on workplace issues and discrimination experienced by oppressed groups. The two coders, both identifying as women and one as a racially marginalized woman, were blind to participants' racial identity. After the first readthrough of the data, we added inductively derived subcodes to the word dictionary of any concepts that were, at that point, missing.

Thereafter, we did a first round of coding the whole dataset. Due to insufficient reliability and ambiguity of the codes, we revised the codebook twice to more clearly define the coding criteria. From re-reading the responses, we decided to collapse some codes into overarching intervention needs that connected with the participants' responses and the literature we based our codes on. For example, from the literature we derived separate codes for whether participants would mention their race (*race mentioned*), mention a need for more multicultural diversity (*multicultural*), refer to other stigmatized social groups besides gender (*multiple stigma*), and mention that not all women's needs or experiences are the same (*not monoliths)*. Through the revisions, because these codes shared a similar thread of addressing heterogeneity within women, we collapsed them under an overarching intervention need of *addressing intersectional differences* within women. The research analyses were hence conducted on the overarching intervention needs, and not on the subcodes. The full list of the original subcodes and how they were grouped into overarching intervention needs can be found in **Table 1**. After each revision of the codebook, the two coders recoded the whole dataset. If any disagreements arose, the coders discussed them to see if they could be resolved. This process of revision, coding, and discussion repeated until the inter-rater reliability statistics were up to standard ($x > 0.90$).

We extracted six overarching intervention needs that were collapsed across the responses of the open questions: 42.3% of the participants discussed the importance of *addressing intersectional differences* (e.g., "[The intervention] should also be streamlined for a selected sector of individuals (minorities, gender specific, or sexual orientation)"; "Being a wom[a]n of color I would like this program to also bring up these issues that color women face in today's workplace and how they can overcome these issues"), 31.1% discussed *improving networks* (e.g., "I think that a leadership program would also offer me a support network"; "One on one mentorship should be a[n] option for those who need it"), and 25.6 discussed *improving work-life balance* (e.g., "[I would like] concrete examples of dealing with family/work conflicts"; "How to manage work and home life would be an awesome topic to review"). When participants discussed issues and challenges in their workplace, 86% mentioned *challenges to authority* (e.g., "I expect to face challenges related to people taking my seriously"; "Male superiors would tend not to take me seriously or give me their full attention"), 47.8% mentioned *addressing perceptions of insufficient agency* (e.g., "[People think] that I am too soft hearted"; "I think some people see women as weaker, or easy to walk over"), and 11.6% mentioned *addressing perceptions of excessive agency perceptions* (e.g., "If we're too outspoken, we're bossy"; "And I would not be able to get upset or reprimand someone without being called derogatory names").

Results

Black and Latina women mentioned the importance of incorporating *intersectional differences* more often than White women. Unexpectedly, Asian women did not mention *intersectional differences* more than White women. However, as expected, White women and Asian women mentioned concerns about *insufficient agency* more than Black and Latina women. Asian women also mentioned *improving networks* marginally more frequently than White women. Moreover, Asian women and White women significantly mentioned *improving work-life balance* more than Black and Latina women. The chi-squared statistics and proportions of the intervention needs can be found in **Table 2** and **Figure 1**.

Study 1 Discussion

The aim of this study was to investigate any differences in intervention needs among different racialized groups of women. Aligning with agency stereotypes faced by each group, we found

[4]As pre-registered, the participants also completed measures on the anticipated relevance and success of the intervention, and their feelings of authenticity and leadership intentions. Contrary to our pre-registered hypotheses, the data did not show any differences between the racialized group of women and any of the measures (see "Study 1_Scalar Measures and Null Results" in the **Supplementary Materials**).

TABLE 1 | Codebook for intervention needs.

Intervention needs	Description	Subcodes	Description
Addressing intersectional differences	Requiring the intervention to acknowledge heterogeneity within gender	Race mentioned	Reference to one's own race, ethnicity, or status as (racial or ethnic) minority
		Multicultural	Remarks about diversity, especially ethnically, racially, or nationality; remarking how "White" the program is. Expressing how needs or experiences of racially marginalized women are not represented
		Multiple stigma	Referring to other stigmatized or disadvantaged social groups besides gender (e.g., race, age, motherhood)
		Women as monoliths	Expressing that not all women's needs or experiences are the same. Expressing a more individualized or personalized focus necessary rather than focusing only on gender
Lacking networks	Requiring the intervention to encourage network building, expressing a desire or lack of personal or professional networks	Relatability	Indicating a need for the program coordinators, guest speakers, or participants involved in the intervention to be relatable (e.g., in function, representing one's experiences, in professional background, or in goals). Wanting relevance to one's profession or experiences
		Similar networks	Indicating a need for personally or professionally connecting with someone similar or relatable (e.g., similarity through demographics, or occupations)
		Broad networks	Indicating a need for broadly expanding their contacts
Work-life balance	Indication that work-life balance issues are challenging for participants in the workplace (e.g., maintaining familial relations, distinguishing work from other spheres of life) and a want for addressing work-life balance		
Challenges to authority	Challenges or issues that participants experience as a result of their gender or gendered experiences	Pushback (y/n)	Referring to interpersonal, institutional resistance, or challenges in the workplace related to their gender
		Discrimination	Mentioning past experiences or expectations of actions that discriminate based on social group. Expectations or experiences of discrimination that can be expressed in tangible differences
		Respect	Mentioning past experiences or expectations of not being taken seriously, not having authority, or not being able to garner respect
		Low competence	Reference to the individual or women as a group, not being qualified enough or not embodying appropriate leadership characteristics (e.g., "too emotional")
		Women pushback	Reference to animosity or undermining of authority from women
Insufficient agency perceptions	Describing a need to improve one's agency, or describing self and others' perceptions that the participant is not agentic enough	Confidence	Indicating a need to work on one's confidence (e.g., mentioning that one is too shy or timid). Indicating an importance of assertiveness, confidence, or empowerment training in gender interventions
		Insufficient agency	The perception that the individual, or women as a group are insufficiently agentic to be leaders or successful in the workplace; reference to being too weak or not tough enough
		Excessive agency	Referring to backlash that is faced when the individual or women as a group are behaving in an agentic manner
Excessive agency perceptions	Describing a need to seem less agentic, or describing self and others' perceptions that the participant is too agentic		

The overarching intervention needs were aggregated throughout revisions of the codebook. The descriptions of the overarching intervention needs describe what the authors view as the underlying similarities between the subcodes that were originally created from the literature and first readthrough of the participants' responses.

that White women and Asian women more frequently mentioned a need to address perceptions of insufficient agency more than Black and Latina women. Contrary to our expectations, only Black and Latina women notably mentioned incorporating intersectional considerations in diversity interventions for women more frequently than White women. There could be various explanations for why no relative differences were found with Asian women. First, the relatively low sample size may not be representative of the broad variability in experiences present among Asian women. Second, Asians have been shown to encounter great pressure to assimilate into Eurocentric notions of success and consequently downplay their racial and ethnic differences (Dennis, 2018). This may have contributed to fewer Asian women willing to emphasize their racial or ethnic differences. Before speculating further, however, we wanted to see if this effect would replicate in a follow-up study (i.e., Study 2).

Additionally, our findings that Asian women more frequently responded with a need to improve their networks aligns with research showing Asian women's reported sense of invisibility in the workplace (e.g., Liang and Peters-Hawkins, 2017). These findings may suggest that at least when asked to self-report, Asian

TABLE 2 | Chi-squared statistics of intervention needs per racialized group.

	Frequency	$\hat{p}$ Asian Women	$\hat{p}$ Black/Latina Women	$\hat{p}$ White Women	Asian:Black/Latina	Asian:White	Black/Latina:White
Addressing intersectional differences	124	0.438	0.588	0.342	$\chi2 = 2.711$ $p = 0.100$	$\chi2 = 1.469$ $p = 0.225$	$\chi2 = 13.237$ $p < 0.001$
Improving networks	91	0.417	0.325	0.273	$\chi2 = 1.095$ $p = 0.295$	$\chi2 = 3.578$ $p = 0.059$	$\chi2 = 0.684$ $p = 0.408$
Improving work-life balance	75	0.333	0.163	0.280	$\chi2 = 4.996$ $p = 0.025$	$\chi2 = 0.518$ $p = 0.472$	$\chi2 = 4.004$ $p = 0.045$
Challenges to authority	252	0.888	0.888	0.845	$\chi2 = 0.045$ $p = 0.831$	$\chi2 = 0.268$ $p = 0.604$	$\chi2 = 1.119$ $p = 0.290$
Addressing perceptions of insufficient agency	140	0.667	0.300	0.509	$\chi2 = 16.389$ $p < 0.001$	$\chi2 = 3.692$ $p = 0.055$	$\chi2 = 9.504$ $p = 0.002$
Addressing perceptions of excessive agency	34	0.188	0.088	0.112	$\chi2 = 2.743$ $p = 0.098$	$\chi2 = 1.883$ $p < 0.170$	$\chi2 = 0.335$ $p = 0.563$

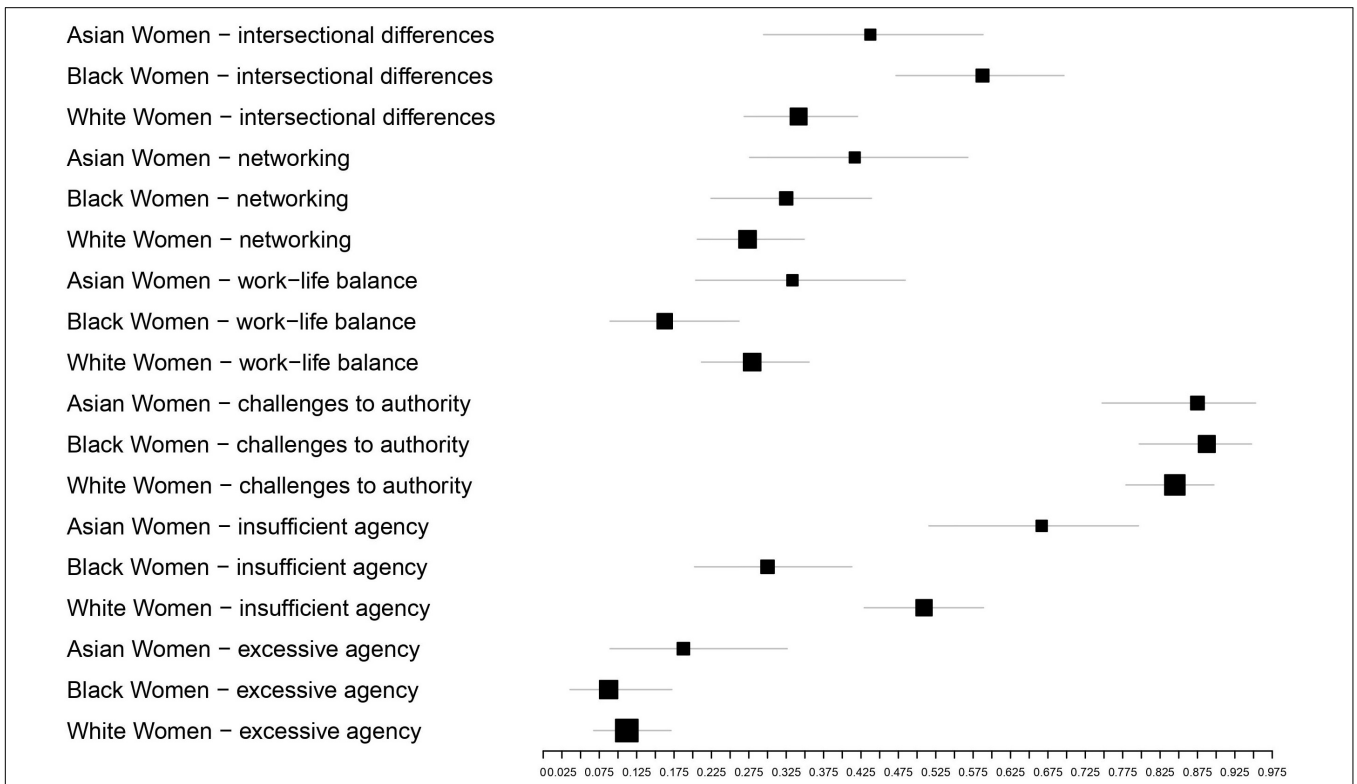

FIGURE 1 | Proportions of intervention needs as a function of racialized group.

women perceived a lack of embeddedness and resources to build networks that are favorable for them.

Lastly, our findings for the work-life balance intervention need showed that Asian and White women mentioned improving work-life balance more than Black women. Despite not being the only caregiving responsibility that women disproportionately bear at home, motherhood can be deeply intertwined with balancing one's work and private life. A possible explanation for our results may be that Black and Latina women may be relatively more hesitant to emphasize notions of motherhood or work-life balance due to being associated with negative stereotypes as bad mothers (e.g., welfare queen stereotype for Black women; Rosenthal and Lobel, 2016) or hyper-fertile (e.g., "breeders" stereotype for Latina women; Gutiérrez, 2009). In comparison, White women and Asian women may face these kinds of associations less frequently. These results do not indicate that that work-life balance resources are more or less relevant for any particular racialized group. However, our rationale does suggest that racially gendered stereotypes may not only affect one's preferences for an intervention, but they may also affect the willingness to express these preferences and be associated with particular interventions.

STUDY 2

In Study 2, we examined how women ranked the importance of the intervention needs identified in Study 1. To address the limitation of having participants react to a particular diversity program in Study 1 and solely a U.S.-based sample, we conducted study 2 to gauge participants' prioritization of intervention needs more generally. In Study 1, we saw the biggest differences in how often *intersectional differences* and perceptions of *insufficient agency* were discussed. Therefore, in Study 2, we anticipated a similar pattern of results where *intersectional differences* and *insufficient agency* would show the biggest ranking differences – we hypothesized:

H1: Black women would prioritize consideration for *intersectional considerations* more than White women.

H2: White women and Asian women would prioritize addressing *perceptions of insufficient agency* more than Black women.

While we aggregated Latina and Black women as we assumed that these groups encounter similar stereotypes (Fiske et al., 2002) in Study 1, we decided not to do so in Study 2 because they each also face unique marginalization that we did not account for Zou and Cheryan (2017).[5] Therefore, only Asian, White, and Black women participated in this study.

Participants

We conducted the survey via Prolific Academic and removed participants if they (a) did not engage in the ranking task, or (b) if their other responses indicated that they had not taken the questionnaire seriously by indicating the same scores for every item (even reverse-coded). The final sample consisted of 489 women, with 302 White women (61.8%), 98 Black women (20.0%), and 89 Asian women (18.2%). The mean age of the sample was 27.20 (SD = 7.97). Of participants, 34.6% of the participants indicated having had experience in a leadership position in their workplace. Most of the sample resided in the United Kingdom (55.2%), and the United States (30.3%), with the remainder in Europe (11.8%), and Canada or Australia (2.7% combined).

Procedure

Participants imagined that their workplace had invited them to participate in a diversity intervention for women and ranked items for potential inclusion in the intervention by personal order of importance (see "Study 2_Survey" for the survey set-up in **Supplementary Materials**). The original survey included 12 items that participants could rank, but we only included six items that most resembled the intervention needs categorized in Study 1. Rankings were reverse-coded, where higher scores indicated a higher prioritization. The rankings included in the main analyses were: *addressing intersectional differences* ("addressing how race influences gender in the workplace"), *improving networks* ("networking opportunities"), *improving work-life balance [*"Discussing how to deal with work-life balance (i.e., parental or other personal issues*)"]*, *addressing challenges to one's authority* ["Dealing with push-back or stereotypes in your workplace (e.g., coping with conflicting expectations, assumptions of incompetence, challenges to authority)"], *dealing with perceptions of insufficient agency* ("addressing the belief that women are not assertive"), and *dealing with perceptions of excessive agency* ("Addressing the held belief that assertive women are too bossy or dominant"). After ranking, the participants completed several measures[6] and indicated their demographics.

Each ranked item was treated as an ordinal variable in the analyses. For each intervention need we used Kruskal–Wallis tests to identify significant group differences between any of the racialized groups. Once a significant difference was found, we further looked at the breakdown of differences between Asian women, Black, women, and White women to identify the significant contrasts; for this, we used Dunn's *post hoc* test.

Results

The results for the Kruskal–Wallis and *post hoc* Dunn's tests are found in **Tables 3**, **4**.

Overall, the standard deviations for each intervention need suggests high variation within each racialized group for how each intervention need was ranked. Therefore, it must be borne in mind that any group differences found may be on the aggregate level, but individual participants may differ widely in how they provided rankings. Consistent with Study 1, Black women ranked *intersectional differences* significantly higher than White women. Contrary to Study 1, however, Asian women also ranked *intersectional differences* significantly higher than White women. Moreover, as in Study 1, White women ranked *dealing with perceptions of insufficient agency* higher than Black women, though the difference between Asian and Black women was not statistically significant. At the same time, interestingly, White women ranked *dealing with perceptions of excessive agency* higher than Asian women. White women and Asian women ranked *challenges to authority* significantly higher than Black women. Unlike in Study 1, there were no significant differences in the rankings for *work-life balance* or *networking* among any of the racialized groups of women.

Study 2 Discussion

When looking at how women prioritized intervention needs differently in a diversity intervention for women, our first hypothesis was that Black women may value interventions that addressed their racialization alongside their gender. This was supported. Unlike in Study 1, with a larger Asian sample

[5]The racialization of Latina women is largely varied and can differ immensely from the experiences of Black women. Mohr and Purdie-Vaughns (2015) seminal piece, for example, specifically highlights differences between Black and Latina women; all the while, they call for more scholarship wholly on Latina women. While the groupings of women were changed in the second study, this complexity must be borne in mind when interpreting the results of Study 1.

[6]We also measured anticipated intervention success, colorblindness, gender blindness, and belief in meritocracy as potential scalar outcome and exploratory moderator variables. Ultimately, it was not statistically possible to use these variables as moderators in main analyses using Kruskal–Wallis and Dunn tests. Racialized group differences were, however, found and are reported in "Study 2_Exploratory Variables ANOVA and Tukey HSD Analyses" in the **Supplementary Materials**.

TABLE 3 | Differences in rankings of the intervention needs between racialized group.

	Addressing intersectional differences	Improving networks	Improving work-life balance	Addressing challenges to authority	Dealing with perceptions of insufficient agency	Dealing with perceptions of excessive agency
Kruskal–Wallis *H*	29.624	2.346	0.816	5.8541	10.519	6.162
df	2	2	2	2	2	2
Asymp. Sig.	<0.001	0.310	0.665	0.0536	<0.001	0.046

and presumably more statistical power, we *were* able to find that Asian women prioritized incorporating intersectional differences higher than White women. This result provides some evidence that Black women and Asian women may require an acknowledgment of how race affects their gendered experiences compared to White women due to their racial marginalization.

In our second hypothesis we anticipated that White women and Asian women would prioritize interventions that addressed insufficient agency more than Black women. Consistent with Study 1, White women ranked interventions that addressed perceptions of insufficient agency higher than Black women. Surprisingly, White women also ranked addressing perceptions excessive agency higher than Asian women. This finding may suggest that White women may be more concerned with balancing perceptions of agency than Black and Asian women.

Inconsistent with Study 1, Asian women did not differ significantly from Black women on the importance of addressing perceptions on insufficient agency. This inconsistency may firstly be connected to the immense variability in racialized experiences and stereotypes that Asian woman are confronted with, both within and across different Asian communities. This may be especially so as the first study was U.S.-based, and the second study sampled a broader participant pool. In Study 2, a higher South and South-East Asian population was represented compared to Study 1 (Study 1 = 38.5%, Study 2 = 46.0%), where a higher East Asian population participated. Research has shown a lot of variation in how different groups of Asian women encounter different agency-related stereotypes, for example, showing that some South Asians (e.g., Bangladeshis or Pakistanis) are perceived to be more assertive compared to some East Asians (e.g., Vietnamese or Koreans) (Ramakrishnan et al., 2017; Hassan, 2018). Arguably, the differences in the intervention needs that would accurately reflect the intra-group diversity among Asians are more pronounced than what is currently presented.

Secondly, we theorize that the discrepancy in results between these first two studies may be based on differences in self versus other perceptions. That is, the perceptions of a group may differ based on whether someone is a member of that group (i.e., self-perceptions) or outside of the group (i.e., other perceptions). Research with Asian women have detailed a discrepancy in how agentic they view themselves from the perceptions that others have of them (Cheryan and Markus, 2020). Even though Asian women are stereotyped by others to be closer to traditional femininity and report feeling pressure to behave accordingly (Williams et al., 2016), Asian women have rated themselves as more assertive than White women (Toosi et al., 2019). With that logic, Study 1 may have been more conducive for participants to think about others' perceptions, because we asked them to think about how others' stereotypes and treatment of them would elicit intervention needs. In turn, Study 2 may have been more conducive for participants to think about self-perceptions because we asked them to order the intervention needs based on their personal needs. Therefore, while Asian participants may bring up addressing perceptions of insufficient agency because that is how others view them, they may not prioritize this intervention need as they may not see themselves as actually lacking in agency.

Even though no significant differences were found in Study 1 for challenges to authority, in this study, Asian and White women ranked tackling challenges to authority significantly higher than Black women. Challenges to authority and insufficient agency may, in hindsight, tap into similar theoretical issues, such that the stereotypes for Black women are more similar to stereotypes of men, and that Asian women and White women are perceived as relatively less assertive and assured (Ghavami and Peplau, 2013; Rosette et al., 2016, 2018; Hall et al., 2019). In fact, tackling challenges to authority may be more reflective of the stereotypes that others have of Asian women than their own sense of agency. Having ranked challenges to authority higher may also explain why the rankings for insufficient agency are

TABLE 4 | Mean rankings, standard deviations (in parentheses), and Dunn tests' contrasts of each intervention need per racialized group.

Intervention needs	Asian women	Black women	White women	Comparison	*z*	*p*. adj
Intersectional differences	3.989 (1.578)	4.796 (1.324)	3.666 (1.824)	Asian:Black	–3.348	<0.001
				Asian:White	1.181	<0.001
				Black:White	5.442	<0.001
Networking	3.798 (1.866)	3.408 (1.793)	3.513 (1.770)	Asian:Black	1.470	0.424
				Asian:White	1.266	0.308
				Black:White	–0.538	0.590
Work-life balance	3.034 (1.715)	2.908 (1.650)	3.096 (1.719)	Asian:Black	0.436	0.994
				Asian:White	–0.332	0.740
				Black:White	–0.895	1.000
Challenges to authority	3.753 (1.805)	3.133 (1.791)	3.364 (1.744)	Asian:Black	2.395	0.050
				Asian:White	1.791	0.110
				Black:White	–1.158	0.247
Insufficient agency	3.303 (1.465)	3.306 (1.509)	3.765 (1.519)	Asian:Black	–0.015	0.988
				Asian:White	–2.511	0.018
				Black:White	–2.587	0.029
Excessive agency	3.124 (1.608)	3.449 (1.507)	3.596 (1.581)	Asian:Black	–1.359	0.261
				Asian:White	–2.467	0.041
				Black:White	–0.848	0.396

relatively lower for Asian women, when compared to the other racialized groups.

Lastly, our results indicate that there were also shared intervention needs across the racialized groups in this study. For instance, improving networking or work-life balance were ranked relatively similarly; these results could indicate that when made to choose between other intervention needs (and not self-generate as in Study 1), participants are similarly in need of work-life balance and networking elements in a diversity intervention for women.

STUDY 3

In our final study, we examined the extent to which the intervention needs identified in previous studies were recognized and addressed by organizations. We scraped and analyzed the public websites of companies that pledged to promote women's representation. In line with intersectional invisibility research, we expected that the intervention needs that were more relevant to multiply marginalized groups would be less represented among organizations than the intervention needs that were more relevant to White women as singly marginalized groups (Purdie-Vaughns and Eibach, 2008; Thomas et al., 2014). Specifically, we anticipated that agency-enhancing needs that seemed to be more relevant for White women would be represented the most among the organizations.

Method

Sample

The public websites of 186 signatory organizations of the Dutch "Talent naar de Top" (ENG: Talent to the Top; TndT) diversity charter were used. The charter allows private enterprises and public organizations to publicly commit to promoting women's representation in top management positions (Talent naar de Top, 2020). We only mined websites that advocated or referred to women, including efforts to promote women, foster women's inclusion, or inform the public about their interventions for women. Signatories without any website information advocating for women were not included, resulting in a final sample of 92 organizations.

Procedure

After screening and scraping organizational websites, we compiled a word dictionary based on the intervention needs identified in Study 1 using procedure. In this procedure, prior to engaging with the websites, the first author and a second expert outside of the project used Weber's (2005) procedure and generated a literature-based version of the word dictionary for each intervention need. Words were generated for each intervention need based on the responses to the open-ended questions from Study 1 and related diversity research. For instance, we drew on Pietraszkiewicz et al. (2019) agency word dictionary by borrowing from their agency words and adding our own words based on the quotes that were coded under the agency categories in Study 1. A similar procedure was used for the other intervention needs of the word dictionary. Following the creation of these preliminary lists, the coders brainstormed to generate other relevant words for each category and added them to the initial lists. This process mainly involved generating synonyms of adjectives (e.g., shy, timid). Additionally, the coders attempted to streamline the lists as much as possible by including the word stems of relevant words (e.g., including empower* in the word list that would accept all words that start with "empower-," rather than including "empower," "empowerment," "empowering" as separate entries).

Subsequently, the two coders each independently coded 10% of the sample to review, revise, and check for the saturation of the word dictionary (i.e., the point at which no additional words could be contributed to the word dictionary). From this, we arrived at a preliminary word dictionary. Because many websites were only in Dutch, we translated the dictionary from English to Dutch (Singh et al., 2006) through joint discussions with native Dutch speakers external to the project. At this stage, we also added variations of adjectives for proper nouns that are used in Dutch, depending on whether the adjective describes a noun with a "de" or "het" article in Dutch. An example of this is the word "Chinees" in Dutch (ENG: Chinese), which can be used as a proper noun or an adjective for a "het" noun. Other variations of "Chinees" are "Chinese," the adjective used for "de" nouns, and "Chinezen," the plural form of the proper noun.

We then conducted a post-measurement validation to fine-tune the word dictionary. Through an iterative procedure of human and LIWC computer coding (Weber, 2005), we first manually coded a subset (10%) of the documents using the preliminary word dictionary. Then we ran these documents through the LIWC program. Together, we calculated a "hit rate" and "false hit rate"; if the hit rate was less than 80 and the false hit rate was more than 10%, revisions would be made to the word dictionary. This process was continued for five iterations until the hit rates and false hit rates were satisfactory across all categories (see "Study 3_Establishing Word Dictionary Reliability" in the **Supplementary Materials**), arriving to the final version of the word dictionary (see "Study 3_Word dictionary" in the **Supplementary Materials**). Using the finalized word dictionary, we used the Linguistic Inquiry and Word Count program (LIWC) to scan the websites.

The categories in the word dictionary largely coincided with their corresponding intervention needs found in Study 1; however, "challenges to authority" was not included because these specific individual experiences could not be detected using LIWC and may have been confounded with the agency category. Ultimately, we used six categories: *agency*, *insufficient agency, excessive agency, intersectional differences*, *networking, and work-life balance*. *Insufficient agency* (e.g., "docile," "shy") and *excessive agency* (e.g., "bossy," "aggressive") related to being perceived as too agentic, or not agentic enough. Compared to intervention needs found in Study 1, we added a general referral to *agency* as a category (e.g., "assertiveness," "confidence") to account for related words that do not carry as much valence as *insufficient* and *excessive agency*. *Intersectional differences* included words or phrases associated with multicultural representation, racial or ethnic representation, and reference to stigmatized groups and identities other than women (e.g., "cultural background," "skin

color"). Because we examined these other stigmatized identities within the organizations' advocacy of women, this coding proxied an acknowledgment of differences within women. Moreover, to check for possible over-estimation of this category, we used the quanteda package in R to see whether race and ethnicity-related word co-occurred within a window of five words (pre- and post-) with "women" throughout the texts. *Networking* consisted of words and phrases related to role-models, references to community, or expanding the professional and personal contacts of women (e.g., "connection," "mentor*"). *Work-life balance* included words related to negotiating ones' career and caregiving responsibilities, or one's general personal life (e.g., "flexible," "work-life").

The LIWC provided crude percentages based on the frequency with which a word or short phrase had been detected within our word dictionary, relative to the total number of words in the text. We calculated the prevalence and their respective ranges of each category across the organizations wholly (see **Table 5**) and split by industry (see **Table 6**). Splitting the data by industry was done to gain insight in how the intervention needs were represented in the Education, Science, and Research sector, where social science research is most likely to take place. Moreover, we calculated the total percentage of organizations that mentioned each category in any capacity (i.e., more than 0% prevalence in the categories). Lastly, we used chi-squared analyses to determine if any category was significantly associated with each other (see **Table 7**). In addition to reporting the LIWC results in the next section, we footnoted supporting quotes and remarks that we made during the human coding that reflected more conceptual content to support the LIWC results.

Results

Notably, only about 49% of the companies that were members of TndT showed some content of their advocacy for women on their websites. As expected, *agency* was the intervention need most represented out according to the LIWC results and manual coding with 97.8% of the organizations representing *agency* in some way in their websites. When disaggregating by industry, "we still observed that at least 90% of organizations mentioned agency across all industries." However, words related to *insufficient agency* and *excessive agency* were mentioned the least across the organizations.[7] *Networking* was the second most

[7]Of the nine companies that were randomly selected for manual coding, six organizations focused on *agency* where organizations spotlighted women who

TABLE 5 | Prevalence of intervention needs.

Category	Prevalence (%)	Range (%)	Organizations with > 0 prevalence (%)
Agency	2.010	6.120	97.8
Insufficient agency	0.010	0.090	9.7
Excessive agency	0.010	0.240	18.3
Intersectional differences	0.090	1.220	51.6
Networking	0.660	6.800	90.3
Work-life balance	0.390	1.060	55.9

TABLE 6 | Prevalence of intervention needs per industry.

Category	Prevalence (%)	Range (%)	Organizations with > 0 prevalence (%)
Accountancy, Banking, and Finance (*N* = 11)			
Agency	2.477	2.630	100.0
Insufficient agency	0.000	0.000	0.0
Excessive agency	0.000	0.000	0.0
Intersectional differences	0.073	0.370	54.5
Networking	1.319	6.610	100.0
Work-life balance	0.077	0.440	27.3
Business, Consulting, and Management (*N* = 19)			
Agency	2.248	5.330	94.7
Insufficient agency	0.006	0.090	15.8
Excessive agency	0.020	0.240	42.1
Intersectional differences	0.107	0.480	73.7
Networking	0.746	2.400	89.5
Work-life balance	0.247	0.850	78.9
Education, Science, and Research (*N* = 18)			
Agency	1.731	3.960	94.4
Insufficient agency	0.003	0.060	5.6
Excessive agency	0.006	0.060	16.7
Intersectional differences	0.167	1.220	44.4
Networking	1.194	4.710	94.4
Work-life balance	0.330	0.330	44.4
Information Technology (*N* = 4)			
Agency	2.230	1.630	100.0
Insufficient agency	0.000	0.000	8.3
Excessive agency	0.003	0.010	25.0
Intersectional differences	0.053	0.090	75.0
Networking	0.630	1.120	75.0
Work-life balance	0.155	0.300	100.0
Law (*N* = 12)			
Agency	1.613	2.950	100.0
Insufficient agency	0.008	0.010	28.6
Excessive agency	0.006	0.030	25.0
Intersectional differences	0.041	0.250	41.7
Networking	0.833	2.260	100.0
Work-life balance	0.161	0.650	50.0
Property, Manufacturing, and Construction (*N* = 7)			
Agency	1.514	0.790	100.0
Insufficient agency	0.010	0.040	28.6
Excessive agency	0.001	0.010	14.3
Intersectional differences	0.133	0.530	71.4
Networking	0.537	1.440	85.7
Work-life balance	0.250	1.060	85.7
Public Services and Administration (*N* = 6)			
Agency	3.385	5.260	100.0
Insufficient agency	0.000	0.000	0.0
Excessive agency	0.000	0.000	0.0
Intersectional differences	0.272	1.170	33.3
Networking	0.587	2.040	66.7
Work-life balance	0.000	0.000	0.0
Retail and Services (*N* = 15)			
Agency	2.279	3.350	100.0
Insufficient agency	0.006	0.090	6.7
Excessive agency	0.000	0.000	0.0
Intersectional differences	0.050	0.420	26.7
Networking	1.358	3.650	86.7
Work-life balance	0.145	0.560	60.0

frequent category. The prevalence of networking words was mentioned by 90.3% across all organizations, and by more than 85% of organizations in each industry. The chi-squared analyses also showed that *agency* and *networking* words were significantly associated with each other.[8]

Words associated with *work-life balance* was third most prevalent amongst the intervention needs, after *agency* and *networking*, and was mentioned by 55.9% of the organizations. Compared to *agency* and *networking*, there was more variation in how individual sectors represented *work-life balance*. The sectors with which *work-life balance* was mostly represented were Information Technology (100% across all organizations) and Property, Manufacturing, and Construction (85.7% across all organizations). The sectors with which *work-life balance* was least represented in the organizations' websites were in Public Services and Administration (0% across all organizations) and Accountancy, Banking, and Finance (27.3% across all organizations).

Lastly, while *intersectional differences* was indicated by the LIWC to be mentioned by a little over than a half of the organizations, the prevalence of words related to this category was relatively low. Moreover, the co-occurrence analysis suggests that the websites may have mentioned other social groups besides gender in their advocacy of women, but mainly as separate groups. The organizations seemed to rarely refer other social groups' intersection with women as "women" co-occurred with race and ethnicity related words only 27 times out of a corpus of approximately 36,000 words.[9]

When zooming in on the Education, Science, and Research sector, the patterns of the data parallel that of looking at all the organizations. *Agency* and *networking* were most represented among the intervention needs, and addressing perceptions of *insufficient agency* and *excessive agency* were the least represented. While *intersectional differences* and *work-life balance* seemed to be represented equally when considering whether the organizations represented these needs at all, the prevalence of words related *intersectional difference* was still roughly one-half that of *work-life balance*.

demonstrated agency, encouraged cultivating assertiveness, or set targets for female leaders. For example, some testimonials from women of two organizations strongly emphasized the importance of being agentic (e.g., "*I think it is extremely important to take the time to determine what you want and what you need to do to achieve it – and then to be vocal about your ambitions*."; *"I learned a more effective way of saying no, which helps me cultivate the right relationships and communicate more honestly," she says, adding that it's something that has helped her manage her workload better*").

[8]Most of the manually coded organizations mentioned the importance of bringing women together to build networks ($N = 6$); however, this often involved an element of agency. Of the organizations, four linked networking to being assertive by focusing on how agentic women could help other (lower ranked) women become more agentic. To illustrate, an organization mentions on their website that their mentorship program hosts "*female leaders*" who "*help (. . .) to empower girls and women [. . .] to break through long-standing cultural barriers and build rewarding careers of their own*".

TABLE 7 | Chi-squared statistics of intervention needs.

Comparisons		
Agency	Intersectional Differences	$\chi2 = 2.180$
		$p = 0.140$
	Networking	$\chi2 = 19.077$
		$p < 0.001$
	Work-Life Balance	$\chi2 = 2.592$
		$p = 0.107$
Intersectional Differences	Insufficient Agency	$\chi2 = 0.019$
		$p = 0.019$
	Excessive Agency	$\chi2 = 15.049$
		$p < 0.001$
	Networking	$\chi2 = 6.545$
		$p = 0.011$
	Work-Life Balance	$\chi2 = 14.660$
		$p < 0.001$
Networking	Insufficient Agency	$\chi2 = 1.068$
		$p = 0.301$
	Excessive Agency	$\chi2 = 2.229$
		$p = 0.135$
	Work-Life Balance	$\chi2 = 2.061$
		$p = 0.151$
Work-Life Balance	Insufficient Agency	$\chi2 = 7.856$
		$p = 0.005$
	Excessive Agency	$\chi2 = 12.317$
		$p < 0.001$

Study 3 Discussion

The aim of Study 3 was to examine the extent to which the intervention needs of various racialized groups of women were represented in a sample of organizations that advocated for women. Only roughly half of the signatories had any website relating to the advocacy and promotion of women. Of those organizations, agency, networking, and work-life balance were prominent intervention needs. However, showcasing agency was the most prominent as it was also referenced in conjunction with other intervention needs. Few organizations mentioned perceptions of excessive agency that may affect women at the workplace. Representing the need to boost one's agency to be successful while failing to emphasize the potential consequences of being perceived as excessively agentic reinforces the White prototype that women's issues exclusively concern perceptions of insufficient agency. This approach poses a particular risk of excluding Black women, where addressing perceptions of insufficient agency was less relevant for them.

The prevalence of organizations acknowledging intersectional differences seems low, particularly when considering an actual intersection of gender and other social groups. While stigmatized groups other than gender seemed to be named frequently by organizations, in the co-occurrence analysis we saw that they were often discussed as independent entities rather than intersectionally. It is, therefore, not definitive that organizations, including the Education, Science, and Research sector, are strongly articulating intersectional considerations. Lacking

[9]In the manual coding we only found two instances where a social group other than gender was mentioned, from which only one brought attention to how these groups intersected.

specificity when discussing how different social intersections differentially impact women's experiences may be a notable shortcoming, particularly for Black women and Asian women who highly prioritize addressing intersectional differences in a diversity intervention for women.

GENERAL DISCUSSION

In this research, we found evidence of differences between different racialized groups of women in their intervention needs for a successful diversity intervention for women. We found that White women and Asian women prioritized addressing perceptions of insufficient agency more than Black women across our first two studies. These findings fit with the stereotypes that each group faces, where Black women are not generally perceived to be lacking in agency, while White women and Asian women are (Rosette et al., 2016, 2018). Our finding in Study 3 that organizations widely promoted enhancing agency perceptions may, therefore, be more likely to serve the intervention needs for Asian and White women, particularly if they involve dealing with others' perceptions of these women and challenges to their authority.

However, the organizations in Study 3 rarely mentioned perceptions of excessive agency in their advocacy of women. Excluding this element may neglect the intervention needs of White women who may be concerned with balancing insufficient and excessive agency perceptions, as shown in Study 2's findings where White women ranked addressing both agency perceptions relatively highly. Additionally, organizations who fail to address excessive agency may also exclude Black women as they are more likely than Asian or White women to be prescribed as more dominant and even aggressive (Rosette et al., 2016). Therefore, diversity interventions that seek to use perceptions of agency as a point of training for women may benefit from incorporating how perceptions of excessive agency affect women, and the idea of balancing on the tightrope between being perceived as too agentic and insufficiently agentic.

Across the first two studies, Black women consistently brought up and prioritized intersectional differences more than White women; Asian women also showed this pattern in the second study. When considering this prioritization with the results of Study 3, we saw that while other stigmatized identities besides gender were recognized among the organizations, the explicit link to these marginalizations and gender were often unmentioned and unexplored. Therefore, our findings in Study 3 that the organizations did not conclusively address intersectional considerations present another source of exclusion of intervention needs that may be especially relevant for Black women and Asian women.

The exclusion of intersectional considerations overlap with other intervention needs too. Although we studied incorporating intersectional differences as a separate intervention need, intersectional considerations theoretically extend to other intervention needs. Despite finding a sizeable representation of work-life balance policies and networking in our sample of organizations in the third study, the lack of an intersectional consideration may compromise these needs for racially marginalized women, too.

To illustrate, in the second study we found that the three groups of participants shared a concern for work-life balance and networking as intervention needs. Yet, different racially gendered obstacles may fuel this prioritization for these two needs. It may be possible that a networking intervention for Asian women requires an understanding of the invisibility that can often be felt by Asians, and the model-minority myth that can act as a barrier for Asian women to seek out mentoring and professional help. This reasoning for having problems with networking is different from the issue of networking for Black women who may be more likely to lack informal connections and may need wrestle with impression management in their workspaces.

In the same vein, lacking intersectional considerations when addressing work-life balance aspects of a diversity intervention miss out on possible important nuances for different groups' motivations. As theorized in Study 2, even though work-life balance policies may be very important for Black women, they may be hesitant to express and associate themselves with the negative stereotypes that are associated with Black women and motherhood. Organizations and institutions therefore must also be able to recognize the different racialized struggles that these women face to be able to adequately help them navigate through these struggles, participate in diversity interventions, and comprehensively benefit from them.

Implications for Academic Social Sciences

Our findings have implication for the social sciences, and academia more broadly. After all, in the third study we saw that the Education, Science and Research sector is not impervious to showcasing agency while being limited in their intersectional scope. Therefore, the findings in this research are likely to emerge in their own form in the academic social sciences.

For instance, as in any job position, work in academia involve evaluations. Evaluations are present for teaching, research performance, when applying for grants, and when considering tenure should be granted. There is already much evidence showing that evaluations within academia are skewed negatively toward women (Llorens et al., 2021). However, as the first and second study show, it is incomplete to assume that these biases are one and the same for all women. That is, differential perceptions of insufficient agency and excessive agency are undoubtedly present, and result in different trajectories for the same possible negative evaluations. Being aware of how these biases differ may be relevant for academic and research institutions to take the appropriate steps to mitigate any respective negative consequences.

Additionally, to increase women's representation in academia, many universities are increasingly establishing diversity interventions for women throughout their own staffing and retention procedures (e.g., via targets or quotas; European Commission, 2019). However, without specifically attuning to intersectional differences, such initiatives are at risk of— through

the prototypicality of Whiteness and atypicality of racially marginalized women— exclusively divesting efforts toward the benefit of White and female scholars. As a result, women from racially marginalized groups are further overlooked. Furthermore, by having interventions that seemingly target all women, such exclusive interventions may contribute to the further legitimization of inequality of racially marginalized women in these spaces (Brady et al., 2015).

Limitations

We based our research focus and findings on the context of Western Europe and North America. Consequently, we examined racialized differences between Asian women, Black women, and White women because these three marginalized groups are the best understood in the stereotyping literature in these contexts. However, the openness to which racially marginalized groups are expressive and considerate of racialized or ethnic differences relative to White majority groups is different from contexts where race and ethnicity discourse is less present (e.g., Law and Zakharov, 2019). Moreover, one can surmise that because Western Europe and North American both have colonial and imperial histories, that this is linked to many racially marginalized people leaving their home countries as economic and educational migrants. Racially marginalized people within these contexts may therefore be more likely to participate in the labor market in professional and service industries where diversity interventions are implemented in the first place. The importance of racialized and ethnic differences, and the resources to tend to these differences, may differ from places such as Latin America and the Caribbean where racial dynamics are very different from North America and Western Europe (England, 2010; Golash-Boza and Bonilla-Silva, 2013), and where similar diversity interventions are less likely to be present.

Moreover, White women, Black women, and Asian women do not represent all the ways that gendered experiences can be racialized. Very different ethnicities were combined into racialized categories (e.g., Afro-Caribbean Black women and African-American Black women, or Chinese Asian women and Indian Asian women). Moreover, while we attempted to control for sexual orientation by sampling only heterosexual women, our research is limited in that our theorizations and findings do not consider *trans* and non-binary overlaps of gender with identifying as a woman. Such an approach misses rich heterogeneity in experience between and within racialized and gender groups (Mohr and Purdie-Vaughns, 2015).

Furthermore, not all the intervention needs found in the first two studies may be generalizable to other racialized groups of women who were not included in this research. Middle-Eastern and North African women for example, are likelier than Asian or Black women to be perceived as Muslim and struggle with stereotypes of being "repressed," while at the same time maneuvering stereotypes of excessive agency as "Angry Arabs" (Hamad, 2020). Indigenous or aboriginal women in settler colonial contexts may have intervention needs that are more likely to be informed by navigating through competence stereotypes that they are uneducated and undisciplined, yet spiritual and wise (Morrison et al., 2008). These varied and somewhat contrasting experiences may then also translate to other intervention needs and their respective prioritizations that were not included in this research. At the same time, while the exact constellation of intervention needs may not exactly map on to other contexts and racializations, the pattern that intervention needs differ among women based on racialization likely extends to other racially marginalized groups.

Future Directions

The findings of our studies may lead to many future avenues of research on intervention needs for racially marginalized women. After providing evidence that intervention needs may differ based on racialization, empirically connecting these differences with research on racially gendered experiences and stereotypes would provide further insights on how organizations can precisely nuance and improve their interventions. For instance, if the pattern of results for Asian women are indeed connected to the model-minority stereotypes that they face, how can this be incorporated in an intervention to improve intervention success? How can what is known about negative competence stereotypes that Black women face be added to diversity interventions to provide Black women with greater access to informal networks? Looking at these finer grained explanations and connecting them to participants' intervention preferences would offer more content-specific and practical insights into successful diversity intervention design.

Across the first two studies we observed general differences by considering how racialization is intertwined with gender among these intervention preferences. This was, however, only a glimpse of how these differences emerge considering various intersectional axes. Research on diversity approaches in organizations, for instance, show that numerical representation of racially marginalized folks affects their preferences in approaches (Apfelbaum et al., 2016). While we could not show this with our data, other factors such as social economic class, education level, and job industry are closely associated with racial representation. Racial minorities are, for instance, often disproportionately represented in lower paying industries (Kmec, 2003; Byrne et al., 2005) that require lower to no formal education. In these contexts where racially marginalized people are at least moderately represented, racially marginalized women may face less representation concerns and may prioritize intersectional differences less and other intervention needs more. Rather, women may prioritize more resource-based interventions, such as work-life balance interventions that may make time as a resource more readily available. On the other hand, scarcity in racial representation, as can be seen in higher educated industries such as the social sciences (Spalter-Roth and William, 2007; Kohout et al., 2014), may place an even greater emphasis on having intersectional differences acknowledged for a racially marginalized member. While no single study can be fully comprehensive of all these factors, it is important to realize in continued research and theorization that intersectional differences among women regarding their intervention needs is

sophisticated and can be interpreted in conjunction with many other seemingly unrelated intervention needs.

CONCLUSION

It is crucial when designing gender diversity interventions to understand that women are not a monolith. We observed how different Asian, Black, and White women were associated with different intervention needs that aligned with their respective racially gendered stereotypes. Moreover, we found that when organizations discuss their diversity and inclusion efforts for women, they mainly focused on intervention needs associated with enhancing agency. While this focus may fulfill some of the intervention needs for White women and some Asian women, an exclusive focus on agency runs the risk of failing to meet other important intervention needs that these women possess. Black women and Asian women, both of whom prioritized addressing intersectional considerations, are additionally at risk for being excluded from these diversity interventions for women. Moreover, while some intervention needs may be shared by different racialized groups, the rationales for these needs may by racially gendered, and therefore racially gendered intersectional considerations may still be required in these shared concerns.

The range of intervention needs that are required for these diversity interventions suggest that focusing on any one given intervention need is insufficient, and the continued unfulfillment of intervention needs of specific groups of women might ironically exacerbate inequalities. Our results have implications for the social sciences in academia, that is growingly internationalized and that seeks to design their work more and more equitably for racially marginalized groups. Practitioners may likely benefit more from their own local investigation of the intervention needs required in a given group to flexibly design interventions that seek to fulfill participants' prioritized intervention needs. Otherwise, interested participants with needs other than enhancing agency may be unaffected by these diversity interventions for women that seemingly help them, or feel actively excluded. Both of which will ultimately negatively affect racially marginalized women's inclusion and put them at a greater disadvantage in an already competitive environment.

DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found below: https://figshare.com/articles/dataset/Data_package/16775728.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Faculty of Economics and Business Ethics Committee, University of Groningen. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

CW primarily drafted and revised the work, while other authors provided substantial edits and feedback to the manuscript. All authors made substantial contributions to the conception, analyses, interpretation of data of this work, and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2022.791572/full#supplementary-material

REFERENCES

Ahern, G. (2019). *Overworked and Isolated: the Rising Epidemic of Loneliness in Academia: NPJ Science of Learning*. Available online at: https://npjscilearncommunity.nature.com/posts/43686-overworked-and-isolated-the-rising-epidemic-of-loneliness-in-academia [accessed on March 5, 2019]

Alfred, M. V., Ray, S. M., and Johnson, M. A. (2019). Advancing women of color in STEM: an imperative for U.S. global competitiveness. *Adv. Dev. Hum. Resour.* 21, 114–132. doi: 10.1177/1523422318814551

Annabi, H., and Lebovitz, S. (2018). Improving the retention of women in the IT workforce: an investigation of gender diversity interventions in the USA. *Inform. Syst. J.* 28, 1049–1081. doi: 10.1111/isj.12182

Apfelbaum, E. P., Stephens, N. M., and Reagans, R. E. (2016). Beyond one-size-fits-all: tailoring diversity approaches to the representation of social groups. *J. Pers. Soc. Psychol.* 111, 547–566. doi: 10.1037/pspi0000071

Arends-Tóth, J., and Van De Vijver, F. J. R. (2003). Multiculturalism and acculturation: views of Dutch and Turkish-Dutch. *Eur. J. Soc. Psychol.* 33, 249–266. doi: 10.1002/ejsp.143

Azhar, S., and McCutcheon, K. P. D. (2021). How racism against BIPOC women faculty operates in social work academia. *Adv. Soc. Work* 21, 396–420. doi: 10.18060/24118

Bell, E., and Nkomo, S. (2003). *Our Separate Ways: Black and White Women and the Struggle for Professional Identity*. Boston, MA: Harvard Business School Press.

Bhopal, K. (2018). *White Privilege: The Myth of a Post-Racial Society*. Bristol: Policy Press.

Bhopal, K. (2020). *UK's White Female Academics are being Privileged above Women – and Men – of Colour*. London: The Guardian.

Bleiweis, R. (2021). *The Economic Status of Asian American and Pacific Islander Women*. Washington, DC: Center for American Progress.

Bonilla-Silva, E., and Baiocchi, G. (2001). Anything but racism: how sociologists limit the significance of racism. *Race Soc.* 4, 117–131. doi: 10.1016/S1090-9524(03)00004-4

Bowleg, L. (2008). When Black + lesbian + woman ≠ Black lesbian woman: the methodological challenges of qualitative and quantitative intersectionality research. *Sex Roles* 59, 312–325. doi: 10.1007/s11199-008-9400-z

Bowleg, L. (2012). The problem with the phrase women and minorities: intersectionality-an important theoretical framework for public health. *Am. J. Public Health* 102, 1267–1273. doi: 10.2105/AJPH.2012.300750

Brady, L. M., Kaiser, C. R., Major, B., and Kirby, T. A. (2015). It's fair for us: diversity structures cause women to legitimize discrimination. *J. Exp. Soc. Psychol.* 57, 100–110. doi: 10.1016/j.jesp.2014.11.010

Breslin, R. A., Pandey, S., and Riccucci, N. M. (2017). Intersectionality in public leadership research: a review and future research agenda. *Rev. Public Pers. Adm.* 37, 160–182. doi: 10.1177/0734371X17697118

Byrne, J., Clarke, L., and Van Der Meer, M. (2005). Gender and ethnic minority exclusion from skilled occupations in construction: a Western European comparison. *Construct. Manage. Econ.*23, 1025–1034. doi: 10.1080/01446190500310759

Castro, A. R., and Collins, C. S. (2021). Asian American women in STEM in the lab with "White men named John.". *Sci. Educ.* 105, 33–61. doi: 10.1002/sce.21598

Catalyst (2020). *Women in Academia: Quick take*. Available online at: https://www.catalyst.org/research/women-in-academia/ [accessed on January 23, 2020]

Chavez, K., and Wingfield, A. H. (2018). "Racializing gendered interactions," in *Handbooks of Sociology and Social Research*, eds B. Risman, C. Froyum, and W. Scarborough (New York, NY: Springer International Publishing), 185–197. doi: 10.1007/978-3-319-76333-0

Cheng, A. W., Chang, J., O'Brien, J., Budgazad, M. S., and Tsai, J. (2017). Model minority stereotype: influence on perceived mental health needs of Asian Americans. *J. Immigr. Minor. Health* 19, 572–581. doi: 10.1007/s10903-016-0440-0

Cheryan, S., and Markus, H. R. (2020). Masculine defaults: identifying and mitigating hidden cultural biases. *Psychol. Rev.* 127, 1022–1052. doi: 10.1037/rev0000209

Crenshaw, K. (1991). Mapping the margins: intersectionality, identity politics, and violence against women of color. *Stanf. Law Rev.* 43, 1241–1299. doi: 10.2307/1229039

Deliovsky, K., and Kitossa, T. (2013). Beyond black and white : when going beyond may take us out of bounds. *J. Black Stud.* 44, 158–181. doi: 10.1177/0021934712471533

Dennis, E. (2018). "Exploring the model minority: deconstructing Whiteness through the Asian American example," in *Cartographies of Race and Social Difference*, eds G. J. Sefa Dei and S. Hilowle (New York, NY: Springer), 33–48. doi: 10.1007/978-3-319-97076-9_3

Elo, S., and Kyngäs, H. (2008). The qualitative content analysis process. *J. Adv. Nurs.* 62, 107–115. doi: 10.1111/j.1365-2648.2007.04569.x

ENAR (2017). *Racism and Discrimination in Employment in Europe*. Available online at: https://ec.europa.eu/migrant-integration/?action=media.download&uuid=F613A27D-A960-4FB3-FD3AD6A629C8FBE7 [accessed on March 21, 2018]

England, S. (2010). Mixed and multiracial in Trinidad and Honduras: rethinking mixed-race identities in Latin America and the Caribbean. *Ethnic Racial Stud.* 33, 195–213. doi: 10.1080/01419870903040169

European Commission (2019). *2019 Report on equality between women and men in the EU*. Luxembourg: Publications Office of the European Union. doi: 10.2838/395144

European Commission (2021). *Women's Situation in the Labour Market*. Available onlline at: https://ec.europa.eu/info/policies/justice-and-fundamental-rights/gender-equality/women-labour-market-work-life-balance/womens-situation-labour-market_en [accessed on June 3, 2017]

Eurostat (2020). *Women's Employment in the EU*. Available online at: https://ec.europa.eu/eurostat/web/products-eurostat-news/-/EDN-20200306-1#:$\sim$:text=In2019%2C the unemployment rate,Spain to 2.4%25 in Czechia [accessed on March 6, 2020]

Fearfull, A., and Kamenou, N. (2006). How do you account for it?: a critical exploration of career opportunities for and experiences of ethnic minority women. *Crit. Perspect. Account.* 17, 883–901. doi: 10.1016/j.cpa.2005.08.006

Fernandez, R. (2007). *America beyond Black and White*. Ann Arbor, MI: University of Michigan Press, doi: 10.3998/mpub.268662

Fiske, S. T., Cuddy, A. J. C., Glick, P., and Xu, J. (2002). A model of (often mixed) stereotype content: competence and warmth respectively follow from perceived status and competition. *J. Pers. Soc. Psychol.* 82, 878–902. doi: 10.1037/0022-3514.82.6.878

Galinsky, A. D., Hall, E. V., and Cuddy, A. J. C. (2013). Gendered races: implications for interracial marriage, leadership selection, and athletic participation. *Psychol. Sci.* 24, 498–506. doi: 10.1177/0956797612457783

Gause, S. A. (2021). White privilege, Black resilience: women of color leading the academy. *Leadership* 17, 74–80. doi: 10.1177/1742715020977370

Gezici, A., and Ozay, O. (2020). An intersectional analysis of COVID-19 unemployment. *J. Econ. Race Policy* 3, 270–281. doi: 10.1007/s41996-020-00075-w

Ghavami, N., and Peplau, L. A. (2013). An intersectional analysis of gender and ethnic stereotypes: testing three hypotheses. *Psychol. Women Q.* 37, 113–127. doi: 10.1177/0361684312464203

Giscombe, K., and Mattis, M. C. (2002). Leveling the playing field for women of color in corporate management: Is the business case enough? *J. Bus. Ethics* 37, 103–119. doi: 10.1023/A:1014786313354

Golash-Boza, T., and Bonilla-Silva, E. (2013). Rethinking race, racism, identity and ideology in Latin America. *Ethnic Racial Stud.* 36, 1485–1489. doi: 10.1080/01419870.2013.808357

Gopaldas, A., and DeRoy, G. (2015). An intersectional approach to diversity research. *Consumpt. Mark. Cult.* 18, 333–364. doi: 10.1080/10253866.2015.1019872

Gündemir, S., Martin, A. E., and Homan, A. C. (2019). Understanding diversity ideologies from the target's perspective: a review and future directions. *Front. Psychol.* 10:282. doi: 10.3389/fpsyg.2019.00282

Gutiérrez, E. R. (2009). *Fertile Matters: The Politics of Mexican-Origin Women's Reproduction*. Austin, TX: University of Texas Press.

Gvozdanović, J., and Bailey, J. (2020). "Unconscious bias in academia: a threat to meritocracy and what to do about it," in *The Gender-Sensitive University: A Contradiction in Terms?*, eds E. Drew and S. Canavan (Oxfordshire: Taylor & Francis), 208.

Hall, E. V., Hall, A. V., Galinsky, A. D., and Phillips, K. W. (2019). MOSAIC: a model of stereotyping through associated and intersectional categories. *Acad. Manage. Rev.* 44, 643–672. doi: 10.5465/amr.2017.0109

Hamad, R. (2020). *White Tears Brown Scars: How White Feminism Betrays Women of Colour*. Melbourne: Melbourne University Publishing.

Hassan, A. (2018). *Confronting Asian-American Stereotypes*. New York, NY: The New York Times.

Hewlin, P. F. (2003). And the award for best actor goes to: facades of conformity in organizational settings. *Acad. Manage. Rev.* 28, 633–642. doi: 10.5465/amr.2003.10899442

Hewlin, P. F. (2009). Wearing the cloak: antecedents and consequences of creating facades of conformity. *J. Appl. Psychol.* 94, 727–741. doi: 10.1037/a0015228

Hillman, F., Ernst, S., and van Naerssen, T. (2005). "Labdscapes of Asian migrant labour in Europe," in *Asian Migrants and European Labour Markets: Patterns and Processes of Immigrant Labour Market Insertion in Europe*, eds E. Spaan, H. Felicitas, and T. van Naerssen (London: Routledge), 1–20. doi: 10.1057/978-1-137-51742-5_1

Johnson, K. L., Freeman, J. B., and Pauker, K. (2012). Race is gendered: how covarying phenotypes and stereotypes bias sex categorization. *J. Pers. Soc. Psychol.* 102, 116–131. doi: 10.1037/a0025335

Kamenou, N., and Fearfull, A. (2006). Ethnic minority women: a lost voice in HRM. *Hum. Resour. Manage. J.* 16, 154–172. doi: 10.1111/j.1748-8583.2006.00010.x

Keum, B. T., Brady, J. L., Sharma, R., Lu, Y., Kim, Y. H., and Thai, C. J. (2018). Gendered racial microaggressions scale for asian american women: development and initial validation. *J. Couns. Psychol.* 65, 571–585. doi: 10.1037/cou0000305

Kmec, J. A. (2003). Minority job concentration and wages. *Soc. Probl.* 50, 38–59. doi: 10.1525/sp.2003.50.1.38

Koenig, A. M., and Eagly, A. H. (2014). Evidence for the social role theory of stereotype content: observations of groups' roles shape stereotypes. *J. Pers. Soc. Psychol.* 107, 371–392. doi: 10.1037/a0037215

Kohout, J. L., Pate, W. E., and Maton, K. I. (2014). "An updated profile of ethnic minority psychology: a pipeline perspective," in *APA Handbook of Multicultural Psychology: Theory and Research*, Vol. 1, eds F. T. L. Leong, L. Comas-Díaz, G. C. Nagayama Hall, V. C. McLoyd, and J. E. Trimble (Washington, DC: American Psychological Association), 19–42. doi: 10.1037/14189-002

Law, I., and Zakharov, N. (2019). "Race and racism in Eastern Europe: becoming White, becoming Western," in *Relating Worlds of Racism*, eds P. Essed, K. Farquharson, K. Pillay, and E. White (Cham: Springer International Publishing), 113–139. doi: 10.1007/978-3-319-78990-3_5

Leslie, L. (2020). *What Makes a Workplace Diversity Program Successful? Greater Good Magazine*. Available online at: https://greatergood.berkeley.edu/article/item/what_makes_a_workplace_diversity_program_successful#:~{}:text=Diversity initiatives are policies and,disadvantage in the broader society [accessed on January 21, 2020]

Leung, D. W., and Rainone, N. (2018). Where are the women of color in I-O Psychology? *Indus. Organ. Psychol.* 11, 433–439. doi: 10.1017/iop.2018.95

Liang, J. G., and Peters-Hawkins, A. L. (2017). I am more than what I look alike. *Educ. Adm. Q.* 53, 40–69. doi: 10.1177/0013161X16652219

Llorens, A., Tzovara, A., Bellier, L., Bhaya-Grossman, I., Bidet-Caulet, A., Chang, W. K., et al. (2021). Gender bias in academia: a lifetime problem that needs solutions. *Neuron* 109, 2047–2074. doi: 10.1016/j.neuron.2021.06.002

Marafioti, E., and Perretti, F. (2006). International competition in the Academia. *J. Manage. Inq.* 15, 318–326. doi: 10.1177/1056492606291213

Matias, J. N., Lewis, N., and Hope, E. (2021). *Universities Say they Want More Diverse Faculties. So Why is Academia Still so White?*. Available online at: https://fivethirtyeight.com/features/universities-say-they-want-more-diverse-faculties-so-why-is-academia-still-so-white/ [accessed on September 7, 2021]

Mohr, R. I., and Purdie-Vaughns, V. (2015). Diversity within women of color: Why experiences change felt stigma. *Sex Roles* 73, 391–398. doi: 10.1007/s11199-015-0511-z

Moradi, B. (2017). "(Re)focusing intersectionality: from social identities back to systems of oppression and privilege," in *Handbook of Sexual Orientation and Gender Diversity in Counseling and Psychotherapy*, Vol. 4, eds K. A. DeBord, A. R. Fischer, K. J. Bieschke, and R. M. Perez (Washington, DC: American Psychological Association), 105–127. doi: 10.1037/15959-005

Morrison, M. A., Morrison, T. G., Harriman, R. L., and Jewell, L. M. (2008). "Old-fashioned and modern prejudice toward aboriginals in Canada," in *The Psychology of Modern Prejudice*, eds M. A. Morrison and T. G. M. Morrison (Hauppauge: NY: Nova Science Publishers, Inc), 1–29. doi: 10.1353/hpu.2021.0181

Mukkamala, S., and Suyemoto, K. L. (2018). Racialized sexism/sexualized racism: a multimethod study of intersectional experiences of discrimination for Asian American women. *Asian Am. J. Psychol.* 9, 32–46. doi: 10.1037/aap0000104

Muradoglu, M., Horne, Z., Hammond, M. D., Leslie, S.-J., and Cimpian, A. (2021). Women—particularly underrepresented minority women—and early-career academics feel like impostors in fields that value brilliance. *J. Educ. Psychol.* doi: 10.1037/edu0000669

Pe'er, E., Rothschild, D. M., Evernden, Z., Gordon, A., and Damer, E. (2021). MTurk, Prolific or panels? Choosing the right audience for online research. *SSRN Electron. J.* doi: 10.2139/ssrn.3765448

Phillips, K. W., Rothbard, N. P., and Dumas, T. L. (2009). To disclose or not to disclose? Status distance and self-disclosure in diverse environments. *Acad. Manage. Rev.* 34, 710–732. doi: 10.5465/amr.34.4.zok710

Pietraszkiewicz, A., Formanowicz, M., Gustafsson Sendén, M., Boyd, R. L., Sikström, S., and Sczesny, S. (2019). The big two dictionaries: capturing agency and communion in natural language. *Eur. J. Soc. Psychol.* 49, 871–887. doi: 10.1002/ejsp.2561

Pietri, E. S., Hennes, E. P., Dovidio, J. F., Brescoll, V. L., Bailey, A. H., Moss-Racusin, C. A., et al. (2019). Addressing unintended consequences of gender diversity interventions on women's sense of belonging in STEM. *Sex Roles* 80, 527–547. doi: 10.1007/s11199-018-0952-2

Plaut, V. C., Thomas, K. M., Hurd, K., and Romano, C. A. (2018). Do color blindness and multiculturalism remedy or foster discrimination and racism? *Curr. Direct. Psychol. Sci.* 27, 200–206. doi: 10.1177/0963721418766068

Pronin, E., Lin, D. Y., and Ross, L. (2002). The bias blind spot: perceptions of bias in self versus others. *Pers. Soc. Psychol. Bull.* 28, 369–381. doi: 10.1177/0146167202286008

Purdie-Vaughns, V., and Eibach, R. P. (2008). Intersectional invisibility: the distinctive advantages and disadvantages of multiple subordinate-group identities. *Sex Roles* 59, 377–391. doi: 10.1007/s11199-008-9424-4

Ramakrishnan, K., Wong, J., Lee, J., and Lee, T. (2017). *2016 Post-Election National Asian American Survey*. Available online at: https://naasurvey.com/wp-content/uploads/2017/05/NAAS16-post-election-report.pdf [accessed on May 16, 2017]

Remedios, J. D., and Snyder, S. H. (2015). Where do we go from here? Toward an inclusive and intersectional literature of multiple stigmatization. *Sex Roles* 73, 408–413. doi: 10.1007/s11199-015-0543-4

Reyes, M.-E. (2011). Unique challenges for women of color in STEM transferring from community colleges to universities. *Harv. Educ. Rev.* 81, 241–263. doi: 10.17763/haer.81.2.324m5t1535026g76

Richardson, J. (2009). Geographic flexibility in academia: a cautionary note. *Br. J. Manage.* 20, S160–S170. doi: 10.1111/j.1467-8551.2008.00641.x

Roberts, S. O., Bareket-Shavit, C., Dollins, F. A., Goldie, P. D., and Mortenson, E. (2020). Racial inequality in psychological research: trends of the past and recommendations for the future. *Perspect. Psychol. Sci.* 15, 1295–1309. doi: 10.1177/1745691620927709

Rosenthal, L., and Lobel, M. (2016). Stereotypes of Black American women related to sexuality and motherhood. *Psychol. Women Q.* 40, 414–427. doi: 10.1177/0361684315627459

Rose-Redwood, R., Alderman, D., and Azaryahu, M. (eds). (2017). *The Political Life of Urban Streetscapes*. London: Routledge. doi: 10.4324/9781315554464

Rosette, A. S., Koval, C. Z., Ma, A., and Livingston, R. (2016). Race matters for women leaders: intersectional effects on agentic deficiencies and penalties. *Leadersh. Q.* 27, 429–445. doi: 10.1016/j.leaqua.2016.01.008

Rosette, A. S., Ponce, de Leon, R., Koval, C. Z., and Harrison, D. A. (2018). Intersectionality: connecting experiences of gender with race at work. *Res. Organ. Behav.* 38, 1–22. doi: 10.1016/j.riob.2018.12.002

Ryan, C. S., Hunt, J. S., Weible, J. A., Peterson, C. R., and Casas, J. F. (2007). Multicultural and colorblind ideology, stereotypes, and ethnocentrism among Black and White Americans. *Group Process. Intergr. Relat.* 10, 617–637. doi: 10.1177/1368430207084105

Schug, J., Alt, N. P., and Klauer, K. C. (2015). Gendered race prototypes: evidence for the non-prototypicality of Asian men and Black women. *J. Exp. Soc. Psychol.* 56, 121–125. doi: 10.1016/j.jesp.2014.09.012

Sesko, A. K., and Biernat, M. (2010). Prototypes of race and gender: the invisibility of Black women. *J. Exp. Soc. Psychol.* 46, 356–360. doi: 10.1016/j.jesp.2009.10.016

Shortland, S. (2011). Networking: a valuable career intervention for women expatriates? *Career Dev. Int.* 16, 271–292. doi: 10.1108/13620431111140165

Simons, M. A. (1979). Racism and feminism: a schism in the sisterhood. *Femin. Stud.* 5, 384–401. doi: 10.2307/3177603

Singh, V., Vinnicombe, S., and James, K. (2006). Constructing a professional identity: how young female managers use role models. *Women Manage. Rev.* 21, 67–81. doi: 10.1108/09649420610643420

Spalter-Roth, R., and William, E. (2007). *Race and Ethnicity in the Sociology Pipeline*. (Washington, DC: ASA)

Stragà, M., Piccoli, V., Coladonato, R., Zotti, D., Bianchi, M., and Carnaghi, A. (2020). Race can be sexually oriented: the intersection between Asian/Black and heterosexual/homosexual categories. *Psicol. Soc.* 15, 15–31.

Strauβ, A., and Boncori, I. (2020). Foreign women in academia: double-strangers between productivity, marginalization and resistance. *Gender Work Org.* 27, 1004–1019. doi: 10.1111/gwao.12432

Talent naar de Top (2020). *Over Talent naar de Top*. Talent Naar de Top. Available online at: https://talentnaardetop.nl/index.php/over-talent-naar-de-top

Teranishi, R. T. (2010). *Asians in the Ivory Tower: Dilemmas of Racial Inequality in American Higher Education. Multicultural Education Series*. New York, NY: Teachers College Press.

Thomas, E. L., Dovidio, J. F., and West, T. V. (2014). Lost in the categorical shuffle: evidence for the social non-prototypicality of Black women. *Cult. Div. Ethnic Minor. Psychol.* 20, 370–376. doi: 10.1037/a0035096

Thomas, G., and Hollenshead, C. (2001). Resisting from the margins: the coping strategies of Black women and other women of color faculty members at a research university. *J. Negro Educ.* 70, 166–175. doi: 10.2307/3211208

Toosi, N. R., Mor, S., Semnani-Azad, Z., Phillips, K. W., and Amanatullah, E. T. (2019). Who can lean in? The intersecting role of race and gender in negotiations. *Psychol. Women Q.* 43, 7–21. doi: 10.1177/0361684318800492

Wang, Q., and Jeon, H. J. (2020). Bias in bias recognition: people view others but not themselves as biased by preexisting beliefs and social stigmas. *PLoS One* 15:e0240232. doi: 10.1371/journal.pone.0240232

Weber, K. (2005). A toolkit for analyzing corporate cultural toolkits. *Poetics* 33, 227–252. doi: 10.1016/j.poetic.2005.09.011

Williams, J., and Dempsey, R. (2014). *What Works for Women at Work*. New York, NY: New York University Press doi: 10.18574/9781479814688

Williams, J. C., Phillips, K., and Hall, E. V. (2016). Tools for change: boosting the retention of women in the STEM pipeline. *J. Res. Gender Stud.* 6:11. doi: 10.22381/JRGS6120161

Wilton, L. S., Sanchez, D. T., Aiello, J. R., Wilder, D., and Unzueta, M. M. (2015). *Diversity Stigma and Credits*. Ph.D. thesis. Rutgers: The State University of New Jersey. doi: 10.7282/T3T72K9S

Wolsko, C., Park, B., and Judd, C. M. (2006). Considering the tower of Babel: correlates of assimilation and multiculturalism among ethnic minority and majority groups in the United States. *Soc. Just. Res.* 19, 277–306. doi: 10.1007/s11211-006-0014-8

Wong, Y. J., and McCullough, K. M. (2021). The intersectional prototypicality model: understanding the discriminatory experiences of Asian American women and men. *Asian Am. J. Psychol.* 12, 87–99. doi: 10.1037/aap0000208

Zou, L. X., and Cheryan, S. (2017). Two axes of subordination: a new model of racial position. *J. Pers. Soc. Psychol.* 112, 696–717. doi: 10.1037/pspa0000080

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REVIEW
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U.S. Women Faculty in the Social Sciences Also Face Gender Inequalities

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There is a national interest in United States women's underrepresentation in science, technology, engineering, and mathematics (STEM); however, gender inequality in the social sciences has not received similar attention. Although women increasingly earn postgraduate degrees in the social sciences, women faculty still experience gender inequities. Consistent gender inequities include slower career advancement, blunted salaries, unequal workloads, work-life conflict, systemic gender biases, underrepresentation in positions of power, and hostile work environments. Cultural biases suggest that once women have achieved parity, gender bias no longer exists. This review challenges that notion by providing evidence from social science domains in which women are well-represented but continue to face systemic gender biases. We examine cultural influences on gender representation and career advancement in psychology, economics, political science, sociology, and anthropology. We make interdisciplinary comparisons of career trajectories and salaries using national data, documenting patterns across the social sciences. For example, women economists face gendered standards in publishing, and women political scientists are less likely to have their work cited than men. Furthermore, data show that salaries become stagnant as the representation of women in these fields increases. These disparities reflect cultural biases in perceptions of women's competence stemming from social role theory. We discuss best practices to address these problems, focusing on the ADVANCE organizational change programs funded by the National Science Foundation that target (a) improving academic climate, (b) providing professional development, and (c) fostering social networking. Federally supported interventions can reveal systemic gender biases in academia and reduce gender disparities for women academics in the social sciences.

Keywords: women faculty, gender bias, interventions—psychosocial/behavioral, social role theory, gender disparities in social sciences

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INTRODUCTION

There is a national interest in United States women's underrepresentation and career advancement in the academic fields of science, technology, engineering, and mathematics (STEM); however, gender inequality in the social sciences has not received similar attention. While the number of women earning postgraduate degrees in the social sciences continues to increase, women

faculty still experience gender inequities. Persistent gender inequities include slower careeradvancement, blunted salaries, unequal workloads, work–life conflict, systemic gender biases, underrepresentation in positions of power, and hostile work environments (Gruber et al., 2020). Cultural biases suggest that once women have achieved parity or are well-represented in an academic domain, gender bias no longer exists (Begeny et al., 2020). This review challenges that notion by providing evidence from social science domains in which women are well-represented but continue to face systemic gender biases (see Van Veelen and Derks, 2022). For example, women doctoral-level social scientists average $14,000 less than men regardless of academic rank (National Center for Science and Engineering Statistics [NCSES], 2021b).

This review examines United States cultural influences on gender representation and career advancement in psychology, economics, political science, sociology, and anthropology. For example, women economists face gendered standards in publishing, and women political scientists are less likely to have their work cited than their male peers (Maliniak et al., 2013). These disparities reflect cultural biases in perceptions of women's competence stemming from social role theory (Eagly and Steffen, 1984). We make interdisciplinary comparisons of prestige and salaries using national data, documenting commonalities and differences across five social sciences.

We discuss best practices from effective interventions to address these problems, focusing on the ADVANCE organizational change programs funded by the National Science Foundation (NSF) that target (a) improving academic climate, (b) providing professional development, and (c) fostering social networking. Federally supported interventions implemented across the United States can reveal systemic gender biases in academia and enact solutions to reduce gender disparities for women academics in the social sciences.

SOCIAL ROLE AND ROLE CONGRUITY THEORETICAL FRAMEWORKS

Even though women are typically well-represented among students and faculty in the social sciences, gender disparities persist (Gruber et al., 2020), which reflect long-standing cultural biases. Social role theory (Eagly and Steffen, 1984) is a helpful framework to understand the historical and continued gender disparities women face in academic careers. Historically, women did not have public education because their proper role in United States society was to be domestic caretakers. This role did not require formal education in the humanities and sciences (Welch and Ruelas, 2015). Later, when women obtained public education, they were limited to pursuing specific careers that fit feminine gender role expectations of caretaking (e.g., caring, nurturing), including secretaries, nurses, and early childhood education. According to role congruity theory (Eagly and Karau, 2002), women should fill normative social roles, including employment, compatible with the characteristics appropriate for women, such as prescriptive stereotypes to be warm, nurturing, and harmonious (Prentice and Carranza, 2002). Initially, women were not allowed to be schoolteachers. This intelligence domain was a masculine domain; only men had the competence and status to lead the future generation in intellectual pursuits. Over time, women became well represented among schoolteachers, and teaching became a primary profession for women due to the vital role of caring for young children and facilitating their intellectual and social development. During the "Republican Motherhood" (Kerber, 1976), women were put on a pedestal for their superior moral character and tasked with preparing the future generation of young republican boys to become workers, fathers, and heads of households.

Despite women's dominance in youth education, the teaching profession was primarily a caretaking role rather than an intellectual pursuit. In contrast, men have historically dominated the professoriate. The highest levels of education were reserved for men as an advanced education was only necessary for individuals who were intellectually fit for such pursuits and those who engaged in paid employment and supported families.

The history of gendered social roles continues to influence women faculty's experiences in academia. Although women have achieved significant advances, disparities persist, reflecting implicit biases. These implicit biases include perceptions of women as less competent than men, that women's social roles should focus on nurturing, and that men should be awarded the appropriate status and prestige for their dominance in intellectual pursuits, e.g., in the form of salary and rank.

FOCUS, METHODOLOGY, AND DATA SOURCES

Throughout this review, we provide evidence from five social science fields (psychology, economics, political science, sociology, anthropology) that cultural biases around gender role expectations may subtly maintain gender disparities in academia. These cultural biases affect women's degree attainment, faculty ranks, salaries, time to tenure, leadership, authorship, publications, citations, conferences, networking, and grant funding.

Focus

This review discusses trends and data from the United States. Although there is international interest in gender disparities in STEM and the social and behavioral sciences (e.g., the European Union's Athena Swan Charter), the authors are most familiar with and work within the United States context. This review treats gender as a binary of cisgender women and men. National data sources (e.g., NSF) do not yet specify data for non-binary persons or other gender identities; therefore, our review reflects this cultural bias. Further, we acknowledge that women are not a monolithic group, and women's experiences differ based on intersectional identities, including race, ethnicity, sexual orientation, age, and social class (Gruber et al., 2020). Women faculty from racially minoritized groups are less represented in academic domains than European American women and likely experience multiple disparities (Judson and Ross, 2021; Miles et al., 2021). Our review focuses on broad, cultural-level gendered

patterns in academia, allowing for interdisciplinary comparisons. Our focus solely on gender is a limitation of the data. It reflects inadequacies in national datasets in delimiting data by subgroups (e.g., gender by race), which often have low sample sizes (Gruber et al., 2020). Our broad focus limits generalizability to women with intersectional identities (see Fox Tree and Vaid, 2022; Morimoto, 2022; Wong et al., 2022).

Methodology

We selected the five social science disciplines of psychology, economics, political science, sociology, and anthropology due to their popularity (i.e., undergraduate enrollment) and greater representation among academic programs. These five fields are the most popular social science fields in terms of undergraduate degree attainment (Georgetown University, 2020), which often dictates the number of faculty in an academic department. However, most quantitative research studies on gender disparities in the social sciences focus on psychology, economics, and political science; thus, our examples come primarily from these fields. Much of the research on academic gender disparities in sociology and anthropology were case studies or qualitative, which we excluded. We exclude many other social sciences, but for comparative purposes, we provide data from the social sciences overall, which NSF defines (National Center for Science and Engineering Statistics [NCSES], 2017) to include the fields reviewed here and area and ethnic studies, history of science, linguistics, and others. By providing data from the social sciences as a broad category, we can evaluate how specific social science fields (e.g., sociology) compared to others, mainly whether patterns are similar or different as the representation of women varies across each discipline. Gender disparities exist in other fields, such as the humanities (e.g., philosophy); however, we excluded them to narrow the focus of the review.

Data Sources

We used the most recent publicly available data sets that provide degree attainment by gender and field, median salaries, and representation within academic ranks. The data sources come from national government agencies (e.g., NSF) and professional disciplinary organizations (e.g., American Political Science Association [APSA], American Psychological Association [APA]). We also drew upon relevant scholarly literature reporting trends and patterns in academic gender disparities (e.g., Gruber et al., 2020; Casad et al., 2021).

WOMEN'S REPRESENTATION, ACADEMIC RANK, AND SALARY IN THE SOCIAL SCIENCES

Women are well-represented in social science degree programs at all levels, accounting for 55.2% of baccalaureate, 57% of master's, and 50.6% of doctoral degrees awarded (National Center for Science and Engineering Statistics [NCSES], 2019). We can compare representation within specific social science fields to the overall representation of women earning baccalaureate degrees in any field, which remains around 57% (National Center for Science and Engineering Statistics [NCSES], 2019). However, gender representation within specific social science fields varies, with women more highly represented in psychology, anthropology, and sociology but less represented in political science and economics (see **Table 1**). Research suggests gender representation within specific fields reflects how the domain promotes masculine cultural norms (Cheryan et al., 2017), consistent with a social role and role congruity framework.

Gendered Patterns

In psychology, women outnumber men in degrees awarded at all levels (National Center for Science and Engineering Statistics [NCSES], 2019). However, these statistics obscure women's lower representation in subfields of psychology, including cognitive neuroscience, cognitive psychology, experimental psychology, and neuropsychology (Hilsabeck and Martin, 2010; Vaid and Geraci, 2016; Odic and Wojcik, 2020; Fulvio et al., 2021). For example, compared to earning 73.7% of doctorates in psychology overall, women were awarded 53% of doctorates in cognitive neuroscience, 58.5% of doctorates in cognitive psychology and psycholinguistics, and 59.9% of doctorates in experimental psychology (National Center for Science and Engineering Statistics [NCSES], 2019). These statistics compare to women's higher representation in other subfields, including 84.8% of doctorates in school psychology, 81.5% of doctorates in behavioral analysis, 86.4% of doctorates in development and child psychology, and 75.6% of doctorates in clinical psychology (National Center for Science and Engineering Statistics [NCSES], 2019).

Similar patterns to psychology emerge for women's degree attainment in anthropology and sociology, which are higher than the social sciences overall but lower than their related social science discipline, psychology. In addition, women's

TABLE 1 | Gender representation in social science degree programs.

		Baccalaureate degrees awarded (%)	Master's degrees awarded (%)	Doctoral degrees awarded (%)
Social Sciences	Men	44.8	43.0	49.4
	Women	55.2	57.0	50.6
Psychology	Men	21.1	19.8	26.3
	Women	78.9	80.2	73.7
Anthropology	Men	27.1	29.1	33.0
	Women	72.9	70.9	67.0
Sociology	Men	28.4	35.9	36.6
	Women	71.6	64.1	63.4
Political Science/Public Administration[a]	Men	45.1	43.1	52.0
	Women	54.9	56.9	48.0
Economics	Men	67.9	58.6	67.8
	Women	32.1	41.4	32.2

Fields are listed from general social sciences to specific fields and most to least representation of women. Sources: National Center for Science and Engineering Statistics [NCSES] (2019), Argyle and Mendelberg (2020).
[a]NSF combines these subfields.

representation declines at the master's and doctoral levels in anthropology and sociology.

Different patterns emerge in economics and political science, where women have lower overall representation than in psychology, anthropology, and sociology. Within economics, women's representation is imbalanced across specialty areas. For example, women are scarce in general economics and finance and more abundant in labor and other applied microeconomic fields (Lundberg and Stearns, 2019). Although women trend toward equal or greater representation than men in political science at the baccalaureate (54.9%) and master's (56.9%) levels, there is a lower representation at the doctoral level (48%); however, the inclusion of Public Administration in the National Center for Science and Engineering Statistics data may obscure gender representation.

Theoretical Applications

Variation in women's representation across education ranks and within specialty areas of psychology, economics, political science, anthropology, and sociology reflect gender role socialization. Women may gravitate toward subfields like developmental, school, and clinical psychology that meet communal goal affordances (Diekman et al., 2010), e.g., concerns for others' welfare. Fields perceived as more agentic and prestigious have a lower representation of women, such as cognitive neuroscience, experimental psychology, sports sociology, and biological anthropology (Antón et al., 2018). Careers in anthropology and sociology, like psychology, involve the study of people, cultures, and societies and thus likely fill many women's communal career goals (Diekman et al., 2010). People perceive economics as a profession that meets agentic career goals (Diekman et al., 2010). Given its focus on mathematics, many women may shy away from economics due to math-related stereotype threats, gender role socialization, and low math self-efficacy (Ceci et al., 2014; Cheryan et al., 2017). For political science, lower representation at the doctoral level is related to gender role socialization and stereotypes that politics and governmental power fall within the masculine domain (Mo, 2015).

FACULTY RANK AND THE PATH TO TENURE

Although women's representation among degree earners in the social sciences has increased, their education does not directly translate into representation among the faculty ranks.

Gendered Patterns

Except for economics and political science, there are more women in the lower faculty ranks than men, including Instructor/Lecturer and Assistant Professors, and less represented among Associate and Full Professors (see **Table 2**; Finder, 2007; Dellinger et al., 2009; Jaschik, 2009; American Political Science Association [APSA], 2011; Ginsberg, 2016; National Center for Science and Engineering Statistics [NCSES], 2017). Women hold most untenured instructor and lecturer positions in psychology, anthropology, and sociology (Finder, 2007; Jaschik, 2009; National Center for Science and Engineering Statistics [NCSES], 2017). Women's representation in economics has stalled, with little to no progress in the past several decades, reflecting the lowest representation of women faculty, alongside physics, math, engineering, and far below biology and many other social science fields (Lundberg and Stearns, 2019).

Even though women are numerically well-represented in the social sciences, gender disparities in time to tenure persist. In sociology, women are 29% less likely to achieve tenure than men and take longer to do so (men 6.6 years, women 7.2 years; Weisshaar, 2017). In a national study of 95 sociology departments assessing 475 randomly selected assistant professors in sociology, 78% of women received tenure compared to 85% of men (Weisshaar, 2017). After controlling for research productivity (e.g., publications and NSF grants), departmental characteristics, time in rank, and contextual factors, 40–45% of the variance in promotion and tenure remained unexplained, reflecting a gender bias in tenure evaluations (Weisshaar, 2017). In economics, 68% of men earn tenure within 10 years of earning their Ph.D. compared to 47% of women (Lundberg and Stearns, 2019). Women also take longer to earn tenure in political science and are less likely than men to be tenured at a research institution 10 years after earning their Ph.D. (American Political Science Association [APSA], 2004; Hesli et al., 2012).

The more male-dominated social sciences, specifically economics and political science, have attrition starting at the tenure stage. Although women make up 32% of doctoral recipients in economics (National Center for Science and Engineering Statistics [NCSES], 2020), women comprise only 15% of Full professors (National Center for Science and Engineering Statistics [NCSES], 2017). In addition, academia has the lowest representation of women economists in senior positions (Women in Economics Initiative, 2020). Political science also shows a loss of women at higher ranks, despite equitable representation at the baccalaureate and master's levels (De Brey et al., 2021).

Reasons for Gender Gaps in Faculty Rank and Time to Tenure

Research offers several explanations for gender disparities in rank and time to tenure. First, women are less likely to be promoted in fields in which they are overrepresented (Ceci et al., 2014), such as psychology, sociology, and anthropology. Women's overrepresentation, albeit in lower ranks, may be interpreted by senior faculty and administrators as gender parity, and they may not see a need for intervention (Begeny et al., 2020). Secondly, women may hold themselves to higher standards for promotion than men and, therefore, may not seek promotion or delay consideration for promotion (Gruber et al., 2020). Previous research supports the tendency for women to hold themselves to higher standards, such as research on the shifting standards model (Biernat et al., 1997) or undervaluing their worth in pay allocations (O'Brien et al., 2012). It may also be that men overvalue their worth (Niederle et al., 2013; Niederle and Vesterlund, 2007; O'Brien et al., 2012). Finally, research on gender differences in competitiveness and risk aversion found that women were less likely to apply for a competitive

tournament. However, when women did enter the competition, they were equally successful as men in a math-based challenge (Niederle et al., 2013; Niederle and Vesterlund, 2007).

Although research indicates that qualified women and men are equally likely to be hired in psychology tenure track positions (American Psychological Association [APA], 2017), this is not the case in economics (Steinpreis et al., 1999). Women economists report facing barriers that negatively affect their productivity and probability of promotion, which can reduce expectations of future success and impede research activity and publication outcomes (Lundberg and Stearns, 2019). Both popular media and scholarly sources note that economics is perceived to have a "dismal" climate for women, with "rampant" overt sexism and sexual harassment (Smith, 2014; Casselman and Tankersley, 2019; Wu, 2020). Further, letters of recommendation supporting job candidates' applications for academic positions report different adjectives (e.g., agentic, communal) to describe men and women. The characteristics used to describe women are viewed more negatively in hiring decisions (Schmader et al., 2007; Madera et al., 2009). However, recent research indicates that letters for women faculty in psychology and sociology do not reflect gender differences compared to letters in physics and that letters in these social sciences favor women (Bernstein et al., 2022).

Another contribution to gender disparities in rank and time to tenure is the differential impact of parental leave. Women are more likely to take parental leave than men (Zagorsky, 2017), and research indicates that men's productivity can benefit from parental leave (Antecol et al., 2018). Women in psychology without children and a partner are 8.7% more likely to receive tenure 6 years after earning their Ph.D. than men without children and a partner, providing evidence for the motherhood penalty (American Psychological Association [APA], 2017). Women faculty working toward tenure while having family responsibilities must contend with institutional policies that may hinder progress to tenure and promotion, such as flexibility regarding parental leave, stopping the tenure clock, and family-care reimbursement (Ginther, 2004). Such policies contribute to an academic climate in which women perceive they are devalued compared to men (Ginther, 2004).

Theoretical Applications

The gender disparities in faculty rank and time to tenure reflect gender role socialization and implicit biases consistent with role congruity theory (Eagly and Karau, 2002). Women may be less represented in positions of power, that is, tenured Associate and Full Professor positions, due to implicit biases in hiring and promotion practices (Moss-Racusin et al., 2012; Devine et al., 2017; Gruber et al., 2020). Stereotypes of women as less competent than men persist and may leak into candidates' letters of recommendation (Schmader et al., 2007; Madera et al., 2009), thus further biasing hiring and promotion. Women with children and partners seem to pay a "motherhood penalty" compared to men (Ginther, 2004; American Psychological Association [APA], 2017). Women are expected to fulfill communal roles, such as motherhood, whereas men are expected to be career oriented. Prescriptive gender stereotypes still influence the judgments of career women (Ginther, 2004; Rudman et al., 2012).

TABLE 2 | Gender representation among social science faculty positions by rank.

Social sciences	Instructor or lecturer (%)	Assistant professor (%)	Associate professor (%)	Full professor (%)
Men	49.5	54.5	54.6	70.6
Women	50.5	45.5	45.4	29.4
Psychology				
Men	31.1	34.2	44.2	54.0
Women	68.9	65.8	55.8	45.5
Anthropology[a]				
Men	33	51[a]	66	79
Women	67	49[a]	34	21
Sociology, demography, and population studies[b]				
Men	42.9	41.9	36.5	57.3
Women	57.1	58.1	63.5	42.7
Political science and government[b]				
Men	50.0	64.9	59.1	78.7
Women	50.0	35.1	40.9	21.3
Economics				
Men	66.7	61.4	71.0	84.9
Women	33.3	38.6	29.0	15.1

Fields are listed from general social sciences to specific fields and most to least representation of women. All anthropology data come from Ginsberg (2016), Winking et al. (2019), and Burton et al. (2020), except for data on Assistant Professors, which reflects NSF data on Other Social Sciences; National Center for Science and Engineering Statistics [NCSES] (2017).

[a]NSF does not separately classify anthropology but includes it in Other social sciences.

[b]NSF combines these subfields.

Finally, gender role socialization and self-stereotyping play a role in women's differential standards and perceptions of pay entitlement (Biernat et al., 1997; Laurin et al., 2011; Niederle et al., 2013; Niederle and Vesterlund, 2007; O'Brien et al., 2012), which reflect socialization to gender congruent roles.

FINANCIAL COMPENSATION

Data show salaries become stagnant as the representation of women in the social sciences increases, and career prestige similarly declines (e.g., American Psychological Association [APA], 2017). Gender gaps in salary remain despite equal rank, education, and experience, even in women-dominated social science fields (see **Table 3**). Despite equitable gender representation in degrees awarded in the social sciences, there are gender disparities in median annual salary across all types of employment. In 2019, women with a doctorate in any social science field earned a median annual salary of $92,000 compared to $110,000 for men (National Center for Science and Engineering Statistics [NCSES], 2021b). The gender gap in salaries across industries in the social sciences extends to academia. In all faculty ranks except for Instructors and Lecturers, men in the social sciences earn higher salaries than women, with the most significant gap (14k) at the Full Professor rank (National Center for Science and Engineering Statistics [NCSES], 2021a).

TABLE 3 | Social science faculty salaries by gender and rank.

Social sciences	Instructor or lecturer	Assistant professor	Associate professor	Full professor
Men	59,000	80,000	90,000	129,000
Women	62,000	77,000	87,000	115,000
Psychology				
Men	60,000	77,000	89,000[b]	129,000
Women	65,000	75,000	89,000[b]	119,000
Anthropology				
Men	58,000	70,000	86,000	115,000
Women	61,000	73,000	84,000	107,000
Sociology, demography, and population studies[a]				
Men	52,000	75,000	83,000	129,000
Women	55,000	74,000	82,000	121,000
Political science and government[a]				
Men	64,000	74,000	82,000	122,000
Women	71,000	76,000	87,000	114,000
Economics				
Men	85,000	109,000[b]	109,000[b]	152,000
Women	76,000	96,000	103,000	129,000

Fields are listed from general social sciences to specific fields and most to least representation of women. 2019 median salary (National Center for Science and Engineering Statistics [NCSES], 2021b). We do not assume men in Economics promoted from Assistant to Associate do not receive a raise. The values reflect the median rather than the mean and have different standard errors.

[a]*NSF combines these subfields.*

[b]*Although the medians are equal, the standard errors differ (Psychology men 2k, women 2.5k; Economics Assistant 8k, Associate 5k).*

Gendered Patterns

With the highest number of women faculty, disciplines such as psychology also have the greatest gender pay gaps (American Psychological Association [APA], 2017). Salary data from 2019 indicate that the median salary for men in psychology ($100,000) was higher than for women in psychology ($88,000; American Psychological Association [APA], 2019). Men earn more than women at all tenured/tenure-track psychology faculty ranks, with the greatest gap (10k) at the Full Professor level (National Center for Science and Engineering Statistics [NCSES], 2021b). In anthropology, women earn more than men at the lower ranks of Instructor/Lecturer ($61,000 vs. $58,000) and Assistant Professor ($73,000 vs. $70,000). However, at the higher ranks of Associate ($84,000 vs. $86,000) and Full ($107,000 vs. $115,000), men outearn women, with the greatest gap at the Full rank (8k; National Center for Science and Engineering Statistics [NCSES], 2021b). In sociology, women earn more than men ($55,000 to $52,000) only at the Instructor/Lecturer rank, and the gap widens in favor of men at the tenured/tenure-track ranks, with the greatest gap (8k) at the highest rank (National Center for Science and Engineering Statistics [NCSES], 2021b). In contrast to economics, women in political science have a lower salary gap, and at all but the Full Professor rank, outearn men (National Center for Science and Engineering Statistics [NCSES], 2021b; see **Table 3**). Regardless of academic rank, men earned more than women in economics, earning a median base annual salary of $123,000, whereas women earned $104,000 (National Center for Science and Engineering Statistics [NCSES], 2021b). In all fields except economics, women make more than men in the non-tenure-track ranks of Instructor or Lecturer.

Theoretical Applications

Salaries become stagnant as the representation of women in the social sciences increases, and career prestige similarly declines (e.g., American Psychological Association [APA], 2017). More specifically, women's salaries languish, but men's do not, creating gender gaps in salary despite equal rank, education, and experience. Except for economics, the only rank in which women consistently earn more is the non-tenured instructor or lecturer positions. As a result, women are overrepresented in positions that provide the least power within the university. Significant systemic gender biases contribute to these disparities, such as devaluing women's work (Ginther, 2004) and assuming men are the primary breadwinners in the home and therefore need higher salaries (Eagly and Karau, 2002). There also may be influences of perceived competence on salary related to scientific fields relying heavily on math and data analytic skills (e.g., economics). Stereotypes of women's inferior abilities in math and science domains linger, and assumptions of men's natural quantitative abilities may contribute to unequal pay in science domains (Ceci and Williams, 2007).

In addition to ongoing systemic bias, issues at the individual level persist due to gender role socialization. Women may undervalue their worth (O'Brien et al., 2012), whereas men may overvalue their worth (Niederle et al., 2013; Niederle and Vesterlund, 2007; O'Brien et al., 2012). This self-assessment bias (Correll, 2004) permeates the negotiating process. According to some research, women "just don't ask" (Babcock and Laschever, 2003; Amanatullah and Morris, 2010). However, other research shows no gender differences in hiring salary negotiation practices (Crothers et al., 2010). Research shows differences in opening negotiations for promotion and related salary increases, with men initiating more than women, but these differences are slight and are moderated by situational ambiguity (Kugler et al., 2018).

Regardless of the causes of gender gaps in salaries, the gaps need attention to make progress toward gender equality. Legislation such as the Equal Pay Act (United States Department of Labor, 2021) can federally mandate equal pay for equal work in academia.

BARRIERS TO WOMEN'S REPRESENTATION AND CAREER SUCCESS IN THE SOCIAL SCIENCES

Thus far, this manuscript has reviewed gender dominance, equity, and disparities in degree attainment, faculty ranks and the path to tenure, and salary in the social sciences. In addition to these critical areas of the education and academic pipelines, other barriers exist in various forms and stages of academic careers that hinder women's career progression. Next, we address gender disparities in women's academic experiences in leadership, authorship, publications, citations, social networks, and grant funding.

LEADERSHIP

Within academia, women are underrepresented in leadership positions in the social sciences (Ceci et al., 2014; Gruber et al., 2020), such as Department Chair, Dean, Provost, President, and Chancellor. Women also are underrepresented in professional organization memberships (Gruber et al., 2020) and prestigious influential positions that guide the direction of the social science fields, such as journal editors and elected leaders in professional societies (Goodwin, 2005; Vaid and Geraci, 2016; American Psychological Association [APA], 2017).

Gendered Patterns

Women are underrepresented in leadership positions in psychology departments and other areas of academic administration (American Psychological Association [APA], 2017). Despite outnumbering men in APA membership, women hold only 18% of APA editorships (American Psychological Association [APA], 2017). In 2013, the number of women editors in psychology journals dropped by 18%, putting the numbers on par with the number of women editors in 1995 (American Psychological Association [APA], 2017). Women in editorial positions in cognitive psychology and cognitive neuroscience subfields have seen less drop because there was never a rise. An analysis of ten leading journals that primarily focus on publishing topics from cognitive psychology indicates that 100% of the editors in chief were men, and men represented over 50% of the other editorial positions (Vaid and Geraci, 2016). After expanding the number of journals examined to include 60 cognitive psychology journals, researchers found that 80% of the editors and 70% of the associate editors were men (Vaid and Geraci, 2016). Women also are underrepresented as members and in leadership positions in some of the experimental and cognitive societies. For example, women made up about 15% of the Society of Experimental Psychology (Goodwin, 2005).

Women economics faculty report facing many challenges in pursuing tenure track positions. Combined with family responsibilities, they often are discouraged from pursuing leadership roles, particularly since they are already underrepresented among the tenure-track faculty (Ginther, 2004). Additionally, the university climate may discourage women in economics from pursuing more prestigious roles as women faculty report feeling devalued and experiencing sexism in the workplace (Ginther, 2004). Furthermore, women in economics receive less recognition and awards than men (Lundberg and Stearns, 2019), which may negatively impact their evaluation for leadership positions.

Theoretical Applications

Research on leadership reports that women's experience with the double bind of family responsibilities and working toward tenure and promotion creates hardships and perpetuates stereotypes (American Political Science Association [APSA], 2004). Consistent with role congruity theory, traits associated with leaders are not associated with motherhood (Hoyt and Simon, 2017). Additionally, systemic biases such as gender norms and stereotypes can put ambitious women in a double bind (Dittmar, 2015). Gender stereotypes regarding the traits necessary for leadership may put women, particularly mothers, at a disadvantage for prestigious leadership positions in political science and social sciences (Prentice and Carranza, 2002; Brescoll et al., 2018). Additionally, while outright hostility has decreased over time, researchers have found more resistance toward women Presidents (Streb et al., 2008), representing a considerable stigma associated with women in leadership roles.

Several studies show that when women express gender-specific stereotypes, it can reduce their support in leadership positions (Bauer, 2015; Mo, 2015). Furthermore, research indicates that women need to be more qualified to succeed in politics, whereas men often are accepted on potential (Mo, 2015). This disparity indicates that women are held to a higher standard than their male counterparts.

PUBLICATIONS, AUTHORSHIP, AND CITATIONS

A critical part of earning tenure and promotion is publishing and being cited by other researchers (Ghiasi et al., 2016; Mershon and Walsh, 2016). Unfortunately, women authors are underrepresented in top-tier journals within the social sciences (Gruber et al., 2020).

Gendered Patterns

Although most academic sociologists are women, authorship does not reflect the representation of women (Weisshaar, 2017). For example, the number of women authors in the top sociology journals (*American Journal of Sociology*, *American Sociological Review*, and *Social Forces*) is disproportionately smaller compared to the number of men authors, as is the total number of women's publications overall (Weisshaar, 2017; Lynn et al., 2019). In addition, women in the most prestigious sociology journals are less likely to be co-authors than men (Grant and Ward, 1991; Belgacem and Lamari, 2012).

Authorship positions reflect similar gender disparities. Senior, or last authorship, shows significant gender disparities, with women constituting 53.56% of last authors in developmental, 40.54% in clinical, and 34.48% in cognitive psychology (National Science Foundation [NSF], 2017). However, Odic and Wojcik (2020) found that the rates of women last authors in developmental, health, and clinical psychology have shown steady improvement. Women in political science are disproportionately less likely to be included in teams of co-authors (Teele and Thelen, 2017) and to be invited to contribute to edited volumes (Mathews and Andersen, 2001).

Gender disparities also exist in citation rates. Men authors are more likely to be cited than women authors in psychology (Gruber et al., 2020), economics (Maliniak et al., 2013), political science (Maliniak et al., 2013; Mitchell and Hesli, 2013; Mershon and Walsh, 2016; Dion et al., 2018), sociology (Weisshaar, 2017), and anthropology (Chibnik, 2014). In economics, women are less likely to cite themselves than men, and men tend to cite other men more than women (Maliniak et al., 2013). Gendered patterns in citations among the social sciences indicate papers

authored by men as the first and last authors have been overcited compared with what would be expected based on the number of papers authored by male/male teams (Sarsons, 2015). Papers authored by teams with at least one woman in the first or last-author position have been under-cited, and in co-authored papers, men authors often are attributed more credit than women authors (Sarsons, 2015). Fulvio et al. (2021) note that the citation imbalance results from systemic factors.

Theoretical Applications

The gender disparities in publishing, authorship position and citation patterns reflect implicit biases and differential standards based on gender stereotypes, reflected in predictions from role congruity theory (Eagly and Karau, 2002). Stereotypes of women as less competent than men permeate judgments of women's scholarship, as reflected in evaluation standards. Both men and women reviewers hold women authors to a higher standard (as measured by citation counts; Lundberg and Stearns, 2019). Additionally, men's and women's publications are evaluated differently, such that women with more co-authored publications are less likely to receive tenure than similar men (Sarsons, 2015). Women may face higher expectations because of gender gaps in publication rates and thus feel the need to work more to keep up with their men colleagues (Correll et al., 2017).

Men and women alike hold implicit biases about gender that shape their attitudes and behavior including the tendency to think of—and reference—men rather than women as experts (Morrow-Jones and Box-Steffensmeier, 2014; Leslie et al., 2015). When deadlines are looming, academics often reach for the most accessible and known literature, usually authored by men (Beaulieu et al., 2017). The citation bias favoring men in political science and methodologically focused social sciences is so familiar that it is called the "Matthew Effect" (Dion et al., 2018). The bias against women, the "Matilda Effect," excludes women's research citations from articles, scholarly journals, course syllabi, and textbooks (Dion et al., 2018). Publication and citation biases negatively impact academics careers, considering the significant impact citations and exposure have on consideration for raises, tenure and promotion, grants, and research awards.

Regarding potential self-stereotyping and differential standards, research in sociology suggests that women only submit their best writing compared to men authors, who are more likely to submit a broader range of quality of writing (Reuben et al., 2014). With this line of reasoning, one would expect women's publications to be higher quality and, thus, more likely to get published than male-led papers, though research shows otherwise (Lynn et al., 2019). This discrepancy in evaluation can lead to substantial differences in the probability that women-authored papers receive a revise and resubmit decision.

While the evidence is not conclusive, differences in co-authorship networks and potential bias in the publishing process may contribute to this gap. The Committee on the Status of Women in the Economics Profession Mentoring Program (CeMent) significantly increased the publication rates of participants by 20%, bolstering the argument that lack of mentoring may be a significant contribution to women's lower authorship (Blau et al., 2010). In anthropology, women are more likely to get published in journals with at least one woman editor (McElhinny et al., 2003).

SOCIAL NETWORKS AND CONFERENCE PRESENTATIONS

Interventions promoting women in academia often focus on facilitating the development of their social networks (Casad et al., 2021). Women need robust social networks because of gender gaps in publication rates, authorship positions, and citations. However, each social science reviewed here indicates that insufficient social networks play a role in women's lower representation in higher faculty ranks, leadership positions, publications, authorship, and citation rates (American Political Science Association [APSA], 2004; Lundberg and Stearns, 2019). One way to increase recognition and reputation and increase one's scholarly network is to present research at conferences (Carley and Wendt, 1991). Next, we describe gender disparities in conference presentations and issues with social networks.

Gendered Patterns

Women are underrepresented at high-profile conferences in psychology (Hinshaw et al., 2014; Johnson et al., 2017), economics (Lundberg and Stearns, 2019), and anthropology (Isbell et al., 2012), more likely to present at regional than international conferences (Hinshaw et al., 2014), and more likely to present posters than talks (Hinshaw et al., 2014). For example, from 2013 to 2016, the National Bureau of Economic Research Summer Institute Conference had only 20.6% women authors (Chari and Goldsmith-Pinkham, 2017). Similarly, women in political science are disproportionately less likely to appear on professional panels at conferences and be invited to speak at university colloquia (Nittrouer et al., 2018). An examination of sociology colloquia speakers at the top 50 colleges and universities in the United States indicated that men were more likely to be invited speakers than women. This gender disparity was not explained by women declining invitations or viewing colloquium talks as unimportant (Nittrouer et al., 2018). This pattern also existed for psychology and political science colloquia (Nittrouer et al., 2018). Research also suggests that political science conferences encourage a masculine normative culture (Biggs et al., 2018). When women are missing from academic discussions, the professions lose out on the expertise and perspective they have to offer (Barnes and Beaulieu, 2017), and faculty miss exposure, networking, and potential job opportunities (Boss and Eckert, 2004; Nittrouer et al., 2018).

In addition to representation as speakers at conferences, women experience disparate treatment at professional meetings than men. Women presenters often are asked 3–6 more questions on average than men presenters (Dupas et al., 2021). Men were more likely to ask questions and offer comments to women than men presenters, suggesting higher rates of critical feedback for women, resulting in the audience's adverse reaction (Winking et al., 2019). A higher rate of questioning, particularly by men in the audience, may reflect perceptions of women's lower

competence and may create more hostile environments for women at conferences.

In contrast to potentially hostile environments at psychology, economics, political science, and anthropology conferences, after accounting for speaker and audience gender composition, women at sociology conferences tend to have equal speaking time as men (Kriwy et al., 2013). However, when the audience was primarily women, women tended to have more speaking time, mainly when women Associate and Full Professors were in the majority (Kriwy et al., 2013). This finding suggests that women-dominant networks are beneficial to women as they provide gender capital and gender equity to women in the professional career domain (McAdam et al., 2019).

Theoretical Applications

Conferences and social networks are yet additional intellectual domains in which women are underrepresented. The exact causes of these gender disparities are unknown, but they likely reflect gendered socialization in professional development and professional cultural norms. For example, speaking at a conference is prestigious and reflects one's prominence in their field. If women are underrepresented, receive more critical feedback, and have less access to social networks than men, they are further disadvantaged in intellectual domains, consistent with a role congruity perspective of academic gender disparities.

GRANT FUNDING

The gender gap in success rates for research funding is prevalent in the social sciences (i.e., psychology and anthropology; Van der Lee and Ellemers, 2015). Research indicates gender equality at the application stage of funding, but disparities emerge at the award level (Van der Lee and Ellemers, 2015). For example, some research indicates slight gender bias in the funding of National Institutes of Health (NIH) R01 grants (Forscher et al., 2019), yet other research shows women earn smaller grant awards, nearly $40,000 less (Oliveira et al., 2019). In addition, Biernat et al. (2020) suggest that women may respond more negatively to feedback and be less likely to resubmit a grant than men (Biernat et al., 2020). Finally, research shows bias in the narratives of grant peer reviews (Magua et al., 2017).

Gendered Patterns

According to the American Psychological Association [APA], 2017, women tenure-track faculty are less likely to receive research grants. The NIH reports that women received 35% of the Research Project Grants, such as an R01 grant, in the 2020 fiscal year (Chaudhary et al., 2021). NIH grant awards indicate no gender differences in the number of Principal Investigators awarded a first-time grant; however, only 31% of NIH grantees are women (Hechtman et al., 2018). When women earn NIH grants, they are less likely to apply for renewals or other grants later in their careers (Boyle et al., 2015; Hechtman et al., 2018). Overall, women are less likely to apply for research grants but have an equal likelihood of funding as men when reviewers focus on the quality of the proposed research rather than the investigator's credentials (Gruber et al., 2020).

Many social scientists seek funding from the NSF rather than, or in addition to, the NIH. Research indicates that women are less likely to submit grants as Principal Investigators to the Directorate of Social, Behavioral, and Economic Sciences than men, even after considering their representation in academia (Rissler et al., 2020). Men's NSF submission rate is a 1:1 ratio of submissions to male faculty in academia (Rissler et al., 2020). Although gender differences in NSF grant submissions exist, data suggest equal funding success rates (Rissler et al., 2020). Next, we turn to theoretical applications for these gendered patterns in grant applications and funding.

Theoretical Applications

Researchers' interpretation of gender gaps in funding takes (Eagly, 2020) or complements a social role theory lens (Rissler et al., 2020). Women tend to work in more teaching-intensive than research-intensive colleges and universities, which put less emphasis on research for tenure and promotion (Eagly, 2020). In teaching-intensive roles, there is less incentive to submit NIH or NSF research grants (Rissler et al., 2020). Similarly, women are less likely to indicate that research is their primary responsibility (Rissler et al., 2020), even at very high research universities. Instead, women more often engage in teaching, mentoring, service, and other non-research-related responsibilities (e.g., administration; Mitchell and Hesli, 2013; O'Meara et al., 2017), which take away time and focus from grant submissions. Roles in which women dominate, such as teaching, mentoring, and service, are perceived to be more communal. In contrast, research is more agentic, which may influence women's focus in academic careers if they are communal goal oriented.

LESSONS FROM INTERVENTIONS

Federal granting agencies like the NSF and NIH earmark funding to address gender disparities in STEM; however, fewer funding mechanisms target gender equity in the social sciences. Despite the primary focus on STEM, several NSF and NIH-funded interventions include faculty from the social and behavioral sciences. NSF's ADVANCE program expanded STEM to include social science fields (i.e., psychology, economics, sociology, and political science; Hutchins and Kovach, 2019). We review the main findings of effective interventions funded by the NSF, NIH, universities, and private foundation grants to demonstrate minor changes that can combat inequality in STEM. The social sciences can reduce the gender disparities addressed in this review. Successful interventions addressing inequality within the social sciences often focus on (a) improving academic climate, (b) providing professional development, and (c) fostering social networking.

As stated throughout this review, stereotypes and biases in the social sciences lead to workload inequities and hostile academic climates for women (Moss-Racusin et al., 2012; Devine et al., 2017; Gruber et al., 2020). Interventions to improve academic climate include the Faculty Workload and Rewards Project

(FWRP: The Faculty Workload and Rewards Project [umd.edu]), Athena Swan Charter (Athena Swan Charter | Advance HE [advance-he.ac.uk], the Recruitment of Underrepresented People (GEAR UP; GEAR UP: Faculty Search Committee Training Program | University of New Hampshire [unh.edu]), and Transformation through Relatedness, Autonomy, and Competence Support program (TRACS; https://www.montana.edu/nsfadvance/summary.html), which have been successful at addressing gender workload inequalities (e.g., campus service, teaching, and mentoring workloads) and workload equity reform (e.g., providing resources, giving credit where credit is due, challenging *status quo* thinking and distrust). In addition, understanding how implicit bias impacts faculty workload empowers women to seek additional departmental support. Removing implicit bias in workload can be addressed by focusing on workload transparency (e.g., faculty workload activity dashboards, faculty service audits), clarity (e.g., faculty expectation guidelines, compensation for crucial roles), and credit (e.g., credit systems, teaching credit swaps). In addition, norms (e.g., planned service rotations, planned teaching-time rotations), context (e.g., differentiated workload policy, modified criteria for promotion and tenure), and accountability (e.g., restructuring and reducing committees, statement of mutual expectations) reduce bias (O'Meara et al., 2017, 2020). Educating faculty about microaggressions and biases and how to address them effectively changes departmental climate, improves workplace satisfaction, and increases perceptions of fairness and self-advocacy for all faculty involved (i.e., white men, women, racially minoritized groups; O'Meara et al., 2017, 2020).

Interventions that raise awareness of microaggressions and implicit biases directly influence hiring practices. Faculty reported that bias education increased their understanding of how gender impacts the evaluation of job candidates and how microaggressions and implicit biases impact candidate selection. This improved understanding leads to an increase of between 20 (Jones et al., 2019) and 67% (Smith et al., 2015) of women faculty representation. Successful workplace equity interventions demonstrate that educating faculty about workload inequalities and gender biases in academia and working together to implement changes positively influence women faculty and increase the representation of women in the social sciences.

In addition to fostering equitable climates, interventions such as the Visiting STEM Women Scholars Program (Visiting STEM Women Scholars Program [unh.edu]), the Gender Equity Project (Gender Equity Benchmarks — Hunter College [cuny.edu]), and TRACS (Smith et al., 2017) focus on advancing women's achievement in academia, including the social sciences. These interventions include workshops informing women on enhancing research opportunities, improving grant proposals, building research labs, mentoring graduate students, and achieving work-life balance while providing opportunities for underrepresented faculty to increase recognition within their fields (Smith et al., 2015). For example, after participating in the TRACS grant-writing boot camps, women faculty submitted more external grants, served as principal investigators on more proposals, and received more external grant funds than their pre-workshop achievements and a comparison sample of non-TRACS peers (Smith et al., 2017). These interventions increase research funding and scholarly productivity and decrease attrition (Hunter College, 2007; Barnes and Beaulieu, 2017).

Another effective intervention for supporting women and increasing their social sciences representation is building social networks. Interventions like the Visions in Methodology group (VIM; VIM | Visions in Methodology) and the American Economic Association (AEA) Committee on the Status of Women in the Economics Profession's (CSWEP) Mentoring Program (CeMENT; https://www.aeaweb.org/about-aea/committees/cswep/programs/cement-mentoring-workshops) introduce junior women faculty to senior women faculty. These partnerships allow faculty members to share knowledge on the tenure process, build peer networks (Blau et al., 2010), and understand career success factors (e.g., publishing, effective teaching, work–life balance). Social network interventions build faculty networks and increase women's sense of support from their networks (e.g., mentors and peers) compared to women at similar points in their careers without such networks (Barnes and Beaulieu, 2017).

While this review examines interventions that address one or more of three topics, (a) improving academic climate, (b) providing professional development, and (c) fostering social networking, many successful interventions address multiple factors related to gender inequalities. For example, interventions to increase women's achievements or decrease biases against women may also have a mentorship component. Additionally, interventions focusing on one aspect of gender inequality still led to change in other domains. Mentorship interventions increase support and recognition one has in one's field, thus increasing achievement and strengthening social networks. For example, women who attended VIM conferences that focus on faculty mentorship and career support submitted significantly more articles per year on average (2.23) than comparable women who did not attend VIM conferences (1.58), which is like comparable men faculty (1.96; Barnes and Beaulieu, 2017). Furthermore, women who attended the VIM conferences gave 0.48 more talks than comparable men, on average, the following year, and 0.60 more talks during their careers than other women at similar points (Barnes and Beaulieu, 2017). On average, women who attended CeMENT workshops received 0.4 more NSF and NIH grants, were 25% more likely to have a top-tier publication, and had, on average, three additional publications than women in a comparison group five years after the intervention (Blau et al., 2010). These statistics demonstrate that interventions that (a) improve academic climate, (b) provide professional development, and (c) foster social networking can impact women social scientists' success and address several factors that cause gender inequalities.

CONCLUSION

This review and others (e.g., Gruber et al., 2020) provide evidence that examining gender disparities in the social sciences is warranted. Less national attention and federal funding have

focused on gender inequities in the social sciences because many of these fields have better representation of women (American Psychological Association [APA], 2017; Begeny et al., 2020; Gruber et al., 2020; Van Veelen and Derks, 2022). Despite higher degree attainment among women in the social sciences, psychology, anthropology, and sociology, women faculty are underrepresented at higher faculty ranks and among economics and political science faculty. Several peer-reviewed studies document systemic biases women faculty face in hiring, promotion, tenure, salaries, leadership positions, authorship, publications, citations, conferences and social networking, and grant funding.

Social role and role congruity theories and the examination of communal and agentic goals and implicit biases provide an explanatory framework for persisting gender stereotypes and broader systemic gender biases in social science fields. In sum, evidence indicates that cultural gender biases subtly maintain gender disparities in academia in degree attainment, faculty ranks, salaries, time to tenure, leadership, authorship, publications, citations, conferences, networking, and grant funding.

Through the NSF ADVANCE program, federal research funding and other agencies (e.g., NIH) have targeted academic interventions to reduce gender disparities. Much of this work focuses on STEM, but many programs include the social and behavioral sciences in interventions and policy changes. This review highlights several successful interventions that focus on changing organizational cultures, policies, and practices that continue to disenfranchise women in academia. In addition, interventions provide training to improve academic climates, promote professional development, and foster social networking opportunities to enrich the professional lives of women in the social sciences.

AUTHOR CONTRIBUTIONS

BC contributed to conception and design of the study, wrote the introduction, abstract, and conclusion, and completed all editing. CG wrote the interventions section. TJ wrote on Anthropology and Sociology. AB wrote on Economics and Political Science. JF wrote on Psychology, provided statistics, and created tables. CB wrote on Social Sciences, provided statistics, and created tables. All authors contributed to manuscript revision, read, and approved the submitted version.

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REFERENCES

Amanatullah, E. T., and Morris, M. W. (2010). Negotiating gender roles: gender differences in assertive negotiating are mediated by women's fear of backlash and attenuated when negotiating on behalf of others. *J. Pers. Soc. Psychol.* 98, 256–267. doi: 10.1037/a0017094

American Political Science Association [APSA] (2004). *Women's Advancement in Political Science: A Report of the APSA Workshop on the Advancement of Women in Academic Political Science in the United States*. Washington, DC: APSA.

American Political Science Association [APSA] (2011). *Report of the Task Force on Political Science in the 21st Century*. Washington, DC: APSA.

American Psychological Association [APA] (2017). *The Changing Gender Composition of Psychology: Update and Expansion of the 1995 Task Force Report*. Washington, DC: APA.

American Psychological Association [APA] (2019). *The Academic Psychology Workforce: Characteristics of Psychology Research Doctorates in Faculty Positions (1995-2015)*. Washington, DC: APA.

Antecol, H., Bedard, K., and Stearns, J. (2018). Equal but inequitable: who benefits from gender-neutral tenure clock stopping policies? *Am. Econ. Rev.* 108, 2420–2441. doi: 10.1257/aer.20160613

Antón, S. C., Malhi, R. S., and Fuentes, A. (2018). Race and diversity in U.S. Biological Anthropology: a decade of AAPA initiatives. *Am. J. Phys. Anthropol.* 165, 158–180. doi: 10.1002/ajpa.23382

Argyle, L. P., and Mendelberg, T. (2020). Improving women's advancement in political science: what we know about what works. *Polit. Sci. Polit.* 53, 718–722. doi: 10.1017/s1049096520000402

Babcock, L., and Laschever, S. (2003). *Women don't ask: Negotiation and the gender divide*. Princeton, NJ: Princeton University Press.

Barnes, T. D., and Beaulieu, E. (2017). Engaging women: addressing the gender gap in women's networking and productivity. *Polit. Sci. Polit.* 50, 461–466. doi: 10.1017/s1049096516003000

Bauer, N. M. (2015). Emotional, sensitive, and unfit for office: gender stereotype activation and support for female candidates. *Polit. Psychol.* 36, 691–708. doi: 10.1111/pops.12186

Beaulieu, E., Boydstun, A. E., Brown, N. E., Dionne, K. Y., Gillespie, A., Klar, S., et al. (2017). Women also know stuff: meta-level mentoring to battle gender bias in political science. *Polit. Sci. Polit.* 50, 779–783. doi: 10.1017/s1049096517000580

Begeny, C. T., Ryan, M. K., Moss-Racusin, C. A., and Ravetz, G. (2020). In some professions, women have become well represented, yet gender bias persists—Perpetuated by those who think it is not happening. *Sci. Adv.* 6:eaba7814. doi: 10.1126/sciadv.aba7814

Belgacem, I., and Lamari, M. (2012). "Scientists' collaboration in the social sciences field: investigating the determinants of scholarly collaboration in the Canadian context 2001–2008," in *Proceedings of the International Conference on Education and e-Learning Innovations*, New York, NY.

Bernstein, R. H., Macy, M. W., Williams, W. M., Cameron, C. J., Williams-Ceci, S. C., and Ceci, S. J. (2022). Assessing gender bias in particle physics and social science recommendations for academic jobs. *Soc. Sci.* 11:74. doi: 10.3390/socsci11020074

Biernat, M., Carnes, M., Filut, A., and Kaatz, A. (2020). Gender, race, and grant reviews: translating and responding to research feedback. *Pers. Soc. Psychol. Bull.* 46, 140–154. doi: 10.1177/0146167219845921

Biernat, M., Manis, M., and Kobrynowicz, D. (1997). Simultaneous assimilation and contrast effects in judgments of self and others. *J. Pers. Soc. Psychol.* 73:254. doi: 10.1037//0022-3514.73.2.254

Biggs, J., Hawley, P. H., and Biernat, M. (2018). The academic conference as a chilly climate for women: effects of gender representation on experiences of sexism, coping responses, and career intentions. *Sex Roles* 78, 394–408. doi: 10.1007/s11199-017-0800-9

Blau, F., Currie, J., Croson, R. T. A., and Ginther, D. (2010). Can mentoring help female Assistant Professors? Interim results from a randomized trial. *Am. Econ. Rev.* 100, 348–352. doi: 10.3386/w15707

Boss, J. M., and Eckert, S. H. (2004). *Academic Scientists at Work: The Job Talk. Science*. Available online at: www.sciencemag.org/careers/2004/12/academic-scientists-work-job-talk (accessed October 9, 2021).

Boyle, P., Smith, L., and Cooper, N. (2015). Gender balance: women are funded more fairly in social science. *Nature* 525, 181–183. doi: 10.1038/525181a

Brescoll, V. L., Okimoto, T. G., and Vial, A. C. (2018). You've come a long way…maybe: how moral emotions trigger backlash against women leaders. *J. Soc. Issues* 74, 144–164. doi: 10.1111/josi.12261

Burton, M., Watson, P. J., and Webster, C. (2020). *Academic Employment of Women: Participate & Advocate*. Available online at: https://www.americananthro.org/ParticipateAndAdvocate/Content.aspx?ItemNumber=12674 (accessed October 9, 2021).

Carley, K., and Wendt, K. (1991). Electronic mail and scientific communication. A study of the SOAR extended research group. *Knowledge* 12, 406–440. doi: 10.1177/107554709101200405

Casad, B. J., Franks, J. E., Garasky, C. E., Kittleman, M. M., Roesler, A. C., Hall, D. Y., et al. (2021). Gender inequality in academia: problems and solutions for women faculty in STEM. *J. Neurosci. Res.* 99, 13–23. doi: 10.1002/jnr.24631

Casselman, B., and Tankersley, J. (2019). *Women in Economics Report Rampant Sexual Assault and Bias*. New York, NY: The New York Times.

Ceci, S. J., Ginther, D. K., Kahn, S., and Williams, W. M. (2014). Women in academic science: a changing landscape. *Psychol. Sci. Public Interest* 15, 75–141. doi: 10.1177/1529100614541236

Ceci, S. J., and Williams, W. M. (2007). *Why Aren't More Women in Science?: Top Researchers Debate the Evidence*. Washington, DC: American Psychological Association.

Chari, A., and Goldsmith-Pinkham, P. (2017). *Gender Representation in Economics Across Topics and Time: Evidence from the NBER Summer Institute (No. w23953)*. Cambridge, MA: National Bureau of Economic Research.

Chaudhary, A., Naveed, S., Safdar, B., Saboor, S., Zeshan, M., and Khosa, F. (2021). Gender differences in research project grants and R01 grants at the National Institutes of Health. *Cureus* 13:e14930. doi: 10.7759/cureus.14930

Cheryan, S., Ziegler, S. A., Montoya, A. K., and Jiang, L. (2017). Why are some STEM fields more gender-balanced than others? *Psychol. Bull.* 143, 1–35. doi: 10.1037/bul0000052

Chibnik, M. (2014). Gender and citations in american anthropologist. *Am. Anthropol.* 116, 493–496. doi: 10.1111/aman.12117

Correll, S. J. (2004). Constraints into preferences: gender, status, and emerging career aspirations. *Am. Sociol. Rev.* 69, 93–113. doi: 10.1177/000312240406900106

Correll, S. J., Ridgeway, C. L., Zuckerman, E. W., Jank, S., Jordan-Bloch, S., and Nakagawa, S. (2017). It's the conventional thought that counts: how third-order inference produces status advantage. *Am. Sociol. Rev.* 82, 297–327. doi: 10.1177/0003122417691503

Crothers, L. M., Hughes, T. L., Schmitt, A. J., Theodore, L. A., Lipinski, J., Bloomquist, A. J., et al. (2010). Has equity been achieved? Salary and promotion negotiation practices of a national sample of school psychology university faculty. *Psychol. Manag. J.* 13, 40–59. doi: 10.1080/10887150903553790

De Brey, C., Snyder, T. D., Zhang, A., and Dillow, S. A. (2021). *Digest of Education Statistics 2019 (NCES 2021-009)*. Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Dellinger, K., England, P., Nelson, M., Robnett, B., Vidal-Ortiz, S., and Spalter-Roth, R. (2009). *Report of the American Sociological Association's Committee on the Status of Women in Sociology*. Washington, DC: American Sociology Association.

Devine, P. G., Forscher, P. S., Cox, W. T., Kaatz, A., Sheridan, J., and Carnes, M. (2017). A gender bias habit-breaking intervention led to increased hiring of female faculty in STEMM departments. *J. Exp. Soc. Psychol.* 73, 211–215. doi: 10.1016/j.jesp.2017.07.002

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

Dion, M. L., Sumner, J. L., and Mitchell, S. M. L. (2018). Gendered citation patterns across political science and social science methodology fields. *Polit. Analysis* 26, 312–327. doi: 10.1017/pan.2018.12

Dittmar, K. (2015). *Navigating Gendered Terrain: Stereotypes and Strategy in Statewide Races*. Philadelphia, PA: Temple University Press.

Dupas, P., Modestino, A. S., Niederle, M., and Wolfers, J. (2021). *Gender and the Dynamics of Economics Seminars (No. w28494)*. Cambridge, MA: National Bureau of Economic Research.

Eagly, A. H. (2020). Do the social roles that women and men occupy in science allow equal access to publication? *Proc. Natl. Acad. Sci. U.S.A.* 117, 5553–5555. doi: 10.1073/pnas.2001684117

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

Eagly, A. H., and Steffen, V. J. (1984). Gender stereotypes stem from the distribution of women and men into social roles. *J. Pers. Soc. Psychol.* 46, 735–754. doi: 10.1037/0022-3514.46.4.735

Finder, A. (2007). *Decline of The Tenure Track Raises Concerns*. New York, NY: New York Times.

Forscher, P. S., Cox, W. T., Brauer, M., and Devine, P. G. (2019). Little race or gender bias in an experiment of initial review of NIH R01 grant proposals. *Nat. Hum. Behav.* 3, 257–264. doi: 10.1038/s41562-018-0517-y

Fox Tree, J. E., and Vaid, J. (2022). Why so few, still? Challenges to attracting, advancing, and keeping women faculty of color in academia. *Front. Sociobiol.* 6:792198. doi: 10.3389/fsoc.2021.792198

Fulvio, J. M., Akinnola, I., and Postle, B. R. (2021). Gender (im)balance in citation practices in cognitive neuroscience. *J. Cogn. Neurosci.* 33, 3–7. doi: 10.1162/jocn_a_01643

Georgetown University (2020). *National Data for Social Sciences Majors*. Washington, DC: Georgetown University.

Ghiasi, G., Larivière, V., and Sugimoto, C. (2016). "Gender differences in synchronous and diachronous self-citations," in *Proceedings of the 21ST International Conference on Science and Technology Indicators*, eds I. Ràfols, J. Molas-Gallart, E. Castro-Martínez, and R. Woolley (Valencia: Editorial Universitat PoliteÌcnica de ValeÌncia), 844–851.

Ginsberg, D. (2016). *Survey Respondents At-A-Glance: 2016 Membership Survey, Report #1*. Arlington: American Anthropological Association.

Ginther, D. K. (2004). *Gender Differences in Salary and Promotion in Political Science*. Available online at: https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.595.4036&rep=rep1&type=pdf (accessed October 9, 2021).

Goodwin, C. J. (2005). Reorganizing the experimentalists: the origins of the society of experimental psychology. *History Psychol.* 8, 347–361. doi: 10.1037/1093-4510.8.4.347

Grant, L., and Ward, K. B. (1991). Gender and publishing in sociology. *Gender Soc.* 5, 207–223. doi: 10.1177/089124391005002005

Gruber, J., Mendle, J., Lindquist, K. A., Schmader, T., Clark, L. A., Bliss-Moreau, E., et al. (2020). The future of women in psychological science. *Perspect. Psychol. Sci.* 16, 483–516. doi: 10.1177/1745691620952789

Hechtman, L. A., Moore, N. P., Schulkey, C. E., Miklos, A. C., Calcagno, A. M., Aragon, R., et al. (2018). NIH funding longevity by gender. *Proc. Natl. Acad. Sci. U.S.A.* 115, 7943–7948. doi: 10.1073/pnas.1800615115

Hesli, V. L., Lee, J. M., and Mitchell, S. M. (2012). Predicting rank attainment in political science: what else besides publications affects promotion? *Polit. Sci. Polit.* 45, 475–492. doi: 10.1017/s1049096512000364

Hilsabeck, R. C., and Martin, E. M. (2010). Women and advancement in neuropsychology: real-life lessons learned. *Clin. Neuropsychol.* 24, 481–492. doi: 10.1080/13854040802360566

Hinshaw, J., Reinbold, T., Geher, M. E., and Geher, G. (2014). Are women given voice at psychology conferences? A content analysis of gender of presenter at major evolutionist and general psychology conferences. *J. Evol. Stud. Consort.* 6, 17–24.

Hoyt, C. L., and Simon, S. (2017). "Social psychological approaches to women and leadership theory," in *Handbook of Research on Gender and Leadership*, ed. S. R. Madsen (Cheltenharn: Edward Elgar Publishing), 85–99. doi: 10.4337/9781785363863.00013

Hunter College (2007). *The Gender Equity Project: Leading the way in demolishing the glass ceiling–Benchmarks 2006-2007*. Available online at: http://www.hunter.cuny.edu/genderequity/ (accessed October 9, 2021).

Hutchins, H. M., and Kovach, J. V. (2019). ADVANCING women academic faculty in STEM careers: the role of critical HRD in supporting diversity and inclusion. *Adv. Dev. Hum. Resour.* 21, 72–91. doi: 10.1177/1523422318814547

Isbell, L. A., Young, T. P., and Harcourt, A. H. (2012). Stag parties linger: continued gender bias in a female-rich scientific discipline. *PLoS One* 7:e0049682. doi: 10.1371/journal.pone.0049682

Jaschik, S. (2009). *The Disappearing Tenure-Track Job*. Stanford, CA: Stanford University.

Johnson, C. S., Smith, P. K., and Wang, C. (2017). Sage on the stage: women's representation at an academic conference. *Pers. Soc. Psychol. Bull.* 43, 493–507. doi: 10.1177/0146167216688213

Jones, W., Graham, K., Shea, C. M., and Williams, J. (2019). *UNH UNBIASED: Leadership Development and Policy Change to Promote Institutional Transformation*. Available online at: https://ssrn.com/abstract=3345185 (accessed October 9, 2021).

Judson, E., and Ross, L. (2021). Effects of gender and underrepresented minority status on faculty workload recommendations. *J. Women Minorities Sci. Eng.* 27, 49–82. doi: 10.1615/jwomenminorscieneng.2021034858

Kerber, L. K. (1976). The republican mother: women and the enlightenment: an historical perspective. *Am. Q.* 28, 187–205. doi: 10.2307/2712349

Kriwy, P., Gross, C., and Gottburgsen, A. (2013). Look who's talking: compositional effects of gender and status on verbal contributions at sociology conferences. *Gend. Work Organ.* 20, 545–560. doi: 10.1111/j.1468-0432.2012.00603.x

Kugler, K. G., Reif, J. A., Kaschner, T., and Brodbeck, F. C. (2018). Gender differences in the initiation of negotiations: a meta-analysis. *Psychol. Bull.* 144, 198–222. doi: 10.1037/bul0000135

Laurin, K., Kay, A. C., and Shepherd, S. (2011). Self-stereotyping as a route to system justification. *Soc. Cogn.* 29, 360–375. doi: 10.1521/soco.2011.29.3.360

Leslie, S. J., Cimpian, A., Meyer, M., and Freeland, E. (2015). Expectations of brilliance underlie gender distributions across academic disciplines. *Science* 347, 262–265. doi: 10.1126/science.1261375

Lundberg, S., and Stearns, J. (2019). Women in economics: stalled progress. *J. Econ. Perspect.* 33, 3–22. doi: 10.1257/jep.33.1.3

Lynn, F. B., Noonan, M. C., Sauder, M., and Andersson, M. A. (2019). A rare case of gender parity in academia. *Soc. Forces* 98, 518–547. doi: 10.1093/sf/soy126

Madera, J. M., Hebl, M. R., and Martin, R. C. (2009). Gender and letters of recommendation for academia: agentic and communal differences. *J. Appl. Psychol.* 94, 1591–1599. doi: 10.1037/a0016539

Magua, W., Zhu, X., Bhattacharya, A., Filut, A., Potvien, A., Leatherberry, R., et al. (2017). Are female applicants disadvantaged in National Institutes of Health peer review? Combining algorithmic text mining and qualitative methods to detect evaluative differences in R01 reviewers' critiques. *J. Women's Health* 26, 560–570. doi: 10.1089/jwh.2016.6021

Maliniak, D., Powers, R., and Walter, B. F. (2013). The gender citation gap in international relations. *Int. Organ.* 67, 889–922. doi: 10.1017/s0020818313000209

Mathews, A. L., and Andersen, K. (2001). A gender gap in publishing? Women's representation in edited political science books. *Polit. Sci. Polit.* 34, 143–147. doi: 10.1017/s1049096501000221

McAdam, M., Harrison, R. T., and Leitch, C. M. (2019). Stories from the field: women's networking as gender capital in entrepreneurial ecosystems. *Small Bus. Econ.* 53, 459–474. doi: 10.1007/s11187-018-9995-6

McElhinny, B., Hols, M., Holtzkener, J., Unger, S., and Hicks, C. (2003). Gender, publication and citation in Sociolinguistics and linguistic anthropology: the construction of a scholarly canon. *Lang. Soc.* 32, 299–328. doi: 10.1017/s0047404503323012

Mershon, C., and Walsh, W. (2016). Diversity in political science: why it matters and how to get it. *Polit. Groups Ident.* 4, 462–466. doi: 10.1080/21565503.2016.1170703

Miles, M. L., Agger, C. A., Roby, R. S., and Morton, T. R. (2021). Who's who: how "women of color" are (or are not) represented in STEM education research. *Sci. Educ.* 106, 229–256. doi: 10.1002/sce.21694

Mitchell, S. M., and Hesli, V. L. (2013). Women don't ask? Women don't say no? Bargaining and service in the political science profession. *Polit. Sci. Polit.* 46, 355–369. doi: 10.1017/s1049096513000073

Mo, C. H. (2015). The consequences of explicit and implicit gender attitudes and candidate quality in the calculations of voters. *Polit. Behav.* 37, 357–395. doi: 10.1007/s11109-014-9274-4

Morimoto, S. A. (2022). The social science of institutional transformation: intersectional change in the academy. *Front. Psychol.* 7:824497. doi: 10.3389/fsoc.2022.824497

Morrow-Jones, H., and Box-Steffensmeier, J. M. (2014). Implicit bias and why it matters to the field of political methodology. *Polit. Methodol.* 21, 16–19.

Moss-Racusin, C. A., Dovidio, J. F., Brescoll, V. L., Graham, M. J., and Handelsman, J. (2012). Science faculty's subtle gender biases favor male students. *Proc. Natl. Acad. Sci. U.S.A.* 109, 16474–16479. doi: 10.1073/pnas.1211286109

National Center for Science and Engineering Statistics [NCSES] (2007). *National Science Foundation. ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers*. Alexandria, VA: National Science Foundation.

National Center for Science and Engineering Statistics [NCSES] (2017). *Survey of Doctorate Recipients, 2017*. Alexandria, VA: National Science Foundation.

National Center for Science and Engineering Statistics [NCSES] (2019). *Women, Minorities, and Persons with Disabilities in Science and Engineering: Data Tables*. Alexandria, VA: National Science Foundation.

National Center for Science and Engineering Statistics [NCSES] (2020). *Doctorate Recipients from U.S. Universities: 2019. NSF 21-308*. Alexandria, VA: National Science Foundation.

National Center for Science and Engineering Statistics [NCSES] (2021a). *Survey of Doctorate Recipients, 2019. NSF 21-320*. Alexandria, VA: National Science Foundation.

National Center for Science and Engineering Statistics [NCSES] (2021b). *Table 59. Median Annual Salaries of U.S. Residing Full-Time Employed Doctoral Scientists and Engineers in 4-Year Educational Institutions, by Field of Doctorate, Sex, and Faculty Rank: 2019. NSF 21-320*. Alexandria, VA: National Science Foundation.

National Science Foundation [NSF] (2017). *Women, Minorities, and Persons With Disabilities in Science and Engineering*. Alexandria, VA: National Science Foundation.

Niederle, M., Segal, C., and Vesterlund, L. (2013). How costly is diversity? Affirmative action in light of gender differences in competitiveness. *Manag. Sci.* 59, 1–16. doi: 10.1287/mnsc.1120.1602

Niederle, M., and Vesterlund, L. (2007). Do women shy away from competition? Do men compete too much? *Q. J. Econ.* 122, 1067–1101. doi: 10.1162/qjec.122.3.1067

Nittrouer, C. L., Hebl, M. R., Ashburn-Nardo, L., Trump-Steele, R. C., Lane, D. M., and Valian, V. (2018). Gender disparities in colloquium speakers at top universities. *Proc. Natl. Acad. Sci. U.S.A.* 115, 104–108. doi: 10.1073/pnas.1708414115

O'Brien, L. T., Major, B. N., and Gilbert, P. N. (2012). Gender differences in entitlement: the role of system-justifying beliefs. *Basic Appl. Soc. Psychol.* 34, 136–145. doi: 10.1080/01973533.2012.655630

Odic, D., and Wojcik, E. H. (2020). The publication gender gap in psychology. *Am. Psychol.* 75, 92–103. doi: 10.1037/amp0000480

Oliveira, D. F., Ma, Y., Woodruff, T. K., and Uzzi, B. (2019). Comparison of National Institutes of Health grant amounts to first-time male and female principal investigators. *JAMA* 321, 898–900. doi: 10.1001/jama.2018.21944

O'Meara, K. A., Beise, E., Culpepper, D., Misra, J., and Jaeger, A. (2020). Faculty work activity dashboards: a strategy to increase transparency. *Change* 52, 34–42. doi: 10.1080/00091383.2020.1745579

O'Meara, K. A., Kuvaeva, A., Nyunt, G., Waugaman, C., and Jackson, R. (2017). Asked more often: gender differences in faculty workload in research universities and the work interactions that shape them. *Am. Educ. Res. J.* 54, 1154–1186. doi: 10.3102/0002831217716767

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

Reuben, E., Sapienza, P., and Zingales, L. (2014). How stereotypes impair women's careers in science. *Proc. Natl. Acad. Sci. U.S.A.* 111, 4403–4408. doi: 10.1073/pnas.1314788111

Rissler, L. J., Hale, K. L., Joffe, N. R., and Caruso, N. M. (2020). Gender differences in grant submissions across science and engineering fields at the NSF. *Bioscience* 70, 814–820. doi: 10.1093/biosci/biaa072

Rudman, L. A., Moss-Racusin, C. A., Phelan, J. E., and Nauts, S. (2012). Status incongruity and backlash effects: defending the gender hierarchy motivates prejudice against female leaders. *J. Exp. Soc. Psychol.* 48, 165–179. doi: 10.1016/j.jesp.2011.10.008

Sarsons, H. (2015). *Gender Differences in Recognition for Group Work*. Cambridge, MA: Harvard University.

Schmader, T., Whitehead, J., and Wysocki, V. H. (2007). A linguistic comparison of letters of recommendation for male and female chemistry and biochemistry job applicants. *Sex Roles* 57, 509–514. doi: 10.1007/s11199-007-9291-4

Smith, J. L., Handley, I. M., Zale, A. V., Rushing, S., and Potvin, M. A. (2015). Now hiring! Empirically testing a three-step intervention to increase faculty gender diversity in STEM. *BioScience* 65, 1084–1087. doi: 10.1093/biosci/biv138

Smith, J. L., Stoop, C., Young, M., Belou, R., and Held, S. (2017). Grant-writing bootcamp: an intervention to enhance the research capacity of academic women in STEM. *BioScience* 67, 638–645. doi: 10.1093/biosci/bix050

Smith, N. (2014). *Economics is a Dismal Science for Women*. New York, NY: Bloomberg.

Steinpreis, R. E., Anders, K. A., and Ritzke, D. (1999). The impact of gender on the review of the curricula vitae of job applicants and tenure candidates: a national empirical study. *Sex Roles* 41, 509–528. doi: 10.1023/A:1018839203698

Streb, M. J., Burrell, B., Frederick, B., and Genovese, M. A. (2008). Social desirability effects and support for a female American president. *Public Opin. Q.* 72, 76–89. doi: 10.1093/poq/nfm035

Teele, D., and Thelen, K. (2017). Gender in the journals: publication patterns in political science. *Polit. Sci. Polit.* 50, 433–447. doi: 10.1017/S1049096516002985

United States Department of Labor (2021). *Equal Pay for Equal Work*. Available online at: https://www.dol.gov/agencies/oasam/centers-offices/civil-rights-center/internal/policies/equal-pay-for-equal-work (accessed October 9, 2021).

Vaid, J., and Geraci, L. (2016). An examination of women's professional visibility in cognitive psychology. *Feminism Psychol.* 26, 292–319. doi: 10.1177/0959353516641139

Van der Lee, R., and Ellemers, N. (2015). Gender contributes to personal research funding success in The Netherlands. *Proc. Natl. Acad. Sci. U.S.A.* 112, 12349–12353. doi: 10.1073/pnas.1510159112

Van Veelen, R., and Derks, B. (2022). Equal representation does not mean equal opportunity: women academics perceive a thicker glass ceiling in social and behavioral fields than in the natural sciences and economics. *Front. Psychol.* 13:790211. doi: 10.3389/fpsyg.2022.790211

Weisshaar, K. (2017). Publish and perish? An assessment of gender gaps in promotion to tenure in academia. *Soc. Forces* 96, 529–560. doi: 10.1093/sf/sox052

Welch, K., and Ruelas, A. (2015). *The Role of Female Seminaries on the Road to Social Justice for Women*. Eugene: Wipf and Stock Publishers.

Winking, J., Hopkins, A. L., Yeoman, M., and Arcak, C. (2019). M-AAA-nsplaining: gender bias in questions asked at the American Anthropological Association's Annual Meetings. *PLoS One* 14:e0207691. doi: 10.1371/journal.pone.0207691

Women in Economics Initiative (2020). *Women in Economics Index*. Available online at: https://women-in-economics.com/wp-content/uploads/2020/10/WiE_Index_2020.pdf (accessed October 9, 2021).

Wong, C. Y., Kirby, T. A., Rink, F. A., and Ryan, M. K. (2022). Intersectional invisibility in women's diversity interventions. *Front. Psychol.* doi: 10.3389/fpsyg.2022.791572 [Epub ahead of print].

Wu, A. H. (2020). Gender bias among professionals: an identity-based interpretation. *Rev. Econ. Stat.* 102, 867–880. doi: 10.1162/rest_a_00877

Zagorsky, J. L. (2017). Divergent trends in U.S. maternity and paternity leave, 1994-2015. *Am. J. Public Health* 107, 460–465. doi: 10.2105/AJPH.2016.303607

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The Reproducibility Movement in Psychology: Does Researcher Gender Affect How People Perceive Scientists With a Failed Replication?

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The reproducibility movement in psychology has resulted in numerous highly publicized instances of replication failures. The goal of the present work was to investigate people's reactions to a psychology replication failure vs. success, and to test whether a failure elicits harsher reactions when the researcher is a woman vs. a man. We examined these questions in a pre-registered experiment with a working adult sample, a conceptual replication of that experiment with a student sample, and an analysis of data compiled and posted by a psychology researcher on their public weblog with the stated goal to improve research replicability by rank-ordering psychology researchers by their "estimated false discovery risk." Participants in the experiments were randomly assigned to read a news article describing a successful vs. failed replication attempt of original work from a male vs. female psychological scientist, and then completed measures of researcher competence, likability, integrity, perceptions of the research, and behavioral intentions for future interactions with the researcher. In both working adult and student samples, analyses consistently yielded large main effects of replication outcome, but no interaction with researcher gender. Likewise, the coding of weblog data posted in July 2021 indicated that 66.3% of the researchers scrutinized were men and 33.8% were women, and their rank-ordering was not correlated with researcher gender. The lack of support for our pre-registered gender-replication hypothesis is, at first glance, encouraging for women researchers' careers; however, the substantial effect sizes we observed for replication outcome underscore the tremendous negative impact the reproducibility movement can have on psychologists' careers. We discuss the implications of such negative perceptions and the possible downstream consequences for women in the field that are essential for future study.

Keywords: reproducibility movement, failed replications, researcher gender, career impact, gender stereotypes

INTRODUCTION

> Sharing a frustration that I'm working through—one that I think many mobbing/bullying targets have experienced: My organization/field is beginning to acknowledge the existence of a destructive and pervasive cultural problem: harassment, abuse, bullying, and mobbing (Amy Cuddy, PhD, Twitter, April 11, 2021).

> And I'm really not saying this to be a jerk. I've been on Twitter for 4 years and I've seen this over and over and over again. And once again, it's often targeted toward women scholars (Jide Bamishigbin, PhD, Twitter, November 13, 2021).

Relative to their representation in the natural and physical sciences, women faculty are far better represented in the social and life sciences (e.g., Ginther and Kahn, 2014) and yet continue to face barriers to success. According to data from the National Center for Science and Engineering Statistics Survey of Earned Doctorates, women earned 59.9% of doctoral degrees awarded in psychology and the social sciences in 2020, up from 46.6% in 1990 (National Center for Science and Engineering Statistics Survey of Earned Doctorates (NCSES), 2021). Despite these gains, women academics in the social and life sciences are underrepresented as invited colloquium speakers at prestigious research universities (Nittrouer et al., 2018), and, in social and personality psychology specifically, they are less likely than men to be cited (Brown and Goh, 2016) or have their research included in graduate-level syllabi (Skitka et al., 2021). In a profession where promotion often depends on establishing and sustaining a national research reputation in one's field of study, such gender disparities should not be taken lightly. Indeed, these factors may help explain why women-identified social scientists remain significantly underrepresented at the level of full professor (e.g., Ginther and Kahn, 2014; National Center for Science and Engineering Statistics Survey of Earned Doctorates (NCSES), 2021), the highest rank within academia. In the present research, we explored another potential mechanism through which women social scientists may be disadvantaged. Specifically, we examined whether women researchers face greater reputational consequences than men when their work fails to replicate and whether they are disproportionately targeted by the reproducibility movement in psychology. Our research questions were inspired by highly publicized cases in psychology in which researchers expressed concerns about failed replications leading to personal mistreatment (as illustrated by the first of our opening quotes) and by anecdotal observations that such mistreatment seems more often directed at women researchers (as the second of our opening quotes suggests). Despite numerous anecdotes, we could find no previously published work to address these important research questions.

IMPACT OF THE REPRODUCIBILITY MOVEMENT ON TRUST IN PSYCHOLOGICAL SCIENCE AND SCIENTISTS

For over a decade, the field of psychology has experienced a crisis of confidence (see Fanelli, 2018). Some trace the origins of this crisis to a widely cited publication on the surprising prevalence of false positives (i.e., when researchers reject a null hypothesis that is, in fact, true) (Simmons et al., 2011). Subsequently, a revolution of sorts took over the field, with psychological scientists adopting many of the recommendations made by Simmons et al., to achieve greater research transparency. These included tactics such as mechanisms for pre-registration of hypotheses and data analytic procedures, as well as journals' increasing willingness to publish registered reports for which as-predicted significant results are not required. In addition, the field experienced the launching of large-scale replication projects (e.g., ManyLabs) to assess the reproducibility of widely cited past findings with appropriate statistical power. Unquestionably, open science practices such as pre-registration, increased statistical power in studies, and the publication of replications are best practices in the social sciences. Indeed, replicability is a key ingredient in the scientific process, and increasing transparency of methods and analyses is a welcome advancement in scientific norms (e.g., Asendorpf et al., 2013).

Although replication is a critical part of the scientific method, some researchers have argued that the "reproducibility crisis narrative" is an unnecessarily dramatic description of the problem (Fanelli, 2018). There are myriad reasons why scientific findings may fail to replicate (Asendorpf et al., 2013; Maxwell et al., 2015; Schmidt and Oh, 2016), and many of these have little to do with the scientific competence or ethical research practices of individual researchers. Rates of engagement in outright scientific misconduct and (perhaps less egregious but still problematic) questionable research practices (QRPs) are likely relatively low (Fanelli, 2009). Rather, replicability of findings in psychology depends on the contextual sensitivity of the research topic, above and beyond statistical power and effect size (Van Bavel et al., 2016), and replication efforts led by less experienced teams of researchers are more likely to fail than those led by teams with greater research expertise (Bench et al., 2017). Furthermore, one systematic analysis of social science experiments published in *Nature* and *Science* over a 5 year period revealed that social scientists' *beliefs* about the replicability of a study's findings predicted their actual replicability (Camerer et al., 2018). Specifically, researchers were provided copies of 21 replication reports and citations for the originally published studies prior to the conduct of the replications, and they were asked to predict the likelihood that each of the studies selected for the large-scale replication project would successfully replicate. Results revealed that researchers' aggregated predictions about a given study's replicability strongly predicted the outcome of the associated replication, $r = 0.76$. On the one hand, this finding may suggest that researchers are able to identify conditions under which

findings may not successfully replicate with surprising accuracy; but, on the other hand, this finding also suggests that replication outcomes are not solely due to chance. It could be that, based on their beliefs about a given study's replicability, researchers sometimes "cherry-pick" which studies to target for replication, which could artificially inflate the rates of failed replications. Of note, systematic investigations of replication studies suggest that the majority provide weak or inconclusive evidence for the reproducibility of the original findings (Etz and Vandekerckhove, 2016). In short, a single failed replication is inconclusive, and yet, the number of Web of Science papers perpetuating the "crisis" narrative exponentially increased in the late 2010s (Fanelli, 2018).

Several studies suggest that the increased salience of the reproducibility movement may pose some serious consequences for the reputation of the field of psychology. In one study, reading about replication failures in psychology (relative to a control condition in which participants read about psychological research in general), decreased trust in past research in psychology (Anvari and Lakens, 2018). In that same study, exposure to information about replication failures was no different from exposure to information about QRPs in psychology, and reading about reforms to address psychology's reproducibility problem actually served to undermine participants' trust in future psychological research. Wingen et al. (2020) conceptually replicated those findings, not only demonstrating that learning about low replicability rates in psychology decreases public trust in the field, but also demonstrating that commonly used strategies to repair trust (e.g., increased transparency in research methods reporting) did not significantly restore it. Although there are various reasons for failed replications, these studies suggest that many people do not distinguish among them. Indeed, relative to their baseline attitudes, even a one-hour lecture on the replication crisis that explicated the many reasons for replication failure, from low statistical power to fraudulent research practices, decreased undergraduate students' trust in psychology research results as measured post-lecture (Chopik et al., 2018).

Although failures to replicate do not necessarily imply either scientific misconduct or incompetence, studies have revealed that researchers fear personal reputational consequences of failed replications. For example, in one study, researchers were asked to imagine one of their own findings versus someone else's findings failing to replicate, and what the reputational costs would be. Consistently, these researchers believed that their own reputation (both scientific and social) would suffer more, and that their work (both their original finding and other work from their lab) would be perceived more negatively (Fetterman and Sassenberg, 2015). Although the authors concluded from their findings that researchers overestimate the reputational costs of failed replications, their data clearly demonstrate that researchers are concerned about how they will be perceived should their studies fail to replicate.

Some studies suggest that researchers' concerns about the reputational impact of failed replication attempts may be well-founded. Ebersole et al. (2016) asked United States survey respondents first to imagine and evaluate a researcher who found and published an interesting result. Respondents were then asked to evaluate the same researcher when another researcher successfully replicated the target researcher's interesting results, and then later to evaluate that same researcher when another researcher failed to replicate the interesting results. Relative to the control condition with no information about the results' replicability, perceptions of the researcher's ability and ethics, as well as perceived truthfulness of the results, increased when another researcher replicated the original findings, but significantly decreased when the findings failed to replicate. Similarly, in a primarily German sample, Hendriks et al. (2020) manipulated whether a study replication attempt was successful or unsuccessful, and found that failure to replicate decreased ratings of study credibility and researcher trustworthiness.

Collectively, these studies demonstrate that failed replications can have negative consequences for perceptions of both the field and individual researchers. To date, key outcomes of extant experiments have been limited to perceptions of researcher ability, ethics, credibility and trustworthiness, as well as truthfulness or trustworthiness of study results; these are important outcomes given that people do not always appreciate the differences between QRPs and other factors that affect replicability of a single study (e.g., Chopik et al., 2018). In the current research, we conceptually replicated these past experiments and also expanded them to include broader perceptions of the researcher, such as their likability and intentions to interact with the researcher or with their work in the future, as well as perceptions of the importance of their research. These outcomes speak to other reputational costs that may affect researchers' careers, such as whether they get invited as a consultant in applied settings and whether they are able to attract students to assist in their labs. Consistent with extant research, we expected that, relative to a successful replication attempt, a researcher whose original findings failed to replicate would be perceived as less competent, likable, lower in integrity, and less likely to elicit a desire for future interactions, and that their research would be considered less important and fundable.

THE POSSIBLE BACKLASH AGAINST WOMEN SOCIAL SCIENTISTS

Simmons et al. (2011) indicated, "Our goal as scientists is not to publish as many articles as we can, but to discover and disseminate truth" (p. 1365). But in their very next sentence, the authors go on to admit that even they themselves "often lose sight of this goal, yielding to the pressure to do whatever is justifiable to compile a set of studies that we can publish." In fact, in an investigation of publication trends in social psychology, Sassenberg and Ditrich (2019) found that the number of studies per article in the field's top journals significantly increased following the Simmons et al. call to action, as did the average sample size per study. However, these practices came at the expense of laboratory investigations and behavioral

measures that are more time-intensive and effortful to conduct, but that were once considered a hallmark of social psychological research (e.g., Baumeister et al., 2007). For better or for worse, researchers are clearly changing their methods in response to increased pressure to conduct and replicate highly powered studies.

Such pressures to "do whatever it takes" to succeed are consistent with a masculinity contest culture, a culture in which ambition, independence, and assertiveness (characteristics of agency and dominance) are valued, and sensitivity and vulnerability (characteristics of communality) are disparaged (Berdahl et al., 2018; Glick et al., 2018). If social science research has become a masculinity contest culture, as some have suggested about academia more broadly (Kaeppel et al., 2020), then researchers of all genders are at greater risk of burnout, job dissatisfaction, and experiences with harassment (Glick et al., 2018). Furthermore, if behaviors associated with agentic dominance are rewarded more than those associated with communality in social science research, then women researchers who assert themselves in efforts to succeed are at increased risk of backlash (Rudman et al., 2012). Indeed, meta-analytic evidence demonstrates that women are penalized more than men for dominance displays, both in terms of their likability and downstream career consequences such as hireability (Williams and Tiedens, 2016).

Psychology provides a unique context for examining potential backlash against women researchers, given that, in this field, women outnumber men (albeit at lower ranks; Ginther and Kahn, 2014; National Center for Science and Engineering Statistics Survey of Earned Doctorates (NCSES), 2021), and given that the field is stereotypically associated with feminine traits to a greater degree than with masculine traits (Boysen et al., 2021). Thus, one might expect greater equity in psychology and other social sciences than in the physical and natural sciences. In fact, one study found a 2:1 preference for women candidates over equally qualified men with regard to hiring at the assistant professor level in psychology (as well as biology, engineering, and economics; Williams and Ceci, 2015). Furthermore, some evidence suggests that previously observed barriers for women's advancement are beginning to break down. For example, women applying for a position who were once described more by communal traits in their letters of reference—which predicted lower ratings of hireability (Madera et al., 2009)—are now described similarly as their male counterparts, and in some cases are described more positively than men (Bernstein et al., 2022). This is good news for women applying to academic positions, as their odds of being hired may be improving (see also Ceci, 2018).

Despite some evidence of increasing gender equity, other findings suggest that women social scientists do not always experience more equitable or favorable treatment once in the field itself. For example, women hold significantly fewer positions of power within psychology (Gruber et al., 2021), which may limit their ability to advocate for certain gender-equity practices that women administrators value more than men, such as accommodations for mothers in federal grant funding (Williams et al., 2017). In addition, in social psychology (a field which, according to membership in its largest professional organization, is 51% female), women comprised only 34% of first authors in a random sample of issues of the field's flagship journal in a 10-year time period, were significantly less likely to be cited than men, and received only 25% of the society's top professional awards (Brown and Goh, 2016). Another examination of social psychology's largest conference revealed that women were significantly underrepresented as speakers, and this was especially true for women lower in academic rank (Johnson et al., 2017). Similarly, women in psychology and other fields with relative gender parity were significantly less likely than men to give invited colloquia at top research universities (Nittrouer et al., 2018). Such findings likely have downstream implications for women's careers in academic psychology, given the importance of lead authorship in top journals and conference symposia, of receiving national awards, and of giving invited talks at prestigious institutions in promotion and tenure decisions.

Although many of the aforementioned findings are descriptive in nature, they are corroborated by past and recent experimental evidence (e.g., Steinpreis et al., 1999; Heilman and Haynes, 2005; Moss-Racusin et al., 2012; Proudfoot et al., 2015; Bian et al., 2018; Régner et al., 2019; Witteman et al., 2019; Begeny et al., 2020). For example, when abstract submissions to an international social science conference were manipulated with male-typical versus female-typical names, not only were supposedly male-authored abstracts viewed as higher quality, but when the male-authored abstract featured stereotypically more masculine research topics, the research was especially likely to yield high ratings of quality (Knobloch-Westerwick et al., 2013). Similarly, psychological research journals that are gender-related (vs. other specialty journals) are viewed as less meritorious even when they have the same technical impact factor (Brown et al., 2022). Collectively, these findings suggest the greater perceived value of masculinized knowledge, even in the stereotypically feminine (Boysen et al., 2021) field of psychology (see also Niemann et al., 2020). In a profession arguably governed by masculine defaults (Cheryan and Markus, 2020), we therefore expected that any replication failure would be viewed negatively, and that, in particular, social science women whose research findings fail to replicate would be evaluated more critically and negatively than men.

OVERVIEW OF THE CURRENT RESEARCH

Although anecdotal data (such as the Tweets quoted in the introduction to this paper) point toward the possibility that women are targeted more harshly and/or more often than men by the reproducibility movement, we could find no prior efforts to investigate this systematically. The goal of the present work was to address this important limitation and to expand

upon the nascent knowledge base regarding perceptions of failed replications in psychology. First, we wished to examine a broad range of reactions to a researcher's (ostensible) replication failure versus success, replicating and extending past experiments documenting some narrower reputational costs of failed replications (Ebersole et al., 2016; Hendriks et al., 2020). We explored both attitudes and behavioral intentions toward interacting with the researcher, as well as perceptions of their research in general, and we predicted an overall replication-failure bias (such that researchers and their work broadly would be perceived substantially more negatively in the replication failure vs. success condition). Second, we investigated the gender-replication hypothesis; we expected that, relative to men, women researchers would not only be evaluated more negatively for failed replications, but also targeted more often in reproducibility efforts.

We examined these research questions in a pre-registered experiment conducted with a working adult sample, a replication of that experiment conducted with a student sample, and in an analysis of archival data from one public website. Participants in the experiments were randomly assigned to read a (fictional) news article describing a successful versus failed replication attempt of social science research, in which the author's name and pronouns were manipulated to portray a woman or man psychological scientist. We also culled researcher gender data from a website that portrays itself as dedicated to improving research replicability to examine the proportion of men and women "targets" of replication tests.

STUDY 1

We were first interested in public reactions to a failed social science replication, and whether those reactions might vary as a function of researcher gender. Public perceptions were of interest for a number of reasons. First, psychology's reproducibility "crisis" was highly publicized, with news stories appearing in popular media outlets, countless social media posts casting doubt on classic and/or intriguing or "sexy" findings (e.g., such as Dr. Amy Cuddy's power pose findings referenced in the opening quote), and "watchdog" websites being launched to monitor scientific replications and retractions. Second, the reproducibility movement appeared to converge with an increasing public distrust of scientific experts in the United States, particularly among political conservatives (Pew Research Center, 2019), thereby potentially constituting a source of divisiveness among voters. Finally, and most germane to our purposes in the present research, public perceptions of research, perhaps especially when politicized, can have serious career consequences for researchers whose work has caught the public eye (for an example, see news stories regarding Dr. Nikole Hannah-Jones' tenure rejection; e.g., Folkenflik, 2021).

Method

Participants

Adult participants at least 18 years of age were recruited from Amazon's Mechanical Turk through CloudResearch's (formerly TurkPrime) MTurk Toolkit (Litman et al., 2017). Participants were compensated with $1 USD. Four hundred and twelve individuals opened the study link, but 360 people actually participated in the study. This number was larger than our pre-registered target sample size of 320, which was based on recommendations of at least 40 participants per cell. G*Power software (Faul et al., 2009) furthermore indicated that a sample of 199 participants would provide 80% power to test our hypothesized interaction, assuming a small effect size ($d = 0.20$) and an alpha of 0.05. After removing 15 participants (4.17% of the sample) who failed at least one of two attention check items, 55 (15.28%) who failed the scientist gender manipulation check (24 in the male scientist condition and 31 in the female scientist condition), and 24 participants (6.67%) who failed the replication outcome manipulation check (11 in the successful condition, 13 in the failed condition), the working sample included 266 (mostly White, 77.1%) participants (149 men, 117 women) with an average age of 35.03 years ($SD = 11.06$ years). Participants represented all regions of the United States, and the vast majority (96.2%) were originally from the United States, with English as their first language (95.9%). Most (83.8%) were not students, but rather were employed in or retired from various occupations (e.g., retail, business, computing). Participants overall were very unfamiliar with the Strack facial feedback research prior to participation ($M = 2.21$, $SD = 1.57$), which was significantly below the scale midpoint of 4, $t(265) = 18.59$, $p < 0.001$, $d = 1.14$.

Design and Procedure

This study was pre-registered at https://osf.io/vy246/?view_only=95879962e6fb469fb226157edaecd861. The experiment employed a 2 (replication outcome: successful vs. failed replication) × 2 (scientist gender: male vs. female) between-subjects design. After consenting to participate, participants were told that researchers were interested in the public's perceptions of scholars whose research is part of the "reproducibility project." Introductory information defined and explained the purpose of replication and its importance to science. In addition, the information explained that sometimes research replicates and sometimes it does not. Participants then were required to spend at least 2 min viewing an ostensibly real single-page science news article describing the outcome of a large-scale attempt to replicate the original experimental investigation of the facial feedback hypothesis by Strack et al. (1988), in which holding a pen between their teeth (i.e., forcing a smile) elevated participants' mood, whereas holding a pen between their lips (i.e., forcing a frown) worsened participants' mood. This article contained our experimental manipulations. Participants were randomly assigned to one of four resulting conditions in which the experiment of Dr. Brian Strack versus Dr. Karen Strack either replicated or failed to replicate. They then completed (in a random order) measures of the researcher's competence, likability, integrity, perceptions of the research, and desired future interactions with the researcher. For each item that referred to the researcher, the researcher's first name (i.e., Brian or Karen) was piped in to ensure the salience of the researcher

gender manipulation.[1] In addition, instructions for each of the key dependent measures underscored that we were interested in participants' opinions and that there were no right or wrong answers. Two attention check items were embedded in the dependent measures (i.e., "If you are reading this, click the number 4″; "The answer to this question is 2. Please click 2."). Following their completion of the dependent measures (described in greater detail below), participants responded to two manipulation check items to ensure that they could correctly identify the gender of the researcher from the news story (i.e., "What was the gender of the researcher you read about?") and the outcome of the replication attempt (i.e., "What was the outcome of the replication attempt that you read about?"). Lastly, participants completed demographic items, including gender, race and ethnicity, age, United States region of residence, country of origin, whether English is their first language, socioeconomic status, occupation, and student status. Participants also completed an item to assess their degree of familiarity with psychological research on the effects of smiling on mood prior to taking part in the study (1 = not at all familiar to 7 = extremely familiar). The last screen of the survey debriefed participants with regard to the purpose of the study and the fact that the news article was created for the purposes of the experiment.

Measures

Researcher Competence

Participants completed 12 items assessing perceived researcher competence. Seven of the items, adapted from Smith et al. (2007), were statements (e.g., I would describe Dr. Strack as a highly skilled researcher) to which participants indicated their agreement on seven-point Likert-type scales (1 = strongly disagree to 7 = strongly agree). Four items, adapted from Moss-Racusin and Miller (2016) asked participants to indicate the likelihood (1 = not at all to 7 = very much) that Dr. Strack had certain qualities (e.g., the necessary skills to perform well as a researcher). One item asked participants to indicate the likelihood (on a scale from 0% no chance to 100% definitely) that Dr. Strack would receive a prestigious award for their research in the next 5 years. After reverse-scoring relevant items, we standardized each, given they were on different scales, and examined their reliability. The 12 standardized items were highly reliable ($\alpha = 0.92$) and were averaged to form a scale, with higher scores indicating greater perceived competence.

Researcher Likability

Using a seven-point scale (1 = not at all to 7 = very much), participants responded to six items adapted from Smith et al. (2007) and Moss-Racusin and Johnson (2016) regarding how much they thought they would like the researcher. For example, "I think I would like Dr. Strack as a person." The items demonstrated high internal consistency ($\alpha = 0.92$) and were averaged to form an index, with higher scores indicating greater likability.

Researcher Integrity

Participants indicated on seven-point scales (1 = not at all to 7 = very much) the extent to which they perceived the researcher as having integrity. There were nine total items (e.g., "To what extent do you think Dr. Strack is trustworthy?"). Three of these items were adapted from Biernat et al. (1996), one item was adapted from Smith et al. (2007), and the remaining five items were created for this study. After reverse-scoring relevant items, reliability analysis indicated strong internal consistency ($\alpha = 0.94$). We created an index of researcher integrity by averaging items such that higher scores indicate greater perceived integrity.

Perceptions of the Research

Participants responded to seven items concerning their perceptions of the research. Two items were adapted from Handley et al. (2015) and concerned funding, including one open-ended question regarding the budget they would suggest Dr. Strack should receive for more research in this area by the National Foundation. Participants were told that such grants typically range from $100,000 to $900,000 with an average of $500,000. Participants responded to the remaining items (e.g., How important is more research on this topic) on seven-point scales (1 = not at all to 7 = very much). After reverse-scoring relevant items, items were standardized, as they were on different scales. The standardized items demonstrated good reliability ($\alpha = 0.91$) and were averaged to form an index with higher scores indicating more favorable perceptions of the research.

Future Interactions

Participants responded to five items (e.g., How likely are you to attend a public lecture by Dr. Strack) regarding their desired future interactions with the researcher. The items were developed for this study based on ways that the public might likely engage with academic researchers (e.g., attending lectures, searching for additional articles by the researcher). Participants responded using seven-point scales (1 = extremely unlikely to 7 = extremely likely). The items were highly reliable ($\alpha = 0.91$) and were averaged to form an index such that higher scores represent greater likelihood of future interactions.[2]

[1]In an earlier pre-registered study that yielded virtually identical results as the studies reported in this paper (for complete access to materials and data, see https://osf.io/vq2as/?view_only=354d1ad17bfa433092f0f6f5a2724265), we did not make researcher gender salient in this way. In Studies 1 and 2 of this paper we attempted to strengthen our original researcher gender manipulation through repeated reference to the researcher's full name. Furthermore, in our initial pre-registered study, the fictitious articles containing the manipulations did not make mention of the researcher's reactions to the failed replication of their work. In Studies 1 and 2 of this paper, we attempted to create a context (through researcher quotes in the stimulus articles) that suggested the researcher was overly self-confident (i.e., a context in which women might be more likely to be penalized). Despite this change, our findings were consistent across experiments.

[2]In addition to these critical measures, for which we had pre-registered hypotheses, we asked participants to respond to exploratory open-ended and closed-ended questions regarding their perceptions of how the researcher should feel and react to the replication outcome as well as how they personally felt upon learning about the outcome. These measures and data are available on the registration website for interested readers.

Results and Discussion

We first examined the descriptive statistics and correlations among the variables of interest. As shown in **Table 1**, outcomes were positively correlated, as expected.

Next, we conducted univariate analyses of variance (ANOVAs) on each dependent measure, including participant gender as a variable. Across all of these analyses, participant gender yielded only two significant findings, and neither qualified any of the findings reported below; thus, we dropped participant gender from analyses and report findings from two-way between-subjects ANOVAs including scientist gender and replication outcome as predictors. Furthermore, controlling for participants' self-reported prior familiarity with Strack's facial feedback research did not change any of the reported results.

Results revealed significant main effects of replication outcome on each of the dependent variables. As shown in **Table 2**, participants perceived the researcher as significantly less competent [$F(1, 262) = 63.53$, $p < 0.001$, $d = 0.98$], less likable [$F(1, 262) = 21.27$, $p < 0.001$, $d = 0.57$], and as having less integrity [$F(1, 262) = 55.35$, $p < 0.001$, $d = 0.91$] when their work failed to replicate than when it successfully replicated. Additionally, participants perceived the research less favorably (e.g., as less important and deserving of funding) [$F(1, 262) = 62.12$, $p < 0.001$, $d = 0.97$], and intended to interact less with the researcher [$F(1, 261) = 53.17$, $p < 0.001$, $d = 0.90$] when their results failed to replicate than when the replication attempt was successful. Across study outcomes, there were no significant main effects of nor interactions with scientist gender ($ps > 0.05$), in contrast to our gender-replication hypothesis.

Study 1 conceptually replicated past research and provided further evidence that replication failures lead to more negative perceptions of researchers and their research. Expanding upon earlier findings (Ebersole et al., 2016; Hendriks et al., 2020), we demonstrated in a sample of adults not only did the public have more negative perceptions of a researcher's competence and scientific integrity and of their research when their findings failed to replicate than when they replicated successfully, but they also liked the researcher less and reported weaker behavioral intentions to interact with them in the future. Of importance, the observed effect sizes were very robust, suggesting that the consequences of a failed replication are quite serious and arguably greater than is justified, given the nature of what a failed replication can(not) tell us (Maxwell et al., 2015; Schmidt and Oh, 2016).

Contrary to our gender-replication hypothesis, findings did not suggest that women were evaluated more harshly than men when their findings failed to replicate. We considered, however, whether that was a function of the sample of laypeople, who are perhaps less invested than some other populations in evaluating academic psychologists, with whom they may have limited personal interactions. Might people who engage more regularly with psychology faculty, such as college students, respond differently? We conducted the same experiment with a sample of undergraduate students to explore that possibility.

STUDY 2

Some research provides reason to believe that college undergraduates would be more critical of women faculty whose work fails to replicate than they would be of a male faculty member with a failed replication. For example, in an experiment of teaching evaluations, students in a social science course were randomly assigned to online discussion groups in which a male versus a female assistant presented themselves with their own versus the other assistant's identity (i.e., as male vs. female, regardless of their own gender). At the end of the term, students evaluated their assistant instructor more harshly when they perceived her to be female (MacNell et al., 2015). In other research, women-identifying professors not only reported experiencing more requests for special favors from students than their male colleagues, but experimental evidence also demonstrated that students were more likely to expect a female vs. a male professor to grant favors, especially when those students were high in academic entitlement (El-Alayli et al., 2018). These studies collectively suggest that women faculty

TABLE 1 | Descriptives and correlations among all outcomes in Study 1.

	Mean (SD)	1	2	3	4	5	6	7	8	9
1. Standardized competence	0.00 (0.74)	(0.92)								
2. Likelihood prestigious award	35.93 (27.74)	0.63*	–							
3. Competence (sans Award item)	4.92 (1.06)	0.99*	0.56*	(0.92)						
4. Likability	4.38 (1.29)	0.64*	0.43*	0.64*	(0.92)		.			
5. Integrity	4.57 (1.29)	0.76*	0.40*	0.76*	0.72*	(0.94)				
6. Standardized research perceptions	0.00 (0.80)	0.79*	0.56*	0.78*	0.68*	0.73*	(0.88)			
7. NSF	239859.78 (204,587.04)	0.59*	0.44*	0.58*	0.45*	0.53*	0.72*	–		
8. Research perceptions (sans NSF item)	4.45 (1.20)	0.81*	0.52*	0.81*	0.64*	0.79*	0.93*	0.60*	(0.87)	
9. Future interactions	3.48 (1.67)	0.60*	0.52*	0.58*	0.65*	0.61*	0.75*	0.52*	0.67*	(0.91)

Correlation is significant at the 0.01 level (two-tailed).

Cronbach's alpha is reported on the diagonal where relevant. Competence and Research Perceptions were standardized to accommodate different scales of measurement. Likelihood of Prestigious Award was a single item (0–100) that was part of the Standardized Competence scale, and Competence sans this item is reported for interpretation of mean scores. NSF was a single item numeric response that could range from 0 to 900,000 and was part of the Standardized Research Perceptions scale. All other measures were on seven-point scales.

TABLE 2 | Study 1 dependent variable means and standard deviations by experimental conditions and participant gender.

	Successful replication				Failed replication			
	Male scientist		Female scientist		Male scientist		Female scientist	
	Men	Women	Men	Women	Men	Women	Men	Women
Competence	0.30 (0.50)	0.38 (0.52)	0.17 (0.75)	−0.27 (0.70)	−0.30 (0.81)	−0.26 (0.62)	−0.46 (0.72)	−0.27 (0.70)
Likability	4.72 (1.35)	4.34 (1.43)	4.55 (1.25)	5.23 (1.14)	4.17 (1.12)	3.95 (1.32)	3.79 (1.13)	4.17 (1.11)
Integrity	4.98 (1.28)	4.80 (1.20)	5.17 (1.12)	5.43 (0.95)	4.02 (1.22)	4.22 (1.14)	3.77 (1.04)	4.17 (1.34)
Research Perceptions	0.35 (0.77)	0.21 (0.82)	0.22 (0.67)	0.59 (0.66)	−0.39 (0.61)	−0.18 (0.75)	−0.54 (0.71)	−0.27 (0.75)
Future Interactions	4.26 (1.71)	3.84 (1.71)	4.02 (1.39)	4.41 (1.63)	2.88 (1.39)	2.89 (1.48)	2.63 (1.32)	2.75 (1.64)

Competence and Research Perceptions were standardized to accommodate different scales of measurement. All other measures were on seven-point scales.

may walk a tighter rope with students than male faculty walk (see Williams and Dempsey, 2014). Thus, we again tested our gender-replication hypothesis, but with a student sample.

Method

Participants

The design of the experiment was identical to that of Study 1, for which G*Power software (Faul et al., 2009) recommended a sample of 199 participants would provide 80% power to test our hypothesized interaction, assuming a small effect size ($d = 0.20$) and an alpha of 0.05. Given we did not obtain the predicted interaction in Study 1, we intentionally increased our sample in Study 2. Three hundred fifty students enrolled in Introduction to Psychology at a large Midwestern university completed the study in exchange for research credit. After removing 17 participants (4.86% of the sample) who failed the scientist gender manipulation check (13 in the male scientist condition and 4 in the female scientist condition), and 43 participants (12.29% of the sample) who failed the replication outcome manipulation check (22 in the successful condition, 21 in the failed condition), 19 people (5.43%) who were missing manipulation check data, and another 19 (5.43%) with missing or failed attention check data, the working sample included 252 (mostly White, 74.2%) participants (139 men, 111 women, 2 other) with an average age of 20.31 years (SD = 3.93 years). Most participants (89.3%) were originally from the United States, with English as their first language (87.3%) and middle-class self-reported SES ($M = 3.44$, $SD = 1.06$ on a 5-point scale where 1 = I cannot make ends meet to 5 = I do not have to worry about money). Participants overall were not familiar with the Strack facial feedback research prior to participation ($M = 3.35$, $SD = 1.94$), which was significantly below the scale midpoint of 4, $t(251) = 5.29$, $p < 0.001$, $d = 0.33$.

Design and Procedure

The experimental design and procedure were identical to Study 1.

Measures

Measures were identical to those used in Study 1, with the exception of the future interaction items, which were adapted to fit the ways in which college students, instead of the general public, might interact with researchers (e.g., take a class with Dr. Strack, apply to work in Dr. Strack's lab as a research assistant). In this study, seven items were used to assess likelihood of future interactions, and as in Study 1, these items were highly reliable ($\alpha = 0.89$) and were therefore averaged to form an index where higher scores indicate greater likelihood of future interactions with the scientist. Researcher competence ($\alpha = 0.89$), likability ($\alpha = 0.88$), integrity ($\alpha = 0.90$), and perceptions of the research ($\alpha = 0.85$) were identical to the measures used in Study 1 and had similarly good psychometric properties.

Results and Discussion

Similar to Study 1, dependent variables were positively correlated, as shown in **Table 3**. In addition, analyses revealed inconsistent main effects of participant gender, but in no case did participant gender interact with the key manipulation of replication outcome. Thus, we dropped it from further analysis and report main effects of and interactions between scientist gender and replication outcome for each of the dependent variables. Additionally, controlling for participants' familiarity with prior research on the facial feedback hypothesis did not change our findings.

Replicating findings from Study 1, results revealed significant main effects of replication outcome on each of the dependent variables, but no main effect of or interaction with scientist gender ($ps > 0.23$). As shown in **Table 4**, participants perceived the researcher as significantly less competent [$F(1, 248) = 27.59$, $p < 0.001$, $d = 0.66$], less likable [$F(1, 248) = 21.34$, $p < 0.001$, $d = 0.58$], and as having less integrity [$F(1, 248) = 51.87$, $p < 0.001$, $d = 0.91$] when their work failed to replicate than when it successfully replicated. Participants also perceived the research less favorably [$F(1, 248) = 27.16$, $p < 0.001$, $d = 0.66$], and indicated poorer likelihood of future interactions with the researcher [$F(1, 248) = 34.56$, $p < 0.001$, $d = 0.74$] when the replication attempt was unsuccessful compared with when it was successful.

Demonstrating the generalizability of Study 1 findings across different populations, Study 2 further reinforced the extent to which failed replications in psychology affect confidence in both researchers and their research. These findings are potentially costly for academic researchers' career advancement, given the important role that students play in faculty promotion and tenure. For example, many social science faculty depend on undergraduate students as research assistants, and oftentimes can use students' accomplishments (e.g., research products,

TABLE 3 | Descriptives and correlations among all outcomes in Study 2.

	Mean (SD)	1	2	3	4	5	6	7	8	9
1. Standardized competence	0.03 (0.66)	(0.89)								
2. Likelihood prestigious award	38.16 (25.34)	0.59*	–							
3. Competence (sans Award item)	4.76 (0.79)	0.99*	0.50*	(0.88)						
4. Likability	3.92 (1.06)	0.51*	0.33*	0.51*	(0.88)		.			
5. Integrity	4.43 (1.09)	0.66*	0.38*	0.66*	0.59*	(0.90)				
6. Standardized research perceptions	0.03 (0.72)	0.65*	0.44*	0.64*	0.58*	0.57*	(0.85)			
7. NSF	265858.96 (176,845.38)	0.42*	0.38*	0.41*	0.31*	0.33*	0.64*	–		
8. Research perceptions (sans NSF item)	4.17 (1.11)	0.64*	0.41*	0.63*	0.58*	0.56*	0.99*	0.50*	(0.84)	
9. Future interactions	3.42 (1.37)	0.52*	0.45*	0.50*	0.52*	0.54*	0.59*	0.32*	0.59*	(0.89)

**Correlation is significant at the 0.01 level (two-tailed).*

Cronbach's alpha is reported on the diagonal where relevant. Competence and Research Perceptions were standardized to accommodate different scales of measurement. Likelihood of Prestigious Award was a single item (0–100) that was part of the Standardized Competence scale, and Competence sans this item is reported for interpretation of mean scores. NSF was a single item numeric response that could range from 0 to 900,000 and was part of the Standardized Research Perceptions scale. All other measures were on seven-point scales.

admissions to graduate programs) as evidence of their impact as a mentor. To the extent that failed replications raise doubts about researchers' competence and integrity, and decrease students' likelihood of taking classes from or seeking opportunities to work with them, faculty performance reviews will likely suffer.

As in Study 1, we did not find support for our gender-replication hypothesis in this study. Students were equally critical of a male versus a female researcher whose work failed to replicate, and equally favorable of those whose work successfully replicated. This was surprising, in light of previous studies in which students more negatively evaluated or expected more from female faculty versus male faculty (e.g., MacNell et al., 2015; El-Alayli et al., 2018). On the other hand, information about a failed replication may not make salient the fact that faculty not only conduct research, but also, as teachers and mentors, are frequently in positions in which they are critical of students, which is a key driver of students' denigration of women faculty (e.g., Sinclair and Kunda, 2000).

In Study 3, we tested our gender-replication hypothesis with a different method: archival analysis of data from a public replication-monitoring website. Although our data thus far suggest that women researchers are not evaluated more harshly than men researchers when their work fails to replicate, it could be that women are targeted more often in replication efforts.

STUDY 3

The effort to document the replicability of studies in psychology has led to the establishment of a variety of repositories in which scientists and consumers alike can read about replication results. One example of a popular public website is the Replicability-Index, or R-Index, blog,[3] created in 2014. Inspired by a controversial publication by social psychologist Bem (2011), the site indicates that its goals are to increase reproducibility of findings in social and personality psychology and to inform consumers of psychological research to problematic publications. Although transparent information-sharing is a welcome change in psychological research practices since the site was developed, some aspects of this particular website are potentially problematic. The site maintains a list of 400 social and personality psychologists who have published in 40 journals identified for analysis without clear selection criteria. Moreover, the complete works of each psychologist appearing on the list were not investigated; again, findings are included based on unspecified criteria. The psychologists are rank-ordered by the extent to which their observed discovery rates match their estimated discovery rates using a z-curve statistical package made available on the site. To be fair, the site points out that results are preliminary and should be interpreted with caution, given they are limited by the specific journals searched and the way results are reported, among "many other factors." Although helping the public think more critically about psychological (and other) research and increasing accountability among scientists are laudable goals that can serve to improve science, we suggest that targeting individual social scientists in this way (i.e., through a public rank-ordered list with unclear criteria) is counterproductive and invites the kinds of personal attacks described by Dr. Cuddy in our opening quote. In fact, the paragraph preceding the rank-ordered list of psychologists selected for scrutiny on the site states:

> "Here I am starting a project to list examples of bad scientific behaviors. Hopefully, more scientists will take the time to hold their colleagues accountable for ethical behavior in citations. They can even do so by posting anonymously on the PubPeer comment site."

Though this is only one exemplar case of an internet forum on this topic, because the criteria for selecting scientists for this published list were not clearly defined, and people can anonymously nominate scientists for investigation, we suggest that these rather opaque conditions are ripe for gender bias and selected it as a strong case to test our hypothesis. Past research in employment

[3]https://replicationindex.com/

TABLE 4 | Study 2 dependent variable means and standard deviations by experimental conditions and participant gender.

	Successful replication				Failed replication			
	Male scientist		Female scientist		Male scientist		Female scientist	
	Men	Women	Men	Women	Men	Women	Men	Women
Competence	0.14 (0.49)	0.29 (0.57)	0.09 (0.54)	0.41 (0.61)	−0.29 (0.53)	−0.05 (0.71)	−0.26 (0.83)	−0.08 (0.70)
Likability	4.30 (1.08)	4.26 (1.01)	3.90 (1.08)	4.36 (0.97)	3.58 (0.88)	3.63 (0.93)	3.53 (1.02)	3.71 (1.22)
Integrity	4.66 (0.95)	4.94 (0.99)	4.78 (1.17)	5.17 (0.94)	3.83 (0.79)	4.13 (0.87)	3.75 (1.06)	4.24 (1.09)
Research Perceptions	0.23 (0.72)	0.21 (0.66)	0.17 (0.57)	0.47 (0.60)	−0.21 (0.68)	0.03 (0.67)	−0.38 (0.66)	−0.16 (0.79)
Future Interactions	3.47 (1.47)	4.18 (1.17)	3.77 (0.97)	4.38 (1.35)	3.01 (1.16)	2.83 (1.31)	2.67 (1.31)	3.14 (1.23)

Competence and Research Perceptions were standardized to accommodate different scales of measurement. All other measures were on seven-point scales.

selection demonstrates that gender biases are more likely to manifest themselves when criteria are ambiguous (e.g., Heilman, 2012), and anonymity has been shown to be a key motivator of gender-based harassment (Wesselmann and Kelly, 2010). We therefore examined whether women psychological scientists were overrepresented relative to men on the R-Index site, and whether women were more likely than men to have poor rankings.

Method

We examined the list of 400 psychologists as it appeared on the R-index website[4] on 26 July 2021. Two independent coders naïve to the study hypothesis recorded the researchers' names and replicability rank order as listed on the website, and then they coded each researcher for their gender and indicated the quartile within which they were ranked. Although perceived gender is an imperfect measure of gender, the coders corroborated their ratings with researchers' websites to the extent that such information was available (e.g., whether the researcher used pronouns on their site), yielding 100% agreement. Chi-square calculations were computed using Preacher (2001) goodness of fit calculation software.

Results and Discussion

Of the 400 researchers listed on the site, 265 (66.3%) were coded as male and 135 (33.8%) were coded as female. A non-parametric bivariate correlation analysis was conducted using rank order and researcher gender, revealing no significant relationship, Spearman's rho = −0.02, $p > 0.66$. Thus, on the list as it appeared when data were collected, gender was not associated with rank-ordering by research replicability.

Interpreting these data is extremely challenging, because the criteria for selection are nebulous, and it is difficult to identify the most appropriate comparison for reference. If we assume that the population of social and personality psychologists is half male and half female, roughly reflecting the United States population (United States Census Bureau, 2021), then men are overrepresented in the R-Index list, $\chi^2(1) = 10.56$, $p < 0.01$. If we use the most recent membership statistics reported by the Society for Personality and Social Psychology (SPSP, 2019), in which cisgender women make up 54% and cisgender men 41% of the organization, then men appear to be overrepresented to an even greater degree, $\chi^2(1) = 137.11$, $p < 0.001$. This might be an appropriate metric if all social and personality psychologists were ranked on the site, but they are not. It is unclear what the "expected percent" of women on a list like this should ultimately be, because so little is known about the criteria that predict having one's work selected for replication attempts. For example, perhaps it would be more accurate to compare the observed percent of women on the R-Index list to the percent of those who first author "classic" or canonical work in social psychology (assuming that this is the work most likely to be selected for replication attempts, although this may not be the case; see Lindsay, 2015). Although it is difficult to calculate this expected percentage (i.e., operationalizing "canonical" work could be accomplished in many different ways), if we use findings regarding first authorship in social and personality psychology's top journals, wherein Brown and Goh (2016) reported that 34% were women, then our findings match almost perfectly, $\chi^2(1) = 0.003$, $p > 0.95$.

Regardless of which existing point of comparison is used, these data suggest that women researchers in social and personality psychology were not overtly targeted by this site more often or ranked lower than their male peers. Thus, we did not find support for our gender-replication hypothesis. That said, given our experimental findings about public and student reactions to researchers whose findings have failed to replicate, coupled with the lack of clarity for how researchers are selected for this site, we maintain that this public list is likely to have reputational costs for the social scientists who appear on it (as discussed further below), regardless of their gender.

GENERAL DISCUSSION

Across a pre-registered experiment, a replication of that experiment, and analysis of data from a public weblog, we examined the reputational costs for a social science researcher whose single study failed to replicate, and whether those costs are greater when that researcher is a woman versus a man. Results indicated a sweeping negative reaction to the researcher with the failed replication, among both the general public (i.e., adult workers from Amazon's Mechanical Turk) and among

[4]https://replicationindex.com/2021/01/19/personalized-p-values/

college undergraduates; the social scientist was viewed as less competent, less likable, as having less integrity, and their entire body of work was called into question. Furthermore, both students and the general public expressed a decreased desire to interact with the researcher in the future in ways that have potential downstream negative repercussions for their career (e.g., inviting the researcher for a workplace consultation, applying to work in the researcher's lab) when their original finding failed to replicate. Our results did not support the prediction that if the researcher was a woman, she would be more harshly penalized than if that same researcher was presented as a man. This null finding held for both public and college student perceivers. Nor did our results, based on analysis of data gleaned from a psychologist's public weblog, find that gender of the researcher factored into the ranking of psychological scientists' replicability status.

Theoretical and Practical Implications

The current findings have important implications for research on the impact of the reproducibility movement on perceptions of psychologists and other social scientists, as well as people's overall perceived value of these fields as a result of failed replications. Previous research has shown that learning about psychology's "replication crisis" not only decreases public trust of psychological research (Anvari and Lakens, 2018), but that, perhaps because people do not differentiate among the many reasons for failed replications (many of which are not nefarious; Chopik et al., 2018), restoring public trust in psychology is an exceedingly difficult task (Wingen et al., 2020). Our experiments focused instead on failed replications of a *single* finding from an individual researcher. Consistent with prior research that also examined reputational consequences for individual social scientists with a failed study replication (Ebersole et al., 2016; Hendriks et al., 2020), our findings revealed that a failed replication broadly decreases perceptions of a researcher's competence and scientific integrity, across their entire body of work (rather than just the particular work targeted for replication). Furthermore, our findings uniquely demonstrated consequences for perceived likability and behavioral intentions to interact with the researcher or engage with their work in the future. For example, our public sample reported being less likely to attend a public lecture by the researcher and less likely to invite them to their workplace as a consultant when their work failed to replicate than when it successfully replicated. Similarly, college students indicated that they would be less likely to take a class from or to join the research team of a researcher with a failed replication. Thus, our findings conceptually replicate and extend past findings beyond attitudinal consequences to include behavioral intentions toward researchers when findings from a single study of theirs fail to replicate.

We did not, however, find support for our gender-replication hypothesis, which was based on past and recent evidence of gender disparities in psychology and other social sciences, as well as in STEM, and based on some scholars' characterization of academia as a masculinity contest culture (Kaeppel et al., 2020). In the present studies, we did not observe that women fared worse than men for a failed replication. Interpreting null results is always a cautious endeavor. It is clear that in both experiments, for example, some people did not pay attention to the gender of the researcher (indicated by failing the manipulation checks), but excluding those participants did not change the fact that, across a public and a college sample, participants did not evaluate the researcher differently as a function of our gender manipulation. On the one hand, this may hold promise that negative stereotypes of women researchers are fading, or that they are at least less prevalent in psychology, which is perceived to be a highly feminine field of study (Boysen et al., 2021). In this way, our findings are consistent with recent evidence demonstrating greater gender equity in the social sciences (Williams and Ceci, 2015; Bernstein et al., 2022), and this is a welcome change. On the other hand, women in psychology continue to be underrepresented in positions of leadership and influence (Gruber et al., 2021), and are less likely than men to be invited to share their work (Johnson et al., 2017; Nittrouer et al., 2018), to be cited (Brown and Goh, 2016), or to be featured prominently in graduate syllabi (Skitka et al., 2021). The fact that these disparities remain underscores the need for continued research attention to this matter and evidence-based policy changes in academia.

Our findings have practical implications for social scientists with regard to concerns about the reproducibility movement. For example, although some research suggests that researchers overestimate the personal reputational costs of failed replications (Fetterman and Sassenberg, 2015), our findings make it clear that those serious costs do exist. In the eyes of both the general public and college students, a single failed replication tarnished the researcher's reputation and the esteem with which their work was held, and it led to more negative behavioral intentions toward the researcher. All of these outcomes may come with serious downstream career consequences, as academic researchers must demonstrate their ability to recruit students for their labs and to market their ideas to the public (e.g., broader impacts in grant submissions). Social scientists with "gatekeeper" roles, such as on academic search committees, tenure and promotion committees, and other merit review boards, should consider whether a single failed replication warrants the dismissal of one's entire body of work versus constituting part of an effective scientific self-correcting process.

In addition, our findings echo concerns raised about the antagonistic culture surrounding the reproducibility movement. Network analyses reveal that there are two distinct clusters of literatures that have emerged from the "crisis": one centering "open science" and the other centering "reproducibility" (Murphy et al., 2020). Analyses furthermore reveal that the open science literature is associated with more communal and prosocial descriptive language than the reproducibility literature, and women have greater representation in the open science literature than in the reproducibility literature. These findings suggest that the replication movement need not be a masculinity contest culture, where showing signs of weakness is proscribed (Berdahl

et al., 2018). In light of the robust effects we observed with regard to the impact of a single failed replication on perceptions of the researcher, websites or other media that serve to raise doubts about individual researchers' scientific integrity may contribute—even if unintentionally—to a masculine contest culture, where doubts are viewed as weak, as illustrated by items on the validated measure of masculinity contest culture (e.g., "In my work environment, admitting you do not know the answer looks weak"; Glick et al., 2018). Although we did not manipulate the researcher's reactions to the failed replication in our experiments, participants perceived those researchers as less competent and knowledgeable, effectively admitting they did not have the "right" answers. Rather than contribute to a toxic academic culture, the findings of Murphy et al. (2020) provide reason for optimism that open science practices can serve as effective tools for improving science through transparency and educating people about the self-correcting nature of the scientific enterprise.

Limitations and Future Directions

We note several limitations of our research. First, though we demonstrated the impact of failed replications on researcher and research perceptions among both public and student samples, the strongest test of our gender-replication hypothesis would be among a sample of researchers themselves. Although we did test this hypothesis using public weblog data to see whether members of the social science community would be more likely to target women for replication attempts, we examined only one website, which is likely not representative of the discipline at large. Another website (or list of replication efforts) might yield different results with respect to researcher gender, and, in fact, the R-Index site list itself changes with some frequency. Additionally, determining whether any list of researchers identified as candidates for replication is conclusive, and determining the appropriate benchmark with which to compare such a list, are exceedingly difficult tasks. As a result, we cannot know for sure the extent to which the current archival results are accurate and/or generalize, but we do know that the R-Index website is widely promoted on social media and thus likely highly visible. Future research might utilize algorithms to scrape other websites for information about women researchers targeted by their peers in the reproducibility movement.

Relatedly, there are important individual differences and contextual factors not addressed in the present research that likely have implications for how perceivers react to failed replications. For example, one would expect reactions to be more gendered to the extent that perceivers have implicitly or explicitly sexist views, or do not believe that women researchers face career obstacles due to gender bias (see Régner et al., 2019). In addition, given that women are penalized for displays of dominance, it might be important to examine whether they are more likely targeted by the reproducibility movement when they are especially high-status (Rudman et al., 2012).

We also included only binary categories of gender in the present research, which is a critical shortcoming of much research in psychology and other social sciences (see Tate et al., 2013; Schudson, 2021), and we did not examine the effect of researcher race or ethnicity. We expect that the marginalization related to non-binary and transgender identities may experience even greater reputational costs and potential backlash for researchers with those identities when faced with a failed replication, due to threat they elicit among perceivers (Morgenroth and Ryan, 2021). Additionally, there is reason to predict that people of color would experience a replication failure harshly (Matthew, 2016), but how this might interact with their gender identity is hard to say, given the unique stereotypes associated with intersectional identities (e.g., Ghavami and Peplau, 2013; Rosette et al., 2016). These are important avenues for future research.

Another possible limitation of our experiments concerns the topic we chose for our experimental stimuli. The embodied cognition literature has been a target of criticism, and researchers have recommended more studies from that literature follow open science best practices (Zwaan, 2021). Although, in the present studies, participants' familiarity with prior studies of the facial feedback hypothesis did not alter results, future research on perceptions of failed replications might vary the research topic in the interest of generalizability.

Finally, future research should examine how a researcher's reaction to a replication outcome (e.g., *via* social media or the popular press) is perceived by others. Fetterman and Sassenberg (2015) found that researchers perceived wrongfulness admission to benefit other researchers with regard to suspicion about their other work besides their finding that failed to replicate, but they did not perceive those same benefits of admitting wrongfulness for themselves. Such findings open the door for future studies to understand how a researcher can bounce back in others' eyes after a failed replication that was not due to scientific misconduct or QRPs but instead was part of the normal self-correcting process that is scientific inquiry. Rather than putting the onus on individual researchers to deflect harsh criticism like that behind the quote with which we opened this paper, we suggest that the culture must change, especially if we are to address identity-based disparities that exist within it (see Moss-Racusin et al., 2021).

CONCLUSION

The participation of women in academic social science has improved immensely over the past several decades (e.g., Ginther and Kahn, 2014; National Center for Science and Engineering Statistics Survey of Earned Doctorates (NCSES), 2021). However, the increase in women's representation is tempered by the fact that far fewer women than men occupy positions of influence (as full professors) and power (as university leaders; e.g., Reis and Grady, 2018). As merit reviews and promotion standards at research universities often depend heavily on publications, citations, and evaluation by peers as primary indices of "impact" (Gutiérrez y Muhs et al., 2012), it is important to examine how a single social science research study that fails to replicate (versus successfully replicates) shapes opinions about and behavioral intentions toward the researcher and their work. Given the often inconclusive nature of replication studies (Etz

and Vandekerckhove, 2016), our findings raise the question of whether people make broader and more negative attributions about the researcher and their entire body of work than a single failed replication warrants. In addition, given women's underrepresentation at the highest ranks in academia (even in fields with relative gender parity overall), it is imperative to understand whether women-identified social scientists might be especially at risk for backlash when their research fails to replicate. Our work is an important first step toward answering these questions.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Indiana University. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

LA-N, CM-R, JS, TV, and PG contributed to the conceptualization and design of the studies. CM-R pre-registered the experiments. CS created experimental stimuli, tables, figures, and references. LA-N collected the data, performed the analyses, and wrote the first draft of the manuscript. All authors contributed to the article and approved the submitted version.

REFERENCES

Anvari, F., and Lakens, D. (2018). The replicability crisis and public trust in psychological science. *Compreh. Results Soc. Psychol.* 3, 266–286. doi: 10.1080/23743603.2019.1684822

Asendorpf, J. B., Conner, M., De Fruyt, F., De Houwer, J., Denissen, J. J. A., Fiedler, K., et al. (2013). Recommendations for increasing Replicability in psychology. *Eur. J. Pers.* 27, 108–119. doi: 10.1002/per.1919

Bamishigbin, J. (2021). And I'm really not saying this to be a jerk. I've been on twitter for 4 years and I've seen this [tweet]. Twitter. Available at: https://twitter.com/jidebam/status/1459745541030486022 (Accessed November 14, 2021).

Baumeister, R. F., Vohs, K. D., and Funder, D. C. (2007). Psychology as the science of self-reports and finger movements: whatever happened to actual behavior? *Perspect. Psychol. Sci.* 2, 396–403. doi: 10.1111/j.1745-6916.2007.00051.x

Begeny, C. T., Ryan, M. K., Moss-Racusin, C. A., and Ravetz, G. (2020). In some professions, women have become well represented, yet gender bias persists—perpetuated by those who think it is not happening. *Sci. Adv.* 6, eaba7814–eaba7810. doi: 10.1126/sciadv.aba7814

Bem, D. J. (2011). Feeling the future: experimental evidence for anomalous retroactive influences on cognition and affect. *J. Pers. Soc. Psychol.* 100, 407–425. doi: 10.1037/a0021524

Bench, S. W., Rivera, G. N., Schlegel, R. J., Hicks, J. A., and Lench, H. C. (2017). Does expertise matter in replication? An examination of the reproducibility project: psychology. *J. Exp. Soc. Psychol.* 68, 181–184. doi: 10.1016/j.jesp.2016.07.003

Berdahl, J. L., Cooper, M., Glick, P., Livingston, R. W., and Williams, J. C. (2018). Work as a masculinity contest. *Aust. J. Soc. Issues* 74, 422–448. doi: 10.1111/josi.12289

Bernstein, R. H., Macy, M. W., Williams, W. M., Cameron, C. J., Williams-Ceci, S. C., and Ceci, S. J. (2022). Assessing gender Bias in particle physics and social science recommendations for academic jobs. *Soc. Sci.* 11:74. doi: 10.3390/socsci11020074

Bian, L., Leslie, S.-J., Murphy, M. C., and Cimpian, A. (2018). Messages about brilliance undermine women's interest in educational and professional opportunities. *J. Exp. Soc. Psychol.* 76, 404–420. doi: 10.1016/j.jesp.2017.11.006

Biernat, M., Vescio, T. K., and Theno, S. A. (1996). Violating American values: a "value congruence" approach to understanding Outgroup attitudes. *J. Exp. Soc. Psychol.* 32, 387–410. doi: 10.1006/jesp.1996.0018

Boysen, G. A., Chicosky, R. L., Rose, F. R., and Delmore, E. E. (2021). Evidence for a gender stereotype about psychology and its effect on perceptions of men's and women's fit in the field. *J. Soc. Psychol.* 161, 1–19. doi: 10.1080/00224545.2021.1921682

Brown, A. J., and Goh, J. X. (2016). Some evidence for a gender gap in personality and social psychology. *Soc. Psychol. Personal. Sci.* 7, 437–443. doi: 10.1177/1948550616644297

Brown, E. R., Smith, J. L., and Rossmann, D. (2022). "Broad" impact: perceptions of sex/gender-related psychology journals. *Front. Psychol.* 13:796069. doi: 10.3389/fpsyg.2022.796069

Camerer, C. F., Dreber, A., Holzmeister, F., Ho, T. H., Huber, J., Johannesson, M., et al. (2018). Evaluating the replicability of social science experiments in nature and science between 2010 and 2015. *Nat. Hum. Behav.* 2, 637–644. doi: 10.1038/s41562-018-0399-z

Ceci, S. J. (2018). Women in academic science: experimental findings From hiring studies. *Educ. Psychol.* 53, 22–41. doi: 10.1080/00461520.2017.1396462

Cheryan, S., and Markus, H. R. (2020). Masculine defaults: identifying and mitigating hidden cultural biases. *Psychol. Rev.* 127, 1022–1052. doi: 10.1037/rev0000209

Chopik, W. J., Bremner, R. H., Defever, A. M., and Keller, V. N. (2018). How (and Whether) to teach undergraduates about the replication crisis in psychological science. *Teach. Psychol.* 45, 158–163. doi: 10.1177/0098628318762900

Cuddy, A. (2021). Sharing a frustration that I'm working through – one that I think many mobbing/bullying targets have experienced: my organization/field is beginning [tweet]. Twitter. Available at: https://twitter.com/amyjccuddy/status/1381304459850960896 (Accessed November 17, 2021).

Ebersole, C. R., Atherton, O. E., Belanger, A. L., Skulborstad, H. M., Allen, J. M., Banks, J. B., et al. (2016). Many labs 3: evaluating participant pool quality across the academic semester via replication. *J. Exp. Soc. Psychol.* 67, 68–82. doi: 10.1016/j.jesp.2015.10.012

El-Alayli, A., Hansen-Brown, A. A., and Ceynar, M. (2018). Dancing backwards in high heels: female professors experience more work demands and special favor requests, particularly from academically entitled students. *Sex Roles* 79, 136–150. doi: 10.1007/s11199-017-0872-6

Etz, A., and Vandekerckhove, J. (2016). A Bayesian perspective on the reproducibility project: psychology. *PLoS One* 11, 1–12. doi: 10.1371/journal.pone.0149794

Fanelli, D. (2009). How many scientists fabricate and falsify research? A systematic review and meta-analysis of survey data. *PLoS One* 4:e5738. doi: 10.1371/journal.pone.0005738

Fanelli, D. (2018). Opinion: is science really facing a reproducibility crisis, and do we need it to? *Proc. Natl. Acad. Sci.* 115, 2628–2631. doi: 10.1073/PNAS.1708272114

Faul, F., Erdfelder, E., Buchner, A., and Lang, A. G. (2009). Statistical power analyzes using G*power 3.1: tests for correlation and regression analyses. *Behav. Res. Methods* 41, 1149–1160. doi: 10.3758/BRM.41.4.1149

Fetterman, A. K., and Sassenberg, K. (2015). The reputational consequences of failed replications and wrongness admission among scientists. *PLoS One* 10, 1–13. doi: 10.1371/journal.pone.0143723

Folkenflik, D. (2021). After Contentious Debate, UNC Grants Tenure To Nikole Hannah-Jones. NPR. Available at: https://www.npr.org/2021/06/30/1011880598/after-contentious-debate-unc-grants-tenure-to-nikole-hannah-jones (Accessed November 21, 2021).

Ghavami, N., and Peplau, L. A. (2013). An intersectional analysis of gender and ethnic stereotypes: testing three hypotheses. *Psychol. Women Q.* 37, 113–127. doi: 10.1177/0361684312464203

Ginther, D., and Kahn, S. (2014). "Academic women's careers in the social sciences," in *The Economics of Economists: Institutional Setting, Individual Incentives, and Future Prospects*. eds. A. Lanteri and J. Vromen (Cambridge University Press), 285–316.

Glick, P., Berdahl, J. L., and Alonso, N. M. (2018). Development and validation of the masculinity contest culture scale. *Aust. J. Soc. Issues* 74, 449–476. doi: 10.1111/josi.12280

Gruber, J., Prinstein, M. J., Clark, L. A., Rottenberg, J., Abramowitz, J. S., Albano, A. M., et al. (2021). Mental health and clinical psychological science in the time of COVID-19: challenges, opportunities, and a call to action. *Am. Psychol.* 76, 409–426. doi: 10.1037/amp0000707

Gutiérrez y Muhs, G., Niemann, Y. F., González, C. G., and Harris, A. P. (eds.) (2012). *Presumed Incompetent: The Intersections of Race and Class for Women in Academia*. Logan, UT: Utah State University Press.

Handley, I. M., Brown, E. R., Moss-Racusin, C. A., and Smith, J. L. (2015). Quality of evidence revealing subtle gender biases in science is in the eye of the beholder. *Proc. Natl. Acad. Sci. U. S. A.* 112, 13201–13206. doi: 10.1073/pnas.1510649112

Heilman, M. E. (2012). Gender stereotypes and workplace bias. *Res. Organ. Behav.* 32, 113–135. doi: 10.1016/j.riob.2012.11.003

Heilman, M. E., and Haynes, M. C. (2005). No credit where credit is due: attributional rationalization of women's success in male-female teams. *J. Appl. Psychol.* 90, 905–916. doi: 10.1037/0021-9010.90.5.905

Hendriks, F., Kienhues, D., and Bromme, R. (2020). Replication crisis = trust crisis? The effect of successful vs failed replications on laypeople's trust in researchers and research. *Public Underst. Sci.* 29, 270–288. doi: 10.1177/0963662520902383

Johnson, C. S., Smith, P. K., and Wang, C. (2017). Sage on the stage: women's representation at an academic conference. *Pers. Soc. Psychol. Bull.* 43, 493–507. doi: 10.1177/0146167216688213

Kaeppel, K., Grenier, R. S., and Björngard-Basayne, E. (2020). The F word: the role of women's friendships in navigating the gendered workplace of academia. *Hum. Resour. Dev. Rev.* 19, 362–383. doi: 10.1177/15344843 20962256

Knobloch-Westerwick, S., Glynn, C. J., and Huge, M. (2013). The Matilda effect in science communication: an experiment on gender Bias in publication quality perceptions and collaboration interest. *Sci. Commun.* 35, 603–625. doi: 10.1177/1075547012472684

Lindsay, D. S. (2015). Replication in psychological science. *Psychol. Sci.* 26, 1827–1832. doi: 10.1177/0956797615616374

Litman, L., Robinson, J., and Abberbock, T. (2017). TurkPrime.com: a versatile crowdsourcing data acquisition platform for the behavioral sciences. *Behav. Res. Methods* 49, 433–442. doi: 10.3758/s13428-016-0727-z

MacNell, L., Driscoll, A., and Hunt, A. N. (2015). What's in a name: exposing gender Bias in student ratings of teaching. *Innov. High. Educ.* 40, 291–303. doi: 10.1007/s10755-014-9313-4

Madera, J. M., Hebl, M. R., and Martin, R. C. (2009). Gender and letters of recommendation for academia: agentic and communal differences. *J. Appl. Psychol.* 94, 1591–1599. doi: 10.1037/a0016539

Matthew, P. A. (2016). *Written/Unwritten: Diversity and the Hidden Truths of Tenure. 1st Edn.* University of North Carolina Press.

Maxwell, S. E., Lau, M. Y., and Howard, G. S. (2015). Is psychology suffering from a replication crisis? What does "failure to replicate" really mean? *Am. Psychol.* 70, 487–498. doi: 10.1037/a0039400

Morgenroth, T., and Ryan, M. K. (2021). The effects of gender trouble: an integrative theoretical framework of the perpetuation and disruption of the gender/sex binary. *Perspect. Psychol. Sci.* 16, 1113–1142. doi: 10.1177/1745691620902442

Moss-Racusin, C. A., Dovidio, J. F., Brescoll, V. L., Graham, M. J., and Handelsman, J. (2012). Science faculty's subtle gender biases favor male students. *Proc. Natl. Acad. Sci. U. S. A.* 109, 16474–16479. doi: 10.1073/pnas.1211286109

Moss-Racusin, C. A., and Johnson, E. R. (2016). Backlash against male elementary educators. *J. Appl. Soc. Psychol.* 46, 379–393. doi: 10.1111/jasp.12366

Moss-Racusin, C. A., and Miller, H. G. (2016). "Taking charge" of stigma: treatment seeking alleviates mental illness stigma targeting men. *J. Appl. Soc. Psychol.* 46, 319–335. doi: 10.1111/jasp.12362

Moss-Racusin, C. A., Pietri, E. S., van der Toorn, J., and Ashburn-Nardo, L. (2021). Boosting the sustainable representation of women in STEM With evidence-based policy initiatives. *Policy Insights Behav. Brain Sci.* 8, 50–58. doi: 10.1177/2372732220980092

Murphy, M. C., Mejia, A. F., Mejia, J., Yan, X., Cheryan, S., Dasgupta, N., et al. (2020). Open science, communal culture, and women's participation in the movement to improve science. *Proc. Natl. Acad. Sci.* 117, 24154–24164. doi: 10.1073/pnas.1921320117

National Center for Science and Engineering Statistics Survey of Earned Doctorates (NCSES) (2021). Survey of Earned Doctorates. National Science Foundation. Available at: https://ncses.nsf.gov/pubs/nsf22300/data-tables (Accessed November 9, 2021).

Niemann, Y. F., Gutierrez Muhs, G., and Gonzales, C. G. (2020). *Presumed Incompetent II: Race, Class, Power, and Resistance of Women in Academia* Utah State University Press.

Nittrouer, C. L., Hebl, M. R., Ashburn-Nardo, L., Trump-Steele, R. C. E., Lane, D. M., and Valian, V. (2018). Gender disparities in colloquium speakers at top universities. *Proc. Natl. Acad. Sci. U. S. A.* 115, 104–108. doi: 10.1073/pnas.1708414115

Pew Research Center (2019). Trust and Mistrust in Americans' Views of Scientific Experts. Available at: https://www.pewresearch.org/science/2019/08/02/trust-and-mistrust-in-americans-views-of-scientific-experts/ (Accessed November 12, 2021).

Preacher, K. J. (2001). Calculation for the chi-square test: An interactive calculation tool for chi-square tests of goodness of fit and independence [Computer software]. Available at: http://quantpsy.org (Accessed November 15, 2021).

Proudfoot, D., Kay, A. C., and Koval, C. Z. (2015). A gender bias in the attribution of creativity: archival and experimental evidence for the perceived association between masculinity and creative thinking. *Psychol. Sci.* 26, 1751–1761. doi: 10.1177/0956797615598739

Régner, I., Thinus-Blanc, C., Netter, A., Schmader, T., and Huguet, P. (2019). Committees with implicit biases promote fewer women when they do not believe gender bias exists. *Nat. Hum. Behav.* 3, 1171–1179. doi: 10.1038/s41562-019-0686-3

Reis, T. C., and Grady, M. L. (2018). Women as university presidents: navigating the administrative labyrinth. *Leaders. Res. Educ.* 4, 97–113. https://eric.ed.gov/?id=EJ1174445

Rosette, A. S., Koval, C. Z., Ma, A., and Livingston, R. (2016). Race matters for women leaders: intersectional effects on agentic deficiencies and penalties. *Leadersh. Q.* 27, 429–445. doi: 10.1016/j.leaqua.2016.01.008

Rudman, L. A., Moss-Racusin, C. A., Phelan, J. E., and Nauts, S. (2012). Status incongruity and backlash effects: defending the gender hierarchy motivates prejudice against female leaders. *J. Exp. Soc. Psychol.* 48, 165–179. doi: 10.1016/j.jesp.2011.10.008

Sassenberg, K., and Ditrich, L. (2019). Research in social psychology changed Between 2011 and 2016: larger sample sizes, more self-report measures, and more online studies. *Adv. Methods Pract. Psychol. Sci.* 2, 107–114. doi: 10.1177/2515245919838781

Schmidt, F. L., and Oh, I.-S. (2016). The crisis of confidence in research findings in psychology: is lack of replication the real problem? Or is it something else? *Arch. Sci. Psychol.* 4, 32–37. doi: 10.1037/arc0000029

Schudson, Z. C. (2021). Psychology's stewardship of gender/sex. *Perspect. Psychol. Sci.* 16, 1105–1112. doi: 10.1177/17456916211018462

Simmons, J. P., Nelson, L. D., and Simonsohn, U. (2011). False-positive psychology: undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychol. Sci.* 22, 1359–1366. doi: 10.1177/0956797611417632

Sinclair, L., and Kunda, Z. (2000). Motivated stereotyping of women: She's fine if she praised me but incompetent if she criticized me. *Pers. Soc. Psychol. Bull.* 26, 1329–1342. doi: 10.1177/0146167200263002

Skitka, L. J., Melton, Z. J., Mueller, A. B., and Wei, K. Y. (2021). The gender gap: who is (and is not) included on graduate-level syllabi in social/personality psychology. *Pers. Soc. Psychol. Bull.* 47, 863–872. doi: 10.1177/0146167220947326

Smith, J. L., Paul, D., and Paul, R. (2007). No place for a woman: evidence for gender bias in evaluations of presidential candidates. *Basic Appl. Soc. Psychol.* 29, 225–233. doi: 10.1080/01973530701503069

Society for Personality and Social Psychology (2019). Membership Diversity December 2019. Available at: https://www.spsp.org/membership/demographics (Accessed November 15, 2021).

Steinpreis, R. E., Anders, K. A., and Ritzke, D. (1999). The impact of gender on the review of the curricula vitae of job applicants and tenure candidates: A national empirical study. *Sex Roles* 41, 509–528. doi: 10.1023/A:1018839203698

Strack, F., Martin, L. L., and Stepper, S. (1988). Inhibiting and facilitating conditions of the human smile: a nonobtrusive test of the facial feedback hypothesis. *J. Pers. Soc. Psychol.* 54, 768–777. doi: 10.1037/0022-3514.54.5.768

Tate, C. C., Ledbetter, J. N., and Youssef, C. P. (2013). A two-question method for assessing gender categories in the social and medical sciences. *J. Sex Res.* 50, 767–776. doi: 10.1080/00224499.2012.690110

United States Census Bureau (2021). Quick facts: United States. Available at: https://www.census.gov/quickfacts/fact/table/US/LFE046219 (Accessed November 15, 2021).

Van Bavel, J. J., Mende-Siedlecki, P., Brady, W. J., and Reinero, D. A. (2016). Contextual sensitivity in scientific reproducibility. *Proc. Natl. Acad. Sci. U. S. A.* 113, 6454–6459. doi: 10.1073/pnas.1521897113

Wesselmann, E. D., and Kelly, J. R. (2010). Cat-calls and culpability: investigating the frequency and functions of stranger harassment. *Sex Roles* 63, 451–462. doi: 10.1007/s11199-010-9830-2

Williams, W. M., and Ceci, S. J. (2015). National hiring experiments reveal 2:1 faculty preference for women on STEM tenure track. *Proc. Natl. Acad. Sci. U. S. A.* 112, 5360–5365. doi: 10.1073/pnas.1418878112

Williams, J. C., and Dempsey, R. (2014). *What Works for Women at Work - Four Patterns Working Women Need to Know* NYU Press.

Williams, W. M., Mahajan, A., Thoemmes, F., Barnett, S. M., Vermeylen, F., Cash, B. M., et al. (2017). Does gender of administrator matter? national study explores U.S. university administrators' attitudes about retaining women professors in STEM. *Front. Psychol.* 8:700. doi: 10.3389/fpsyg.2017.00700

Williams, M. J., and Tiedens, L. Z. (2016). The subtle suspension of backlash: a meta-analysis of penalties for women's implicit and explicit dominance behavior. *Psychol. Bull.* 142, 165–197. doi: 10.1037/bul0000039

Wingen, T., Berkessel, J. B., and Englich, B. (2020). No replication, no trust? How low replicability influences Trust in Psychology. *Soc. Psychol. Personal. Sci.* 11, 454–463. doi: 10.1177/1948550619877412

Witteman, H. O., Hendricks, M., Straus, S., and Tannenbaum, C. (2019). Are gender gaps due to evaluations of the applicant or the science? A natural experiment at a national funding agency. *Lancet* 393, 531–540. doi: 10.1016/S0140-6736(18)32611-4

Zwaan, R. A. (2021). Two challenges to "embodied cognition" research and how to overcome them. *J. Cogn.* 4, 1–9. doi: 10.5334/joc.151

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Supporting women's research in predominantly undergraduate institutions: Experiences with a National Science Foundation ADVANCE Institutional Transformation Award

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This paper describes the Gender Equity Project (GEP) at Hunter College of the City University of New York (CUNY), funded by the U. S. NSF ADVANCE Institutional Transformation Award (ITA) program. ADVANCE supports system-level strategies to promote gender equity in the social and natural sciences, but has supported very few teaching-intensive institutions. Hunter College is a teaching-intensive institution in which research productivity among faculty is highly valued and counts toward tenure and promotion. We created the GEP to address the particular challenges that faculty, especially White women and faculty of color, face in maintaining research programs and advancing in their careers at teaching-intensive institutions. During the course of the ADVANCE award, its centerpiece was the Sponsorship Program, a multifaceted paid mentorship/sponsorship program that paired each participant with a successful scholar in her discipline. It offered extensive professional development opportunities, including interactive workshops and internal grants to support research. The GEP helped change key policies and practices by ensuring that all faculty were treated fairly in areas like provision of research start-up funds and access to guidance on how to prepare for tenure and promotion. Qualitative and quantitative evidence suggests that participation in the Sponsorship Program boosted research productivity and advanced the careers of many of the women who participated; the Program was highly rated by all participants. Some of the policy and practice changes that the GEP helped bring about were sustained at Hunter beyond the award period and some were adopted and disseminated by the central office of CUNY. However, we were not able to sustain the relatively expensive (but cost-effective) Sponsorship Program. We share the lessons we learned, including that creating a diverse, successful social and natural scientific workforce requires sustained support of female faculty employed at teaching-intensive colleges. We acknowledge the difficulties of sustaining gains, and offer ideas about how to make the case for gender equity when women seem to be doing "well enough." We underscore the imperative of building

support for women's research in teaching-intensive institutions, where most women scientists are employed, and well over 90% of all college students—a disproportionate percentage of whom are female, minoritized, or both—are educated.

KEYWORDS

ADVANCE, research productivity, accumulation of disadvantage, sustainability of equity efforts, faculty development, teaching-intensive institutions, gender equity, women faculty

Introduction

Our goals in this paper are to:

- Argue for the importance of remedying the particular challenges that faculty, particularly White women and faculty who are Black, Indigenous, and People of Color (BIPoC), face at teaching-intensive institutions.
- Describe the creation and delivery of a comprehensive faculty development program aimed at supporting women's research careers at a teaching-intensive institution that also requires research productivity.
- Detail the changes the NSF ADVANCE-funded Gender Equity Project (GEP) led and inspired at the City University of New York (CUNY).
- Share the lessons we learned, paramount among them that creating a diverse, successful social and natural scientific workforce requires *sustained* attention to and support of female faculty employed at predominantly undergraduate, teaching-intensive colleges.
- Review the implications of our analyses and recommend steps forward.

Female faculty in primarily undergraduate institutions: underfunded, overlooked, and disadvantaged

Who has received NSF ADVANCE Institutional Transformation Awards, and why?

The NSF ADVANCE program is the largest, most comprehensive and most prestigious program to promote gender equity in U. S. academic science and engineering. Since 2001, the NSF ADVANCE program has invested more than $270M, most of it *via* its Institutional Transformation Awards (ITA), to increase the representation and advancement of women scientists through systemic change in institutions. Of the 70 universities that have thus far received ITAs, only five are outside the classification of very high (R1) or high (R2) research activity. The first cohort, funded in 2001/2002, included two such schools – Hunter College and the University of Puerto Rico at Humacao. Over the subsequent 20 years, only three more schools outside the research-intensive framework joined the ADVANCE IT awardees. Thus, the schools that could benefit the most have received the fewest awards. (Other award mechanisms, such as Partnership and Adaptation awards, and, earlier, PAID awards, are more evenly distributed. Those awards provide much less money than IT awards.)

There are several possible reasons why so few such schools have received ITAs, and why most of the published literature on the advancement of women scientists has been conducted by researchers at research-intensive universities. For one thing, what happens at prestigious universities attracts more attention than what happens at other institutions simply because they are seen as better and more important. For another, faculty gender imbalances in representation—among other gender inequities in salary, research space, academic rank—have historically been larger at research-intensive universities than they are in teaching-intensive institutions (Bradburn and Sikora, 2002), though the smaller gender disparities in salary in teaching-intensive institutions is likely due to salary compression. For yet another, teaching and service obligations of faculty in teaching-intensive institutions are so high—and institutional infrastructure support for research and writing is so low—that faculty at such institutions lack the time and resources to prepare competitive applications. Finally, one criterion that NSF and other federal agencies use to make awards is "institutional environment," a criterion that consistently works against predominantly undergraduate institutions.

Extensive research on gender schemas and our own experience in predominantly undergraduate institutions suggests additional, less explicit, reasons for the disparity in ITA awards. Faculty at institutions like Hunter are less likely than faculty at research-intensive institutions to be part of professional networks that supply information about how to be successful in the domains of grant-writing, research, and publication. Even if faculty apply for funding and have

excellent ideas, they are not necessarily able to organize and write those ideas in grant-appropriate prose, nor will they know to incorporate grant-winning strategies. As one example, Valian recalls going red with embarrassment at a chance meeting in 2001 with a researcher who was also applying for an ADVANCE ITA. That researcher mentioned that their PIs included deans and the provost. Valian immediately saw the obvious importance of including upper-level administrators, but she had had too little experience with institutional proposals to have had such strategies in mind. Nor was she part of a professional network that would have supplied her with relevant information.

To sum up, there are many reasons so few teaching-intensive institutions have received ITA awards—starting with the lack of time and grant-development resources necessary to craft competitive applications. Also among those reasons are the hidden disadvantages of being outside the prestigious institutions that confer professional legitimacy and offer formal and informal networks that provide insider knowledge.

Neglected: Female faculty in predominantly undergraduate institutions

The challenges and disadvantages that women experience in academia are well-documented, in several cases by researchers funded by the NSF ADVANCE program (e.g., Holman et al., 2018; O'Meara et al., 2018; Stewart and Valian, 2018; Lundberg and Stearns, 2019; Casad et al., 2021). Women in leadership face even more challenges (e.g., Lyness and Grotto, 2018). We focus here on what we think is a neglected group: female researchers in predominantly undergraduate institutions.

Teaching-intensive institutions vary greatly in the extent to which faculty are expected to conduct research. Generally, research activity is greater in four- than in two-year institutions, and in master's degree-granting institutions than in baccalaureate-granting institutions. But even in many community colleges [including all seven of those in the City University of New York (CUNY)], faculty are tenured and promoted based in part on their research productivity.

Attention to researchers at such institutions[1]—master's and baccalaureate-granting colleges, regional colleges, and community colleges—is important for two reasons. First, those institutions, which are far more numerous than elite research institutions, are the places where most women and Black, Indigenous, and People of Color (BIPoC) faculty are employed and conduct research. Second, they are the places where the overwhelming majority of students of color, poor students, and immigrant and first-generation college students are educated (Fry and Cilluffo, 2019).

At community colleges across the nation, 15% of students come from the bottom income quintile and only 0.5% come from the top percentile. In contrast, at the Ivy-Plus colleges (Ivy League schools plus Duke, MIT, Stanford, and the University of Chicago), only 4% of students come from the bottom income quintile, while 15% come from the top percentile (Chetty et al., 2020). It is not just Ivy-Plus colleges that fail in their attention to diversity. An analysis of 101 selective publicly funded institutions shows how little improvement there has been in enrollment of Black and Latinx students since 2000, and how many institutions fail to enroll Black and Latinx students at rates comparable to their presence in their state population (Nichols, 2020). A disturbing 75% of those schools received failing grades for enrollment of Black students, while only 9% received an A; 50% received failing grades for enrollment of Latinx students, while 14% received an A (Nichols, 2020).

Students who come to college with few advantages profit disproportionately from experiential learning, and particularly from authentic, sustained opportunities like undergraduate research (Collins et al., 2017; Stellar, 2017). Exposure to a diverse, research-active faculty and authentic, substantial research experience is critical in showing students that they can create as well as consume knowledge and that productive, successful people in academia are not all White men (Thiry et al., 2012; Lopato, 2017; Fox Tree and Vaid, 2022).

As things stand, however, instead of equalizing opportunity, academia in the United States perpetuates inequality. A staggering 22% of United States faculty have a parent with a PhD (Morgan et al., 2022). For people who earned PhDs and did not go on to become faculty, 11% had a parent with a PhD. For people born at similar times as faculty, less than 1% have a parent with a PhD. Faculty with a PhD parent also received more support, not just financial support, for their ambitions. One way to change those numbers, we suggest, is to support faculty research opportunities at teaching-intensive institutions.

In conclusion, women and people of color are disproportionately represented at teaching-intensive institutions, both as faculty and as students. The failure to support such scientists wastes the human capital of the faculty and compromises the future of the potential next generation of scientists, especially female students and those from underserved groups. Support for women and BIPoC faculty is thus important for increasing and democratizing the nation's research pool.

1 The Carnegie Classification of Institutions of Higher Education includes 32 different types of not-for-profit schools. Three types – a total of 469 institutions – confer advanced degrees: R1 schools (n = 146) that engage in very high research activity top the list, followed by R2 schools (n = 134) that engage in high research activity, followed by another category that includes schools that confer doctoral or professional degrees in a small number of fields (n = 189). These 469 institutions enroll about 41% of all United States students at all levels from associate's to doctoral sectors and confer over one third of all bachelor's degrees (Lombardi and Craig, 2017; Carnegie Classifications, 2021), a total of 7,817,409 students (calculated from Carnegie open data, https://carnegieclassifications.iu.edu/downloads.php). The remaining 29 types of schools educate everyone else, a total of 11,474,598 students enrolled in 3,471 schools (similarly calculated).

What is life like for faculty at a teaching-intensive institution?

CUNY, of which Hunter is a part, is one of the very few institutions across the nation that are reliable engines of social mobility, meaning that they propel students from the lowest rungs of the economic latter to the middle class and beyond. Along with CUNY are some undergraduate institutions within the California State University and the University of Texas systems (Chetty et al., 2020).

Hunter College, which offers bachelor's, master's and professional doctoral degrees in some areas, is an example of a common but particular kind of teaching-intensive institution in which research is highly valued and research productivity is required for tenure and promotion.[2]

In 2002, when Hunter's ADVANCE IT award began, faculty at Hunter had high teaching (6 courses per year), service, and advising responsibilities. Faculty then and now primarily taught and teach introductory-level, lower-division undergraduate courses, making it difficult to keep up with new developments in their fields (Pannapacker, 2021). In 2001, Hunter offered low-to-no start-up packages to support faculty research and poor support for sabbaticals (50% of salary, which was subsequently increased to 80%). Research facilities were substandard. There was little funding for research-related travel, research assistants, or professional activity. Faculty faced and still face murky expectations about how much research to conduct, and many have little or no access to graduate students, research collaborators, or an intellectual community. Those conditions are a recipe for creating scholars who are disconnected, isolated, and unable to contribute to their disciplines. With each passing year, as disadvantage accumulates, more faculty fall further behind their peers at research-intensive institutions, making it harder for them to compete for grants or develop promising research programs. Faculty development was scarce. Faculty were (and still are) rarely nominated for honors, awards, or opportunities within or beyond the institution.

2 Hunter College was founded in 1870 as a women's teaching college. As detailed in Valian (2020), Hunter was a hospitable environment for intellectually ambitious young women. Hunter educated two Nobel Prize winners (Gertrude Elion and Rosalyn Yalow) - the only school with that distinction - and many other important scientists (including Mildred Spiewak Dresselhaus, Beatrice Mintz, and Mina Spiegel Rees). Between 1900 and 1940, Hunter graduated 8% of the women who went on to get a Ph.D. in mathematics. Hunter is now one of 25 colleges and schools that comprise the City University of New York, the nation's largest urban public university, and arguably the most diverse university in the world. In 2020, Hunter's undergraduate student enrollment was nearly 18,000 students, of whom 65% were women and 70% were students of color (http://www.hunter.cuny.edu/communications-office/Hunter_Factbook_2020.html). As in many other predominantly undergraduate institutions, Hunter's professoriate has a relatively large percentage of female full-time faculty (now over half, or 54%) and almost one third (31%) are faculty of color (http://www.hunter.cuny.edu/communications-office/Hunter_Factbook_2020.html). At the start of the NSF award period, slightly less than one half of Hunter's full-time faculty was female.

The accumulation of disadvantage for women in teaching-intensive institutions

Most college faculty in the United States hold doctoral degrees from R1 or R2 institutions and are socialized early into beliefs and values about the roles of research productivity and excellence in academic careers. College faculty across both research- and teaching- intensive institutions and academic disciplines hold consistent views of the professional hierarchy throughout their careers (Gonzales and Terosky, 2016). Professional legitimacy is associated with having a high academic rank in a highly rated academic program in a prestigious, research-intensive university (O'Meara et al., 2018).

The accumulation of advantage and its corollary, disadvantage, is documented by a study of the effects of institution type on research productivity (Way et al., 2019). Faculty with degrees from equivalently prestigious institutions, and with equivalent productivity before being hired, fare differently depending on the prestige of the institution where they are hired: the people at more prestigious institutions publish an average of five more papers in their first five years of employment than do the people hired at less prestigious institutions. Environments create differential productivity, independent of the relevant attributes of the faculty. And a higher percentage of women than men work in non-research-intensive environments (Stewart and Valian, 2018).

Beyond the disadvantages of working in environments that do not support research, women faculty, wherever they work, accumulate more professional disadvantage than men because they are women. They experience higher levels of sexual and gender harassment (Fitzgerald et al., 1988; MacDonald, 2011), they have less access to mentoring and insider information (King et al., 2012; Lundberg and Stearns, 2019), they receive less positive evaluations throughout their academic training and professional lives (Lundberg and Stearns, 2019; Oleschuk, 2020), they have greater service responsibilities (Guarino and Borden, 2017), and if they are in heterosexual relationships they likely have more family and household responsibilities (Bianchi et al., 2012). Women, especially women of color, and men of color, tend to use different research methods and work on different research topics than White men do; White men's methods and research areas are more highly valued (Settles et al., 2021). Over time, then, women in teaching-intensive institutions accumulate more and more disadvantages.

Hidden differences in treatment: The competitive disadvantage for female faculty

Women – White, Black, Asian, and Latina – have joined the full-time tenure-track faculty in greater numbers across

all institution types over the past 10 years, but without reaping the same rewards as men, particularly White men. It is relatively straightforward, if not easy, to change obvious inequities. Although institutions do not necessarily monitor salary, for example, how to do so is not complicated, nor is how to remedy gender-linked salary disparities. What remains stubbornly difficult to change are the subtle, often hidden, differences in treatment of men and women that in turn affect how men and women perform and how they are evaluated (Valian, 1998; Stewart and Valian, 2018).

Citations are one example of hidden differences in treatment. Citation counts of publications are increasingly used by tenure and promotion committees throughout higher education to evaluate whether a person has earned advancement and to decide whether to hire someone currently at another institution. Citation counts are sometimes used alone and sometimes as part of the *h* index, an index of how many papers one has published that have been cited that number of times. (An *h* of 35 means that one has published 35 papers, all of which have been cited at least 35 times.) Citations are an objective measure.

What underlying processes do citations reflect? Among others, citations reflect prestige and status factors within academia, with the result that men are unintentionally advantaged and women are unintentionally disadvantaged. Men as first or last author continue to be cited more often and women less often than would be expected (Chatterjee and Werner, 2021, academic medicine; Dworkin et al., 2020, neuroscience). Similarly, Black researchers are cited less than would be expected, especially by their White peers (Bertolero et al., 2020). Another form of citations – reading lists for graduate level courses – benefits men more than women (Skitka et al., 2021, social psychology). Citations are also more common for papers that describe their findings with generic terms – terms that suggest an enduring finding that extends beyond the particular paper – and men are more likely than women to include generics (DeJesus et al., 2021).

Objective measures seem fair, even though they are affected by gender schemas that portray men as more competent than women and as more deserving of credit (Valian, 1998). The finding that professional society awards for researchers in neuroscience go disproportionately to men - except when *h* is taken into account (Melnikoff and Valian, 2019) - can thus be understood as the result of a train of subtle events largely hidden from view. The field is now developing more ways of measuring how gender affects apparently fair metrics that influence the course of a scholar's career, with advantage (or disadvantage) accumulating over time. Twenty years ago, attention was more narrowly focused on hiring, retention, and promotion (Martell et al., 1996; Valian, 1998). Those remain important, but even as schools make progress on overt problems, the hidden problems remain.

Sponsorship Program: Rationale, structure, and methods

Rationale

In our ADVANCE proposal, we hypothesized that, even in an enlightened teaching-intensive institution like Hunter, hidden gender disparities disadvantaged women. In 2001, Hunter had an almost equal number of male and female faculty, and, as our later analyses documented, men and women in the natural and social sciences had equal salaries (in part due to salary compression), equal laboratory and office space, and even more female than male distinguished professors. Hunter seemed to be a post-equity institution where visible problems like unequal representation of men and women at higher ranks had disappeared. Our informal observations suggested that, even so, women had less successful academic careers, and, more subtly, had less influence than men in their departments and were less embedded in professional networks.

The key elements of the Gender Equity Project (GEP), including our signature Sponsorship Program, were designed to address the hidden and not-so-hidden disadvantages that we thought stood in women's way at Hunter and CUNY. We set out to increase women's scholarly productivity. Despite their sizable numbers and academic achievements compared to many women at other CUNY campuses, we believed that Hunter's female faculty in the social and natural sciences lagged behind their male peers in research productivity, career advancement, and satisfaction with support for their research. One goal of the GEP was and remains to advance the research productivity and professional careers of women faculty in the natural and social sciences.

We relied on social science research to establish the principles, policies, and practices of the GEP in general and the Sponsorship Program in particular. The content of our workshops, including assigned readings and exercises, was based in social science. We have described the Sponsorship Program elsewhere (Rabinowitz and Valian, 2007) and summarize it in **Table 1**, adding new conclusions that reflect what we have learned.

Structure

The Sponsorship Program was the centerpiece of the GEP at Hunter College. It was open by application to female faculty below the rank of full professor in the social and natural science departments. We operationally defined "science" as any field that NSF funded. That included Anthropology, Economics, Political Science, Psychology, and Sociology, as well as Biology, Chemistry, Computer Science, Geography (which included geophysics), Mathematics and Statistics, and Physics.

TABLE 1 Key elements of the Sponsorship Program.

- The program was open to full-time, tenured or tenure-track female faculty below the rank of full professor from 11 participating social and natural and physical science departments. (We did accept one full professor who was working on a book in a new area.)
- The program featured a rigorous application process that committed the applicant to a set of goals and actions.
- Applicants had to obtain the written approval of the department chair for course release; that release was paid for by the program.
- The program offered internal grants to associates for up to $15,000 per year for research, $5,000 of which went to their sponsors and some of which could be used to purchase course release (with the department chair's permission).
- Participants could apply twice for an additional year of support, with up to 3 years possible.
- Each program participant was paired with a successful senior scholar, approached personally by one of the GEP co-directors, in the scholar's discipline or topic area.
- The sponsor had to be outside the participant's department (and, where possible, outside the college) so as to avoid potential conflicts of interest.
- Sponsors committed to having regular contact with participants, providing written feedback on work products, giving general professional advice and support, and meeting at least once a semester with a GEP co-director to discuss the participant's progress. In the course of developing the program, we changed from offering sponsors $5,000 per year to $2,500 per semester. That allowed participants to change sponsors if that would be beneficial.
- Mandatory monthly workshops, led by us, by experts within Hunter, by experts within CUNY, and by outside experts, covered such topics as how to negotiate for needed resources, how to present one's work orally in different formats, how to make the most of summer breaks to advance one's research, and how to tackle procrastination and other work problems.
- The three GEP co-directors (Valian, Rabinowitz, Dr. Annemarie Nicols-Grinenko, Director of Research and Project Director) actively engaged with all participants, serving as informal mentors and sponsors, supporting them through challenges, intervening when appropriate, and reviewing progress regularly.
- The GEP meetings and social gatherings took place in a convenient, attractive, dedicated space that was removed from departmental and administrative offices.

For women at a teaching-intensive institution, funding and release time were necessary to give women resources and time; the program provided $10K/year, out of which participants could fund a course release with their chair's permission. The program also addressed our perception that men as a whole received more informal information and feedback about how to be professionally successful than women did, and were embedded in more useful professional networks. From the social science literature and our own experiences, we saw professional success as a product of three things: information; the development and deployment of skills and strategies; psychological support. We reasoned that multicomponent interventions were more likely to have an effect than single component interventions. We hypothesized that women and men have both different kinds and numbers of opportunities to receive feedback and different content in the feedback they do receive.

Recent work on "developmental" feedback for aspiring leaders may be relevant to success in academia. Research indicates that men receive more feedback related to how they can become leaders and more challenging and constructive analyses of their performance than women do (King et al., 2012). Comments to women often focus on their interpersonal behavior rather than on how well they perform tasks. An analysis of messages to aspiring political leaders found that women received more empty rah-rah messages while men received more substantive leadership feedback (Doldor et al., 2019).

It does not help women or faculty of color to have a mentor who has low expectations of them or focuses on their interpersonal skills. Interpersonal skills are important, but they are only one component of success in organizations. By having a single mentor, especially an untrained mentor, women run the risk of receiving information and feedback that is not genuinely helpful.

Based on the literature then just developing but now extensive (e.g., McCauley and Martineau, 1998; Packard, 1999, 2003; Blickle et al., 2009; Katz et al., 2009; Allen and Eby, 2011), we rejected the classical mentorship model in favor of a circle of advisors model. The circle of advisors model is similar to the idea of a composite mentor or mentor mosaic or mentor network in which participants receive information and help from a number of sources whom they designate after having analyzed places where they need information and helpful feedback. The classical mentorship model pairs a protégé with a single mentor and assumes that people will grow out of the need for a mentor. Our approach suggests that people need information, feedback, and help throughout their career, though the content changes over time. We thus worked with the faculty associates in the program to help them develop a circle of advisors.

We recognized that faculty also needed intensive attention that they were unlikely to obtain in the normal course of their activities. We thus paired each participant with a senior successful scholar who was paid to provide mentorship and sponsorship—general career guidance and support as well as specific, written feedback on articles and grant proposals. The "sponsor" was paid $5K per year and agreed to a set of activities. Sponsors could not be a member of the faculty member's department. As part of their application to be in the program, associates indicated what type of person they thought could offer them what they most needed, and were invited to recommend a specific person if they had one in mind.

Finally, the program offered extensive professional development opportunities *via* workshops and support that was otherwise not readily available in departments, in the

college, or in the University. The monthly workshops provided information, skills, and supports. Our roster of workshops was initially formed by consulting publications like *The Compleat Academic: A Career Guide* (Zanna and Darley, 1987; Darley et al., 2004) and talking with experts on women's advancement and colleagues from CUNY. Workshops changed over time as we gained experience with what our associates needed most and what social science had to offer by way of improving institutional and individual effectiveness. Following our analysis of what was holding women back at Hunter College, our focus in the workshops was on hidden—practically invisible, rarely discussed, underappreciated—but ubiquitous aspects of academic life: topics like how to handle rejection; how to start a presentation to draw people in; how to negotiate effectively with a chair for teaching releases, lab space, and other matters; how to use the summers to maximize productivity; how to say no without alienating people; how to make the most out of working with undergraduates, and so on.

Table 2 includes a list of the most commonly offered workshops.

Selection process and participants

Over the 6-year course of the ITA, 30 members of eight academic departments in two divisions of the School of Arts and Sciences participated in the Sponsorship Program as *associates*, or direct beneficiaries of program elements, several for more than one year. The women in the program varied in ethnicity, age, rank, years at Hunter, type of work (laboratory-based and field research; qualitative and quantitative research), and work products (books, peer-reviewed journal articles, grant proposals, talks). Sixty percent were women of color.

TABLE 2 Gender Equity Project (GEP) faculty workshops.

Mentoring
- Building and maintaining a circle of advisors
- Advising, mentoring, and sponsoring colleagues
- Mentoring students, staff, and assistants

Balancing
- Balancing work responsibilities: Research, teaching, and service
- Balancing work and a personal life

Writing and publishing
- Time management and procrastination
- Maximizing research and writing during the summer
- Grant writing
- Successfully handling rejection of papers and grants

Professional development
- Curricula vitae (CVs) and cover letters
- Teaching effectively and efficiently
- Attending conferences, public speaking, and presentations
- Tenure and promotion
- Prizes, awards, and other status indicators
- Leadership

Self-presentation
- Entitlement and negotiation
- Dealing with conflict
- Social media: Creating a webpage and translating research for the media
- Social and professional networking

Two thirds of all associates were social scientists. (That was unplanned, and may have partly been due to the fact that the principal investigators were social scientists.) In three departments (Geography, Physics, Psychology) most or all of the eligible women joined the program. In two others (Biology, Computer Science), no women applied. There were a few salient differences between natural and social scientists at Hunter: natural scientists appeared to receive larger start-up packages, more research space, and lower teaching loads than social scientists.

The Sponsorship Program was a pilot program. It accepted all applicants who were willing to make the commitments we required because we wanted to help all those who were interested in joining and we wanted to have an impact on the institution. The program included several different components that operated simultaneously. That choice was deliberate – we wanted to maximize our chances of helping the women in the program. The literature also suggests that a program with many components increases the likelihood of including a component that will resonate with someone, even if other components do not. An exploratory analysis of what led to increases in diverse representation in large firms suggested that most diversity was seen in companies that included a variety of mechanisms (Marquis et al., 2008). We understood that our pilot could not isolate which components were necessary or sufficient for success. For example, our workshops included some role-playing, which some attendees found very helpful and others did not. Our aim was to develop the program over time.

Outcome measures and causal inferences

The main outcome measure was individuals' research productivity pre- and post-participation in the Sponsorship Program. It is inherently challenging to claim program effects on outcome measures in the absence of random assignment to treatment and control groups. Our research design did not meet these conditions, but approximated a particularly powerful and respected class of quasi-experiments–the regression discontinuity pretest-posttest design–in which causal effects can often be inferred. These are cases in which the treatment is novel, distinctive and abruptly instituted, and the outcomes of interest can be measured directly before and after the intervention begins (Cook and Campbell, 1979). In our view, the Sponsorship Program has these elements.

There are some outcomes that, in their temporal proximity to the program, their distinctive character, and their conceptual relation to the program, can plausibly be attributed to the program. For example, the program required certain activities on the part of associates, such as keeping a work log and submitting internal grant proposals. Associates completed all required activities, even though many of those activities were new to them. Simply making an activity obligatory – setting an injunctive norm (Schultz et al., 2007) – was sufficient to change behavior. We recognize that the absence of a control group precludes drawing causal conclusions. We made sustained efforts to construct a matched comparison group *via* curricula vitae (CVs) from other CUNY faculty. At that time, however, CVs were not broadly accessible on websites and only one faculty member responded to our offer of gift certificates. (We believe that this reflected the lack of a professional identity and concerns about underachievement on the part of CUNY faculty.)

Sponsorship Program: Quantitative and qualitative results

Analyses of quantitative and qualitative data we collected over 7 years—including numbers and kinds of contacts with sponsors; monthly progress reports of paper, proposal, and presentation submissions and outcomes; regular interviews with sponsors; regular collection of updated CVs; outcomes of tenure and promotion processes; periodic survey results and other assessments of associates and their sponsors—suggested that between two-thirds and three-fourths of all associates' research productivity improved during their time in the program and for some time after their participation in the program ended.

Research productivity

Data analyses revealed noticeable, broad-based improvements in research productivity. Associates in cohorts 1 through 5 submitted significantly more papers and grants during their first year in the program – Year 1 – than they did during the year before entering the program – Year 0. In Year 2 they submitted significantly more papers and grants than in Year 0. From June 2002 to April 2008, GEP associates became increasingly adept at applying for and obtaining internal funding and were awarded over $4.9M in external grant funding, more than six times what the GEP invested in these associates. During the life of the program, 13 of the 14 eligible GEP associates who came up for tenure were awarded tenure, all nine of those who came up for promotion to associate professor were promoted and two associate professors were promoted to the rank of full professor. (At least three others were promoted to full professor beyond the award period.)

Associates learned to work through procrastination and lack of confidence in order to write, rewrite, and share their drafts of papers and grant proposals. Ultimately, most associates published the major articles or books that had stymied them up to that point, succeeded in obtaining grants to support their research efforts, and were promoted to full professor. Some participants rose to leadership positions in their disciplines and at Hunter College and CUNY; one left Hunter for a position in a more research-intensive institution.

Effort and achievement

Two correlations reveal the connection between effort and achievement. The number of grant proposals (internal and external combined) submitted in Year 1 was positively correlated with the number of articles accepted for publication in Year 2. Across all years of program participation, the total number of academic articles and grants submitted was positively correlated with the number of internal grants funded, and with the number of journal articles, chapters, and books accepted for publication. Associates had the skills necessary to succeed in publishing their work; effort led to success.

Sponsor effects

Correlational analyses also indicated the importance of the sponsor. The amount and type of interaction with sponsors was related to subsequent grant submissions and grant getting. For example, across all years of participation in the program there were significant correlations between the number of associate-sponsor phone calls and email exchanges and associate productivity. Those exchanges (but not in-person meetings) were positively correlated with both the number of internal and external grants submitted by associates and the numbers of internal and external grants funded. There was no correlation with the numbers of journal papers submitted or published; the effects of calls and emails appeared to be specific to grant activity.

Face-to-face interactions showed different effects. In-person contacts with sponsors during Year 1 were positively correlated with the number of journal articles, chapters, and books submitted by associates in subsequent years. In several cases, the year-to-year improvement was sharp—from one journal submission to five, for example—strongly suggesting a program effect. Taken together, our data suggest that face-to-face interactions between sponsors and associates were more important for productivity in Year 1, whereas email and phone exchanges became more important in later years, when relationships were better established.

Collaborations with students

Throughout the Sponsorship Program, we strongly encouraged and tracked collaborating with students at all levels, especially undergraduates, to whom all our associates had access. Many of our associates' students presented their research at conferences and some became authors or co-authors of published papers. The 30 associates in cohorts 1–5 reported supervising more than 150 undergraduates, 40 MA students, and 25 PhD students during the award period.

Program evaluations

Associates provided uniformly high evaluations of the Sponsorship Program over the 6-year course of the award. Those high evaluations could be seen as experimenter demand (it would be hard for associates to tell the developers of the program that they were no help) combined with associates' need to justify the time that they were committing to the program. The positive results already described, however, argue against that interpretation. When rating components of the Sponsorship Program in terms of their usefulness and contribution to the associates' professional development, associates rated funding for research most highly, followed closely by advice from the GEP directors outside of the workshops, followed by sponsor benefits, workshops, workshop handouts and readings, and interactions with other associates. All of these elements were rated over 4 on 5-point scales where 5 was most effective.

Associate comments

Unsolicited comments by associates poignantly capture how the GEP helped them navigate rejection of their articles and get their work published; overcome feelings of overwork, isolation, depression, and disconnection from their work; and clarify their professional goals. Examples of comments include reflections on the differences in associates' working lives as members of the program, such as an increased knowledge and appreciation of what it took to succeed. An unexpected benefit was the sense of community associates told us they developed with fellow participants in their cohorts. For some faculty, the community of GEP associates was the only real community they felt they had at the college. Several participants created professional bonds with their sponsors and thereby expanded their professional networks; even more participants expanded their circle of advisors to include the GEP co-directors and other leaders in the college. Subsequent research suggests the importance of learning communities for women in research-intensive institutions who seek professional legitimacy and advancement (O'Meara et al., 2018).

Even in those Hunter departments with relatively large percentages of women, women felt under-supported (and worse). Some felt that they had no allies, let alone potential collaborators, in their departments, and thought that no one at the college understood, appreciated, or facilitatied their work. Meeting people from different disciplines and departments with similar experiences showed associates that they were not alone in the challenges they faced. In the GEP, women met at least monthly in interactive workshops with peers who were eager to support, connect with, and learn from each other. Recent research shows that faculty learning communities perform important functions, especially for marginalized groups, by creating positive conditions for building academic legitimacy and instilling a sense of belonging (O'Meara et al., 2018).

Workshops and faculty lacunae

In preparation for a workshop regularly offered in early spring, associates identified and interviewed a scholar in their discipline whose research career they admired, with a focus on how these scholars used summers to advance their work. Associates heard that successful scholars worked regularly on their scholarship for at least two hours every day. They used strategies and techniques to avoid distractions and disrupt procrastination, and enlisted support, including paid help, to ensure that their research time was productive. Almost all faculty at Hunter had degrees from highly ranked, research-intensive institutions, so one might have expected them already to know this, but they did not.

We saw other examples of unexpected gaps in faculty knowledge and skills. At one workshop we conducted for faculty across CUNY, a new faculty member from a different college expressed surprise that receiving a "revise and resubmit" message from a journal was a positive response and that outright acceptances were rare. "You mean I should be happy about that?" she said. One sponsor told us of going over a rejection letter from a journal with an associate, helping her see that she could respond to most of the points without much difficulty, and letting her know that criticism was common and could be handled. We believe that the women faculty in the Sponsorship Program lacked enough such experiences as graduate students or post-docs.

In another workshop, on conference attendance and presenting one's work in professional settings, we saw first-hand that associates were unaccustomed to talking about their research, even in low-stakes settings. It was stressful for some of them to present succinct synopses of their work or craft engaging introductions to their conference presentations. Some associates talked about the embarrassment of attending conferences and seeing researchers with whom they had attended graduate school, researchers who were now far ahead of them in their research accomplishments. They had begun

to wonder if they were capable of conducting major research projects. Had they been capable, the world seemed to be telling them, they would have been hired at a research-intensive institution to begin with. Our message was that, with strategy and planning, they could make attending conferences advance their work, their visibility, and their careers.

Lessons Learned: 1–3

Lesson learned #1

By focusing on skill development rather than talent, and by providing necessary information, the Sponsorship Program provided a different message than the one our associates had internalized during their professional socialization. Its message was that success in academia is the result of learning what to do – and there is a lot to learn! – and setting aside time to practice doing it. The Sponsorship Program, *via* its interactive workshops, assignments, and readings, was explicit in dissecting the skills and information necessary for professional success in academia.

With its focus on skills and information the Sponsorship Program sidestepped issues of talent. Its message was that one could learn how to develop one's ideas and present them effectively; one could learn how to be a good leader; one could learn how to respond to rejection. Similarly, the Sponsorship Program fostered the idea throughout the college that participating in faculty development programs/learning communities added value to a faculty member. Associates listed Sponsorship Program membership on their CVs with pride. Over time, candidates' participation in the GEP was increasingly framed as an asset by their department chairs in their presentation for tenure and promotion in college-wide proceedings. As the Sponsorship Program demonstrated its effectiveness and gained prestige, chairs used it as a selling point in recruiting new faculty.

Lesson learned #2

Faculty benefit from a circle of advisors – people from different backgrounds who have different perspectives, skills, and knowledge – rather than a single mentor. The use of expert sponsors who were compensated fairly for their efforts encouraged sponsors to commit time and effort to their mentoring and encouraged participants to ask for help when they needed it, especially in grant preparation and paper submission. The use of expert sponsors in the associates' specific intellectual and professional areas addressed some of the challenges associates faced due to professional isolation and a dearth of natural colleagues at Hunter.

But a single sponsor is not enough. A serendipitous feature of Hunter's GEP—that the three co-directors differed in their knowledge, experience, and interpersonal styles and played different roles in dealings with associates, senior administrators, and ADVANCE—turned out to be a crucial ingredient in how we mentored individual associates, what and how much we were able to do to help them, and how much they took from the program. Given the important role that the associates played in each other's development, we increasingly appreciated the benefits of peers with whom one can check in regularly, at an appointed time, to discuss work progress or work problems, exchange drafts of work, or get advice about career moves.

Lesson learned #3

Sustained connection to professional networks is necessary for career success. The GEP did not recognize the importance of this early enough. Without regular interactions with people with common professional backgrounds, understandings, interests, and concerns, it is easy for scholars to feel isolated and fall behind. Simply keeping up with the literature in one's field has become increasingly daunting as papers proliferate; a network in which people mention useful articles to each other fosters being tuned in. One possible benefit of the ongoing COVID-19 pandemic is increased creativity with respect to conferences and meetings. The increased normativity of long-distance connections could be profitably used to create networks for scholars.

Sponsorship Program: Whose research programs benefited, whose did not, and why

Large gains in research productivity

We define large gains as discontinuous jumps in levels of research activity that resulted in scholarly products (grants, articles, books). We classify our program as a success because roughly two-thirds to three-quarters of the associates showed large productivity gains during the measurement period (2002–2008) and many continued those gains, continuing to publish their research and apply successfully for funding. All associates took their participation seriously and filed monthly progress reports, and most honored the commitments that came with Sponsorship Program membership. From subsequent informal interactions with associates, we have come to think that the people who were helped by the Sponsorship Program were greatly helped. No doubt they were ready to be helped, or they would not have applied to the program, and their sponsors were a good match, but they continue to express informally to us the idea that their sponsors' and our support of and belief in them, and the confidence this inspired in them, helped them succeed.

Medium gains in research productivity

About a quarter to one third of the associates showed medium gains. These associates increased their research

engagement and scholarly work but their work products were limited in nature and scope and did not change the trajectory of their research programs or professional careers. Although modest gains may be expected from any intervention program, we cite two possible reasons for limited results. One was that the match between the sponsor and the associate was not always ideal. Some sponsors turned out to be ill-suited to an associate's current research topic or to the methods, techniques, or analytic strategies that the associate needed to learn. In other cases, the pair did not interact as frequently as they might have, usually due to associate shyness. (The mean number of contacts per month for all associates in the first 2 years of sponsorship was 4.2.) Over the past 20 years, some associates changed their activities to align better with values that were more important to them than producing scholarship; some have become department chairs and program heads or have taken other leadership roles in the college or in their fields. They have not abandoned research but they are classified as having made medium gains because our measuring rod only measured one thing – research productivity as it is traditionally defined.

No gains in research productivity

Three individuals showed no measurable research productivity gains, even after more than one year in the program. Two associates discovered that they had not fully realized what was required to be a productive researcher. They had formerly attributed their lack of research productivity to lack of time and support, but discovered that their values lay elsewhere. Those two redirected their efforts to teaching, mentoring, leadership, and service. For them the benefit of the Sponsorship Program was to clarify and readjust their professional goals. A third associate who joined the Sponsorship Program in Year 5, the year she was coming up for tenure, withdrew her candidacy and subsequently left the college and academia.

Lessons Learned: 4–7

Lesson learned #4

The traditional scholarly norms in the sciences do not fit everyone. We used classic productivity metrics as our measures of success because those metrics were highly respected by both the faculty and the leadership of the college. Although we appreciated work highlighting not only the scholarship of discovery but also the scholarships of integration, application, and teaching (Boyer, 1990), championing such forms of scholarship seemed outside NSF goals. We thus did not emphasize their potential value nor did we integrate those forms into the Sponsorship Program. For some associates other forms of scholarship were likely a better fit.

Lesson learned #5

Succeeding in one's discipline and succeeding at one's institution are not the same thing, especially in predominantly undergraduate institutions. For women (and men) to excel in their research careers, faculty development programs need to encourage and support the use of disciplinary, as well as institutional, standards, practices, and expectations. Success along the tenure track requires a mix of strategies, advisors, resources, and other supports, depending on what counts as success in one's field and one's institution. At Hunter, as in many other teaching-intensive institutions, research, teaching, and service to the college, the department, and the discipline all count toward tenure (though not necessarily toward promotion) decisions. At Hunter, promotion to associate professor and especially to full professor rests largely on research productivity. Informally, being perceived as a good citizen and good colleague factors into tenure decisions in some departments. It was important for our associates to learn college and departmental norms and develop efficient and effective ways of meeting those standards while also meeting the professional standards of their disciplines if they wanted to achieve full professorship.

Lesson learned #6

Academia needs broader models of career success than those that are dominant in research-intensive institutions and national funding agencies. Teaching-intensive institutions are not failed research-intensive institutions. They are fundamentally different in their missions, values, structures, and resources. Increasing research support and scholarly activity among women and BIPoC faculty at teaching-intensive institutions will enable these institutions to remain vibrant by attracting and retaining strong faculty, creating opportunities for collaborations with undergraduate and master's students, and inspiring students to aim higher. Teaching-intensive institutions can assert their own norms and standards of academic excellence by explicitly broadening the range of high-quality scholarship and creative activity that is supported and rewarded to include scholarships of integration, application, and teaching, among others. Seattle University, a teaching-intensive institution, used its 2016 ADVANCE award to better align its expectations of faculty and its promotion standards with its educational mission and successfully achieved that goal in 2021 https://www.seattleu.edu/advance/.

Longer-term effects. About half of the sponsored faculty continued to make strides in the short term and in the long term. For the other half, however, the benefits of the GEP lessened over time as demands of the college became more constraining, both because of increased expectations for faculty as they move up the ranks and because ambitious teaching-intensive and research-oriented colleges like Hunter try to do it all, and have high expectations for teaching, research, and service. It was difficult for former participants to maintain their research. The scheduled workshops and GEP directors were no longer actively available. Lack of bridge funding was another obstacle to continued research activity. If a faculty member in the social and natural sciences lost external grant funding, they then returned to teaching three courses a semester, at which point it became difficult to perform the pilot research necessary for obtaining future funding. It was even more difficult to maintain the sense of community that the Sponsorship Program provided, a difficulty exacerbated by teaching at a commuter campus.

Even obviously successful programs cannot continue at institutions that do not have the funds to maintain them. Mentoring, sponsoring, and supporting faculty cost time and therefore money. Supporting research, including research with students, costs money. At teaching-intensive institutions, the needs are so strong and so pressing that supporting faculty and research seems like an unaffordable luxury. When NSF support ended, funds were not available at Hunter to maintain the staffing, the release time for associates, the modest research funds, the money for sponsors, or the workshops.

Lesson learned #7

Women and people of color need ongoing opportunities for intellectual and social community outside of formal academic department structures. The salutary effects of even demonstrably successful programs may not endure once the program has ended. Academic departments are not optimally designed to offer support and a sense of belonging for people from underrepresented groups. The historic disadvantages, inequities, and biases that women and people of color face in academia do not disappear at the end of a program. The idea that a single, even multi-year, intervention can forever redirect, support, and sustain a successful academic career in the face of accumulated disadvantage is not tenable.

On analogy with efforts to deal with the COVID-19 pandemic, we propose that people need regular "booster shots" throughout their careers to maintain forward momentum in environments not built for them—such as learning communities, workshops, retreats, circles of advisors, and other regularly occurring opportunities.

Effects of the Gender Equity Project on academic departments, the College, the University, and beyond

Department chairs and departments

Academic departments are where faculty live their professional lives, and departmental conditions generally and the department chair particularly have an outsized effect on faculty productivity and satisfaction. During the time of our award, departments and department chairs at Hunter College differed considerably in their support for research activity and their focus on gender equity and faculty satisfaction.

Department chairs at Hunter College are elected, serve for renewable 3-year terms at the pleasure of the voting members of their departments, have more responsibilities than authority, and are under-compensated for the nature and scope of their work. As a former department chair and provost at Hunter College, one of us (VCR) can speak authoritatively about the position of chair.

The responsibilities of department chairs are: to provide a schedule of classes that meets student needs and college requirements; to staff courses with strong teachers; to supervise the department staff; to make committee assignments and ensure that committees do their work; and to arrange for the regular evaluations of faculty and staff. In 2001, chairs received no incentives (or even encouragement) to create faculty development opportunities, increase the time faculty spend on research, or nominate faculty for awards.

Our experience in the GEP was a window into how academic departments function to shape careers. Hunter's faculty, female and male alike, are committed to Hunter's mission. They are dedicated teachers and mentors. Hunter attracts faculty who want to make and do make a difference in students' lives. Department chairs and deans rely on their faculty's willingness to put their students first.

In 2001, chairs varied in their support for faculty research. Some chairs saw faculty research as at odds with the core mission of the college, and, therefore, the core mission of their department. Some department chairs were – quite reasonably – concerned about the costs of losing the associate's teaching due to course release. Some chairs were thus concerned that the GEP would expose associates to new norms, for example, about teaching workloads or other conditions of work. Knowing of other norms could create resentments among their faculty. Other chairs may have been concerned about the exposure of potentially negative aspects of their leadership or their departments to outsiders.

One faculty member remarked that her new chair changed her conception of the role of chair. Up to that point she had simply been happy when a chair did not put obstacles in

her way. Neutrality was the most she had hoped for from a chair. The new chair arranged for her to be nominated for fellow status in a professional society. The idea that a chair would care about professional opportunities for her, as her new chair did, was shocking. Unsupportive chairs exist at all types of institutions and are not necessarily more frequent at teaching-intensive institutions. But their effect is amplified at teaching-intensive institutions.

Some chairs saw their departments as already equitable; they did not see a problem that needed to be fixed. Those chairs were openly skeptical about our comprehensive Sponsorship Program. Knowing from psychology that people are more likely to behave as allies if they are treated as such (Brickman, 1987), our approach was to treat chairs as allies or partners in supporting their faculty. More crucially, we strongly advised our associates to treat their chairs (and other members of their departments who might become chairs or become members of committees that would affect their futures!) as partners and allies, regardless of how they currently felt about their level of support, while being aware of the fact that chairs or senior faculty might rate their needs as unimportant compared to the department's. In a workshop on negotiation, we introduced the idea that associates who wanted something from their department could show how that could lead to solving a departmental problem.

There were times when either Rabinowitz or Valian intervened in what appeared to be discriminatory or hostile conditions, for example, in a department in which several associates complained about a male staff member's sexist behavior. We were generally helpful in resolving such issues. Over time, we were able to make the case that the GEP was not a threat to department chairs or departments. When departments learned of our efforts to rationalize certain college procedures and make them more transparent and to improve orientation for new chairs, they saw benefits of the GEP. At one departmental presentation that we gave, a faculty member said, "you're like an ombuds for departments," a compliment we highly valued.

Lessons Learned: 8–9

Lesson learned #8

Gender equity and diversity programs are windows into institutional effectiveness. A focus on the perceptions, conditions, and outcomes of White women and BIPoC faculty reveals an institution's strengths and vulnerabilities. With that focus, the GEP could see how departments and offices did and did not function for women faculty and for *all* faculty. In the case of the GEP and Hunter College, the focus on gender equity revealed that, despite the nearly equal representation of women and men, women languished in the ranks of associate professor in many departments, were less satisfied and felt less supported than men, and were less productive as scholars. Inadequate and inconsistent information and support for all faculty, starting with offer letters and continuing through tenure and promotion proceedings, had a disproportionate impact on women's careers.

Lesson learned #9

There are advantages and disadvantages to running a major program outside of the formal organizational chart. The imprimatur of the National Science Foundation and the nature and size ($3.75M) of the award conferred prestige on the GEP and its co-directors, and multiplied its effects on the institution and individuals. Investments by NSF (and Hunter) were evident in the time commitment of the co-directors and the refurbished, dedicated program space that offered participants privacy, safety, and social support. All the elements that made the Program seem special also boosted morale and confidence and were ultimately important to its success.

Operating outside of the formal organizational chart, with no direct reports within the college, gave the co-directors autonomy and standing throughout the college. Faculty trusted us with information (about people, policies, and practices) that would otherwise not have been formally reported, and they trusted us to act in the interests of people within and beyond the Sponsorship Program. We had standing to intervene, within limits, as ombudspeople, and we had access, within limits, to the Hunter and CUNY leadership. The significant disadvantage was our inability to institutionalize GEP initiatives, whether they were resource-intensive programs like the Sponsorship Program or relatively inexpensive activities like data collection and reporting after the award period. Nor could we raise money independently of the college.

Hunter College

Our goal—and NSF's mandate—was to transform an institution. *Via* the Sponsorship Program, the GEP directly served 30 associates. The GEP's larger efforts touched hundreds of people and altered numerous policies and practices, not just at Hunter College but across the 25 units of the CUNY.

The GEP was committed to transforming institutional policies and practices in order to create uniform and rational expectations, and knowledge of those expectations, for all faculty. We expected those changes to improve conditions for research at Hunter College and CUNY, and we worked to sustain those changes. What we learned from the Sponsorship Program, from being part of ADVANCE, and the growing literatures on gender equity, racial disparities, and advancement in higher education all contributed to this effort. We summarize below the major changes in policies, practices, and programs that were launched by the GEP during the course of the ADVANCE award, many of which persist in some form to this day.

- We instituted gender equity benchmarks at Hunter College. Throughout the award, the college collected and reported data on hires, advancement, and faculty flux by gender in the relevant natural and social science departments in the School of Arts and Sciences.
- After analyzing offer letter to scientists at Hunter College, the GEP discovered wide disparities from department to department in how much relevant information was included in any given offer. To ensure uniform and complete offer letters, the GEP created a checklist of items an offer letter should include and sample narrative templates for the school deans to provide to all chairs. As Hunter Provost, with the support of the college president, Jennifer Raab, Rabinowitz instituted the practice that all offer letters to new professorial-rank faculty members at Hunter College must include start-up funds for research in order to establish a research expectation.
- Working with the Provost's Office, the GEP developed Tenure and Promotion Guidelines for the College (taken from documents in the Provost's Office, the Hunter Faculty Handbook, and a review of exemplary tenure and promotion packets), a new Chair Handbook, and guidance about pathways to success in various disciplines.
- The GEP, working with chairs and the Provost's Office, developed a survey, known as the "Progress and Planning Report," that natural and social science departments used to report their efforts toward equity and diversity on an annual basis. All science chairs agreed to provide the data with the understanding that the administration would use the information as one criterion in assigning faculty lines and space. For what was perhaps the first time, chairs now knew what the administration expected of them in advocating for lines in their departments. Other items on the report included lists of all faculty whom the department had nominated for awards, honors, or memberships in prestigious organizations, and all faculty who received such accolades. Departments also listed departmental supports that they provided for their faculty. These categories were intended as much to be interventions as reports—to sensitize chairs and their executive committees to best practices in higher education.
- The GEP developed procedures that linked positive efforts toward equity in the Progress and Planning Reports with small cash awards to departments that provided evidence of progress. The money was used for mentoring, colloquia, and so on. It is difficult for faculty who work at research-intensive institutions to understand the meager financial support that departments and programs at underfunded institutions receive. To give an example from 2021, training areas in Psychology at the CUNY Graduate Center were allotted $300 to spend on supplies that would benefit student research.
- The GEP created websites to include equity data, newsletters, resources, and web-based tutorials. Both the GEP website and tutorials have been regularly updated and are currently undergoing reconstruction.
- An outgrowth of the GEP was the creation, in 2007, of a Professional Development Office (PDO) in the Office of the Provost. The PDO institutionalized many GEP initiatives and organized college-wide faculty development and faculty diversity efforts. This included the establishment of a new, permanent administrative line, funded by the college in 2007 and continuing to this day, in the Provost's Office.
- In 2007, Rabinowitz and Nicols-Grinenko instituted regular workshops on preparing for tenure and promotion that were open to male and female faculty throughout Hunter College. The workshops were always over-subscribed, and had to be offered twice per year because of demand. Some participants attended the workshop more than once to reinforce certain lessons. Following the GEP's emphasis on skills and information, participants learned how to organize and present a CV in the best style of their discipline, how to write personal statements about their research, teaching, and service accomplishments that would present them to best advantage, and how to work with their department chairs to make their best case. One of the most valuable aspects of the program was sharing models of the tenure and promotion packets of exemplary faculty who had recently succeeded in the process. Over time we developed a library of such materials to satisfy the demand among the faculty throughout the college. As a result of the availability of these models, tenure and promotion packets improved markedly in quality, becoming more comprehensive, organized, and compelling.
- Starting in 2010 the GEP established an annual five-hour New Faculty Orientation at Hunter College for all new professorial-rank faculty. The orientation prepared faculty for tenure and promotion from day one by discussing, among other topics, balancing the roles of research, teaching, and service; time management; and teaching effectively and efficiently.

Some changes occurred through discussion with department chairs. Other changes occurred through more general effects, in which associates became seeds of change in the college. Some former associates of the Sponsorship Program later served as workshop leaders. Some became department chairs who developed procedures that were helpful to faculty. Others shared what they learned about professional development from the GEP informally with colleagues and students.

Lessons Learned: 10–11

Lesson learned #10

Universal design, a concept borrowed from architecture, is generally applied to serving individuals with disabilities, but it has more general application. The benefits of making life better for White female and BIPoC faculty end up also making life better for everyone. GEP efforts to help women—institute templates for offer letters, clarify and publicize tenure and promotion guidelines, institute regular reporting on scholarship, provide training for giving presentations and grant-writing, encourage the creation of circles of advisors—helped men as well. Efforts on behalf of scientists helped non-scientists. What worked in the School of Arts and Sciences also worked in the Schools of Education, Social Work, and Nursing and Health Sciences. Universal design, with its broad reach, has the additional advantage of creating—and sustaining—buy-in from most constituencies. Among the legacies of GEP initiatives are policies and practices like standardized offer letters, regular faculty satisfaction surveys, and regular tenure and promotion and manuscript and grant-writing workshops. In these cases, the changes cost relatively little and have universal design features that benefit everyone.

Lesson learned #11

Presidents, provosts, and deans play an important role in promoting the linked goals of equity and support for faculty research. Hunter's new president, Jennifer Raab, was announced just weeks before Hunter's ADVANCE proposal was submitted in 2001; she wrote a letter strongly supporting its goals. As president, Raab invested in the GEP's future by completely renovating the space that would become its permanent home. Later, and more crucially, she accepted the recommendation of then-provost Rabinowitz to institute a policy that all incoming professorial-rank faculty would be awarded research funds, however modest, as part of start-up packages, and that start-up funds would appear on the checklist of items to be included in all offer letters to professorial-rank faculty. Standardized offer letters that were co-signed by relevant officers of the college ensured that such funds were guaranteed, ensured that such funds were guaranteed. President Raab and then-Provost Richard Pizer both supported the goals of the award and respected the GEP's autonomy and responsibilities to NSF.

Faculty development, a crucial piece of equity, can nevertheless be a tough sell in institutions that are challenged to provide quality educations to underserved students. For non-elite, under-resourced institutions of higher education, there is never enough money for everything that's important. Since priorities change when leadership changes, it is important to develop an understanding of the importance of faculty research for student development and solidify a commitment and capacity to support a diverse, engaged, research-active faculty.

Table 3 summarizes our lessons learned.

The City University of New York and beyond

The influence of the GEP spread beyond Hunter College. A team from another CUNY college attended our workshops, developed their own workshops, and later successfully applied for an ADVANCE award. The GEP consulted with a CUNY comprehensive technical college in their successful bid for an ADVANCE award. The GEP applied for and received a Partnerships for Adaptation, Implementation, and Dissemination (PAID) award to extend its workshops to faculty across CUNY, and to develop new grant-writing workshops. It ran those workshops for 3 years. The university-wide response to the workshops over the duration of the program was extremely positive, with mean evaluations of their usefulness 3.55 on a four-point scale. Through a partnership with the New York Academy of Sciences, the GEP ran workshops that attracted over 100 graduate students, post-docs, and junior

TABLE 3 Lessons learned.

Lesson learned #1
By focusing on skill development rather than talent, and by providing necessary information, the Sponsorship Program provided a different message than the one our associates had internalized during their professional socialization.
Lesson learned #2
Faculty benefit from a circle of advisors rather than a single mentor – people from different backgrounds who have different perspectives, skills, and knowledge.
Lesson learned #3
Sustained connection to professional networks is necessary for career success.
Lesson learned #4
The traditional scholarly norms in the sciences do not fit everyone.
Lesson learned #5
Succeeding in one's discipline and succeeding at one's institution are not the same thing, especially in predominantly undergraduate institutions.
Lesson learned #6
Academia needs broader models of career success than those that are dominant in research-intensive institutions and national funding agencies.
Lesson learned #7
Women and people of color need ongoing opportunities for intellectual and social community outside of formal academic department structures.
Lesson learned #8
Gender equity and diversity programs are windows into institutional effectiveness.
Lesson learned #9
There are advantages and disadvantages to running a major program outside of the formal organizational chart.
Lesson learned #10
Universal design, a concept borrowed from architecture, is generally applied to serving individuals with disabilities, but it has more general application. The benefits of making life better for White female and BIPoC faculty end up also making life better for everyone.
Lesson learned #11
Presidents, provosts, and deans play an important role in promoting the linked goals of equity and support for faculty research.

faculty in the tri-state area; those workshops received very high evaluations as well, and were again very well-reviewed.

When Rabinowitz became CUNY's University Provost, she established the Office of Faculty Affairs within the Office the Provost, created the new position of University Associate Dean for Faculty Affairs—the first position within Academic Affairs to be focused on the faculty in CUNY history—and hired Nicols-Grinenko to head that office. (Rabinowitz and Nicols-Grinenko strongly supported then-CUNY Chancellor James B. Milliken, CUNY's then-Chancellor, in his leadership of the historic, successful campaign to lower the university teaching workload of CUNY faculty in 2017.) Nicols-Grinenko has recently become University Dean for Faculty Affairs, signaling a long-term commitment by CUNY to its faculty. There are now regularly scheduled well-attended workshops series and course releases for mid-career faculty seeking promotion to full professor, an institutionalized program to support research among community college faculty, an award program to support faculty who write books, and all-day grant-writing workshops to help faculty sharpen their specific aims.

Measures of faculty satisfaction—followed by action on the part of colleges—have now become routine at CUNY. Rabinowitz, as CUNY Provost, and Nicols-Grinenko partnered with Harvard's Graduate School of Education's COACHE program to institute regular surveys of CUNY faculty's satisfaction, which continue to this day, and CUNY pilot-tested the first major survey of community college faculty satisfaction—now a COACHE staple. With COACHE partners, Nicols-Grinenko and Rabinowitz won a grant from the Harvard Club of New York Foundation to support CUNY faculty participation in Harvard's higher education leadership programs. Seventeen aspiring CUNY leaders, most of them faculty and administrators of color, attended the 2-week leadership and management programs over a 2-year period without any cost to them. Many participants described the experience as career-changing and went on to major promotions, including to college president. In addition to heading the Office for Faculty Affairs, Nicols-Grinenko now co-directs The Leadership Institute at CUNY (TLIC), a Mellon Foundation-funded program that supports faculty at CUNY and across the nation who wish to become leaders in urban, mostly teaching-intensive, higher education institutions.

Implications for the future of programs to advance gender equity

As we have noted throughout this paper, the challenges for women and people of color at teaching-intensive institutions overlap but are also distinct from their counterparts at research-intensive ones. Increasing representation remains important, especially in some departments. Even more important is increasing faculty's ability to develop their scholarship and engage students in meaningful inquiry.

Facilitate cross-institutional and collaborative work

Teams and cross-institutional collaborations are growing in size, averaging more than three people in some scientific fields, and becoming more cross-institutional (Jones et al., 2008; Stewart and Valian, 2018). Yet female faculty in teaching-intensive institutions are unlikely to be part of cross-institutional teams. Scientists from top-tier institutions tend to collaborate with scientists from other top-tier institutions—and the same is true of scientists in lower-tier institutions in what Stewart and Valian call "assortative matching." We can also see this as contributing to the accumulation of advantage and disadvantage, respectively. The 5% of institutions in the top tier of citation rates accounts for 59% of cross-institutional collaborations; the lowest tier, which consists of 80% of all institutions and virtually all teaching-intensive institutions, accounts for just 30% of cross-institutional collaborations (Jones et al., 2008).

Women are, on average, less likely to adopt the collaborative patterns—maintaining regular and repetitive collaborations over time, finding new collaborators to plug structural holes in their knowledge base as needed—that are related to success (Jadidi et al., 2018). Given the scientific imperative to develop and maintain stable, trusted collaborative networks (Carr and Walton, 2014; McDaniel and Salas, 2018)—and the already existing marginalization and isolation of female and minority scientists in teaching-intensive institutions—it is unlikely that useful collaborations involving faculty and students from teaching-intensive institutions will take place without concerted and deliberate action on the part of major funding agencies like NSF. To that end, ADVANCE has supported four partnership grants over the past 20 years, three within STEM disciplinary professional societies and one among different types of institutions.

Cross-institutional collaborations that seem particularly promising include those in which there are strong and durable ties among colleges, as in public systems with flagship research units and regional, satellite, and community colleges. Others with potential include research-intensive institutions that already have some relationship with teaching-intensive institutions by virtue of geographic proximity or other important commonalities, like shared interests in regional or global challenges.

For collaborations to work, recognition and respect for the talents and skills of all partners in the collaboration are required. Work on diverse teams shows that the innovative solutions that diverse teams generate occur when participants have a feeling of psychological safety and a feeling that what they have to offer is valued (see discussion in Stewart and Valian, 2018, Chapter 2). People do not offer ideas unless they think that those ideas will be respectfully considered. In order to receive funding, potential teams would describe how they intend to maximize productive collaborations. At the faculty level, the benefits are obvious for both types of institutions. At the student level, the benefits include giving undergraduates at teaching-intensive institutions familiarity with the doctoral institutions where they might apply for graduate school and giving those research-intensive institution access to a wider and more diverse range of students than generally apply.

Include women in the social sciences

The ADVANCE program started 20 years ago in response to obvious and serious problems in the sciences, primarily the natural sciences, engineering, technology, and mathematics: women were underrepresented, underpaid, under-tenured, and underpromoted. The early leadership of ADVANCE was mindful of the relevance of social science research to the success of the program, and the program included all NSF-supported disciplines, including the social sciences, from its inception. Our experience suggests that the plight of women in the social sciences remains underappreciated generally, much like the plight of women in teaching-intensive institutions—and for much the same reasons: that women are more plentiful in the social than the natural sciences and seem to be doing "well enough." We suspect that the social sciences are also regarded as less rigorous and important than the natural sciences, and for all these reasons, less in need of attention and interventions.

Two recent articles on the plight of women in the social and behavioral sciences document that women continue to experience significant gender inequities despite their strong representation in these fields (Casad et al., 2022; van Veelen and Derks, 2022). Data on citations, awards, promotions, salary, and invitations to give colloquia and keynotes suggest that women in the social sciences are under-recognized (Beaulieu et al., 2017; Nittrouer et al., 2018; Ginther and Kahn, 2021; Gruber et al., 2021; Skitka et al., 2021; White et al., 2021). In the same way that we have spoken of institutions like Hunter College as places where the hidden problems predominate over overt problems, we see the social sciences as disciplines where the hidden problems predominate. The situation of women in the social sciences is the leading edge. Social science is important to institutions because of what social science can uniquely contribute to our understanding of individual and institutional change. But it is also important because the social sciences represent such a large percentage of faculty and students in most colleges, and they continue to attract a large percentage of undergraduate women. Women in social science face challenges that all women face in professional life. We thus recommend expanding the focus of attention to include *hidden problems*, by increasing funding opportunities for teaching-intensive institutions and for women in the social sciences.

Final thoughts: transforming institutions; potential roles for funding agencies

NSF's ADVANCE Institutional Transformation program has increased the numbers of women in STEM. The 2001 and 2003 cohorts, for example, increased the percentage of women from 16% to 24% and of new women hires from 25% to 35%. Comparable increases from comparison groups of non-ADVANCE institutions were significantly lower (Rosser et al., 2019).

As crucial as it is to increase the representation of women in science, increased representation is but one facet of diversity, equity, and inclusion. Similarly, as important as it is to support the research productivity of women and people of color in science, discrete efforts like the Sponsorship Program, no matter how well-intentioned and well-designed, cannot alone create real and lasting change in the research careers of minoritized groups. As is increasingly being realized, our notion of transformation itself needs to expand to encompass strategies for creating and sustaining comprehensive, inclusive work environments for all kinds of people over long periods of time. If our experience is a guide, we believe that teaching-intensive institutions will be particularly challenged to sustain improvements in research environments beyond the 5-year award period that NSF IT awards provide. The GEP's Sponsorship Program was successful in improving scholarly productivity, but no amount of faculty development can overcome inadequate facilities, underfunded research operations, poor incentive structures, and the lack of intellectual community and research collaborations that sustain successful academic careers. Five or even 10 years is not enough time to transform the institution in the ways we now understand that institutions must change. At colleges like Hunter, where the pressures from the institution are unremitting and where the deck is stacked against research productivity from the get-go,

faculty need a constant prevailing counter-force in order to be successful in the external world.

All institutions have four potential sources of funding: grants from federal and other agencies, state and city support, private philanthropy, and tuition. Public teaching-intensive institutions like CUNY colleges are, by their nature, dependent on tuition, and that tuition—now about $7,500 per year for full time attendance at CUNY–does not cover the cost of instruction, let alone undergraduate research opportunities, faculty research, or faculty development. The infrastructure to support expensive science is lacking and state and local governments are increasingly chary with funding. To improve equity at those institutions, and to ensure a future in STEM for the diverse group of immigrant students, first-generation students, and students of color, more extended support is needed.

One way federal and state funding agencies can evaluate applications for continued support from teaching-intensive institutions is to include the economic and social mobility of its students as a criterion. As we have noted, higher education is the best engine of mobility. To maintain and enlarge the range and effectiveness of the teaching-intensive institutions that provide that mobility, more funding for the researchers at those institutions is warranted and necessary. Federal agencies already have some mechanisms. We think they can be expanded.

We make two further recommendations. Funding agencies understandably focus on new ideas, and thus do not engage in long-term funding of successful faculty development programs at teaching-intensive institutions. One way to prevent the return to *status quo ante* is to continue support at under-resourced institutions that can demonstrate the effectiveness of their programs. The second recommendation is to require institutions to include a commitment within the initial application to seek outside funding, if necessary, to sustain demonstrably successful faculty development projects. In that way, effective programs could be immune to changes in administrative leadership priorities.

In the ecosystem of teaching-intensive institutions, student success affects faculty and faculty success affects students. Reflecting on the meaning of faculty research success to students, one of our former associates, now a full professor, recently wrote:

> "*Students at Hunter are also extremely proud of having been a student of mine or others that are published, in the news, or have a presence in policy circles. Comments go something like this: "I go to Hunter and I get to take classes with famous professors, too". Or: "I see myself in your research." Faculty development should be a higher priority for Hunter because it inspires students. I wonder if anyone has ever surveyed students on their feelings about faculty.*"

We are not aware of such studies, which go far beyond regular teaching evaluations, but we offer this as another fruitful area for future research.

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All authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Allen, T. D., and Eby, L. T. (eds) (2011). *The Blackwell Handbook of Mentoring: A Multiple Perspectives Approach*. Malden, MA: Blackwell.

Beaulieu, E., Boydstun, A. E., Brown, N. E., Dionne, K. Y., Gillespie, A., Klar, S., et al. (2017). Women also know stuff: meta-level mentoring to battle gender bias in political science. *Polit. Sci. Polit.* 50, 779–783. doi: 10.1017/S1049096517000580

Bertolero, M. A., Dworkin, J. D., David, S. U., Lloreda, C. L., Srivastava, P., Stiso, J., et al. (2020). Racial and ethnic imbalance in neuroscience reference lists and intersections with gender. *BioRxiv* [Preprint]. doi: 10.1101/2020.10.12.336230v1.full.pdf

Bianchi, S. M., Sayer, L. C., Milkie, M. A., and Robinson, J. P. (2012). Who did, does, or will do it, and how much does it matter? *Soc. Forc.* 91, 55–63. doi: 10.1093/sf/sos120

Blickle, G., Witzki, A., and Schneider, P. B. (2009). Self-initiated mentoring and career success: a predictive field study. *J. Vocation. Behav.* 74, 94–101. doi: 10.1016/j.jvb.2008.10.008

Boyer, E. L. (1990). *Scholarship Reconsidered: Priorities of the Professoriate*. Princeton, NJ: Carnegie Foundation for the Advancement of Teaching.

Bradburn, E. M., and Sikora, A. C. (2002). 'Gender and racial/ethnic differences in salary and other characteristics of postsecondary faculty: fall 1998'. *Educ. Stat. Q.* 4, 57–99. doi: 10.1037/e610562011-011

Brickman, P. (1987). *Commitment, Conflict, and Caring*. Englewood Cliffs, NJ: Prentice-Hall.

Carnegie Classifications (2021). Available online at: https://carnegieclassifications.iu.edu/downloads/CCIHE2021-FactsFigures.pdf (accessed July 18, 2022).

Carr, P. B., and Walton, G. M. (2014). Cues of working together fuel intrinsic motivation. *J. Exp. Soc. Psychol.* 53, 169–184. doi: 10.1016/j.jesp.2014.03.015

Casad, B. J., Franks, J. E., Garasky, C. E., Kittleman, M. M., Roesler, A. C., Hall, D. Y., et al. (2021). Gender inequality in academia: problems and solutions for women faculty in STEM. *J. Neurosci. Res.* 99, 13–23. doi: 10.1002/jnr.24631

Casad, B. J., Garaskey, C. E., Jancetic, T. R., Brown, A. K., Franks, J. E., and Bach, C. R. (2022). U.S. women faculty in the social sciences also face gender inequalities. *Front. Psychol.* 13:792756. doi: 10.3389/fpsyg.2022.792756

Chatterjee, P., and Werner, R. M. (2021). Gender disparity in citations in high-impact journal articles. *JAMA Netw. Open* 4:e2114509. doi: 10.1001/jamanetworkopen.2021.14509

Chetty, R., Friedman, J. N., Saez, E., Turner, N., and Yagan, D. (2020). Income segregation and intergenerational mobility across colleges in the United States. *Q. J. Econ.* 135, 1567–1633. doi: 10.1093/qje/qjaa005

Collins, T. W., Grineski, S. E., Shenburger, J., Morales, X., Morera, O. F., and Echegoyan, L. E. (2017). Undergraduate research participation is associated with improved student outcomes at a Hispanic-serving institution. *J. College Student Dev.* 58, 583–600. doi: 10.1353/csd.2017.0044

Cook, T. D., and Campbell, D. T. (1979). *Quasi-Experimentation: Design and Analysis Issues for Field Settings*. Boston, MA: Houghton Mifflin Company.

Darley, J. M., Zanna, M. P., and Roediger, H. L. (eds) (2004). *The Compleat Academic: A Career Guide*, 2nd Edn. Washington, DC: American Psychological Association (accessed July 23, 2022).

DeJesus, J. M., Umscheid, V. A., and Gelman, S. A. (2021). When gender matters in scientific communication: the role of generic language. *Sex Roles* 85, 577–586. doi: 10.1186/s12913-016-1423-5

Doldor, E., Wyatt, M., and Silvester, J. (2019). Statesmen or cheerleaders? using topic modeling to examine gendered messages in narrative developmental feedback for leaders. *Leadersh. Q.* 30:101308.

Dworkin, J. D., Linn, K. A., Teich, E. G., Zurn, P., Shinohara, R. T., and Bassett, D. S. (2020). The extent and drivers of gender imbalance in neuroscience reference lists. *Nat. Neurosci.* 23, 918–926. doi: 10.1038/s41593-020-0658-y

Fitzgerald, L. F., Shullman, S. L., Bailey, N., Richards, M., Swecher, J., Gold, Y., et al. (1988). The incidence and dimensions of sexual harassment in academia and the workplace. *J. Vocation. Behav.* 32, 152–175. doi: 10.1016/0001-8791(88)90012-7

Fox Tree, J. E., and Vaid, J. (January, 2022). Why so few, still? Challenges to attracting, advancing, and keeping women faculty of color in academia. *Front. Sociol.* 6:792198. doi: 10.3389/fsoc.2021.792198

Fry, R., and Cilluffo, A. (2019). *A Rising Share of Undergraduates are From Poor Families, Especially at Less Selective Colleges*. Washington, DC: Pew Research Center.

Ginther, D. K., and Kahn, S. (2021). Women in academic economics: have we made progress? *AEA Pap. Proc.* 111, 138–142. doi: 10.1257/pandp.20211027

Gonzales, L. D., and Terosky, A. L. (2016). From the faculty perspective: defining, earning, and maintaining legitimacy across academia. *Teach. Coll. Rec.* 118, 1–44.

Gruber, J., Mendle, J., Lindquist, K. A., Schmader, T., Clark, L. A., Bliss-Moreau, E., et al. (2021). The future of women in psychological science. *Perspect. Psychol. Sci.* 16, 483–516. doi: 10.1177/1745691620952789

Guarino, C. M., and Borden, V. M. (2017). Faculty service loads and gender: are women taking care of the academic family? *Res. High. Educ.* 58, 672–694.

Holman, L., Stuart-Fox, D., and Hauser, C. E. (2018). The gender gap in science: how long until women are equally represented? *PLoS Biol.* 16:e2004956. doi: 10.1371/journal.pbio.2004956

Jadidi, M., Karimi, F., Lietz, H., and Wagner, C. (2018). Gender disparities in science? Dropout, productivity, collaborations and success of male and female computer scientists. *Adv. Complex Syst.* 21:1750011. doi: 10.1142/S0219525917500114

Jones, B. F., Wuchty, S., and Uzzi, B. (2008). Multi-university research teams: shifting impact, geography, and stratification in science. *Science* 322, 1259–1262. doi: 10.1126/science.1158357

Katz, J. K., Rosen, S., and Morahan, P. (March 2009). What is team coaching, and why use co-coaches? *Acad. Phys. Sci.* 5, 2–6.

King, E. B., Botsford, W., Hebl, M. R., Kazama, S., Dawson, J. F., and Perkins, A. (2012). Benevolent sexism at work: gender differences in the distribution of challenging developmental experiences. *J. Manag.* 38, 1835–1866. doi: 10.1177/0149206310365902

Lombardi, J. V., and Craig, D. D. (2017). *America's Research Universities: Is the Enterprise Model Sustainable? The Top American Universities 2017 Annual Report*. Gainesville, FL: University of Florida.

Lopato, D. (2017). Undergraduate research experiences support science career decisions and active learning. *CBE Life Sci. Educ.* 6, 297–306. doi: 10.1187/cbe.07-06-0039

Lundberg, S., and Stearns, J. (2019). Women in economics: stalled progress. *J. Econ. Perspect.* 33, 3–22. doi: 10.1257/jep.33.1.3

Lyness, K. S., and Grotto, A. R. (2018). Women and leadership in the United States: are we closing the gender gap? *Annu. Rev. Organ. Psychol. Organ. Behav.* 5, 227–265. doi: 10.1146/annurev-orgpsych-032117-104739

MacDonald, P. (2011). Workplace sexual harassment 30 years on: a review of the literature. *Int. J. Manag. Rev.* 14, 1–17. doi: 10.1186/s13690-022-00828-z

Marquis, J. P., Lim, N., Scott, L. M., Harrell, M. C., and Kavanagh, J. E. (2008). *Managing Diversity in Corporate America: An Exploratory Analysis*, Vol. 206. Santa Monica, CA: Rand Corporation. doi: 10.7249/OP206

Martell, R. F., Lane, D. M., and Emrich, C. (1996). Male-female differences: A computer simulation. *Am. Psychol.* 51, 157–158.

McCauley, C. D., and Martineau, J. W. (1998). *Becoming Your Own Best Mentor: Selecting a Mosaic of Mentors. Reaching Your Developmental Goals: Ideas into Action Guidebooks*. Greensboro, NC: Center for Creative Leadership.

McDaniel, S. H., and Salas, E. (2018). The science of teamwork: introduction to the special issue. *Am. Psychol.* 73, 305–307. doi: 10.1037/amp0000337

Melnikoff, D. E., and Valian, V. V. (2019). Gender disparities in awards to neuroscience researchers. *Arch. Sci. Psychol.* 7, 4–11. doi: 10.1037/arc0000069

Morgan, A., LaBerge, N., Larremore, D., Galesic, M., Brand, J. E., and Clauset, A. (2022). Socioeconomic roots of academic faculty. *SocArXiv* [Preprint] 17. doi: 10.31235/osf.io/6wjxc

Nichols, A. H. (2020). *'Segregation forever'?: The Continued Underrepresentation of Black and Latino Undergraduates at the Nation's 101 Most Selective Public Colleges and Universities*. London: Education Trust.

Nittrouer, C. L., Hebl, M. R., Ashburn-Nardo, L., Trump-Steele, R. C., Lane, D. M., and Valian, V. (2018). Gender disparities in colloquium speakers at top universities. *Proc. Natl. Acad. Sci. U.S.A.* 115, 104–108. doi: 10.1073/pnas.1708414115

Oleschuk, M. (2020). Gender equity considersations for tenure and promotion during Covid-19. *Can. Sociol. Assoc.* 57, 502–515. doi: 10.1111/cars.12295

O'Meara, K., Templeton, L., and Nyunt, G. (2018). Earning professional legitimacy: challenges faced by women, underrepresented minority and non-tenure-track faculty. *Teach. College Rec.* 120, 1–38. doi: 10.1177/016146811812001203

Packard, B. W. L. (1999). *To Construct a "Composite Mentor": College Women's Conceptions of Mentoring, Future Images, and Motivation in Science*. Unpublished PhD dissertation. East Lansing: Michigan State University.

Packard, B. W. L. (2003). Student training promotes mentoring awareness and action. *Career Dev. Q.* 51, 335–345. doi: 10.1002/j.2161-0045.2003.tb00614.x

Pannapacker, W. (2021). *On why I'm leaving academe. The Chronicle of Higher Education*. Available online at: https://www.chronicle.com/article/on-why-im-leaving-academe (accessed September 13, 2021).

Rabinowitz, V. C., and Valian, V. (2007). "Beyond mentoring," in *Transforming Science and Engineering: Advancing Academic Women*, eds A. J. Stewart, J. E. Malley, and D. LaVaque-Manty (Ann Arbor, MI: University of Michigan Press), 96–115.

Rosser, S. V., Barnard, S., Carnes, M., and Munir, F. (2019). Athena SWAN and ADVANCE: effectiveness and lessons learned. *Lancet* 393, 604–608. doi: 10.1016/S0140-6736(18)33213-6

Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., and Griskevicius, V. (2007). The constructive, destructive, and reconstructive power of social norms. *Psychol. Sci.* 18, 429–434. doi: 10.1111/j.1467-9280.2007.01917.x

Settles, I. H., Jones, M. K., Buchanan, N. T., and Dotson, K. (2021). Epistemic exclusion: scholar(ly) devaluation that marginalizes faculty of color. *J. Divers. High. Educ.* 14, 493–507. doi: 10.1037/dhe0000174

Skitka, L. J., Melton, Z. J., Mueller, A. B., and Wei, K. Y. (2021). The gender gap: who is (and is not) included on graduate-level syllabi in social/personality psychology. *Pers. Soc. Psychol. Bull.* 47, 863–872. doi: 10.1177/0146167220947326

Stellar, J. R. (2017). *Education That Works: The Neuroscience of Building a More Effective Higher Education*. Oakton, VA: Ideapress Publishing.

Stewart, A. J., and Valian, V. (2018). *An Inclusive Academy: Achieving Diversity and Excellence*. Cambridge, MA: MIT Press. doi: 10.7551/mitpress/9766.001.0001

Thiry, H., Weston, T. J., Laursen, S. L., and Hunter, A. (2012). The benefits of multi-year research experiences: differences in novice and experienced students; reported gains from undergraduate research. *CBE Life Sci. Educ.* 11, 260–272. doi: 10.1187/cbe.11-11-0098

Valian, V. (1998). *Why so Slow? The Advancement of Women*. Cambridge, MA: MIT Press. doi: 10.7551/mitpress/7235.001.0001

Valian, V. (2020). "Women in science at Hunter College," in *Hunter 150: Celebrating the Past, Caring for the Future*, ed. H. Holzer (New York, NY: Hunter College), 177–201.

van Veelen, R., and Derks, B. (2022). Equal representation does not mean equal opportunity: women academics perceive a thicker glass ceiling in social and behavioral fields than in the natural sciences and economics. *Front. Psychol.* doi: 10.3389/fpsyg.2022.790211

Way, S. F., Morgan, A. C., Larremore, D. B., and Clauset, A. (2019). Productivity, prominence, and the effects of academic environment. *Proc. Natl. Acad. Sci. U.S.A.* 116, 10729–10733. doi: 10.1073/pnas.1817431116

White, S. W., Xia, M., and Edwards, G. (2021). Race, gender, and scholarly impact: disparities for women and faculty of color in clinical psychology. *J. Clin. Psychol.* 77, 78–89. doi: 10.1002/jclp.23029

Zanna, M. P., and Darley, J. M. (1987). *The Compleat Academic*. New York, NY: McGraw-Hill.

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What makes the pipeline leak? Women's gender-based rejection sensitivity and men's hostile sexism as predictors of expectations of success for their own and the respective other gender group

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In academia, the proportion of women decreases with each career level. In this research, we examined how this so-called leaky pipeline relates to gender-based relative expectations of success. The participants were students from social sciences where women are the majority among students, such that it is more readily – but erroneously – inferred that gender discrimination is not an issue. We assumed that gender-based relative expectations of success should be predicted by two variables. Women students should experience higher gender-based rejection sensitivity than men students, with gender-based rejection sensitivity mitigating relative success expectations in women, but not in men. Men students should exhibit higher hostile-sexist attitudes toward women than women students, with hostile sexism reducing men students' but not women students' relative success expectations. We tested our hypotheses in an (under-)graduate sample of women and men students enrolled in educational or psychological majors (N=372). Results show that a quarter of the women students expected men to be more successful than women and that proportionately more women than men students indicated that women have worse chances of success than men in the job they aspire to. Women were more concerned about being treated differently because of their gender than men, and men held more sexist attitudes toward women than women, with gender-based rejection sensitivity contributing to women students' and sexism to men students' expectation that their own gender group will less likely succeed in their aimed for future job. Implications how the leaky pipeline can be patched are discussed.

KEYWORDS

leaky pipeline, gender, academia, expectations of success, rejection sensitivity, hostile sexism

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Introduction

In academia, the proportion of women decreases with each career level, a phenomenon for which Clark Blickenstaff (2005) coined the term *leaky pipeline*. An example are higher education institutions where from the undergraduate to the professorial staff level the percentage of women is declining steadily (e.g., for the United Kingdom: Cooper, 2019; for Germany where our study was conducted: German Federal Office of Statistics, 2019). Contributing to the current Research Topic, we investigated the social sciences. The study of psychological causes of the leaky pipeline is particularly interesting for this domain: as women are the majority among students in the social sciences and are also relatively well represented at lower hierarchical levels within the academic staff, the persistence of gender discrimination – as shown in the leaky pipeline – is less obvious than in domains where women are underrepresented at all levels, such as in the fields of natural sciences and technology. This can prove to be an additional disadvantage for women seeking careers within fields where women are well represented on average. For instance, investigating a discipline in which women professionals had a share of 50% + for more a decade now, veterinary medicine, Begeny et al. (2020) found that women still experienced greater discrimination and less recognition from colleagues than men. In an experimental study, Begeny et al. (2020) found that managers evaluated the performance review of a vet called Mark as more competent and suggested a higher salary – equating to an 8% gender pay-gap – than when they assessed the same performance review of an employee called Elizabeth. But not only negative stereotypes toward women, such as that they are less competent, also (apparently) positive stereotypes may play a role even in academic domains in which women are well represented on average. While negative stereotypes are largely considered inappropriate today, people may emphasize a group's positive traits – without experiencing themselves as prejudiced or being perceived as prejudiced by others (Czopp et al., 2015). Even when expressed with benevolent intent, positive stereotypes (e.g., women as warm and caring; Eagly et al., 1991) can have the same adverse effects on targeted individuals as negative stereotypes, namely self-stereotyping and feeling of depersonalization due to being acknowledged through one's group membership rather than one's personal achievements (for a review see Czopp et al., 2015). Taken together, these findings suggest that gender stereotypes persist even in disciplines where the overall percentage of women is high and that since gender stereotypes' existence is less obvious, they have significant psychological consequences. In line with this view, van Veelen and Derks (2022) found that in the social sciences – but not in natural sciences, technology, and economics – women assistant and associate professors perceived a thicker glass ceiling than their men colleagues and considered it less likely to become full professors the thicker they perceived the glass ceiling to be (with no such moderated mediation appearing for men).

van Veelen and Derks (2022) had their research participants estimate the likelihood that they will become a full professor during their career. Such expectations of success are an empirically well-established predictor of achievement-related choices and persistence in academia. As Muenks et al. (2018) point out in their literature review, the concept of expectancy-related beliefs is found in numerous motivational theories, such as expectancy-value theory, social cognitive theory, and theories on self-concept and self-worth. A common feature of the various approaches is the assumption that individual differences in the choice of task difficulty, in engagement and persistence in the pursuit of a goal can be explained by how strongly the person is convinced that they can succeed, i.e., by the person's expectations of success. In our study we investigated university students' gender-based expectations of success regarding the future profession they aimed to work in. More specifically, we asked them whether they thought that women have worse, the same, or better chances of success than men in their aimed for future job, assuming that subjective chances of success matter for students motivationally.

Women students' gender-based relative expectations of success

With gender discrimination remaining an issue even in disciplines where women are well represented on average (e.g., Begeny et al., 2020; van Veelen and Derks, 2022), we expected that women students in the social sciences often have pessimistic expectations regarding their gender group's future success in the jobs they personally aspire to. If gender and gender stereotypes do not play a role, individuals' real chances of success should depend on their performance and other idiosyncratic personal characteristics. Accordingly, men and women should have equal chances on average. We asked our participants whether men and women have (a) the same, (b) relatively better, or (c) relatively worse chances in the profession they themselves aim to work in. While respondents who consider gender to be a non-significant predictor of success should choose response option (a), we assumed for respondents who consider women to be disadvantaged that they choose response option (b) and for respondents who consider men to be disadvantaged that they choose response option (c). For women students, we predicted a pessimistic expectation. That is, the proportion of women who believes that men are more likely to succeed than women should be greater than the proportion who believes that women are more likely to succeed than men, and proportionately more women than men students should expect that women have worse chances of success than men in the job they aspire to.

We further assumed that among women students, the pessimistic expectation that women have lower chances of success in their future job than men do is predicted by gender-based rejection sensitivity. Gender-based rejection sensitivity is a cognitive–affective process triggered by the personal experience or the witnessing of other ingroup members to be discriminated

against or socially excluded due to gender (London et al., 2012). Such experiences make the person anxiously expect to be rejected even by unfamiliar other persons or in newly encountered situations, to monitor new contexts for possible rejections, heighten their readiness to perceive rejection, and intensify their emotional reactions to rejection (Mendoza-Denton and Goldman-Flythe, 2009; London et al., 2012; Ahlqvist et al., 2013). We expected that women noticing gender disparities on higher career levels are inclined to experience gender-based rejection sensitivity and accordingly expect men to have higher success in their future job than women.

Regarding gender-based rejection sensitivity, we expected that due to the experience of women's limited advancement to higher career levels, women students are more sensitive to gender-based discrimination than their men fellow students. We further assumed that this difference would be particularly pronounced in encounters with men staff members or peers, as gender is more salient in mixed gender groups than when only one gender is present (e.g., McGuire and Padawer-Singer, 1976; Kessels and Hannover, 2008). Also, a woman getting treated in a discriminatory manner by a man because of her gender represents a *prototypical situation* of discrimination and therefore concerns of gender disadvantage should be inherent to any interaction of a woman with a man (Carlsson and Sinclair, 2018).

Men students' gender-based relative expectations of success

Regarding the dependency of men students' rejection sensitivity on the interaction partner's gender, our expectations deviated from what we had assumed for women students. As gender is more pronounced in mixed gender than in same-gender encounters (*cf.* McGuire and Padawer-Singer, 1976; Kessels and Hannover, 2008), it could be argued that both women and men students are more anxious when interacting with someone of the other gender group. However, men students witness women's limited advancement to higher career levels in their own study environment. This could mean that men students experience women as less powerful than men and accordingly do not feel more threatened to be discriminated against based on their own gender in an interaction with a woman than in an interaction with a man. We therefore expected men students' gender-based rejection sensitivity to be the same, irrespective of the interaction partner being a woman or a man.

For men, the perception of the leaky pipeline should imply that their own gender group has good career prospects – even though they are in the minority among students. This leads to the prediction that the proportion of men students who think that men have better chances of success in their future job than women is larger than the proportion of men who think women's relative success is greater than men's.

At the same time, however, research found men and women to be particularly sensitive toward discriminatory treatment of members of their own gender group (Elkins et al., 2002). We therefore considered it also possible that men too – mirroring women's gender-related relative expectations of success – would be more likely to expect their own gender group's career opportunities to be lower than those of the other gender group.

In either case, however, men's gender-based success expectations should be unrelated to gender-based rejection sensitivity. The prototypical situation of gender-based discrimination is one in which a woman is disadvantaged by a man or by men, with the prototypicality of a situation influencing how likely people experience or perceive the interaction as discriminatory (Carlsson and Sinclair, 2018). Hence, we predicted that in men, gender-based rejection sensitivity would be unrelated to their gender-based relative expectations of success.

We examined hostile sexism toward women as a predictor that should inversely predict in men, but not in women, how they view the relative career opportunities of men and women. Hostile sexism is an overtly negative attitude characterized by the belief that women are inferior, incompetent, and trying to control men or take advantage of them (Glick and Fiske, 1996). Many studies have shown that men endorse hostile sexism toward women to a stronger extent than women do (e.g., Glick et al., 2000; Cowie et al., 2019). In our study, we expected hostile sexism to predict men students' expectation that women would (unjustifiably) be given better opportunities in their future job than men, while hostile sexism should be unrelated to gender-based relative expectations of success in women students.

The present study

In an online survey with students of the social sciences, we measured gender-based rejection sensitivity, hostile sexism toward women, and gender-based relative expectations of success for own and the respective other gender group and tested the following hypotheses:

1. The proportion of women students who believe that men are more likely to succeed than women is greater than the proportion who believes that women are more likely to succeed than men.
2. For men students, no directed hypothesis was specified regarding their gender-based relative expectations of success. It is possible that the proportion of men students who think that men have better chances of success in their future job than women is larger than the proportion of men who think women's relative success is greater than men's, or vice versa, or that they are equal.
3. The proportion of women students who expect women to be less successful than men in the aspired for future job is larger than the proportion of men students.
4. Gender-based rejection sensitivity is stronger in women than in men students.

5. While women students are particularly anxious to be discriminated based on their gender in encounters with a man, for men students the interaction partner's gender does not matter.
6. Men students endorse hostile-sexist attitudes toward women more strongly than women students.
7. Rejection sensitivity predicts gender-based relative expectations of success in women but not in men. This should also become evident in gender moderating the relationship between rejection sensitivity and expected success.
8. Hostile sexism predicts gender-based relative expectations of success in men but not in women. This should also become evident in gender moderating the relationship between sexism and expected success.

Materials and methods

Participants

The online study took place at a large German university and was part of a more comprehensive survey examining experiences of sexual harassment and violence. All measures reported in this paper were collected prior to the sexual harassment and violence survey. Three hundred and eighty-four students of the social sciences (educational science, teacher education, psychology) participated. The university's ethics committee approved the study under the constraint that we were not allowed to collect any personal data besides gender, in order to ensure anonymity even for those who identify as non-binary. Of the participants, 311 identified as women, 63 as men, 6 as non-binary, and four individuals did not specify their gender. This corresponds to the ratios of the genders as they are in the social sciences at the university studied here, $\chi^2(1) = 1.96$, $p = 0.16$. While 221 students were enrolled in bachelor studies, 161 students were pursuing their master's degree. One person was pursuing another degree, and one person did not indicate the degree. According to the enrollment office, at this university the age of students in the social sciences is on average 26.31 ($SD = 6.67$). We were also able to receive information from the enrollment office that 11.1% of the students in the subjects we examined were not born in Germany. Of these, 27.9% have German citizenship. The most frequently represented countries of origin of students with a migration background in our sample were Turkey, Russia, China, and the US.

Measures

Participants completed measures of gender-based rejection sensitivity, hostile sexism toward women, and gender-based relative expectations of success. To measure gender-based rejection sensitivity, we adapted the scale of London et al. (2012) by choosing all situations that fit well to the scenario of studying at a university. In total, we extracted six situations (out of 11) where gender rejection may be experienced. We worded all items in such a way that respondents should relate them to their own field of study (e.g., "Imagine that you have to give an oral presentation in a very important course. After everyone gives their presentations, the professor announces that he/she will post the grades outside of the classroom."). We translated the situations into German, and an independent native English speaker translated them back into English. In the grammatical gender language German, nouns and adjectives are gendered (e.g., for a woman professor: Professorin, for a man professor: Professor). Therefore, for each of the six items we developed one version in which the acting person was a woman (e.g., Professorin P.) and one in which she was a man (e.g., Professor P.). We then created two different blocks. Block A: in situations 1, 3, and 5 the acting person was a man and in situations 2, 4, and 6 a woman; Block B: in situations 1, 3, and 5 the acting person was a woman and in situations 2, 4, and 6 a man. Each participant was randomly assigned to one block.

Following the procedure of London et al. (2012), for each situation, participants rated their level of concern about being rejected or treated unfairly because of their gender on two 6-point Likert scales: (1) "How concerned would you be that you would be treated differently or have a negative experience because of your gender?" and (2) "To what extent would you expect to be treated fairly?" (response scales: 1 = *not at all*, 6 = *very strongly*). Again, following the procedure by London et al. (2012), responses to items 2 were reverse coded, and for each situation, the item 1-score was then multiplied by the item 2-score, such that higher product-scores reflect stronger rejection sensitivity. Product-scores were averaged across the six situations, with the resulting rejection sensitivity score ranging between 1 and 36. The Cronbach's alphas across the six product-scores of the gender-based rejection scale was good with a total value (averaged across Block A and B) of 0.85 and a value of 0.81 for the man acting person and 0.80 for the woman acting person. Hostile sexism toward women was measured with a subscale of the ambivalent sexism inventory (original: Glick and Fiske, 1996; German translation: Eckes and Six-Materna, 1999). The hostile sexism subscale measures overtly hostile attitudes toward women. Participants responded to 11 statements, such as "Women are too easily offended," on six-point Likert scales (1 = *strongly disagree*, 6 = *strongly agree*). The reliability for hostile sexism was good with a Cronbach's alpha of 0.91. Regarding gender-based relative expectations of success, students were asked to indicate whether men or women have better chances to be successful in their intended future job. Responses were given on a three-point scale ("Women have worse chances of success than men in the job I aspire to"; "Women have the same chances of success as men in the job I aspire to"; "Women have better chances of success than men in the job I aspire to").

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Results

Only participants who identified as women or as men were included in all further analyses. Data was analyzed using SPSS 25. Since the variance homogeneity assumption for the *t*-test was violated, we performed a Welch-test to test Hypothesis 6 regarding the gender difference in hostile sexism. A sensitivity analysis indicated that this test would be sensitive to effects of Cohen's $d = 0.39$, given a sample size of 63 men and 309 women students ($\alpha = 0.05$, two-tailed). This means our study would not be able to reliably detect effects smaller than Cohen's $d = 0.39$. As expected, men students reported more hostile sexism ($M = 2.35$, $SD = 1.1$) than women students ($M = 1.86$, $SD = 0.74$), $t(73.66) = 3.35$, $p = 0.001$, $d = 0.6$. To test our hypotheses regarding gender differences in gender-based rejection sensitivity, we conducted a repeated measurement ANOVA with gender of the student as between-participant-factor (Hypothesis 4) and gender of the acting person (man vs. woman) as within-participant-factor (Hypothesis 5). A sensitivity analysis indicated that effects of $\eta_p^2 = 0.02$ could be detected with a sample size of 373 students and a power of 80% ($\alpha = 0.05$, two-tailed). As expected, a significant main effect for student gender was found, $F(1, 371) = 11.86$, $p = 0.001$, $\eta_p^2 = 0.031$, with women students reporting higher gender-based rejection sensitivity ($M = 4.11$, $SD = 2.85$) than men students ($M = 3.67$, $SD = 2.98$; $M_{\text{across both gender groups}} = 4.04$, $SD = 2.87$). Furthermore a significant interaction effect for gender of student x gender of acting person was found, $F(1, 371) = 17.71$, $p < 0.001$, $\eta_p^2 = 0.046$, confirming Hypothesis 5. As Figure 1 shows, when the acting person was a man, women students reported significantly higher gender-based rejection sensitivity ($M = 4.84$, $SD = 3.65$) than men students ($M = 3.6$, $SD = 3.28$), $t(95.88) = -2.69$, $p = 0.008$, $d = -0.35$, while when the acting person was a woman, women ($M = 3.38$, $SD = 2.57$) and men students ($M = 3.74$, $SD = 3.32$) did not differ significantly in their gender-based rejection sensitivity, $t(77.86) = 0.81$, $p = 0.423$, $d = 0.13$. To test research Hypotheses 1 and 2 referring to the proportions of women and, respectively, men students selecting the different response options regarding gender-based relative expectations of success, we conducted a chi-squared test for women and men students separately. The tests were significant for women students: $\chi^2(2) = 109.75$, $p < 0.001$, as well as for men students: $\chi^2(2) = 26.95$, $p < 0.001$, indicating that both men and women students did not choose the three response categories with an equal probability. The largest proportion of the women students reported that women and men have the same chances of success (60.3%, $n = 187$). Confirming Hypothesis 1, while more than a quarter of the women students expected men to be more successful than women (26.5%, $n = 82$), only 13.2% ($n = 41$) believed that women would be more successful than men. Regarding our non-directional Hypothesis 2, results showed that the proportion of men students who expected better chances of success for women than for men was larger (23.8%, $n = 15$) than the proportion of men who thought that men will be more successful than women (12.7%, $n = 8$); with the remaining 63.5% ($n = 40$) expecting equal chances of success for both genders.

To test our research Hypothesis 3 according to which the proportion of women students who expect women to be less successful than men is larger than the proportion of men students, we conducted a 2 (gender) × 3 (response category) chi-square test. The chi-square test showed that men and women students chose the different response categories with different frequencies, $\chi^2(2) = 8.10$, $p = 0.017$. To examine in which of the three response categories a significant difference existed, z-tests with Bonferroni correction were conducted. These indicated a significant difference ($p < 0.05$) for the two

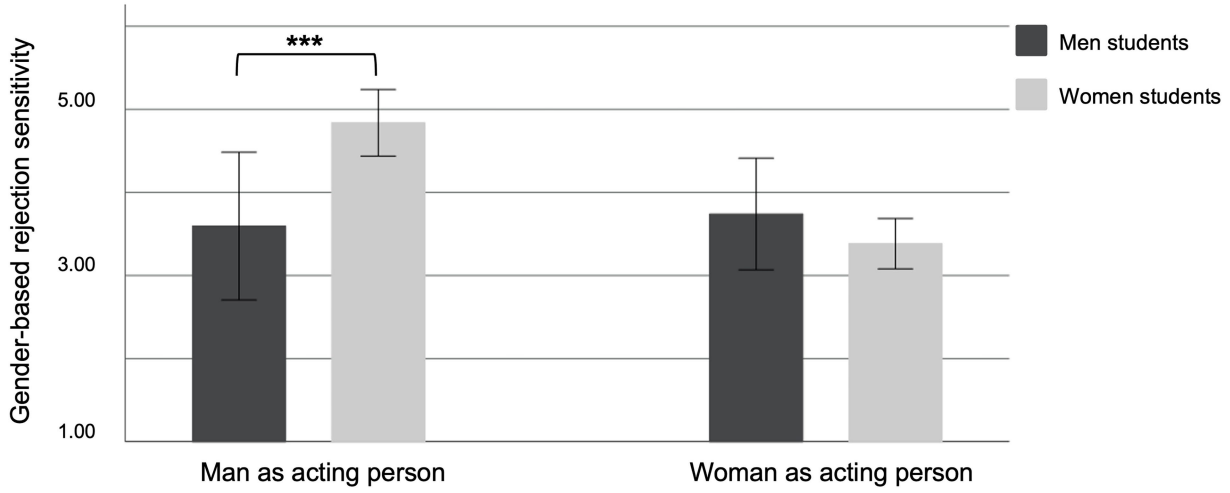

FIGURE 1
Gender-based rejection sensitivity depending on the acting person's gender and of participants' gender. Depicted are mean total scores with 95% confidence intervals of the gender-based rejection sensitivity scale. Asterisks highlight significant between-group differences. ***p<0.001.

TABLE 1 Summary of OLR model on women's gender-related relative expectations of success.

Parameter		*B*	*SE*	Exp(*B*)	*p*
Threshold	Expectations of success = 1	−1.39	0.39	0.25	<0.001
	Expectations of success = 2	1.67	0.40	5.29	<0.001
Gender-based rejection sensitivity		−0.19	0.04	0.83	<0.001
Hostile sexism		0.24	0.17	1.27	0.17

TABLE 2 Summary of OLR model on men's gender-related relative expectations of success.

Parameter		*B*	*SE*	Exp(*B*)	*p*
Threshold	Expectations of success = 1	−0.04	0.70	0.96	0.96
	Expectations of success = 2	3.49	0.86	32.86	<0.001
Gender-based rejection sensitivity		0.51	0.09	1.05	0.58
Hostile sexism		0.84	0.30	2.32	0.004

outer response categories, but not for the middle category ("Women have the same chances of success as men in the job I aspire to"). More specifically, confirming Hypothesis 3, proportionately more women (26.5%, $n = 82$) than men students (12.7%, $n = 8$) indicated that women have worse chances of success than men in the job they aspire to. As women and men were equally likely to choose the middle category, by implication, proportionately more men (23.8%, $n = 15$) than women students (13.2%, $n = 41$) reported that women have better chances of success than men in the job they aspire to.

We performed two ordinal logistic regressions (OLR) for women and men students separately to predict relative expectations of success through hostile sexism (Hypothesis 8) and gender-based rejection sensitivity (Hypothesis 7). The use of OLR was indicated as our dependent variable was not continuous but categorically ordered ("Women have worse chances of success than men/ the same chances of success as men/ better chances of success than men"). Pearson chi-squared test, women students: $\chi^2(506) = 526.02$, $p = 0.26$; men students: $\chi^2(116) = 112.77$, $p = 0.57$, and the deviance test, women students: $\chi^2(506) = 476.33$, $p = 0.83$; men students: $\chi^2(116) = 98.53$, $p = 0.88$, indicated that the data fitted our specified models well. Further, a likelihood ratio chi-squared test showed that our models fitted the data better than the respective null models, women students: $\chi^2(2) = 23.23$, $p = <0.001$; men students: $\chi^2(2) = 11.11$, $p = 0.004$. Lastly, OLR assumes proportional odds which should be tested before interpreting estimates. In both samples the assumption of proportional odds was met as indicated by a test of parallel lines, women students: $\chi^2(2) = 4.09$, $p = 0.13$; men students: $\chi^2(2) = 3.54$, $p = 0.17$.

Results are presented in Table 1 for women students and in Table 2 for men students. In the model for women students, consistent with Hypothesis 7, gender-based rejection sensitivity predicted that women were more pessimistic regarding their own gender group's relative success ($\gamma = -0.19$, $p = <0.001$, odds ratio [OR] = exp. −0.19 = 0.83). For every one-unit decrease in gender-based rejection sensitivity the odds to rate women's success as more likely (compared to men's success being considered equally likely or more likely) were reduced by 17% (1–0.83). Consistent with Hypothesis 8, hostile sexism did not predict women's gender-based relative expectations of success ($\gamma = 0.24$, $p = 0.17$, odds ratio [OR] = exp. 0.17 = 1.27).

In contrast, in the model for men students, reversed effects were observed: Consistent with Hypothesis 8, hostile sexism predicted stronger expectations that women are going to be more successful than men in the aspired for future job ($\gamma = 0.84$, $p = 0.004$, odds ratio [OR] = exp. 0.84 = 2.32). This indicates that for every one-unit increase in hostile sexism the odds to rate women's success as more likely (compared to men's success being considered equally likely or more likely) increased by 2.32 times. Consistent with research Hypothesis 7, gender-based rejection sensitivity did not predict men's gender-based relative expectations of success ($\gamma = 0.05$, $p = 0.58$, odds ratio [OR] = exp. 0.05 = 1.05).

To test our assumption that gender moderates the relationship between rejection sensitivity (Hypothesis 7) or hostile sexism (Hypothesis 8) on the one hand and relative success expectations on the other, we calculated the interaction effect of participant genderx gender-based rejection sensitivity and the interaction effect of gender x hostile sexism on gender-based expectations of career success. Confirming Hypothesis 7, the interaction between gender and gender-based rejection sensitivity significantly predicted gender-based expectations of career success ($\gamma = -0.30$, $p = 0.002$, odds ratio [OR] = exp. −0.30 = 0.74). Regarding Hypothesis 8, the interaction between gender and hostile sexism predicted gender-based expectations of career success, however only marginally significantly so ($\gamma = 0.52$, $p = 0.08$, odds ratio [OR] = exp. 0.52 = 1.69).

Discussion

In this research, we investigated expectations of success women and men students in the social sciences hold for their own and the other gender group's future vocational success, as a motivational predictor of task engagement and readiness to take on difficult challenges. It is good news that the majority of the students participating in our study assumed that gender is not a predictor of success: around two-thirds of the women and men agreed that the genders do not differ *per se* in their future success. However, we also found evidence for pessimistic expectations in women. As expected, the proportion of women students who believed that men are more likely to succeed in their aspired to future job than women was greater than the proportion of women students who thought that women are more likely to succeed than men. Also as expected, proportionately more women than men students believed that women have worse chances of success than men in the job they aim for.

However, not only in women but also in men the proportion of students who thought success was relatively less likely for their own gender group was larger than the proportion of students who thought success was relatively more likely for the respective other gender group. This result is in line with previous research suggesting that both men and women are particularly sensitive to discriminatory treatment of members of their own gender group (*cf.*, Elkins et al., 2002). Women students' pessimistic expectations possibly reflect that for them it is very salient that the proportion of women decreases with increasing career level. This interpretation is consistent with the findings by van Veelen and Derks (2022) who observed that professionals in the life, social, and behavioral sciences perceived the glass ceiling for women to be even thicker than professionals in the natural sciences, technology, and economics did. Men students' pessimistic expectations in our study may reflect that their being in a minority position is more salient for them than the leaky pipeline that puts women at a disadvantage.

Our findings substantiate the hypothesis that the pessimistic expectation for their own gender group was predicted by gender-based rejection sensitivity in women students only. At the same time, the expectation that women will be more successful in their future job than men was predicted by hostile sexism in men students only, suggesting that it served as a self-handicapping strategy or had a self-esteem-protective function for men. However, this effect should be interpreted with caution since the interaction term of hostile sexism and gender was only marginally significant, probably because substantially fewer men participated in our study. Consistent with previous research, men exhibited more hostile attitudes toward women than women (Glick et al., 2000) and women had greater concerns about being rejected because of their gender than men (London et al., 2012). These findings are significant in that they demonstrate that even those men who choose a field of study in which women are in the majority among students, namely the social sciences, are more hostilely sexist than their women peers. Further, these results suggest that women's higher sensitivity to gender-based discrimination does not seem to be cured by the numerical dominance of women among students, and may even be strengthened by the leaky pipeline being particularly noteworthy in disciplines with a high proportion of women on average. Going beyond previous studies on gender-based rejection sensitivity, we examined the extent to which concerns about gender disadvantage depend on the gender of the interaction partner. London et al. (2012) wanted to investigate gender-based rejection sensitivity "in competitive, historically male institutions" (p. 961). This may explain why they did not make any explicit assumptions about whether their research participants imagine a man or am women when responding to items that are ambiguous regarding the interacting partner's gender, seemingly implying that respondents necessarily think of a man. In London et al.'s (2012) questionnaire, in only six of the 11 items the male gender of the acting person is explicitly stated ("a senior male professor") or can be inferred ("you approach your professor to ask him…"). In the remaining five items, the gender of the acting person is not specified ("your professor," "your boss"). No item explicitly refers to a woman. In our study we investigated the social sciences where women are well represented on average. Here, it makes sense to assume that people do not necessarily think of a man when describing a social encounter in the context of their university studies. We have assumed that in such an environment, women students are particularly anxious to be treated differently based on their gender when interacting with a man, while men students' rejection sensitivity was predicted to be the same irrespective of the interaction partner's gender. While a comparison of the rejection sensitivity depending on whether the acting person is a man or a woman is impossible with London's original questionnaire, our data does allow for it. As expected, in our study women showed higher gender-based rejection sensitivity when interacting with a man than with a woman, while interaction partner's gender did not matter for gender-based rejection sensitivity in men. A possible mechanism underlying this finding is the prototypicality of a situation where a woman gets treated in a discriminatory manner by a man because of her gender. As shown by Carlsson and Sinclair (2018), individuals are the more likely to experience an ambiguous situation as discriminatory, the more prototypical it is of discrimination, with the prototypical situation regarding gender discrimination being one in which a woman experiences a disadvantage by a man. This may explain our finding that even in a context in which women are well represented on average women were more concerned about possible gender-based rejection than men and were particularly strongly concerned when interacting with a man.

The extent to which our participants were concerned about being discriminated against because of their gender was relatively weak: on a scale from 1 to 36, women had a mean score of 4.11 and men of 3.67. How do these scores compare to the ones found in other studies? Unfortunately, rejection sensitivity has relatively rarely been described for men versus women: In most studies, it was either examined in non-marginalized populations (e.g., appearance-based rejection sensitivity in adolescents) or in relation to ethnicity/race or gender minority membership (Garthe et al., 2020, for a review). We are only aware of the studies by London et al. (2012) and Ahlqvist et al. (2013) who did compare rejection sensitivity in men and women. Here, the items applied to the world of business (e.g., you start a new job in a corporate office; you are at an important business meeting), to the university context in general (e.g., you were accepted to a graduate program), or to math and science university courses, while respondents in our study were supposed to relate all items to their own university studies – i.e., to the social sciences. Interestingly, rejection sensitivity scores were weaker in our sample than in the ones participating in the studies by London et al. (2012) who reported scores between 6.76 and 8.79 for their women participants and scores between 3.17 and 5.52 for their men participants[1] and weaker than the score of 7.18

1 While participants in London et al.'s (2012) Study 5 were law students no information is provided about the fields of study of the students participating in the other studies.

reported by Ahlqvist et al. (2013) for their women STEM major participants. There are several explanations why our participants were less fearful to be rejected or treated unfairly because of their gender. First, our participants had been asked to relate all items to the social sciences, while the original scale by London et al. (2012) includes scenarios from predominantly masculine environments where women face particularly strongly negative stereotypes about their group's capabilities: business and STEM (e.g., Diekman et al., 2019; Makarem and Wang, 2020; Caleo and Halim, 2021; Shen and Joseph, 2021). A second explanation is that our participants were enrolled in the social sciences, while Ahlqvist et al. (2013) investigated STEM-students and London et al. (2012) (among others) law students: As van Veelen et al. (2019) found, women in traditionally male disciplines are not only threatened by negative stereotypes but also by being outnumbered by their male peers. Future studies should use the identical scale to measure rejection sensitivity with students from different disciplines to assess whether the social sciences are indeed a less threatening context regarding possible gender-based rejection than other academic subjects. A third explanation is that none of the scenarios provided in the questionnaire by London et al. (2012) refers to a woman as the acting person. As our findings show, the extent to which women are anxious to be rejected based on their gender depends on the gender constellation of the interaction partners in the respective situation, with women students being more concerned about possible gender disadvantage when imagining an interaction with men staff or peers.

Limitations

There are several limitations of our study that must be considered in the interpretation of our findings. We surveyed our participants' subjective expectations regarding success in their future job without considering the extent to which men and women might actually have different chances in different professional fields in the social sciences. Further studies should examine the relationship between students' subjective expectations of success and actual relative career opportunities for women and men in different occupational domains. In addition, we asked about gendered success expectations in future job, so possibly some students may have been thinking about careers outside of social science. Furthermore, we investigated only two potential predictors of gender-based relative expectations of success in our study. Thus, it is quite likely that the expected success depends on other relevant predictors too, such as the subjective assessment of the gender group's competence in the field or different career aspirations and life plans that are attributed to men and women. It is also possible that we missed including other relevant variables on the individual level in the survey (e.g., self-efficacy beliefs). Further research in this area should consider these possibilities. Likewise, further research should investigate career related expectations of success and their predictors in people who do not feel they belong to any of the two binary gender groups or who identify as non-binary. Our hypotheses related exclusively to students identifying as either women or men and to expectations of success regarding women's and men's future success. There were several reasons for this. We had expected that the group of students identifying as non-binary would be so small that their data could not have been analyzed by parametric statistical techniques, and this proved to be so in our sample. Also, we would have been investigating a different research question had we asked students how they rated the success of their own gender group relative to the success of the group identifying as non-binary. By asking this question, we would have examined possible prejudices of men and women toward this gender group, which presumably depend on different predictors than those we examined (gender-based rejection sensitivity and sexism toward women). Due to the small number of people identifying as non-binary in our sample, we were unfortunately unable to examine their data.

Implications of our findings

What are the implications of our research findings for how to improve the motivational situation of women and men students in the social sciences? Women students' concern of being rejected due to gender suggests that the environment of their university studies is not identity safe: With increasing gender-based rejection sensitivity we found women students to be less optimistic regarding their own gender group's relative professional future success. Van Laar et al. (2019) describe identity safety as a context in which people do not feel threatened regarding any aspect of their personal identity and thus do not need to regulate threats. Factors that promote identity safety include the conveyance of the feeling that one's social group is accepted and valued, as communicated through the diversity climate of the organization – be it the workplace or an educational institution, such as a university: An organization with a positive diversity climate signals to be open toward and to welcome various social groups (Van Laar et al., 2019). A subtle factor by which students can gauge how welcome women actually are in their field of university studies is the representation of women among high-status and influential members of the university, specifically professors and assistant professors or highly placed representatives of the administration. An increase in women's representation in such high-ranking positions at the university should diminish potential triggers of identity threat for women students and hence have a favorable effect on their expectations regarding their own opportunities to attain a professional position with high social status within their field of study.

According to Van Laar et al. (2019), another indicator of identity safety is instrumental or emotional support provided by the organization, for instance by representatives of the university in positions of authority and power. Our results show that women students are less anxious to be rejected because of their gender in social interactions with a woman than with a man. A stronger representation of women among high-status academic staff would make it more likely for women students to encounter women in high-stakes academic settings (e.g., an admission interview or an oral exam) and should therefore reduce gender-based rejection

sensitivity. What is more, high-status women in the university setting serve as ingroup role models for women students. Ingroup expert models have been shown to mitigate the effects of negative stereotypes on stigmatized individuals as they invalidate the assumption that individuals affected by the stereotype cannot succeed: They have a successful career to their credit, despite the obstacles that members of the respective group need to overcome (Marx and Roman, 2002; Steele et al., 2002; Liu et al., 2021). Against this background, Dasgupta (2011) proposes that ingroup expert models inoculate stigmatized individuals not to experience threat and self-doubt in high-stakes environments.

Our finding that men students considered their own gender group's relative future success less likely the more hostile their attitudes toward women were suggests gender-based zero-sum thinking, i.e., the belief that women succeed at the expense of men (Kuchynka et al., 2018). As Van Laar et al. (2019) emphasize, this finding suggests that identity safety needs to be assured not only for members of negatively stereotyped groups, but also for members of the dominant or majority group, not to make them feel that the organization's diversity efforts put their own group at a disadvantage. In the social sciences, where men students are outnumbered by their women student peers, an all-inclusive environment (Emerson and Murphy, 2014) providing identity safety for all students signals that men are just as valued and welcome as women. Only to the extent that zero-sum beliefs about the professional success of men and women can be reduced among students of both genders can women and men students also be expected to affirm measures for more gender equity, such as an increase in the representation of women in high-status positions at the university.

Data availability statement

The data supporting the conclusions of this article will be made available by the authors on request.

Ethics statement

The studies involving human participants were reviewed and approved by Ethikkommission des Fachbereiches Erziehungswissenschaft und Psychologie der Freien Universität Berlin. Written informed consent from the participants' legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

KO, MR, and BH contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

References

Ahlqvist, S., London, B., and Rosenthal, L. (2013). Unstable identity compatibility: how gender rejection sensitivity undermines the success of women in science, technology, engineering, and mathematics fields. *Psychol. Sci.* 24, 1644–1652. doi: 10.1177/0956797613476048

Begeny, C. T., Ryan, M. K., Moss-Racusin, C. A., and Ravetz, G. (2020). In some professions, women have become well represented, yet gender bias persists-perpetuated by those who think it is not happening. *Sci. Adv.* 6:eaba7814. doi: 10.1126/sciadv.aba7814

Caleo, S., and Halim, M. L. D. (2021). Gender and the development of leadership stereotypes. *Psychol. Inq.* 32, 72–76. doi: 10.1080/1047840X.2021.1930745

Carlsson, R., and Sinclair, S. (2018). Prototypes and same-gender bias in perceptions of hiring discrimination. *J. Soc. Psychol.* 158, 285–297. doi: 10.1080/00224545.2017.1341374

Clark Blickenstaff, J. (2005). Women and science careers: leaky pipeline or gender filter? *Gend. Educ.* 17, 369–386. doi: 10.1080/09540250500145072

Cooper, O. (2019). Where and what are the barriers to progression for female students and academics in UK higher education? *Perspect. Policy Pract. Higher Educ.* 23, 93–100. doi: 10.1080/13603108.2018.1544176

Cowie, L. J., Greaves, L. M., and Sibley, C. G. (2019). Sexuality and sexism: differences in ambivalent sexism across gender and sexual identity. *Personal. Individ. Differ.* 148, 85–89. doi: 10.1016/j.paid.2019.05.023

Czopp, A. M., Kay, A. C., and Cheryan, S. (2015). Positive stereotypes are pervasive and powerful. *Perspect. Psychol. Sci.* 10, 451–463. doi: 10.1177/1745691615588091

Dasgupta, N. (2011). Ingroup experts and peers as social vaccines who inoculate the self-concept: the stereotype inoculation model. *Psychol. Inq.* 22, 231–246. doi: 10.1080/1047840X.2011.607313

Diekman, A. B., Clark, E. K., and Belanger, A. L. (2019). Finding common ground: synthesizing divergent theoretical views to promote women's STEM pursuits. *Social Issues Policy Rev.* 13, 182–210. doi: 10.1111/sipr.12052

Eagly, A. H., Mladinic, A., and Otto, S. (1991). Are women evaluated more favorably than men? *Psychol. Women Q.* 15, 203–216. doi: 10.1111/j.1471-6402.1991.tb00792.x

Eckes, T., and Six-Materna, I. (1999). Hostilität und Benevolenz: Eine Skala zur Erfassung des ambivalenten Sexismus [Hostility and benevolence: a scale measuring ambivalent sexism]. *Z. Sozialpsychol.* 30, 211–228. doi: 10.1024//0044-3514.30.4.211

Elkins, T. J., Phillips, J. S., and Konopaske, R. (2002). Gender-related biases in evaluations of sex discrimination allegations: is perceived threat the key? *J. Appl. Psychol.* 87, 280–292. doi: 10.1037/0021-9010.87.2.280

Emerson, K. T. U., and Murphy, M. C. (2014). Identity threat at work: how social identity threat and situational cues contribute to racial and ethnic disparities in the workplace. *Cult. Divers. Ethn. Minor. Psychol.* 20, 508–520. doi: 10.1037/a0035403

Garthe, K., Dingley, C., and Johnson, M. (2020). A historical and contemporary literature review of rejection sensitivity in marginalized populations. *J. Health Disparities Res. Pract.* 13, 1–28.

German Federal Office of Statistics (2019). Bildung und Kultur. Personal an Hochschulen [Education and Culture. University staff]. Fachserie 11, Reihe 4.4. Available at: https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bildung-Forschung-Kultur/Hochschulen/Publikationen/Downloads-Hochschulen/personal-hochschulen-2110440197004.pdf?__blob=publicationFile

Glick, P., and Fiske, S. T. (1996). The ambivalent sexism inventory: differentiating hostile and benevolent sexism. *J. Pers. Soc. Psychol.* 70, 491–512. doi: 10.1037/0022-3514.70.3.491

Glick, P., Fiske, S. T., Mladinic, A., Saiz, J. L., Abrams, D., Masser, B., et al. (2000). Beyond prejudice as simple antipathy: hostile and benevolent sexism across cultures. *J. Pers. Soc. Psychol.* 79, 763–775. doi: 10.1037/0022-3514.79.5.763

Kessels, U., and Hannover, B. (2008). When being a girl matters less: accessibility of gender-related self-knowledge in single-sex and coeducational classes and its impact on students' physics-related self-concept of ability. *Br. J. Educ. Psychol.* 78, 273–289. doi: 10.1348/000709907X215938

Kuchynka, S. L., Bosson, J. K., Vandello, J. A., and Puryear, C. (2018). Zero-sum thinking and the masculinity contest: perceived intergroup competition and workplace gender bias. *J. Social Issues* 74, 529–550. doi: 10.1111/josi.12281

Liu, S., Liu, P., Wang, M., and Zhang, B. (2021). Effectiveness of stereotype threat interventions: a meta-analytic review. *J. Appl. Psychol.* 106, 921–949. doi: 10.1037/apl0000770

London, B., Downey, G., Romero-Canyas, R., Rattan, A., and Tyson, D. (2012). Gender-based rejection sensitivity and academic self-silencing in women. *J. Pers. Soc. Psychol.* 102, 961–979. doi: 10.1037/a0026615

Makarem, Y., and Wang, J. (2020). Career experiences of women in science, technology, engineering, and mathematics fields: a systematic literature review. *Hum. Resour. Dev. Q.* 31, 91–111. doi: 10.1002/hrdq.21380

Marx, D. M., and Roman, J. S. (2002). Female role models: protecting women's math test performance. *Personal. Soc. Psychol. Bull.* 28, 1183–1193. doi: 10.1177/01461672022812004

McGuire, W. J., and Padawer-Singer, A. (1976). Trait salience in the spontaneous self-concept. *J. Pers. Soc. Psychol.* 33, 743–754. doi: 10.1037/0022-3514.33.6.743

Mendoza-Denton, R., and Goldman-Flythe, M. (2009). Personality and racial/ethnic relations: a perspective from cognitive–affective personality system (CAPS) theory. *J. Pers.* 77, 1261–1282. doi: 10.1111/j.1467-6494.2009.00581.x

Muenks, K., Wigfield, A., and Eccles, J. S. (2018). I can do this! The development and calibration of children's expectations for success and competence beliefs. *Dev. Rev.* 48, 24–39. doi: 10.1016/j.dr.2018.04.001

Shen, W., and Joseph, D. L. (2021). Gender and leadership: a criterion-focused review and research agenda. *Hum. Resour. Manag. Rev.* 31:100765. doi: 10.1016/j.hrmr.2020.100765

Steele, C. M., Spencer, S. J., and Aronson, J. (2002). Contending with group image: the psychology of stereotype and social identity threat. *Adv. Exp. Soc. Psychol.* 34, 379–440. doi: 10.1016/S0065-2601(02)80009-0

Van Laar, L., Meeussen, L., Veldman, J., Van Grootel, S., Sterk, N., and Jacobs, C. (2019). Coping with stigma in the workplace: understanding the role of threat regulation, supportive factors, and potential hidden costs. *Front. Psychol.* 10:1879. doi: 10.3389/fpsyg.2019.01879

van Veelen, R., and Derks, B. (2022). Equal representation does not mean equal opportunity: women academics perceive a thicker glass ceiling in social and behavioral fields than in the natural sciences and economics. *Front. Psychol.* 13:790211. doi: 10.3389/fpsyg.2022.790211

van Veelen, R., Derks, B., and Endedijk, M. D. (2019). Double trouble: how being outnumbered and negatively stereotyped threatens career outcomes of women in stem. *Front. Psychol.* 10:150. doi: 10.3389/fpsyg.2019.00150

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