CRITICAL PERSPECTIVES ON GENDER EQUALITY POLICIES AND PRACTICES FOR STAFF IN HIGHER EDUCATION

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Editorial: Critical perspectives on gender equality policies and practices for staff in higher education

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Editorial on the Research Topic
Critical perspectives on gender equality policies and practices for staff in higher education

This Research Topic shares critical perspectives on gender equality policies and practices for staff across the international higher education. There is evidence of persistent and entrenched gender inequity in the staffing of universities and research centers. On average women represent between 23 and 57 per cent of academic roles in higher education in all OECD countries with available data, most below the 50 per cent level (OECD, 2019). At senior levels, women make up 22 per cent of heads of all Higher Education Institutions (HEIs) and 14 per cent of the heads of universities across the EU (European Commission, 2019). Similarly, 39 out of the top 200 institutions in the world (19.5 per cent) are currently led by women (Bothwell, 2020), and when women lead institutions, they are disproportionately more likely to be smaller colleges or women's universities, particularly in South Asian countries (Morley and Crossouard, 2016). Correspondingly, in Japan, South Korea, and Hong Kong, the top national or public universities that have entered the highest ranks of the international league tables are all led by male presidents (Cheung, 2021). Therefore, despite some variance in proportions of women in academic roles across the globe, higher education institutions remain indisputably gendered organizations (Acker, 2006).

Dominant rationales for addressing this phenomenon include gender inequity in the academy wastes female talent (Blackmore, 2014) that leads to an underperformance of research capacity and poor return on financial investment and human resources (Henderson and Herring, 2013)—a business case for equality. In addition, it is posited that universities have a moral mandate to ensure women are properly represented in senior academic positions in universities to help female students envision themselves in leadership roles in the organizations into which they will enter as graduands. Finally, gender equity is presented as central to social and epistemic justice (Clavero and Galligan, 2021).

Importantly, funding bodies have used research funding mechanisms as a lever for change, embedding consideration and actions on gender inequality into funding applications processes. For instance, the European Commission has mandated that institutions applying to the Horizon Europe research and development programme have GEPs in place (European Commission, 2021); and the body that convenes the research Councils in UK (UKRI), though not requiring organizations to secure equity awards to access funding, it has stated that it expects those in receipt of Research Council funding to embed equality and diversity in aspects of research practice (UKRI, 2022).

Consequently, many research and higher education institutions are implementing gender mainstreaming and gender equality plans (GEPs) as vehicles to support gender equity. There are as many as 113 gender and diversity Certification and Award schemes (CAS) identified across Europe and beyond (Nason and Sangiuliano, 2020). Therefore, in many contexts, discourses informing policy frameworks have shifted from equal opportunities and gender equity as a social justice imperative, to a "managing diversity" focus that is promoted as better for business and in the national economic interest; and from widespread acceptance of societal support and collectivist alliance to individualism and responsibilisation (Crimmins, 2021). Finally, because COVID-19 has negatively impacted most counties economies, and cuts in gender equality structures occur during times of economic downturn and corresponding austerity (Briskin, 2014), as editors of the Research Topic, *Critical perspectives on gender equality policies and practices for staff in higher education,* we sought to understand the current context and efficacy of gender equity plans and policy within higher education. We therefore invited research and position papers that discuss effective gender equity policy, current gender equity policy maneuvers, and the impact of COVID-19 on gender equity policy frameworks.

Eight papers were published in the series, representing insights from 8 countries (3 in the Global South and 5 in the Global North) and 43 academics (29 of whom are based in Brazil, 4 in the US, 3 in the UK, 2 in Australia, 2 in Ireland, 1 in Austria, 1 in Germany, 1 in Sweden). These papers underwent double blind review by 16 generous reviewers (5 based in the UK, 2 in Germany, 2 in Spain, 2 in the US, 2 in Australia, 1 in Italy, 1 in New Zealand, 1 in South Africa). We acknowledge that the series unintentionally draws on expertise on the critical analysis of gender equality work within and through the lens of the Global North. This reflects two phenomena: First, that formal gender equality policies are most commonly employed (and generally named as such) across the Global North; and second that academics from these regions feel most prepared in reviewing academic papers that focus on this topic.

The methodologies and methods employed across the 8 papers include: a literature review outlining what we know about implicit bias in academia (also known as unconscious bias), with recommendations for action from the perspective of a group of Latinx American scientists comprising Black and Latina women, teachers, and undergraduate students who participate in women in science working group at universities in the state of Rio de Janeiro, Brazil (Calaza et al.); analysis of a national survey in which US professors ($n = 364$) responded to vignettes of three hypothetical undergraduates, rating the extent to which they would encourage male and female students to pursue a Ph.D. in physics regardless of whether this course of action matches the students goals and interests (Bailey et al.); a qualitative questionnaire methodology used to garner written narratives based on the lived experience of women working in an Australian regional university (White and Goriss-Hunter); an analysis of the influence of gender, parenthood, and race on academic productivity during the pandemic period based on a survey of Brazilian academics ($n = 3,345$) from various knowledge areas and research institutions (Staniscuaski et al.); a case study employing thematic content analysis of institutional documents pertaining to gender equality, with a focus on internal promotions to Associate Professor in an Irish university (Hodgins and O'Connor); an action research-based ethnographic methodology used to explore practices "change agents" experienced as useful and important for promoting gender equality in their different organizational contexts (Dahmen-Adkins and Peterson); a comparison of two of the main gender equality schemes used by research-performing organizations in Europe based on qualitative interviews with stakeholders and document analysis (Tzanakou et al.); and a critical evaluation of the Austrian quota regulation and the gender competence policy in Austria, including implementation and limitations of these approaches (Wroblewski). The methodological approaches were somewhat varied, including both qualitative and quantitative methods. This has resulted in useful overviews of the situation in different contexts, in-depth consideration of policy documentation and the gathering of rich data as a women share their stories. The Research Topic, therefore, provides a comprehensive assessment of the various elements of academic productivity relevant to a wide range of knowledge areas and research institutions.

Whilst the papers published in this Research Topic provided varied new knowledge and insights, there were two main preoccupations that permeate most of the papers published: First, an endurance of discrimination that is (re)expressed at a cultural level with institutions acting as sites of resistance in the face of pressure to change; and second, the impact of gender intersections with race on inequalities in the higher education sector. Whilst the intentions of gender equality policy and practices were generally described as positive and having achieved some success, gender bias and resistance to gender equality actions were presented as difficult to explicitly discern and disrupt. Although potential solutions and strategies for effective change practices were also focused upon. The authors of these papers proffer specific, actionable strategies

and interventions to address these issues, and future research based on the implementation and assessment of the suggested strategies is recommended. A further recommendation is for collaborations gender equality policy and practice mapping and implementation between scholars located across the Global North and South, to expand discourses around gender equity within the international higher education sector.

Author contributions

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Conflict of interest

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Gender, Race and Parenthood Impact Academic Productivity During the COVID-19 Pandemic: From Survey to Action

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The coronavirus disease 2019 (COVID-19) pandemic is altering dynamics in academia, and people juggling remote work and domestic demands – including childcare – have felt impacts on their productivity. Female authors have faced a decrease in paper submission rates since the beginning of the pandemic period. The reasons for this decline in women's productivity need to be further investigated. Here, we analyzed the influence of gender, parenthood and race on academic productivity during the pandemic period based on a survey answered by 3,345 Brazilian academics from various knowledge areas and research institutions. Productivity was assessed by the ability to submit papers as planned and to meet deadlines during the initial period of social isolation in Brazil. The findings revealed that male academics – especially those without children – are the least affected group, whereas Black women and mothers are the most impacted groups. These impacts are likely a consequence of the well-known unequal division of domestic labor between men and women, which has been exacerbated during the pandemic. Additionally, our results highlight that racism strongly persists in academia, especially against Black women. The pandemic will have long-term effects on the career progression of the most affected groups. The results presented here are crucial for the development of actions and policies that aim to avoid further deepening the gender gap in academia.

Keywords: motherhood and academia, women career, gender gap, racial bias, gender equity

INTRODUCTION

As COVID-19 spreads around the globe, countries are facing different degrees of lockdown and social distancing (World Health Organization, 2020). In most affected countries, schools and universities have shifted from in-person learning to online classes and remote activities/work. The pandemic is also altering the work dynamics of many academics and scientists, especially parents of young children (Myers et al., 2020; Staniscuaski et al., 2020), who face the additional challenge of balancing remote work and domestic labor, which includes full-time childcare responsibilities. Since the pandemic outbreak, editors from a variety of respected scientific journals have warned the scientific community of the decreasing number of manuscript submissions authored by women despite the overall increase in total submissions driven by male authors (Viglione, 2020). The effect is even more striking for publications with women as first authors (Vincent-Lamarre et al., 2020). The aim of this study was to investigate whether gender, race and parenthood are associated with academic productivity during the COVID-19 pandemic.

The gender gap in science and academic careers is not new, and it has been previously exposed in many ways, such as in relation to career transitions (Lerchenmueller and Sorenson, 2018; Cardel et al., 2020), patent registration (Frietsch et al., 2009; Whittington, 2011; Hunt et al., 2013) and publications (Brooks et al., 2014). Additionally, high-status awards and positions are less likely to be given to women in science (Lunnemann et al., 2019), and a funding and salary gap is observed in several countries (Shen, 2013; Valentova et al., 2017; James et al., 2019), showing that gender equity in science is far from being achieved. Despite good intentions, the patterns and attitudes within academic settings work systematically against women (MIT Committee on Women Faculty in the School of Science, 1999). Often, merit-based systems of evaluation and career advancement have led to gender inequalities in academia (Krefting, 2003; van den Brink and Benschop, 2012). The top positions of institutional hierarchies are dominated by men, the gatekeepers who evaluate performance, which helps to maintain the male perspective (Acker, 2006; Treviño et al., 2018).

There are several factors that contribute to the underrepresentation of women in higher positions and leadership in science, from gender stereotypes to conscious prejudice to unconscious bias (Reuben et al., 2014; Gaston, 2015; Carli et al., 2016). However, one major factor influencing women's career path in science is still an understudied topic: motherhood. Mothers continue to struggle for a place in academic and scientific landscapes (Isgro and Castañeda, 2015), and myths and misunderstandings on this subject misdirect efforts and resources intended to solve the problem (Verniers and Vala, 2018). Williams and Ceci (2012), studying the impact of motherhood on women's careers, concluded that the effect of children on women's academic careers is so remarkable that it eclipses other factors contributing to women's underrepresentation in science. According to Whittington (2011), in academia, mothers are less likely to register patents than men and childless women, and Kyvik (1990) found that women with children younger

than 10 years of age are considerably less productive than their male counterparts. Sustaining a career while being a mother is particularly challenging in highly masculinized areas, such as in STEM (Herman and Lewis, 2012). For instance, it has been shown that new parents (male and female) are significantly less likely than their childless peers to remain in STEM full time after their first child is born or adopted, with 23% of new fathers and 43% of new mothers leaving full-time STEM employment for other types of work or leaving the labor workforce entirely (Cech and Blair-Loy, 2019). The motherhood penalty in academia is a worldwide issue, but the acknowledgment of the problem by the academic community is very recent, and the development of effective actions and policies toward solving it is rather scarce. Gender-neutral policies that attempt to level the playing field by adjusting measures of productivity to account for early child rearing have been adopted in some institutions. However, such policies have unintended consequences that can actually hurt women (Antecol et al., 2018).

Remote work, when analyzed from the perspective of gender roles, has been viewed as a way to perpetuate gender inequality, as women usually carry the burden of both paid work and domestic responsibilities (Sullivan and Lewis, 2001). This phenomenon has been aggravated during the pandemic, as noted by Power (2020). The results obtained by Lyttelton et al. (2020) suggest that the unprecedented increase in telecommuting in response to COVID-19 has the potential to exacerbate gender inequalities in the formal labor market and the domestic division of labor, particularly when daycares, childcare facilities, and schools are facing extended closures. The gap in productivity between academics with and without children is growing, since support networks (i.e., schools and grandparents) were unavailable during the pandemic and childcare, including children's learning, is most likely to be entirely parents' responsibility. Garbe et al. (2020) demonstrated that the majority of parents devoted more than 1 h per day to supporting their child's learning while schools were closed. Childcare is a task predominantly performed by women, including academics (Britton, 2014; Jolly et al., 2014; Sallee et al., 2016). For instance, a recent study found that mothers with young children have reduced their work hours four to five times more than fathers who worked with telecommuting during the pandemic (Collins et al., 2020). The same scenario was observed in academia in a study with American and European scientists, which showed that female scientists and scientists with young children were disproportionately affected in their time devoted to research (Myers et al., 2020).

Racial issues intersect with gender and parenthood and influence women's representation in academia, where women of color face a double bias and multiple challenges in a racially stratified environment characterized by dysfunctional racial and gender hierarchies of predominantly white institutions (Gutiérrez y Muhs et al., 2012; Langin, 2019). Black female academics represent a very small portion of the overall faculty population, comprising only 2% of practicing scientists and engineers (National Science Foundation, 2015) and of full-time professors in research institutions (McFarland et al., 2019) in the US, for instance. In Brazil, Black women account for

only 3% of PhD supervisors (da Silva, 2010; Morcelle et al., 2019). There are many reasons for this underrepresentation of Black women in science, including systemic racism, lack of representation and race-based stereotypes (McGee and Bentley, 2017). This is a major issue because diversity is a keystone for building high-quality and innovative science (Nielsen et al., 2017; Hofstra et al., 2020).

All of the evidence presented here reveals the urgency of shedding light on the full picture of the pandemic's impact on the careers of female academics. It is expected that the gender gap in productivity will increase after the pandemic, but it is not clear whether mothers will be more impacted or whether underrepresented groups in science, especially Black women, will suffer a greater impact from pandemic-related circumstances. Additionally, the identification of the impacts in scientific communities in developing countries should be a top priority behind the design of mitigation policies aimed at building more inclusive research capacities.

To contribute to this urgent discussion, we report herein the impact of COVID-19-related social isolation on the academic productivity of scientists in Brazil, focusing on the influences of gender, parenthood, and race. We collected data via an online survey broadly disseminated across Brazilian regions and research institutions over a month-long period of social isolation. The survey was completed by 3,345 scientists. For the purpose of this study, academic productivity is regarded as the ability to submit papers within a schedule and to meet overall deadlines in the pandemic period. The design of the survey aimed to provide a comprehensive assessment of the various elements of academic productivity relevant to a wide range of knowledge areas and research institutions.

MATERIALS AND METHODS

This project was approved by the Ethics Committee of the Federal University of Rio Grande do Sul (CAAE 82423618.2.0000.5347). The study was performed using an online survey that was available for completion between April 22nd and May 25th, 2020. In this period, Brazilian day cares, schools, and universities had been closed due to the COVID-19 pandemic since approximately the second half of March.

Sample

This survey was posted on social media and was e-mailed to universities and research centers based in Brazil. The snowball sampling technique was also used, where existing study subjects recruited future subjects from among their acquaintances. The survey took approximately 5 min to complete. Participants who failed to fully complete the questionnaire were excluded. The final sample was composed of 3,345 individuals, distributed throughout the country, of whom, the majority self-declared as White (75.9%), are women (68.4%) and are parents (70.7%).

Survey Instrument

The questionnaire was specially developed to assess the impact of COVID-19 pandemic on the productivity of researchers of both genders with and without children. It consisted of 25 questions collecting information about the researchers' demographics (country region, gender, and race), work setting (workplace closure, remote activities, online teaching) and children care (see a complete version of the questionnaire in the **Supplementary Material**). Productivity was assessed by the researchers' self-reported ability to submit papers and meet deadlines during the pandemic period.

Statistical Analysis

Data are presented as the percentage of respondents who were able to submit papers as planned and to meet deadlines related to grant/fellowship proposals and/or project/funding reports within each analyzed group. Statistical analysis to test for differences between groups (men and women; individuals with or without children, also stratified by the age of the youngest child; different races/ethnicities) was performed using a chi-squared test. Chi-squared analysis was performed in R using the chisq.test function. Pearson residual plots were generated with the corrplot package (version 0.84). Finally, pairwise comparisons between groups with statistically significant chi-squared tests were run with the chisq.multcomp function of the R package (version 0.9 - 77) using Bonferroni correction of p-values. The significance level was set at 0.05.

RESULTS

A detailed description of the survey respondents is provided in **Table 1**. The total sample size was 3,345 researchers, predominantly women (68.4%). Higher rates of female respondents in studies targeting university faculty members have been previously reported (Smith, 2008). In Brazil, women account for approximately 50% of the researcher population, according to the last Brazilian National Council for Scientific and Technological Development (CNPq) Census. The percentage of respondents from each region in Brazil followed the same pattern reported by the CNPq (6.3% from the North, 20.5% Northeast, 7.7% Center-west, 42.5% Southeast and 22.9% South), indicating that the sample of respondents is representative of the general academic population. Respondents self-identified as White (75.9%), 18.1% Black, 1.7% Asian, 0.2% Indigenous, and 4% did not inform the race/ethnicity. Considering the small percentage of Asians and Indigenous people, we only included in the analysis Black and White respondents. Most of the researchers have children: 33.8% have one, 30.2% have two, 5.8% have three, and 0.9% have four or more children.

Productivity during the pandemic was assessed by analyzing self-reported data on manuscript submissions and the ability to meet deadlines. We also evaluated how scientists perceived the impact of the social isolation period on their productivity, as well as their perceptions of factors that interfered with their remote work routines. Regarding these perceptions, the researchers were asked if there were any factors in their current situation that impacted their remote work (e.g., childcare – routine care and/or homework assistance, children with disabilities, elderly care, and household chores).

TABLE 1 | Characterization of the sample included in the study (3,345 respondents).

	General (%, n)	Male (%, n)	Female (%, n)
Gender		31.6 (1057)	68.4 (2288)
Race/Ethnicity[§]			
White	75.9 (2540)	73.8 (780)	76.9 (1760)
Black	18.1 (606)	18.9 (200)	17.7 (406)
Asian	1.7 (58)	1.1 (12)	2.0 (46)
Indigenous	0.2 (7)	0.2 (2)	0.2 (5)
ND*	4.0 (134)	5.9 (63)	3.1 (71)
With children	70.7 (2366)	67.6 (715)	72.2 (1651)
Origin (Brazilian Region)[+]			
North	6.2 (208)	6.3 (67)	6.1 (140)
Northeast	15.4 (515)	16.4 (173)	14.9 (342)
Center-west	8.7 (292)	10.0 (106)	8.1 (186)
Southeast	42.7 (1428)	38.9 (411)	44.4 (1016)
South	27.0 (904)	28.4 (300)	26.4 (604)
Academic Area[£]			
Agricultural Sciences	7.1 (237)	8.8 (93)	6.3 (144)
Biological Sciences	20.9 (698)	19.9 (210)	21.3 (488)
Engineering	5.2 (175)	6.9 (73)	4.5 (102)
Exact and Earth Sciences	17.6 (589)	26.7 (282)	13.4 (307)
Health Sciences	19.1 (639)	12.7 (134)	22.1 (505)
Humanities	12.7 (426)	9.7 (103)	14.1 (323)
Linguistics, Language and Arts	4.4 (149)	2.8 (30)	5.2 (119)
Multidisciplinary	3.4 (113)	3.2 (34)	3.4 (78)
Social Sciences	9.6 (320)	9.3 (98)	9.7 (222)

General data are shown as percentages (%) of the total number of respondents. Gender data are shown as percentages (%) of respondents of the same gender (male or female).

The total number of respondents from each category is presented as (n).

[§] *Terminology follows the official Brazilian census and the Brazilian Institute of Geography and Statistics (IBGE). Race/ethnicity categories are based on a skin color continuum ranging from very fair to very dark skin. We adopt official IBGE categories in the questionnaires: branca (White), preta (Black), parda, amarela (Yellow: translated as Asian) and indigena (Indigeneous). In Brazil, there is a common distinction between people who identify as Black (dark-skin Black people) and parda (light-skin Black people). In all results presented in the report, the Black category refers to both IBGE categories (preta and parda) together.*

*Prefer not to disclose.

[+] *The percentage of researchers for each region in Brazil, according to the last Brazilian National Council for Scientific and Technological Development (CNPq) Census, is 6.3% (North), 20.5% (Northeast), 7.7% (Center-west), 42.5% (Southeast), and 22.9% (South).*

[£] *Academic area nomenclature according to the CNPq classification. According to this, "Exact and Earth Sciences" include math, statistics, computer sciences, astronomy, physics, chemistry, geosciences, and oceanography.*

Manuscript Submissions During the Pandemic Period

Among the survey respondents, only 13.6% stated they did not have any manuscript being finalized for submission during the time that social isolation took place, so data on manuscript submission were analyzed excluding these respondents from the dataset. Manuscript submission among male academics was less affected by the pandemic circumstances than that among women (**Figure 1A**), with a significant difference between men and women ($\chi^2 = 88.42$, $P < 0.0001$). Positive associations were observed between women and the non-submission of

FIGURE 1 | The impact of gender, parenthood and race on manuscript submissions during the COVID-19 pandemic. For each figure, the graph on the left-hand side represents the percentage of respondents who submitted manuscripts as planned, while on the right-hand side, the correlation plot shows Pearson's chi-squared standardized residuals calculated for each group. Positive residuals (blue) indicate a positive correlation, whereas negative residuals (red) indicate a negative correlation. The size of the circle is proportional to the cell's contribution to the χ^2 score. **(A)** Gender effect on submissions. **(B)** Parenting effect on submissions. **(C)** Race effect on submissions.

manuscripts as well as between men and the submission of manuscripts (**Figure 1A**). There was a significant effect of parenthood on the submission of manuscripts ($\chi^2 = 110.79$, $P < 0.0001$) (**Figure 1B**). There was a positive association between women with children and the non-submission of manuscripts. However, no association was observed for women without children. The proportion of childless men who submitted manuscripts was higher than that of men with children

($P < 0.01$, Bonferroni *post hoc* test) (**Figure 1B**). Additionally, the proportion of childless women who submitted manuscripts was higher than that of women with children ($P < 0.01$, Bonferroni *post hoc* test) (**Figure 1B**). There was no overall race effect (Black vs. White researchers) on productivity during the pandemic period with respect to submissions ($\chi^2 = 2.29$, $p = 0.1304$) (**Supplementary Figure 1**), but there was a significant effect of race and gender on the submission of manuscripts ($\chi^2 = 91.01$, $P < 0.0001$) (**Figure 1C**). Positive associations were observed between White men and the submission of manuscripts as well as between both Black and White women and the non-submission of manuscripts (**Figure 1C**).

There was a significant difference among groups of men (Black with children, Black without children, White with children, White without children) with respect to the submission of manuscripts ($\chi^2 = 10.93$, $P < 0.05$) (**Figure 2A**). A negative association between White men without children and the non-submission of manuscripts was detected. The proportion of childless White men who submitted manuscripts was higher than that of White men with children ($P < 0.05$, Bonferroni *post hoc* test) (**Figure 2A**). Additionally, there was a significant difference among groups of women (Black with children, Black without children, White with children, White without children) with respect to the submission of manuscripts ($\chi^2 = 16.43$, $P < 0.001$) (**Figure 2B**). There was a positive association between White women without children and the submission of manuscripts. The proportion of childless White women who submitted manuscripts was higher than that of White women with children ($P < 0.01$, Bonferroni *post hoc* test) (**Figure 2B**). For Black women, there was no significant difference between the groups with and without children.

Children's age was also associated with productivity. There was a significant difference between men and women depending on the age of their youngest child with respect to the submission of manuscripts ($\chi^2 = 147.95$, $P < 0.0001$) (**Figure 2C**). There was a negative association between women whose youngest child ranged from 1 to 6 years old and the submission of manuscripts. The proportion of this group's submissions was lower than that of men with children of the same age ($P < 0.001$, Bonferroni *post hoc* test) (**Figure 2C**). Additionally, the proportion of submissions observed for men whose youngest child's age ranged from 7 to 12 were higher than that observed for women with children of the same ages ($P < 0.001$, Bonferroni *post hoc* test) (**Figure 2C**).

Ability to Meet Deadlines

The respondents were asked whether the pandemic situation impacted how they met deadlines. There was a significant difference between men and women ($\chi^2 = 21.73$, $P < 0.0001$) regarding the ability to meet deadlines during the pandemic (**Figure 3A**). Positive associations between women and the failure to meet deadlines and between men and the ability to successfully meet deadlines were observed (**Figure 3A**). Parenthood was significantly associated with the ability to meet deadlines ($\chi^2 = 55.33$, $P < 0.0001$) (**Figure 3B**). Positive associations between women with children and the failure to meet deadlines and between men without children and the ability to successfully meet deadlines were detected. There was a significant

difference ($P < 0.0001$, Bonferroni *post hoc* comparison) between the proportions of women and men with children who met deadlines (**Figure 3B**). Moreover, the proportion of women without children who met deadlines was higher than that of women with children ($P < 0.0001$ Bonferroni *post hoc* comparison) (**Figure 3B**). There was no overall correlation of race (Black vs. White researchers) with productivity during the pandemic period in relation to meeting deadlines ($\chi^2 = 0.06$, $p = 0.7956$) (**Supplementary Figure 1**). There was a significant association of race and gender for meeting deadlines ($\chi^2 = 21.39$, $P < 0.0001$) (**Figure 3C**). A significant difference was observed between the proportions of White men and White women who met deadlines ($P < 0.0001$, Bonferroni *post hoc* comparison).

There was no significant difference between groups (Black with children, Black without children, White with children, White without children) among men ($\chi^2 = 5.15$, $P = 0.1611$) (**Figure 4A**), but there was a significant difference among groups of women (Black with children, Black without children, White with children, White without children) with respect to meeting deadlines ($\chi^2 = 20.62$, $P < 0.01$) (**Figure 4B**). There was a negative association between White women without children and the failure to meet deadlines. The proportion of childless White women who met deadlines was higher than that of White women with children ($P < 0.001$, Bonferroni *post hoc* test) (**Figure 4B**). There was no significant difference between the proportions of Black women without children and Black women with children who met deadlines (Bonferroni *post hoc* comparison).

Children's age also influenced the ability to meet deadlines, as observed for manuscript submission. There was a significant difference between men and women depending on the age of their youngest child ($\chi^2 = 83.37$, $P < 0.0001$) (**Figure 4C**). The proportion of women with children who were able to meet deadlines was lower than men with children that met the deadline, regardless of the age of the youngest child ($P < 0.01$ for all comparisons, Bonferroni *post hoc* test) (**Figure 4C**).

Impact of Remote Work on Productivity

Respondents were asked to evaluate how the period of institution closures and the imposed adaptation to remote work had affected their productivity (indicating whether the impact was negative, non-existent or positive). The intersection between race, gender and parenthood was analyzed considering how respondents self-reported the impact of remote work on their productivity. The majority (69.4%) of respondents stated that they had felt a negative impact on their productivity, while only 16.2 and 14.4% reported positive or no impacts, respectively.

There was a significant difference between the way men and women perceived the impact of the pandemic on their productivity during the social isolation period ($\chi^2 = 61.06$, $P < 0.0001$) (**Figure 5A**). We observed a statistically significant positive association of men and the perception of no impact in productivity, and between women and a negative impact in productivity. There was a significant difference between men and women who perceived a positive impact ($P < 0.001$, Bonferroni *post hoc* test). Parenthood influenced the way respondents perceived the impact of remote work on their productivity ($\chi^2 = 127.56$, $P < 0.0001$) (**Figure 5B**), especially for women.

FIGURE 2 | The influence of race, gender, parenthood, and youngest child's age on the submission of manuscripts as planned during the COVID-19 pandemic. Left-hand panels show the percentage of men or women, Black or White, who submitted manuscripts as planned **(A,B)** and the percentage of men or women who submitted manuscripts as planned, according to the youngest child's age **(C)**. The right-hand panels show the correlation plot with Pearson's chi-squared standardized residuals calculated for each group. The color of the circles indicates a positive correlation (blue) or negative correlation (red), and the size of the circles is proportional to the cell's contribution to the χ^2 score. **(A)** Effect of race vs. parenthood for men on submissions. **(B)** Effect of race vs. parenthood for women on submissions. **(C)** Effect of the youngest child's age vs. gender on submissions.

There was a positive association between women with children and a negative impact ($P < 0.0001$), but this association was not observed for men with children. Race was also related to the way respondents perceived the impact of remote work on their productivity ($\chi^2 = 62.63$, $P < 0.0001$) (**Figure 5C**). White men reported a negative impact less frequently than Black men and Black and White women ($P < 0.001$, Bonferroni *post hoc* test for all comparisons).

Parenthood influenced the self-reported impact of the pandemic for White and Black men ($\chi^2 = 26.15$, $P < 0.0001$) (**Figure 6A**) and for White and Black women ($\chi^2 = x\ 46.65$, $P < 0.0001$) (**Figure 6B**). When the analysis considered all intersections between gender, parenthood and race, there was a significant difference between White and Black men with children who felt a negative impact and White and Black men without children, respectively ($P < 0.001$, Bonferroni *post hoc* test). There was a positive association between White men without children and a positive impact on productivity, and this association was weaker for Black men without children. There was a significant difference between White and Black women with children and White and Black women without children ($P < 0.001$, Bonferroni *post hoc* test), but there was no difference between Black and White mothers with respect to the impact on their productivity.

FIGURE 3 | The impact of gender, parenthood and race on meeting deadlines during the COVID-19 pandemic. For each figure, the graph on the left-hand side represents the percentage of respondents who submitted manuscripts as planned, while on the right-hand side, the correlation plot shows Pearson's chi-squared standardized residuals calculated for each group. Positive residuals (blue) indicate a positive correlation, whereas negative residuals (red) indicate a negative correlation. The size of the circle is proportional to the cell's contribution to the χ^2 score. **(A)** Gender effect on meeting deadlines. **(B)** Parenthood effect on meeting deadlines. **(C)** Race effect on meeting deadlines.

Respondents' Perception of the Factors Impacting Their Remote Work Routines During the Pandemic

The respondents were asked to list any factors in their current situation that impacted their productivity during remote work. Among respondents with children, domestic labor was perceived as a factor influencing remote work for 88.7% of Black mothers, 86.1% of White mothers, 78.4% of Black fathers and 70.0% of White fathers. The routine care of children was more commonly a factor listed by women (80.2 and 80.1% of Black and White mothers, respectively) than by men (69.6 and 61.5% of Black and White fathers, respectively). All groups listed children's school activities as a factor perceived as influencing remote work: Black mothers (48.8%), White mothers (46.1%), Black fathers (43.2%) and White fathers (39.6%). The care of family members (other than their own children) was listed by 18.8 and 15.5% of Black and White mothers, respectively, and by 9.5 and 12.5% of Black and White fathers, respectively. For all groups of respondents with children, mental health issues were uncommonly (less than 1.7%) perceived as influencing their remote work at the time the survey was conducted.

Among childless respondents, 76.3% of Black women and 71.9% of White women perceived domestic labor as influencing their remote work routines, compared to 62.1 and 65.2% of Black and White men, respectively. The care of family members was more commonly among the factors listed by women (32.2 and 29.4% for Black and White women, respectively) than by men (22.7 and 22.5% for Black and White men, respectively). Mental health issues were listed by 7.9% of Black women, 9.4% of White women, and 4.5% of both Black and White men.

DISCUSSION

Our results suggest that gender, parenthood and race are associated with the ability to submit manuscripts and to meet deadlines during the pandemic period. Nevertheless, not all scientists are affected in the same way: White mothers and Black females, regardless of whether they are mothers, are the groups taking the strongest hit in academia. Our study is the first to provide conclusive data on the main forces – race and motherhood – driving the productivity imbalance in science during the pandemic. Our results for the Brazilian context echo those of studies based on the US context showing that working mothers, including those in academia, might be disproportionately affected by the COVID-19 crisis (Alon et al., 2020; Wenham et al., 2020). This exacerbated disparity during the pandemic reflects the historical inequality between the careers of men and women.

Data from before the pandemic indicate that women spend significantly more time on household labor and chores than men (Bianchi et al., 2012), including women in scientific careers (Gupta et al., 2005; Jolly et al., 2014) in diverse cultures of India, Germany and the United States. On average, women spend two more hours (5.7 h) each day than men (3.6 h) on caretaking, cleaning, cooking, and doing other domestic work in the United States (Hess et al., 2020). In Brazil, men spend 10.5 h per week on similar activities, caring for children or doing other chores, while women devote 18.1 h per week (nearly 73% more than men) on these tasks (IBGE, 2018). This unbalanced division of domestic tasks between men and women has a huge impact on women's careers, including employment and economic costs, as many caregivers cut back on the time spent in paid work (Lilly et al., 2007). The reduced time dedicated to the paid workforce leads to fewer opportunities for advancement, since a

FIGURE 4 | The influence of race, gender, parenthood, and youngest child's age on meeting deadlines during the COVID-19 pandemic. Left-hand panels show the percentage of men or women, Black or White, who were able to meet deadlines **(A,B)** and the percentage of men or women who met deadlines, according to the youngest child's age **(C)**. The right-hand panels show the correlation plot with Pearson's chi-squared standardized residuals calculated for each group. The color of the circles indicates a positive correlation (blue) or negative correlation (red), and the size of the circles is proportional to the cell's contribution to the χ^2 score. **(A)** Effect of race vs. parenting for men on meeting deadlines. **(B)** Effect of race vs. parenthood for women on meeting deadlines. **(C)** Effect of the youngest child age vs. gender on meeting deadlines.

"successful position" in leadership roles often involves working long hours. These more limited opportunities for promotion can contribute to the gender gap, especially at the height of women's careers. Considering the maternity penalty in particular, women can suffer a decrease in work productivity after the birth of their children in different countries and cultures (Gallen, 2018; Machado et al., 2019). As a result, an increase in the gender gap after motherhood occurs in many fields (Angelov et al., 2016; Hardoy et al., 2017; Kleven et al., 2019; Collins et al., 2020), including academia, where mothers in the United States, spend 8.5 more hours per week on parenting or domestic tasks and less time on research than fathers (Mason and Goulden, 2004; Jolly et al., 2014). Women academics in the United States. also take on tasks such as waking up during the night and staying at home to care for a sick child (Rhoads and Rhoads,

2012). This asymmetrical division of parenting and domestic tasks can be reflected in a decrease in the number of annual scientific publications by Brazilian academic women (Machado et al., 2019), thus affecting the career progression of mothers in academia. Other significant barriers to women's progress include gender stereotypes and implicit gender bias, which are invisible and powerful forces preventing women from advancing in their careers. The stereotype that women are less competent and less hirable than men (Moss-Racusin et al., 2012; Reuben et al., 2014; Eaton et al., 2020) creates unfair disadvantages for women scientists, including lower salaries and less career mentoring (Moss-Racusin et al., 2012). For instance, among articles published in Nature research journals, only 18.1% have women as senior authors (last authorship), and the higher the journal's impact index is, the smaller the number of women
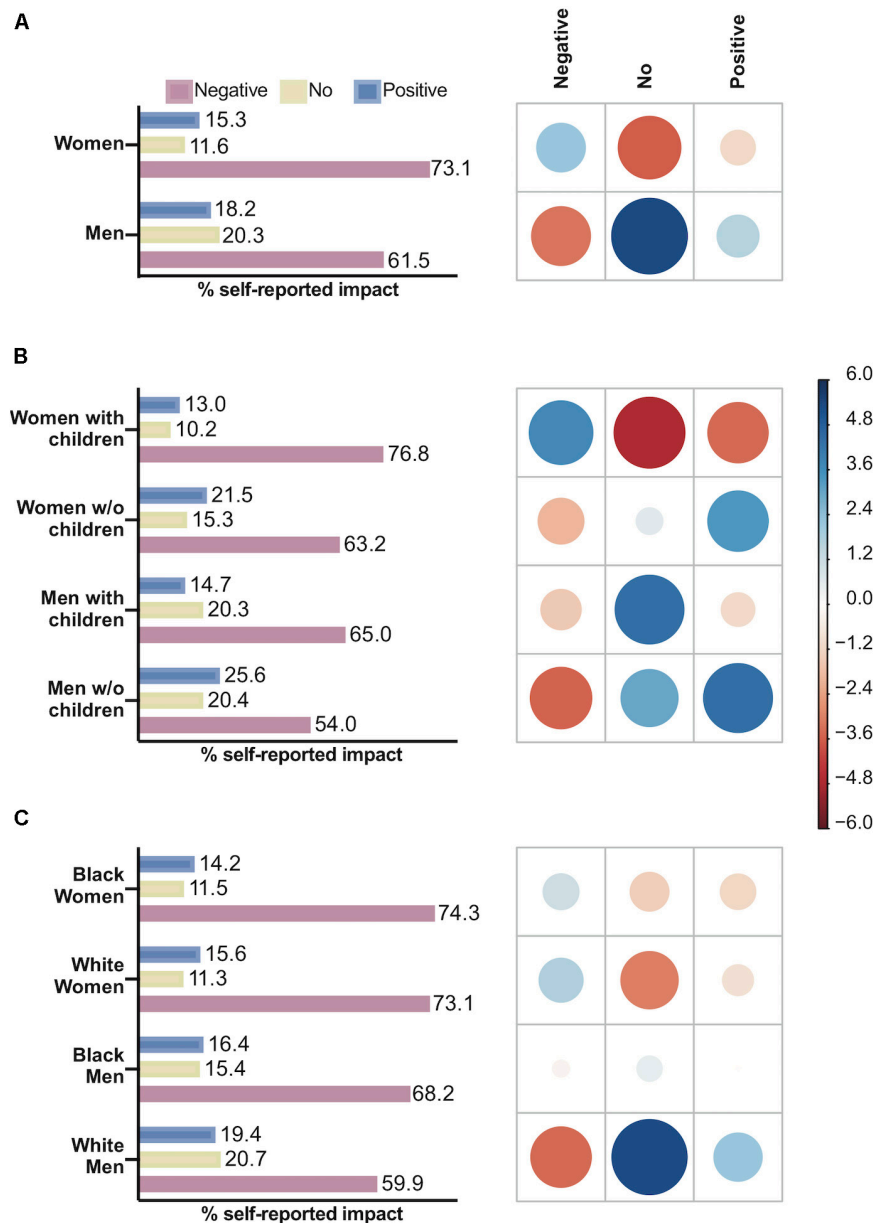
FIGURE 5 | The effect of gender, parenthood and race on the self-reported impact of the remote work regimen on productivity. For each figure, the graph on the left-hand side represents the percentage of respondents who reported negative, no or positive impacts, while on the right-hand side, the correlation plot shows Pearson's chi-squared standardized residuals calculated for each group. Positive residuals (blue) indicate a positive correlation, whereas negative residuals (red) indicate a negative correlation. The size of the circle is proportional to the cell's contribution to the χ^2 score. **(A)** Gender effect on self-reported impact. **(B)** Parenthood effect on self-reported impact. **(C)** Race effect on self-reported impact.

listed as the principal author (Bendels et al., 2018). Importantly, however, the number of articles published with women listed as the first author increases when articles are reviewed anonymously (Budden et al., 2008). In terms of obtaining research funding, the effects of the implicit gender bias against women are also substantial. Women in Sweden need to author twice as many publications to obtain the same scientific competence score as men to obtain a postdoctoral position (Wenneras and Wold, 1997). A study revealed that men obtain more funding renewals than women considering funding provided by the National Institutes of Health in the United States (Pohlhaus et al., 2011).

During the COVID-19 pandemic, several factors that have historically promoted gender inequalities, such as those mentioned above, appear to have increased. For instance, Andersen et al. (2020) argue that the school closures and distancing requirements that have disrupted both work and family life for many people may not have influenced men and women researchers equally. Similarly, female academics based
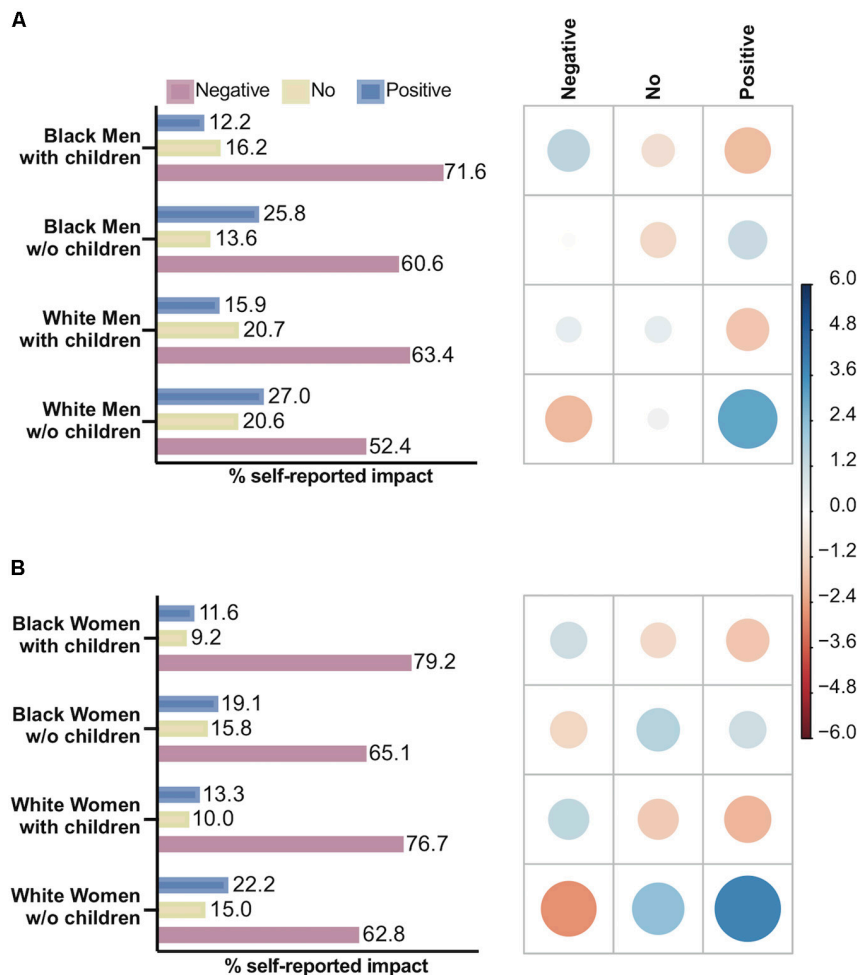
FIGURE 6 | The influence of race, gender and parenthood on the self-reported impact of remote work regimen on productivity. Left-hand panels show the percentage of men or women, Black or White, who reported negative, no or positive impacts. The right-hand panels show the correlation plot with Pearson's chi-squared standardized residuals calculated for each group. The color of the circles indicates a positive correlation (blue) or negative correlation (red), and the size of the circles is proportional to the cell's contribution to the χ^2 score. **(A)** Effect of race vs. parenthood for men on self-reported impact. **(B)** Effect of race vs. parenthood for women on self-reported impact.

on the United States and Europe "reported larger declines in the time they could devote to research than their male colleagues during the pandemic" (Myers et al., 2020), which, according to the authors, will likely continue to evolve and have longer-term impacts on science. In trying to explain the gender gap found in the pandemic's effects on publishing, Viglione (2020) says that female faculty usually carry more teaching responsibilities, so the sudden shift to online teaching has affected them disproportionately. Malisch et al. (2020) suggest that the transition to remote teaching, changes in grading systems, the loss of access to research resources, and shifts in household labor, childcare and eldercare are ways in which COVID-19 is amplifying known barriers to women's career advancement (Malisch et al., 2020). Early career bias has also been proposed as an explanation for the lower paper submission rates of women in academia during this period (Andersen et al., 2020; Viglione, 2020); the early career period aligns with the reproductive

age of these women (Morgan, 2015). Not surprisingly, our results showed that children's age had an impact on Brazilian academic mothers' productivity during the pandemic. Young children require much more attention and care, and parents face additional demands related to having time to homeschool children during the social isolation period. Indeed, studies carried out in the United States and Europe showed mothers with young children reported a reduction in work hours (Collins et al., 2020; Myers et al., 2020). The smaller number of hours dedicated to research likely reduces the paper submission rate among women, which we have in fact demonstrated. Additionally, as stated by Malisch et al. (2020), the burden is even heavier for women who face intersecting systems of oppression, for example, ethnicity and race.

Gender inequality intersects with the racial profile of academics. Indeed, Black women are greatly underrepresented in science in the United States (McGee and Bentley, 2017). Our data

confirmed that it also occurs in Brazil, showing that Black female academics, regardless of the motherhood factor, are the group most affected by the pandemic circumstances. Interestingly, the productivity of White women without children was not affected as much as that of Black women without children, but in both groups, the effect was higher than that observed for childless men, regardless of race. One possible explanation for this finding is that women, particularly Black women, have less social network support than men, which can negatively influence their career trajectory (Feeney and Bernal, 2010; Collins and Steffen-Fluhr, 2019). Black women frequently experience isolation and a sense of "not belonging" (Ong et al., 2018). As proposed by Smith et al. (2007), feelings of isolation and not belonging can elicit "racial battle fatigue" in Black women, i.e., the "cumulative result of a natural race-related stress response to distressing mental and emotional conditions" that adversely impacts the health and accomplishments of Black people (Smith et al., 2007; Corbin et al., 2018). Black women eschew academic careers altogether or exit the academy prior to tenure decisions because they experience social isolation, an unwelcoming environment, bias, and hostility (Trower and Chait, 2002). In academia, networks play a direct role in career success through employment, publication, and conference opportunities, and they can also have less direct impacts, such as by positioning researchers closer to burgeoning research trends, which allows them to work with the most recent data (Heffernan, 2020). The reasons behind the pronounced impact of the pandemic on Black female researchers' productivity, regardless of motherhood, are still debatable; however, the lack of professional networks due to structural racism might play a central role since the challenges of networking can be exacerbated during the pandemic. Working from home poses unique authenticity challenges for Black people, especially Black women, whose colleagues now have windows into their personal lives that could amplify portrayals of them as the "other." This is because "professionalism" is coded by white middle-/upper-social-class standards and Black workers are disproportionately affected by judgments of professionalism and cultural fit (Roberts and McCluney, 2020). Besides, Black patients still die far more frequently than White patients in Brazil (Peres et al., 2021), and Black women are overloaded on the responsibilities for extended family members, including financial responsibilities in the United States (Black et al., 2009).

Although we were able to confirm the association between the COVID-19 pandemic and the lower productivity of women scientists observed in previous studies (Andersen et al., 2020; Myers et al., 2020; Viglione, 2020), our study has some drawbacks that need to be acknowledged. The first concerns the snowball methodology used, which has a sample bias, as study subjects recruit future subjects among their acquaintances. This limitation does not prevent the use of the snowball methodology for a considerable number of studies (see Noy, 2008; Christopoulos, 2009); however, to minimize this problem, we sent emails to all Brazilian graduate programs registered in the Coordination for the Improvement of Higher Education Personnel (CAPES) database, requesting that they share the invitation to participate in the survey with researchers. With these efforts, we obtained a good fit between the number of responses to our questionnaire

and the distribution of scientists from different regions of Brazil (see the section "Results"). Therefore, we believe that our results are, to a certain extent, representative of the geographic regions of Brazil. The second limitation is the bias generated by the number of women respondents, who comprised close to 70% of our sample. This bias seems to be a general effect in this type of study, since women are more responsive to online research, regardless of the purpose of the study (Smith, 2008). Additionally, we obtained a good number of responses for all groups analyzed, since our sample size was relatively large.

In summary, our findings revealed that female academics, especially Black females and mothers (regardless of race), are absorbing the greatest costs of the pandemic. This fact could lead to an unprecedented increase in both gender and race gaps in science. The situation we are facing during the pandemic demands actions from our institutions, and academia should foster a discussion about policies to benefit Black scientists and academics with families in the post-pandemic context.

The short-run challenges posed by the crisis are severe, especially for single mothers and other families with a lack of ability to combine work with caring for children at home (Alon et al., 2020). Ensuring that women's academic output is not disproportionately affected by COVID-19 might safeguard women's career trajectories (Gabster et al., 2020) and affect the overall science landscape. Our study strongly recommends the implementation of policies and actions to mitigate this reality, such as those proposed by Cardel et al. (2020) and Hipólito et al. (2020). The international academic community needs flexibility in institutional policies from research institutions and funding agencies, such as the postponement of deadlines for grant proposals and reports. This is especially important in cases where researchers had caregiving responsibilities during the pandemic. Extending deadlines does not require much investment in terms of public funding and can have a positive impact in allowing people with reduced time dedicated to work to still apply and compete for research grants. Furthermore, funding agencies should consider creating grants designed to benefit Black scientists and academics with families. Actions such as these would reward the most underrepresented and vulnerable groups. It is important to avoid an increase in gender and racial differences after the pandemic. Immediate actions to mitigate the weight women are carrying during the pandemic period include allowing flexible working arrangements, where administrative activities and teaching schedules are carried out by colleagues with more flexibility, and, where possible, not holding meetings during times that conflict with homeschooling hours. Another important point is to create an infrastructure for family care in academic spaces while schools and daycare centers remain closed. This is an issue that should be openly discussed within departments, and collective solutions should be built to reduce the foreseen amplification of the gender gap. Additionally, in a broader sense, evaluations of manuscripts for publication and career assessments should prioritize race and gender equity, especially when the timeframe for evaluations includes 2020 and 2021. The COVID-19 CV Matrix proposed by Arora et al. (2020) is a framework that can enable faculty members to account for their contributions, disruptions, and caregiving responsibilities

and can provide promotion and tenure committees a better way to fairly evaluate faculty members during the pandemic period. In times of growing compassion, we invite the entire scientific community to make science more diverse and fairer after the pandemic.

DATA AVAILABILITY STATEMENT

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

ETHICS STATEMENT

This project was approved by the Ethics Committee of the Federal University of Rio Grande do Sul (CAAE 82423618.2.0000.5347). Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

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SUPPLEMENTARY MATERIAL

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Facing Racism and Sexism in Science by Fighting Against Social Implicit Bias: A Latina and Black Woman's Perspective

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The editors of several major journals have recently asserted the importance of combating racism and sexism in science. This is especially relevant now, as the COVID-19 pandemic may have led to a widening of the gender and racial/ethnicity gaps. Implicit bias is a crucial component in this fight. Negative stereotypes that are socially constructed in a given culture are frequently associated with implicit bias (which is unconscious or not perceived). In the present article, we point to scientific evidence that shows the presence of implicit bias in the academic community, contributing to strongly damaging unconscious evaluations and judgments of individuals or groups. Additionally, we suggest several actions aimed at (1) editors and reviewers of scientific journals (2) people in positions of power within funding agencies and research institutions, and (3) members of selection committees to mitigate this effect. These recommendations are based on the experience of a group of Latinx American scientists comprising Black and Latina women, teachers, and undergraduate students who participate in women in science working group at universities in the state of Rio de Janeiro, Brazil. With this article, we hope to contribute to reflections, actions, and the development of institutional policies that enable and consolidate diversity in science and reduce disparities based on gender and race/ethnicity.

Keywords: implicit bias, stereotype threat, gender inequalities, diversity, underrepresented groups

INTRODUCTION

"Science has a racism problem," claimed an editorial of the important journal "Cell" (Edge, 2020). Editors from a variety of respected scientific journals, such as Nature and Science, have recently asserted the importance of combating racism and sexism in science. Especially after the COVID-19 pandemic, several pieces of evidence suggest that gender and racial gaps may

be widened (Collins et al., 2020; Myers et al., 2020; Staniscuaski et al., 2020). For instance, Staniscuaski et al. (2021), analyzing academic productivity, showed that male academics—especially childless academics—were the group least affected by the pandemic. In contrast, female academics, especially Black women and mothers, were the most impacted group.

Although the fight against racism and sexism in science involves several aspects, socially constructed implicit bias is a key component in this fight. "Bias" is a concept that refers to analysis, judgments, or attitudes that do not adhere to the principles of impartiality. Bias against a person or group can lead to unfair assessments. This judgmental bias can be explicit or implicit (not perceived), and it can occur due to skin color, ethnicity, religion, gender, sexual orientation, weight, physical, or mental disability, among others (Greenwald and Krieger, 2006; Staats et al., 2015). Implicit (unconscious or unperceived) negative judgment bias in the academic sphere is generally associated with social stereotypes of individuals who are stigmatized as intellectually limited or incapable. Importantly, a social stereotype is a mental association of a social group or category with a characteristic or trait that may or may not be favorable (Greenwald and Krieger, 2006). In other words, stereotypes are socially constructed beliefs that do not necessarily reflect reality (Allport, 1954; Ashmore and DelBoca, 1981; Greenwald and Banaji, 1995). Such social constructions, which are determined by culture and the unequal distribution of resources and power in a community, have substantial influence on the unconscious evaluations and judgments of individuals or groups (Staats et al., 2015; Storage et al., 2016). Stereotypes that are repeatedly and imperceptibly transmitted through several information channels induce implicit beliefs that are used to organize and socially categorize the world and provide rationales for entrenched inequalities (Gaucher et al., 2011; Kang, 2012; Gálvez et al., 2019; Rivera and Tilcsik, 2019). These implicit associations are more prevalent than explicit prejudice, which means that even people who consciously believe in and defend the principles of justice and non-discrimination can have their judgment affected by implicit bias, without their knowledge (Staats et al., 2014). In fact, evidence suggests that implicit bias can be a better predictor of behavior than explicit bias (Bargh and Chartrand, 1999; Ziegert and Hanges, 2005). While explicit biases are conscious attributions that are accessible through introspection, implicit biases are more difficult to become conscious of. Nevertheless, implicit bias can be assessed through experimental paradigms using a diversity of approaches and research tools (see below).

IMPLICIT GENDER BIAS

Negative implicit stereotypes are shaped by experience and are based on implicit learned associations between the culturally constructed putative characteristics of members of social categorical groups, including those based on race, gender, and socioeconomic status. The presence of these stereotypes leads to implicit bias in judgments of stigmatized individuals or groups (Greenwald and Banaji, 1995). The formation of implicit gender stereotypes, which associate characteristics of exceptional brilliance and intelligence to the male gender, seems to start early in life (Bian et al., 2017) and is reinforced by daily experiences in which members of a categorical group appear to be associated with economic precariousness and a lack of power (Tilly, 1998). In the study of Bian et al. (2017), children from 5 to 7 years old listened to a text that described a brilliant person. Then, children viewed pictures of women's and men's faces and were asked to indicate which person was the character in the story. Among the five-year-old children, both boys and girls chose photographs of people of their own gender. However, among children aged 6 and older, only boys continued to indicate the pictures of people of their own gender as the brilliant character in the story, while girls became less likely to choose photographs of women. Considering that children at this age generally show positive biases toward their own in-groups (e.g., those of the same gender), this result suggests that the consequences of the stereotype that brilliance is a male characteristic occur very early and that this stereotype already begins to impact girls between 5 and 6 years old (Bian et al., 2017). Interestingly, a study showed that national gender differences in science and math success are associated with national differences in implicit gender-science stereotypes. Specifically, the stronger the nation's citizens' implicit association of men with science and women with the liberal arts, the greater the gap between female and male adolescents' eighth-grade science achievement in that nation (Nosek et al., 2009). There is evidence that implicit bias acts incisively in adulthood, harming women. One study showed that when university faculty (both men and women) analyzed an identical curriculum for a laboratory manager position with either a male or a female name, the faculties evaluated the curriculum with a male name as more competent and deserving a higher salary (Moss-Racusin et al., 2012). In the same vein, Reuben et al. (2014) carried out a study in which participants (men and women) who were volunteers in laboratory research were rewarded for "hiring" a good candidate to perform mathematical tests. Women were systematically less chosen than men in all three experimental conditions tested as: (1) a condition in which no skill information and only information about the physical appearance of the candidates was provided (2) a condition in which the candidates could give a speech to talk about their mathematical skills, and (3) a condition in which information about the candidates' performance on a previous math test was provided. Interestingly, in this last experimental condition, the power of the effect of implicit bias was clearly demonstrated, as the "employers" preferred to choose men with low performance in mathematics over women with good performance. The authors also reported that in condition (2), when the candidates were allowed to talk about their skills, the male candidates overestimated their math skills, while the female candidates did the opposite.

The presence of this implicit bias against women causes considerable damage to the development of their scientific careers. Only 18.1% of articles published in high-impact journals (Nature research journals) have women as senior authors

(last authorship), and the higher the journal's impact index is the smaller the number of women listed as the principal author (Bendels et al., 2018). In addition, articles with women as the principal author are less cited than those with men as the principal author (Larivière et al., 2013). Recently, Dworkin et al. (2020) analyzed high-impact neuroscience journals and found that papers with men listed as the first or last author were cited 11.6% more than expected given the proportion of such articles in the field, and papers with women listed as the first or last author were cited 30.2% less than expected. Importantly, however, when articles are reviewed anonymously (double-blind review), the number of articles published with women listed as the first author increases (Budden et al., 2008), highlighting the impact of implicit bias in this process. Women who have authored the same number of publications with the same publication impact as men are less likely to become research leaders (Van Dijk et al., 2014). Additionally, letters of recommendation written for women use significantly fewer adjectives that represent intelligence and brilliance (Dutt et al., 2016; Kuo, 2016).

In terms of research funding, the effects of implicit bias against women are also significant. A study based on data from a Swedish funding agency reported that women need to author twice as many publications to obtain the same scientific competence score as men (Wenneras and Wold, 1997). Recently, a study based on funding provided by the NIH (a US research funding agency and one of the largest such agencies in the world) revealed that men obtain more funding renewal than women (Pohlhaus et al., 2011). A Dutch study showed no difference between men and women in the quality of the research proposal/project submitted for funding. However, in their sample, women received less funding due to lower scores in the "quality of the researcher" (Van der Lee and Ellemers, 2015). In the same vein, a Canadian study showed that the funding gap is generated by an unfavorable view of women as scientific leaders and not based on the quality of their studies (Witteman et al., 2019). Importantly, when evaluation committees of funding agencies are aware of gender bias against women, the unequal distribution of funding between men and women is less likely to occur (Régner et al., 2019).

IMPLICIT RACIAL/ETHNICITY BIAS

Although the studies discussed above focus on gender stereotypes, the literature also describes implicit judgment bias based on skin color and ethnicity. For example, in one study, fictitious resumes with white-sounding names received 50% more callbacks for interviews than resumes with African-American-sounding names (Bertrand and Mullainathan, 2004). Jaxon et al. (2019) demonstrated in children that the association of brilliance with male gender might depend on the race of the person being evaluated. This intersectional study showed that children associated brilliance with White men but not with Black men (Jaxon et al., 2019). Storage et al. (2016) evaluated the frequency with which college students commented

whether their professors were "brilliant" or a "genius" in course reviews on a popular Web site.[1] They showed that fields in which "brilliant" and "genius" appeared more often were also less likely to be pursued by African–American PhDs, predicting less diversity at the PhD level. This evidence indicates a strong racial bias that helps explain, for instance, the extremely low percentage of faculty positions and PhDs earned by African Americans in STEM (National Science Foundation, 2015; U.S. Department of Education, 2017; Bernard and Cooperdock, 2018). Baron et al. (2006) used an adaptation of the implicit association test (IAT; Greenwald et al., 1998) to assess racial bias in children. Reaction time paradigms, on which the IAT is based, have been long used in studies of attention and motivation. Faster or slower response can indicate preset congruent or incongruent association in brain processing, respectively. Baron et al. (2006) tested for associations between the stereotyped group (race: Black and White) and stereotyped domain (evaluation: words with positive connotations and words with negative connotations) and showed that negative implicit race bias was already present in white children aged 6–10 years. The authors also observed that explicit beliefs about race became more egalitarian over time, but implicit race bias remained unchanged.

In a very recent interesting study, Eaton et al. (2020) probed the implicit bias for gender and its association with race/ethnicity. The authors developed an experimental design in which physics and biology professors from United States Research Universities were asked to evaluate identical curriculum vitae (CV) depicting a hypothetical doctoral graduate applying for a postdoctoral position in their field. The reviewers were asked to rate the candidate on competence, hireability, and likeability. The candidate's name on the CV was used to manipulate race/ethnicity (Asian, Black, Latinx, and White) and gender (female or male), with all other aspects of the CV being the same across conditions. The authors found for physics reviewers an interaction between candidate gender and race/ethnicity. Black women and Latinx candidates were rated the lowest in hireability. This result suggested the robust combined effect of gender and racial/ethnicity biases.

The stereotype of being incompetent/unreliable (Fiske et al., 1999; Jimeno-Ingrum et al., 2009; Pérez, 2010) creates unfair disadvantages for Latinx scientists, especially in the context of leadership roles or to gain recognition for their studies. The persistent lack of Latinx and African representation on editorial boards is an example of the consequences of racism in the academic world (Espin et al., 2017). Latinx exclusion is so problematic that even the widely applied test used to detect/study automatic attitudes and implicit bias for putative stereotype groups, IAT, did not originally include this topic. The first study to adapt an IAT to detect implicit bias toward Latinx individuals was developed much later than the original studies (Pérez, 2010). Thus, discussions about implicit bias and stereotypes and their harmful effects are imperative in science and should consider the intersections between gender and race/ethnicity.

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[1]http://RateMyProfessors.com

STEREOTYPE THREAT

Another harmful consequence of unfounded cultural stigma is low performance on cognitive tasks generated by the threat of stereotypes. Stereotype threat is a psychological phenomenon that involves people feeling at risk of conforming to negative stereotypes about their social group (Steele and Aronson, 1995; see also the review by Spencer et al., 2016). Stereotype threat makes an individual feel a sense of exclusion and lack of belonging that generates psychological stress or anxiety and impairs performance in different situations. Social bonds are necessary for survival and are extremely salient in human beings (Tomasello, 2014), which was highlighted by the COVID-19 pandemic (Bzdok and Dunbar, 2020). Human beings have a constant motivation to form and maintain lasting, positive, and significant interpersonal relationships, even in only a minimal number of these relationships (Baumeister and Leary, 1995). Likewise, perceived social isolation is one of the most pervasive threats to human wellbeing (Cacioppo and Cacioppo, 2014). Humans react to cues of social rejection or exclusion by triggering the autonomic, endocrine and immune systems similarly to when confronting physical attacks or life-threatening events (Eisenberger, 2012), leading authors to tie the word "pain" to both physical and social wounds (see Eisenberger et al., 2003). In fact, neuroimaging studies have shown an overlap of neural representations for social and physical pain (Kross et al., 2011; Eisenberger, 2012). Indeed, in the most efficient experimental protocol to study stress, participants perform speech and cognitive tasks while being ostensively evaluated by a board of trained researchers (Kudielka et al., 2007). The potentially negative evaluation and the fear of failure trigger the reactions of social pain, focusing attentional resources on the threat and weakening performance (Gruenewald et al., 2004; Angelidis et al., 2019).

Belonging to a group stigmatized by negative stereotypes in academic domains exacerbates the pain of social isolation, causing an upward spiral of physiological and mental stress and harmful impairments to performance (Blascovich et al., 2001; Croizet et al., 2004; Allen and Friedman, 2015). Stereotype threat also reduces working memory capacity (Schmader and Johns, 2003; Rydell et al., 2009), which is extremely important to perform well in tasks. Working memory is diverted to address the survival-related threat of social exclusion through intrusive thoughts, anxiety, and stress that are imposed by stereotype threat (Schmader and Johns, 2003). Thus, unsurprisingly, even subtle situational cues for the stress due to stereotype threat can lead to a reduction in performance. In the seminal studies by Steele and Aronson (1995), the authors showed that African American college students performed worse than European American college students on a verbal task under an experimental condition of stereotype threat, in which the task was described as a "diagnostic of intellectual ability." In the non-stereotype threat condition, in which the task was described as "a laboratory problem-solving task that was non-diagnostic of ability," Black and white participants performed equally (Steele and Aronson, 1995). Employing a similar paradigm in France, Croizet and

Claire (1998) showed that students with low socioeconomic status performed significantly worse than those with high socioeconomic status in the diagnostic condition but equally well in the non-diagnostic condition. Désert et al., 2009 observed that children with low socioeconomic status (6–9 years old) are already vulnerable to stereotype threat. Low-status children performed significantly worse under a diagnostic condition than under a non-diagnostic condition in a test of intellectual ability, whereas high-status children were unaffected. Other experimental approaches showed undermining of women's performance in mathematical tests by inducing subtle cues of gender stereotype threat (e.g., Spencer et al., 1999; Dar-Nimrod and Heine, 2006). Indeed, math-gender cultural stereotypes seem to already affect girls, both implicitly and explicitly, at 6–10 years old (Cvencek et al., 2011).

Furthermore, Johns et al. (2005) performed a study in which men and women completed difficult math problems that were described as a problem-solving task "for a study of general aspects of cognitive processes" or a math test "for a study of gender differences in mathematics performance." As expected, the results showed that women performed worse than men when the problems were described as a math test because of the stereotype threat created by the association between women and poor performance in math. Interestingly, when the participants were informed about the stereotype threat phenomenon, the differences in performance between women and men disappeared, indicating that "knowing is half the battle," as the authors suggested in the paper title. Despite all the evidence showing that the stereotype threat is a robust phenomenon, some experimental paradigms have failed to replicate these data or generalize from the laboratory to real-world testing situations (Cullen et al., 2004, 2006; Sackett et al., 2004). However, as pointed out by Spencer et al. (2016), there is converging evidence that indicates that the stereotype threat is, in fact, responsible for decreases in performance in real tests. In addition, as suggested by Spencer et al. (2016), the experimental design must be carefully planned to capture the phenomenon of stereotype threat.

Considering these data, individual and institutional actions to disseminate this knowledge about stereotype threat are fundamental to reduce it among stereotyped groups. We believe these actions would be a powerful approach to fight racism, gender disparity, and the false belief of low intellectual ability of those from disadvantaged socioeconomic environments.

In sum, there is ample evidence indicating the presence of unseen forces that work to prevent the progression of women, Latinx, and Black people to positions of greater prominence and leadership, including in the academic world. In **Figures 1–3**, we suggest several actions aimed at (1) editors and reviewers of scientific journals (2) people in positions of power within funding agencies and research institutions, and (3) to members of selection committees to mitigate this effect. These recommendations are based on the experience of a group of Latinx American scientists comprising Black and Latinx women, teachers, and undergraduate students who participate in women in science working group at universities in the state of Rio de Janeiro, Brazil.

RECOMMENDATIONS TO EDITORS AND REVIEWERS OF SCIENTIFIC JOURNALS

1. Observe the number of publications submitted by negatively stereotyped groups, and ensure that this information is being collected and analyzed in your scientific journal.

2. Be aware that implicit bias is present in all of us and works actively against negatively stereotyped groups.

3. Make reviews double-blind whenever possible.

4. Establish a minimum of publications submitted by negatively stereotyped groups and fulfill this goal.

5. If there is any potential in the paper submitted by a negatively stereotyped group, give these groups a chance. Send the group a clear analysis of the weaknesses of the study and assume the revision will be strong.

6. Whenever possible, give more detailed feedback on the exact reasons for the refusal. This approach has a great educational effect and generates a feeling of inclusion. Paying attention to these groups increases self-esteem and can have transformative effects.

7. Negatively stereotyped groups find it difficult to choose the journals with the best scope for their study; help with this whenever possible. Often, these groups choose low-impact journals due to low self-esteem or imposter syndrome.

8. Be aware that requiring the same performance for groups from quite different starting points is not fair. If opportunities are not generated, the exclusion cycle will never be broken. Obviously, the standard quality criteria must be respected.

9. Always try to empathize and imagine what the difficulties are for someone who is in a negatively stereotyped group. Writing and discussing in a nonnative language, for example, are extremely challenging.

FIGURE 1 | Suggestions for people in positions of power within scientific journals.

RECOMMENDATIONS TO PEOPLE IN POSITIONS OF POWER WITHIN FUNDING AGENCIES AND RESEARCH INSTITUTIONS

1. Before referring someone to an important position, expand your list and think of someone from a negatively stereotyped group who could occupy that position of power. Think twice. Arguing that these people do not exist is not a valid argument in most cases.

2. Try to respect and value different views of the world and the experiences of people from negatively stereotyped groups. The advantage of diversity is having people on the team who think differently.

3. If you are in positions of power within funding agencies, universities and research institutions, you must create diversity committees to develop local policies to improve the participation of Black and Latin people, women and other minorities in science.

4. Maternity support policies should be implemented.

5. Diversity policies should also be developed for the top positions at these institutions.

6. Funding agencies should ask applicants to indicate in their proposals what actions are being taken in their research groups to increase diversity by decreasing the gender gap and racism in science.

FIGURE 2 | Suggestions for people in positions of power within funding agencies and research institutions.

RECOMMENDATIONS TO MEMBERS OF SELECTION COMMITTEES

1 | The evaluation committee must be balanced in its race, ethnicity and gender composition.

2 | The members of a selection committee should use the Implicit Association Test (**https://implicit.harvard.edu/implicit/**) to recognize their own implicit bias and consciously attempt to control it. Educational programs should be carried out to assess these biases in members of the evaluation committee and to teach strategies on how to minimize them.

3 | Evaluations should be performed based on objective criteria that are previously established instead of using "intuition".

4 | Members of the committee should make their own ranking lists before listening to the other members.

5 | Whenever possible, the committee should make the selection (or complete stages of the selection process) without knowing the candidates' identities. Interview questions should be similar across candidates.

6 | For interviews, committee members should ask questions related to professional issues. Personal questions, such as family planning, should not be asked.

7 | All committee members should be heard, and the committee should take time for reflection to consider everyone's opinion.

8 | Committee members should avoid making jokes or comments that call attention to gender or racial/ethnicity bias (**"Nowadays, everything is considered prejudice"**) with other committee members and especially with candidates.

FIGURE 3 | Suggestions for people in positions of power within selection committees.

WHY IS DIVERSITY IMPORTANT FOR SCIENCE?

Diversity in science can promote new discoveries, as it expands the points of view, issues, and areas addressed by researchers (Nielsen et al., 2017). Scientists from different backgrounds may choose to investigate different questions, and more importantly, they may approach the same question in different ways. For instance, historically, bird song has been associated with males seeking to attract females. However, a deeper look at this question performed by women researchers showed that female song is common and that both sexes probably sang in the common ancestor of modern songbirds (Riebel et al., 2019). Hong and Page (2004) showed that when participants try to solve complex problems, the ability to see the problem differently, not simply "being smart," often is the key to discovery. Indeed, when groups of different individuals are working to solve difficult problems, the diversity of the problem-solvers matters more than their individual ability. Another important example of the importance of diversity in the coordination of scientific research concerns the understanding of physiological differences related to health problems. There is evidence that diversity among doctors and health professionals improves access to care for underprivileged groups, develops culturally informed care, and expands the health research agenda (Cohen et al., 2002; Jackson and Gracia, 2014; Valantine and Collins, 2015).

Then, diversity promotes perspectives from different angles, contributing to a more complete understanding of the topic.

Despite the importance of diversity in science, research conducted by underrepresented groups is frequently underestimated. Hofstra et al. (2020) showed that underrepresented groups produce higher rates of scientific novelty. Surprisingly, this study showed that the innovative and disruptive contributions made by underrepresented groups are undervalued and are less accepted by other scholars than are new contributions by gender and racial majorities. In addition, they showed that equally impactful contributions from gender and racial minorities are less likely to result in successful scientific careers. This evidence shows the inequality and injustice that is perpetuated in science. For the building of a fair and truly excellent scientific community, we need efficient policies that promote gender and racial/ethnicity equity.

CONCLUSION

Converging evidence in the literature suggests that explicit and implicit biases related to gender and race/ethnicity are powerful forces that foster the disparities and inequalities found in our society. Cognitive control can allow individuals to more easily refute explicit bias as they consciously perceive it. However, implicit bias is more prevalent than explicit bias. Therefore, it is crucial to increase awareness of the commonly ignored

implicit biases so that each of us can cognitively resignify them. Additionally, institutions must submit proposals to mitigate this problem. With this article, we hope to contribute to reflections, actions, and the development of institutional policies that enable and consolidate diversity in science and reduce disparities in gender, race/ethnicity, which is essential to improve innovation and, therefore, the progress of inclusive science. If we want to combat racism and sexism in science, we need to combat socially constructed implicit bias. This issue is especially important now, as the COVID-19 pandemic may widen the gender and racial gap. Implicit bias is an unseen force that prevents us from moving toward the construction of a more inclusive and diverse science.

AUTHOR CONTRIBUTIONS

KC, LO, FE, and EV conceived the presented idea of writing a manuscript on this subject. All authors contributed to the literature review and discussion of recommendations. All authors contributed to the final version of the manuscript.

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Progress, but at the Expense of Male Power? Institutional Resistance to Gender Equality in an Irish University

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Gender equality is a whole-organization endeavor. Building on Agócs (Journal of Business Ethics, 1997, 16 (9), 917–931) concept of institutionalized resistance this article undertakes a feminist critique of policy and practice around internal promotions to the equivalent of Associate Professor level in one Irish university (called the Case Study University). This university was selected because of its low proportion of women in senior academic positions. The methodology is a single case study design, employing documentary analysis, including secondary data. Since 2013 the proportion of women at Associate Professor in the Case Study University increased significantly (bringing them close to the national average): this being associated with increased transparency, with the cascade model in the background. However, men's "chances" have varied little over time and at 1:4 are the highest in Irish universities. This article uses Agócs (Journal of Business Ethics, 1997, 16 (9), 917–931) stages of institutional resistance to show that while some changes have been made, ongoing institutionalized resistance is reflected in its failure to accept responsibility for change as reflected in its refusal to challenge the "core mission" and restricting the focus to "fixing the women"; and its failure to implement change by focusing on "busy-ness" which does not challenge power and colluding with foot-dragging and slippage in key areas. It is suggested that such institutional resistance reflects the enactment of hidden or stealth power. The article implicitly raises questions about the intractability and the covertness of men's power and privilege and the conditions under which women's "chances" are allowed to improve, thus providing insights into the extent and nature of institutional resistance.

Keywords: institutional resistance, gender equality, university, Irish, associate professor, internal promotion, male power

INTRODUCTION

Gender equality is a whole-organization endeavor reflecting the structure and culture of higher educational institutions (O'Connor, 2020a). The appointment in the past six months of women at Presidential/Rector level in four of the ten Irish public universities is historic, since no woman held that position in the previous 429 years. However, even after several national policy initiatives since 2014 (Athena SWAN[1]; Expert Group

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[1]Athena SWAN (AS) is a gender equality charter, which originated in the United Kingdom in 2005 and has been subsequently adopted/piloted in Australia, Canada, United States as well as in Ireland. Initially focusing on gender equality in the career-progression of women in science, technology, engineering, mathematics and medicine, it has been subsequently extended to include all disciplines as well as professional, technical and support staff. Awards are given at institutional and departmental level and in bronze, silver and gold. For a more detailed description, see O'Connor and Irvine (2020).

Review; Gender Equality Taskforce; Senior Academic Leadership Initiative; research funding agency initiatives and those around sexual harassment: O'Connor and Irvine, 2020) limited change of 1–2% per year has occurred in the proportion of women at full professorial level.

The aim of this article, which is focused at the organizational level, is to undertake a feminist critique of procedures and processes for internal promotion to the equivalent of Associate Professor level in one Irish university. This university was selected because its proportion of women in senior academic positions was particularly low (Higher Education Authority, 2017, 2016–2020). Hence the expectation was that it would provide insights into institutionalized resistance (Agócs, 1997). The university will be referred to as the Case Study University. The methodology is one of single case study design employing documentary and secondary data analysis. Specific documents are referred to by their type and date but not the name of the university (e.g. Commissioned Report[2], 2016).

We outline the key concepts; methodology; main characteristics of the Case Study University; policy and procedures for internal promotion to Associate Professor; discuss stages of institutionalized resistance as reflected in a refusal to accept responsibility for dealing with change and the failure to implement change.

Power and Institutional Resistance in Higher Educational Institutions

Power is required to meet organizational goals. In universities, with the impact of managerialism, there is an increasing centralization of power in the President/Rector and/or in the legitimacy of such centralization (Blackmore and Sachs, 2007; Deem et al., 2008; Lynch et al., 2012; O'Connor, 2014; O'Connor et al., 2019). In this context, many university structures (such as Executive Committee) become largely advisory, while others (such as Academic Council) are limited by lack of access to resources. Similarly, the power of positions such as Vice Presidents or Deans is reduced since these become fixed term Presidential appointments, where occupants serve at the pleasure of the President.

It is increasingly recognized that power in many organizations, including those in higher education, is gendered. Thus, a substantial body of research shows that women are under-represented in senior positions, with power being embodied at senior levels in men, enacted in male dominated structures, and characterized by a culture that facilitates masculinist priorities, lifestyles and relationships, with gender an organizing feature of these structures (Acker, 1990; Sinclair, 2005; Martin, 2020; O'Connor, 2020a).

Much of the early discourse on power explores overt, visible power. We are particularly interested in hidden power (Lukes,

1974; Gaventa, 1980) also referred to as stealth power; power that "operates covertly and panoptically" (Webb, 2008: 127; see also O'Connor et al., 2019). This enables us to transcend a post-heroic (Collinson, 2019) leader/follower paradigm. It reflects a recognition that those holding formal positions of power, can, through altering structures and shaping the organizational culture, exert hidden or stealth power by setting agendas, strike deals which limit others' decision-making, prevent certain conflicts being vocalized, or define problems as individual rather than organizational.

Since universities are gendered, the exercise of this power is also gendered. It is enacted by formal male dominated masculinist structures which can predetermine regulations and practices regarding recruitment and promotion and therefore limit access to senior positions. This formal exercise of hidden or stealth power is supported by informal practices, which have been referred to as micropolitical practices (Morley, 2006; van den Brink et al., 2010; O'Connor, 2020b). These include "the strategies and tactics used by individuals and groups in an organization to further their interests" (van Den Brink et al., 2010: 25). They may be reflected in day-to-day interaction or in evaluation processes such as recruitment or promotion. They include gendered devaluation, stereotyping, procedural subversion, sponsorship, inbreeding etc. (Martin, 2003; O'Connor, 2020b). Given the male dominated structure and culture in universities, even if these micropolitical practices are not overtly gendered, they are likely to favor men.

This gendered reality is obscured by legitimating discourses in universities globally. Such discourses "provide normative justifications for existing policies and practices through which they are seen as appropriate, reasonable, and fair and are consequently more readily accepted" (Tyler, 2005: 211). Legitimating discourses are social constructions which justify the status quo and reflect a construction of gender as a "primary way of signifying (and naturalizing) relations of power and hierarchy" (Mackay et al., 2010: 580). They include gender neutrality, excellence, choice, biological essentialism, and a depoliticized intersectional discourse (O'Connor and White, 2021). Such legitimating discourses typically either deny the existence of gender inequality or frame it as an individual "problem". Even in so far as gender equality is recognized, strategies to deal with it frequently focus on individual women, with the implicit assumption that if women were more confident, better time managers, more political, made more appropriate life choices in effect if they were more like men-gender inequality in universities would not be a problem. Through the use of these legitimating discourses, powerful actors justify the underrepresentation of women in senior positions and other manifestations of gender inequality as "natural", "inevitable", women's "choice" or inadequate "excellence." These legitimating discourses can also be supported by micropolitical practices. Organizational factors are ignored, including evidence that the construct of excellence in higher education is frequently tautological, contested or reflects situationally specific masculinist criteria (Nielsen, 2016; van Den Brink and Benschop, 2012; O'Connor and Barnard, 2021). Thus the structures and culture of universities created

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[2]To protect the identify of the University, we have anonymized certain references, using generic descriptive titles rather than institutional names or authors. Full citations of all anonymized documents has been supplied in confidence to the Journal Editor.

by those in positions of power, through the use of hidden or stealth power, reflect institutionalized resistance to gender equality (Agócs, 1997).

The difficulty of creating gender equality in universities is well documented, (e.g. Burkinshaw and White, 2017; O'Connor, 2020a), with institutionalized resistance theorized as fundamental to understanding diluted, slow or no implementation of gender equality measures (Agócs, 1997; Benschop and Verloo, 2006; Lombardo and Mergaert, 2013; Powell et al.; Peterson et al., 2021; Strategaki, 2005; Smolovic Jones et al., 2020). Since gender equality challenges a powerful patriarchial order, such resistance is not unexpected. It takes many forms, overt and covert, actively or passively exercised (the latter through non-action and indifference). Gender equality can become difficult to challenge and can become more hidden and oblique, leading to a complex "dance" between overt and covert resistance (Smolovic Jones et al., 2020). However such distinctions may be less relevant in the noisy, contradictory world of organizations (Fleming and Spicer, 2008).

Here the focus is on institutionalized resistance, defined as "a pattern of organizational behavior that decision makers in organizations employ" (Agócs, 1997: 918). It can become "embedded in and expressed through organizational structures and processes of legitimation, decision making and resource allocation". (Agócs, 1997: 919) claims that much organizational change literature is power-blind in that it fails to "address the ways in which gender and racial equality are built into the structures and cultures of organizations". Institutional resistance to gender equality is often enacted covertly by those with power in the organization, who see gender equality as a challenge to their power and the privileged position they hold as a result of that power. Change driven solely by external factors such as national policy is likely to be resisted by them, if they see themselves as having something to lose from a change is the status quo. However, without such external pressure it is difficult for initiatives to get traction. Nowhere is this more evident than in the case of almost exclusively male senior management being required to share that power with women.

Agócs (1997): 48 typology of resistance identifies a sequence of four stages viz. denial of the need for change; refusal to accept responsibility for dealing with that change; refusal to implement change that has been agreed, and actions to dismantle change. Studies of resistance to transformative gender mainstreaming in public administration identify denial of the need for change and refusal to accept responsibility for change (Lombardo and Mergaert, 2013). Smolovic Jones et al. (2020) in a study of the British Labor party, identifies idealistic notions of absolute meritocracy combined with micropolitical practices involving localized decision-making, and the unreflexive enactment of long-established norms about suitable candidates for appointment as institutional resistance.

Within higher education, denial of the need for change as reflected in denial of the credibility of the message was evident in a case in 1989 (The Chilly Editorial Collective, 1995, as cited by Agócs, 1997) where a study by female faculty members involving discriminatory decision making around appointments and sexual harassment, was "publicly attacked by the University president, provost and several influential faculty members". Two further

internal reports which found high levels of discrimination and inequality, were neither responded to nor acknowledged by the university authorities (Agócs, 1997: 51). Peterson et al. (2021) also found evidence of institutional resistance to gender equality in Swedish and Portuguese higher education institutions. As in Van den Brink's, (2015) study it was reflected in challenging the data and hence denial of the existence of gender inequality. Peterson et al. (2021) documented change agent's perception of a refusal to take responsibility for change (including blaming the victims) combined with a strong commitment to what was seen as the preservation of a gender-neutral meritocracy. Powell et al. (2018) found that in their Swedish university study, the way gender equality was formulated reflected a discourse that women were the cause of the problem, reflecting a refusal to accept responsibility for change.

Peterson et al. (2021) also highlighted a refusal to allocate appropriate resources for gender equality as a reflection of institutional resistance. That was also noted in Temitope Igiebor's (2021) work, which also highlighted policy silences, the absence of sanctions and the existence of gendered micropolitical practices inhibiting the implementation of gender equality policies in Nigerian higher educational institutions. Thus it is clear that similar patterns of institutional resistance to gender equality have been identified across a geographical spread of higher educational institutions, and that these broadly reflect Agócs (1997) types of institutional resistance.

We undertake a feminist critique of procedures and processes, looking at internal promotions to the equivalent of Associate Professor level in one Irish university. Building on Agócs typology we focus here on institutionalized resistance in the Case Study University, at the second and third stages, viz; the refusal to accept responsibility for dealing with change, and the refusal to implement change. We find evidence of a refusal to accept responsibility for change reflected in an unwillingness to effectively implement change in core institutional values and in the requirement for disadvantaged groups to change ("fix the women approach": O'Connor, 2014; Burkinshaw and White, 2017). With regard to the refusal to implement change, we find evidence of displacement activity involving busy-ness around "soft actions" which leave power structures untouched, as well as foot dragging and slippage in a number of areas.

Theoretically then, the contribution of the article lies in enhanced understanding of institutionalized resistance to gender equality.

METHODS AND MATERIALS

The feminist critique of policy and procedures around internal promotion to Associate Professor or equivalent in one Irish university undertaken here is alert to the gendering of practices which may advantage men and disadvantage women, even if this is unintentional (Bensimon and Marshall, 2003: 338). The Case Study University was selected because the equation of power and position with masculinity was very deeply embedded there (Commissioned Report, 2016; Internal Report on Promotions, 2014: also **Table 1**).

TABLE 1 | Percentage of female senior academics in Irish Universities 2013–19.

		Dec-13	Three year average 2013–15	Three year average 2016–18	Dec-19
ALL 7 Universities	Prof.	19%	19%	24%	26%
	Assc. Prof.	26%	27%	34%	37%
	SL	35%	35%	39%	39%
University A	Prof.	23%	23%	30%	29%
	Assc. Prof.	17%	17%	37%	34%
	SL	33%	33%	38%	36%
University B	Prof.	14%	16%	26%	31%
	Assc. Prof.	45%	43%	43%	48%
	SL	38%	34%	38%	36%
University C	Prof.	16%	18%	21%	24%
	Assc. Prof.	25%	29%	39%	39%
	SL	33%	29%	34%	37%
University D	Prof.	17%	19%	27%	31%
	Assc. Prof.	24%	29%	44%	51%
	SL	33%	35%	43%	42%
University E	Prof.	20%	20%	24%	24%
	Assc. Prof.	27%	29%	29%	33%
	SL	38%	38%	40%	40%
University F	Prof.	31%	31%	31%	28%
	Assc. Prof.	17%	17%	37%	41%
	SL	39%	39%	44%	39%
Case Study University	Prof.	14%	13%	13%	18%
	Assc. Prof.	13%	11%	18%	26%
	SL	30%	31%	40%	41%

Source: Higher education authority, 2016, 2017, 2108, 2019 2020; also internal report on promotions 2014.

The methodology is a single case study, in which the case is an institution, a methodology suitable for complex issues drawing on in-depth analysis of one case, while permitting transferability to other contexts (Simons, 2009). The methods involve documentary analysis (Bowen, 2009), including secondary data analysis (Follmer et al., 2012). The focus of that analysis is publicly available documents pertaining to gender equality in general in the Case Study University, with specific reference to internal promotion to the equivalent of Associate Professor. The analysis is thematic (Braun and Clarke, 2006), supplemented as appropriate by content analysis (Elo and Kyngas, 2008). In an attempt to ensure maximum rigor while maintaining anonymity, specific documents are referred to in this article by their type and date but not by the name of the university. These documents include:

1) Higher Education Authority institutional staff profiles by gender
2) Policy documents pertaining to promotional competitions between 2013 and 2020[3]
3) Athena SWAN institutional submissions
4) Institutional Gender Action Plan 2019 and review of its implementation
5) Reports commissioned by the university relating to gender equality such as Internal Report on Promotions (2014) and Commissioned Report (2016)

[3]A revised promotions process commenced in January 2020 (slightly overlapping with last call under older process) and is not included in this analysis

6) Case Study University web pages–2019–2021

Obviously, our approach raises issues related to access to data, bias etc. However, no research is bias-free, and awareness of potential sources of bias can enable critical reflection (Smith and Noble, 2014). Furthermore, an insider can provide insights unobtainable in any other way. Such work can be seen as a feminist activist reaction to the status quo: potentially "an act of transformational resistance" (Liu and Pechenkina, 2016: 191).

A good deal has been written about the role of feminist activists in initiating change within the masculinist male dominated contexts of academia (Bendl and Schmidt, 2012; Bendl et al., 2014; O'Connor, 2019). In such contexts, feminist agency may be reflected in a critique of policies and procedures through helping to "name, analyze, and think strategically about institutionalized resistance" (Agócs, 1997: 917). [Meyerson and Scully (1995: 586)] put forward the concept of "tempered radicals" individuals who identify with and are committed to their organizations, and are also committed to a cause, community or ideology that is fundamentally different from, and possibly at odds with, the dominant culture of their organization. They are inside/outsiders, people who are ambitious for their organization but also want it to change. Undertaking this work from inside an organization (the situation of one of the authors) poses both personal and intellectual challenges. In that context a second person can provide both support and perspective.

There is anecdotal evidence that, other than in a system where inbreeding dominates, (Cruz-Castro and Sanz-Menéndez, 2010; Montez-Lopez and O'Connor, 2019), external women are more

likely to be appointed at senior level than internal ones. The appointment of three female Presidents (from Germany, United Kingdom and Finland) to Irish public universities in the past six months illustrates this phenomenon. It implicitly suggests that internal processes are problematic and prey to gendered micropolitical practices. Hence, this article, unlike much of the other work in the area, looks at internal promotional processes at Associate Professor or broadly equivalent level.

RESULTS

Main Characteristics of the Case Study University

The Case Study University is a long established publicly funded University with just under 19,000 students and 2,000 staff; a suite of undergraduate and postgraduate programs, and several research institutes and centers. It was ranked in the top 260 of The World University rankings and in the top 1 per cent of universities worldwide on the Quacquarelli Symonds World University Rankings (Case Study University web 2021). There are 21 Schools in four Colleges, with disciplinary leaders in each school (a purely honorofic position). It has, like other Irish universities, experienced the shift to neoliberalism, with elements of collegiality (as reflected in election rather than appointment of line management) persisting up to recently. It commissioned a number of internal and external reports on gender equality from 2010 onwards (Internal Report on Distribution of Gender and Grade 2010; Internal Report on Academic Career Advancement 2011; Internal Report on Promotions 2014; Commissioned Report 2016), arguably reflecting Agócs (1997) tendency to try to deny the problem, including an external report (Commissioned Report, 2016) which firmly closed that option by noting that:

> Many factors contribute to [Case Study University's] poor performance on gender equality relative to the other universities in Ireland, which as a whole, perform relatively poorly on gender equality compared to many other European countries. The key factor is the culture within academia generally and in [Case Study University] in particular, which is based on gendered notions of what constitutes success and excellence. Changing this culture represents a major leadership challenge because it comprises an interlocking set of goals, roles, processes, values, communications practices, attitudes and assumptions (Commissioned Report, 2016: 25).

The Case Study University received an Athena Swan Institutional award (bronze) three years after its initial application. Three of its 21 Schools have secured a Bronze award (2017–2018) (Case Study University web, 2021).

The Gender Profile of the Case Study University

The President and the Deputy President are both male, as all their predecessors have been. The gender profile of the official

decision-making structures was poor in 2015, with women constituting 25% of Executive Management, 20% of Academic Council and 43% of Governing Authority (Higher Education Authority, 2019). This has improved, with women now constituting 44% of those on Executive Management, 48% of Academic Council and 43% of Governing Authority (Higher Education Authority, 2020). A low proportion of women are still in line management positions. There were no women Deans from 2016 to Jan 2020, with 14% being women (i.e. one person) between 2014 and 2016 (Athena SWAN application, 2017: 52). Women make up a larger proportion of Heads of School, although this proportion has also fallen slightly since 2014: from 44% in 2014 to 40% in 2021 (Internal Committee Audit Report, 2020). These posts were filled by election but since 2019 are overwhelmingly filled by internal appointment. It remains to be seen what impact this will have on their gender profile in the future.

The academic career structure in the Case Study University is broadly similar to other Irish universities with four main points on the academic scale: lecturer to (full) professor (Grade A: European Commission, 2019). Full professor is not a promotional grade, and is publicly advertised and filled through external competition and tied to formal managerial responsibilities. The Case Study University differs from other universities in that rather than having a specific Associate Professor grade, there is a post called a personal professor, paid without increments at roughly half way along the salary scale for the full professor post. This title in itself is unhelpful since it can be seen as eliciting a gendered stereotype and is a significant step up from the senior lecturer grade (Commissioned Report, 2016). Indeed, between 2009 and 2015, 80% of the completed applications for this position were from men (Commissioned Report, 2016). The Higher Education Authority[4] assigns it to the Associate Professor category and this is the practice adopted here.

The Higher Educational Authority figures show that in December 2019, women made up 26% of those in Associate Professor positions in the Case Study University, increasing to 29% by December 2020 (Internal Progress Report, 2021), compared with an average of 37% across all then seven Irish universities. The increase occurred much later in the Case Study University (starting 2016–18) and from a lower base, bringing it closer to the national average (see **Table 1**). However, the extent of the change, and its limitations become obvious when we realize that in the Case Study University, women had a 1:42 "chance" of the broad equivalent of an Associate Professorship in 2013–15, improving significantly by 2019 to 1:13 (compared with 1:18 to 1:11 across all these universities in the same period: see **Table 2**).

Men's "chances" of an Associate Professorship across this same time period varied little over time and across universities (**Table 2**). Indeed, in four of the seven universities then in Ireland

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[4]Higher Education Authority uses the term "Associate Professor" (Associate Professor) for comparability across institutions, although titles, terms and conditions vary somewhat between Universities. This data excludes the three new Universities created in 2020.

TABLE 2 | Women's and men's "chances" of securing a professorial position Irish Universities (Rounding to nearest whole number).

		Women's "chances"			Men's "chances"		
		Three year average 2013–15	Three year average 2016–18	Dec-19	Three year average 2013–15	Three year average 2016–18	Dec-19
ALL 7 Universities	Prof.	1:25	1:14	1:13	1:2	1:5	1:5
	Assc. Prof.	1:18	1:13	1:11	1:8	1:7	1:7
University A	Prof.	1:12	1:8	1:9	1:6	1:5	1:4
	Assc. Prof.	1:21	1:7	1:8	1:7	1:5	1:5
University B	Prof	1:21	1:14	1:11	1:5	1:6	1:6
	Assc. Prof.	1:8	1:8	1:6	1:8	1:8	1:7
University C	Prof	1:22	1:19	1:17	1:6	1:6	1:6
	Assc. Prof.	1:23	1:15	1:17	1:11	1:10	1:12
University D	Prof	1:18	1:19	1:16	1:5	1:6	1:7
	Assc. Prof.	1:27	1:25	1:24	1:11	1: 17	1:23
University E	Prof	1:12	1:10	1:11	1:4	1:4	1:4
	Assc. Prof.	1:14	1:15	1:13	1:6	1:7	1:7
University F	Prof	1:11	1:11	1:11	1:7	1:6	1:5
	Assc. Prof.	1:39	1:10	1:7	1:10	1:6	1:5
Case Study University	Prof.	1:28	1:29	1:24	1:5	1:5	1:5
	Assc. Prof.	1:42	1:21	1:13	1:5	1:5	1: 4

Source of data: Higher Education Authority, 2016, 2017, 2108, 2019 2020.

they increased between 2013 and 2019, with men in the Case Study University having the highest "chance", at 1:4 in 2019. This implicitly raises questions about the intractability of men's privileging and the conditions under which women's "chances" improve.

There is a wider pattern of under-representation of women in senior positions in the Case Study University. It has consistently had the lowest proportion of women at full professorial level in any Irish university since 2013 (**Table 1**). This reluctance to appoint women to senior positions has also been evident in the administrative area where only 24% at those paid E106,000 p. a. were women as compared with 38% across all universities (Higher Education Authority, 2020).

Thus, although there are sectoral issues as regards the consistency of men's privileging, there are particular questions as regards the Case Study University, where, despite improvement and effort, men's "chances" remain three times higher than women's "chances" at the equivalent of Associate Professor level.

Policy and Procedures for Promotion at the Equivalent of Associate Professor

Personal professorial posts in the Case Study University (categorized as Associate Professor by the Higher Education Authority and hence here) are internal promotional posts secured on the basis of scholarly achievement and suitability. There is no limit to the number of appointments that the board can recommend, with applicants being ostensibly assessed against a normative standard rather than competing with each other (Internal Report on Promotions, 2014: 7). The procedures changed relatively little between 2009 and 2020 (The last call under the policy discussed here was February 2020).

To be eligible to apply for promotion to this position on the regular track, applicants must hold a senior lectureship and have

reached the top of the salary scale (i.e. at least four years). The procedure includes three stages. Firstly, applications are assessed by the 14–16 person promotion board (14 up to 2016: Athena SWAN application, 2017) including the President and Deputy President as ex-officio members. (Seven or more members can in practice make that decision). Reflecting the continuing collegial ethos of the university, the other members are elected for five years. Up to January 2016, the gender profile of this internal board was 11 men and two women (Internal Report on Promotions, 2014: 9). Given the well-recognized importance of homosociability (Grummell et al., 2009), this raises legacy issues involving the extremely low "chances" of women being promoted from 2016 to 2018.

By 2018, the panel had been changed to include 50% of each gender, and the requirement for all members of the board to be at full professorship was dropped: with four of the eight men and three of the eight women being full professors. All board members have been required (since 2016) to undertake unconscious bias training (Case Study University web, 2021). However, the effectiveness of such training has been challenged internationally: "there is very little evidence that changes in implicit bias have anything to do with changes in a person's behavior" (Oswald et al., 2015; Bartlett, 2017). Up to 2016 there was no scoring of candidates by the board; nor were there any strategies to eliminate conflicts of interests between the members and the applicants. It seems possible that applicants who had "paid forward" by doing favors for powerful members of the board were likely to be favored (O'Connor, 2020b).

Although officially both teaching and research were included as criteria, in practice promotion was primarily based on research output and income. More recently, c. 2018, a scoring system was introduced providing some transparency for individual candidates. However, it continues to favor research: of the 300 marks available, 200 are allocated to research and 50 each to teaching and learning and contribution to the university, school

or community. A minimum score of 210 (70% overall) must be achieved to be recommended for promotion, and this must include a minimum score of 150 (75%) for research and scholarly standing, and a minimum of 20 (40%) in the two other areas. Given that women have 20–30% fewer publications (Rorstad and Aksnes, 2015; European Commission, 2019: 161), are less likely to be cited (Budrikis, 2020: 348), and to receive research grants (European Commission, 2019: 136), this scoring system advantages male candidates. Indeed 41% of female respondents in a survey of the scheme in the Case Study University felt they would never meet the level of achievement required, compared to 6% of the men (Internal Report on Promotions, 2014:13).

When a prima facie case for promotion is established, that board appoints the three members of the second Assessing Board, all external. There is no evidence of a requirement for this second board to be gender balanced. The assessors are asked for a written report on applicants' research and scholarly standing informed by the 10 best papers submitted by the applicant. They are also asked whether the candidate would be suitable for promotion in the assessor's university and to rank them in the top 5, 10 or 20% of applicants. It would be surprising if care was not taken by that board to select assessors who were likely to be supportive of those candidates favored by the board. There is no evidence that the board is aware that evaluations of male candidates tend to be higher than female candidates even in experimental situations (Moss-Racusin et al., 2012); or that letters of recommendation favor male candidates in terms of length, adjectives used and "doubt raisers" (Trix and Psenka 2003; Madera et al., 2009).

Competence is considered the most important criterion when evaluating candidates, however, while male applicants are assessed primarily on competence, female candidates are assessed on a wider range of criteria (Moscatelli et al., 2020) Thus, mothers are less likely to be evaluated positively than fathers (Gonzalez et al., 2019). In a potentially enlightened move, since 2015 applicants in the Case Study University were requested to document "leave taken"[5] so as to allow the assessors to "adjust their expectations" providing "up to one year for each period of maternity leave" (Internal Promotional Documents 2019:17). This forces women to signal their parental status. It presupposes the existence of a supportive organizational culture. In its absence this information can evoke stereotypes and biases which disadvantage women.

There are additional potentially gendered requirements. Candidates are expected to make a clear and unequivocal case that they are currently performing at the higher level, and that they have the drive and capacity to continue performing at that level. Both may be problematic for female applicants, based on evidence that women who self-promote are more negatively evaluated than men who do so and are more vulnerable to a gender stereotyping backlash, since male stereotypes are more compatible with senior positions (Rudman and Glick, 2001:758).

The tendency in women to play down achievements and for male and female assessors to view the achievements of men more favorably than those of women, raises further possibilities as regards gender bias.

The application process includes a commentary from the Head of School, who is expected to liaise with head of discipline, with oversight and sign-off by the Dean. This reflects a collegial ethos (Lynch et al., 2012), giving them (predominantly men), an opportunity to influence the process. Given informal practices such as sponsorship and homosociality (O'Connor, 2020b), this is likely to advantage men and disadvantage women.

The third stage involves the consideration of these reports by the promotion board and its recommendation to Governing Authority. It seems highly possible that "horse trading" (O'Connor and O'Hagan, 2016) occurs between the members of that board so that candidates favored by its most powerful members are recommended for promotion.

Additional routes were identified in 2013: namely "fast track" and leadership (Athena SWAN application, 2017: 43). The fast track category is an "exceptional" provision, which permits exemption from the top of the salary scale criterion, but requires external recognition through the award of an advanced higher degree (D. Litt, D.Sc., etc.) or "equivalent recognition", as judged by the board (Internal Promotional Documents, 2019:1). Given men's greater success at securing research grants (European Commission, 2019:115,116), the potential for gender bias in the judgment of "equivalent recognition", and the lesser likelihood for women to be seen as exceptional (Van den Brink and Benschop, 2012), this route is unlikely to be helpful to women (men are more likely to attempt it: Commissioned Report, 2016).

The recommendation to increase the valuation of teaching (Athena SWAN application, 2017: 83), culminated in the leadership track. The grounds for selecting this track are "outstanding leadership" as evidenced by "projects, including strategic initiatives, which he/she has initiated and successfully implemented, the outcomes of those projects, and how those outcomes have impacted on the University's performance" (Internal Promotional Documents, 2019). Given the under-representation of women in leadership positions in the Case Study University and the tendency for constructions of leadership to be gendered (Schein, 1998; Fitzgerald, 2018; Gandi and Sen, 2021), this also seems unlikely to be helpful to women (it is little used by either: Athena SWAN application, 2017: 44).

Unsuccessful applicants can appeal the process but only on procedural grounds, and only one appeal is permitted. The appeals committee comprises three people (men and women), as least two of whom will be professors or the equivalent of Associate Professor though women are under-represented in both positions (Internal Promotional Documents, 2019: 18).

A survey of senior lecturers in the Case Study University (with an overall response rate of 76%: including 82% of the women) identified a substantial lack of clarity, particularly among the women, about these criteria and procedures (Internal Report on Promotions, 2014). Thus, half of the women (and less than a quarter of the men) were not at all clear what was meant by demonstrating "a high and recognized international standard in scholarship and research"- a key issue since priority is given to

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[5]Time out for documented leave including: maternity; paternity; parental; sick/disability; and carer's leave is discounted in the assessment of applications (Case Study University web, PDs, 2019)

research. Even higher proportions of the women (and a sizeable proportion of men) did not know how they could demonstrate a high level of achievement in teaching; while twice the proportion of women as men did not know what the board was looking for to "demonstrate a high and recognized international standard in academic leadership". Even by 2018, almost one third of women felt they did not understand the promotion process and criteria (Internal Survey Report, 2019a).

Furthermore, although there was little difference in the qualifications, age, marital or family status of the men and women at senior lecturer level in the Case Study University in 2014, more men than women had been encouraged to apply for promotion (47% vs. 36%), mainly by Associate Professors (i.e. mainly men: Internal Report on Promotions, 2014: 9). This did not reflect their differential seeking of advice or length of time in the Case Study University (half of the women had worked there for at least 16 years compared with a third of the men: Internal Report on Promotions, 2014: 9). It may reflect homosocial micropolitical practices favoring men (Graves et al., 2019; O'Connor and Barnard, 2021). Overall although there have been some changes, an unambiguous focus on reducing gender inequality has been missing.

In February 2015, a Gender Equality Task Force (almost half of whom were external to the Case Study University) was established with a remit: to "advise the University on what measures it should take to develop effective gender equality" (Commissioned Report, 2016:9). It challenged the myths underpinning institutionalized resistance (Agócs, 1997): for example, the idea that the construct of excellence is gender neutral (Commissioned Report, 2016: 18) and that women are "the problem".

It made 24 recommendations including the appointment of an adequately resourced Vice President of Equality, the first such appointment in an Irish university; the introduction of "mandatory gender quotas for all academic promotions and competitions" based on the flexible cascade model (i.e. a soft quota) with the number promoted being based on the number of eligible women at the grade below (Commissioned Report, 2016: 40), if necessary phased in over a maximum of two rounds of these competitions. Both of these recommendations were re-iterated at national level by the Expert Group (Higher Education Authority, 2016a) which recommended linking state funding to the gender profile of senior positions and a gender quota of 40 per cent women at full professorial level. The report on the Case Study University also recommended a review of its academic grading structure, including the Associate Professorship; the development of principles to underpin workload models (since women were more likely to be allocated administrative responsibilities: Misra et al., 2011); and "Detailed, specific exemplars of what constitutes excellence for the various areas of academic activity" (Commissioned Report, 2016: 41). There were other "softer" recommendations. Nevertheless, it was an attempt at structural and cultural transformation.

Implementation of Policies: Transparency and the Cascade Model

From 2009 to 2015 there was little information and even less transparency about the Associate Professor process in the Case Study University (Internal Report on Promotions, 2014). Eight rounds of promotions took place involving 69 applications, of which only 14 (20%) were from women (Commissioned Report, 2016: 24). This could be seen as indicating a lack of confidence in the procedures and/or a low proportion of eligible women. The proportion of women in these positions increased from 10% in 2014 to 16% in 2016 (reflecting increases in STEMM: no data available on non-STEMM: Athena SWAN application, 2017: 24).

Following the 2016 Commissioned report, a Vice President was appointed and an office staffed (two persons). This office has since initiated three institutional committees with an equality focus, appointed a Vice Dean for Equality Diversity and Inclusion in each of the four Colleges, developed a Gender Equality Action Plan in 2019 and reviewed it (Internal Progress Report, 2021) and put in place an external advisory group. Gender balance on committees has also been monitored and reported.

From 2017 to 2020 inclusive, 43% of those who applied for an Associate Professorship were promoted (29/68), with roughly a fifth of the men and women who applied being successful (13/68 women V 15/68 men: **Table 3**). The proportion of women promoted to Associate Professor, with the exception of 2017, exceeded that in the senior lecturer pool (**Table 1**). The gains for woman were more marked and consistent after 2018, and placed the Case Study University close to the national average (**Table 1**). This change coincided with improved transparency, including a scoring system and making public the composition of the promotions panel. The number, gender and discipline of applicants at the various stages and ultimately of those promoted was not provided; nor were the applications of successful candidates made available; nor data on appeals.

Gender quotas based on a flexible cascade model are in the Gender Action Plan (2019), but are not explicitly referred to in the promotional documentation. This could be to avoid criticism (Agócs, 1997: 55). However, an explicit, transparent cascade policy could encourage female applicants and prevent slippage (although it may have the opposite effect in highly feminized professions).

Legacy issues such as the requirement to have reached the top of the senior lecturer (SL) salary scale before applying for an Associate Professorship on the regular track was not removed by the end of the scheme (February 2020) although this was recognized as an issue in 2014; listed for action in 2017 (Athena SWAN application, 2017: 44) and reappeared in the 2019 Gender Equality Action Plan.

The ongoing gap in men and women's "chances" suggests that transparency alone (even with the background existence of the cascade model) is not sufficient (van den Brink et al., 2010).

DISCUSSION OF STAGES OF RESISTANCE

The aim of this article is to undertake a feminist critique of procedures and processes for internal promotion to the equivalent of Associate Professor level in one Irish university in order to provide insights into institutionalized resistance (Agócs, 1997). As stated previously, Agócs (1997: 48) identifies a sequence of four stages of resistance: denial of the need for

TABLE 3 | Promotions to equivalent of Associate. Prof. in the Case Study University: 2017–2020.

Year	2017	2018	2019	2020
Total applicants	15	29	13	11
Applicants who got through first stage	7 male, 3 female	16 male, 11 female	4 male, 4 female	5 male, 4 female
Number promoted	2 male, 0 female	8 male, 7 female	3 male, 3 female	2 male, 3 female

Source: The Case Study University Equality Office.

change; refusal to accept responsibility for dealing with that change; refusal to implement change, and actions to dismantle change.

Although it is not the focus here, it is suggested that the first stage of institutional resistance was reflected in the historically extreme position of the Case Study University and its stubborn denial of the existence of gender inequality up to 2016. There have been some improvements since then, most notably the increase in women's "chances" of promotion to Associate Professor from 1: 42 in the 2013–15 period to 1: 13 in 2019. Yet, this current level is more than three times worse than men's "chances". We suggest that this reflects the second stage of Agócs typology of institutional resistance viz. an institutional failure to accept responsibility for dealing with change and (to some extent) the third stage viz. refusal to implement change.

We identify two sub-categories of the second stage viz. refusal to challenge what is seen as "core mission" of the university and "fixing the women". These have been identified in other studies (O'Connor, 2014; Burkinshaw and White, 2017; O'Connor, 2020b; Peterson et al., 2021; Temitope Igiebor, 2021). We also identify two sub-categories of the third stage viz. a refusal to implement change as reflected in the displacement of energy away from tackling power inequalities into "busyness" and foot dragging and slippage in a number of key areas. These are particularly important in the Case Study University where there appears to be a willingness by those in formal positions of power to use stealth power to collude with such tactics and so avoid the need for fundamental structural and cultural change.

Stage of Institutional Resistance: Failure to Accept Responsibility for Change

Based on Agócs (1997) schema, the second stage of institutional resistance is seen as including a refusal to challenge the "core mission" of the university and a focus not on fixing the university but on "fixing the women".

Refusal to Challenge the Core Mission

In the Case Study University there is an uncritical assumption that a meritocratic approach involving excellence is completely free of gender bias, despite caveats expressed in the Commissioned Report (2016) based on Castilla and Benards (2010: 543) evidence that "when an organizational culture promotes meritocracy ... managers in that organization may ironically show greater bias in favor of men over equally performing women". The internal Associate Professor scheme in the Case Study University has continued to list criteria (albeit with some adjustment in their number or the weighting of one set

against the other) based on the assumption that to change this would be to challenge the core mission of the institution (Agócs, 1997: 55). This can be seen as reflecting the exercise of hidden or stealth power by the power holders: the challenging of this being literally unthinkable.

There is now considerable evidence that the definition and operationalization of the construct of excellence is frequently gendered and tautological (Van den Brink and Benschop, 2012; Nielsen, 2016; Campbell, 2018; Ferretti et al., 2018; O'Connor and Barnard, 2021). Excellence has been seen as a rationalizing myth in academia used to legitimate evaluative decisions and to obscure gendered processes (O'Connor and Barnard, 2021). There is no recognition of this in the Case Study University. The criteria outlined in the promotional documentation since 2018 relate to "Research and Scholarly Standing", "Teaching and Learning", and "Contribution to School, College, University and Community. Most appear, at face value, to be appropriate to promotion (student feedback, teaching approach, research funding, scholarly standing, research leadership etc.) but the standards to be attained, and hence the scores, involve judgments that are highly subjective and therefore open to bias. Even for criteria where numerical benchmarks could be applied, subjective terms are employed ("evidence of consistent and continuing high-quality output of research publication in peer-reviewed journals, scholarly works": Internal Promotional Documents, 2019: 3). Phrases such as such as "high level of achievement", "maintaining theoretical currency" "evidence of scholarly contribution", "recognition by peers" (Internal Promotional Documents, 2019; 2–4), appear with no benchmark or objective indictors despite the recommendation to specify the standard expected (Commissioned Report, 2016: 41). These are all presented and applied as gender-neutral. The CVs of successful candidates, which could facilitate a gendered analysis, have also not been made available.

More fundamentally, the bias in favor of research ensures that men's privilege is maintained. The evidence that men outperform women in this area is well established, yet this bias is embedded into the promotion scheme (European Commission, 2003). Women are also likely to carry heavier teaching and administrative loads (not least because the male dominated hierarchies endorse stereotypical views about women and devalue their skills and attributes), and this is seen as "natural" and inevitable.

Many of these processes also occur in other universities: and are arguably not unrelated to the low levels of variation in men's "chances" in Irish universities (see **Table 2**). However, the targets set in the Case Study University reveal the desire to maintain male privilege. Thus, whereas nationally, there is a quota of 40% of the

full professoriate to be women by 2024 (Higher Education Authority, 2016b) the Case Study University has considerably less ambitious targets: 28% by 2024–including both full professors and those in the broadly equivalent Associate Professor category (Case Study University web, 2019).

Restricting the Focus to "Fixing the Women"

In the case study's Gender Equality Action Plan (Internal Progress Report, 2021) there is a good deal of reliance on an uncritical "fix the women" approach (O'Connor, 2014; Burkinshaw and White, 2017). This is seen by Agócs (1997) as indicating a failure to take responsibility for change.

There are 20 references to leadership in that Gender Equality Action Plan, all reflecting a deficit model (Burkinshaw and White, 2017), with women's lack of skills being used as a legitimating discourse. Thus, there is a reference to making women serious candidates for promotion (Van den Brink and Benschop, 2012: 81) by coaching, mentoring and training them. There is also a reference to "a strong pipeline" at Associate Professor level (see **Table 1**) reflected in "the pool of women eligible for promotion to Professor in the coming years" (Internal Progress Report, 2021: 16). This implicitly rejects the idea that the low proportion of women reflects organizational factors and suggests that "the problem is women", with the cause of women's under-representation being framed in terms of individual's deficits.

The Gender Equality Action Plan (Internal Progress Report, 2021) also refers to three separate leadership initiatives i.e. Academic Career Development Workshops, Aurora Leadership training, and Athena SWAN Leadership seminar series. "Successful" women leaders are presented as role models with structural difficulties obscured. There is an uncritical view of the impact of such programs. This is in contrast to [Manfredi et al. (2014): 54] which found that female alumni of its top management program who applied for senior management roles were more than twice as likely as their male counterparts to have been unsuccessful (22% vs. 8.5%).

Maternity is still seen as an aberration. Thus, "ramp-up post-maternity workshops" are provided for women returning from protected leave including maternity leave (Internal Progress Report, 2021: 20) with small grants available since 2016. These are helpful but do not deal with the underlying organizational cultural and structural problems, and can be seen as reflecting institutional resistance to systemic change.

Institutional Resistance: Failure to Implement Change

Agócs (1997: 56) describes this third stage of resistance as involving overt claims of responding to a change message, but with no real change occurring. It includes failure to implement or enforce policy, failure to ensure accountability or delegation of responsibility for implementing change or failure to allocate the necessary resources for such work. While it would be untrue to say that no real change has occurred in the Case Study University, the slow rate of change compared to other Irish Universities (see **Table 1**) suggests that some elements of this stage of resistance are present.

Here it is seen as reflected in busy-ness which does not challenge power and in foot-dragging and slippage in a number of areas.

Busy-Ness Which does not Challenge Power

Here we focus on busy-ness involving de-politicized actions as a stage of institutional resistance. The Gender Equality Action Plan contains 89 actions. Neither power nor inequality is mentioned, "discrimination" only once, while "support" appears 34 times; "committee" 20 times. The references to gender are couched in sanitized terms such as "inclusion" and welcoming "diversity". There is a strong impression that there is a preference for "safe" actions that do not challenge the power structures in the Case Study University. Implicit in this is a kind of de-politicized intersectional approach one that fails to recognize power inequalities and their implications (Indeed, in one College the Vice-Dean is of Equality, Diversity and Wellness, aligning equality with lifestyle).

The Internal Progress Report (2021:1) on the implementation of the Gender Equality Action Plan finds 41 actions completed, a third of which involve the setting up of committees, return of data to the Higher Education Authority, the creation of Athena SWAN structures and the Gender Equality Action Plan itself and reporting on its implementation. Many of the completed actions do not challenge power for example a video showcasing senior women in leadership roles, celebrating diversity events, roadshows for family leave entitlements, and the creation of parental support networks.

Although the proportion of women at Associate Professor has increased, reflected in the improvement of women's "chances" (which at 1:13 are close to the national average of 1:11) the persistently high- and indeed increase in men's "chances" in 2019 (at 1:4, they are now the highest, compared to a 1:7 average across all universities: See **Table 2**) point to institutional resistance.

The need to address gender equality in Case Study University as a deep gendered structural and cultural problem was first recognized in 2016 (Commissioned Report, 2016). Few of the actions to date have addressed this, with the possible exception of the creation of an office for equality and increased transparency (against the backdrop of the cascade model). However, this is concealed by the "busyness" of the actions in Gender Equality Action Plan.

Foot-Dragging and Slippage in a Number of Areas

Here we focus on foot-dragging involving the implementation of recommendations made over a number of years, including the introduction of a new typical Associate Professor grade, the persistence of gendered requirements for promotion to the current equivalent of Associate Professor, legacy issues and the lack of progress on gender balance on committees and line management.

The introduction of a grade of Associate Professor similar to that in other universities was recommended in a report in 2016 (Commissioned Report, 2016: 14); it re-appears as a recommended action in the institutional application for an Athena SWAN award in 2017 (Internal Application Document 2017: 25) but is recorded as "delayed" in the progress report

(Internal Progress Report, 2021: 17). This contrasts with the moving ahead of plans to consolidate the superior status and salary of full professor: a position where women are still very under-represented.

Foot dragging is reflected in the persistence of gendered requirements for promotion to the broad equivalent of Associate Professor, such as the requirement for applicants to make a clear and unequivocal case that they are performing at the higher level; and the maintenance of fast track and leadership additional routes, despite their unhelpfulness as regards gender equality. These requirements, and the failure to acknowledge or defend against micropolitical practices such as sponsorship and homosociability, all point to difficulties in implementing change in the gender profile of senior positions.

Failure to deal with legacy issues is also evident. Women have been under-represented at senior lecturer level in the Case Study University for many years (see **Table 1**) a situation which only started to improve in 2017 (Higher Education Authority, 2018). Retaining the requirement to wait four years until these women reach the top of the salary scale to apply for promotion to Associate Professorship is evidence of foot-dragging.

Further evidence of failure to implement change can be found in slippage regarding gender balance on committees, and in the ongoing low proportion of women still in line management positions. At the Case Study University there has only been one female Dean between 2014 and 2016 and none since then (Athena SWAN application, 2017: 52). The proportion of female Heads of School, while considerably higher at 44% in 2014 actually slipped to 40% in 2020 (Internal committee Audit Report, 2021). Similarly, whereas 66% of all committees were compliant with 40% gender balance in 2018, this dropped to 55% in 2019 and to 46% in 2020 (Case Study University web, 2021).

Slippage is also evident in the description of the very modest targets identified at professorial level as delayed (Internal Progress Report, 2021). Other interventions that might challenge men's advantage are also identified there as "at risk": including gender disaggregation of all personnel data; demonstrable experience of leadership in advancing gender equality for appointment to senior leadership roles; the development of a competency framework and a promotional scheme for professional and administrative staff (Internal Progress Report, 2021:10). It is suggested that these also reflect foot dragging and slippage and ultimately a failure to implement change and a reflection of the third stage of institutionalized resistance (Agócs, 1997). They can also be seen as a manifestation of the enactment of hidden or stealth power.

SUMMARY AND CONCLUSION

The challenges in promoting gender equality in higher educational institutions have been identified in many studies (e.g. Benschop and Verloo, 2006; Lombardo and Mergaert, 2013; Burkinshaw and White, 2017; O'Connor, 2020a; Smolovic Jones et al., 2020; Powell et al.; Peterson et al., 2021). Building on Agócs (1997) conceptualization, the contribution of this article lies in an enhanced understanding of institutionalized resistance to gender

equality as a manifestation of stealth power, reflected in a refusal to accept responsibility for dealing with change and the failure to implement aspects of a change agenda, both indicating an unwillingness to recognize that institutional transformation is required. We demonstrate how the analysis of documentation facilitates the identification of these sub-types of institutional resistance, as does the calculation of men's chances in comparison to women's chances, methods which could be applied in other organizations to reveal the extent and nature of institutional resistance to gender equality.

Gender inequality was identified in 2015 as a particular problem in the Case Study University (Commissioned Report, 2016), and this was the reason for its selection. In this article we have been particularly concerned with the procedures involved in internal promotion to the equivalent of Associate Professor and the related Gender Equality Action Plan (2019) and evaluation of its implementation (2021). It has been shown that women's "chances" have improved dramatically: this coinciding with increased transparency in the process, and the flexible cascade model (i.e. soft quota).

However, in the Case Study University, the "normal" procedures and criteria are designed by men for men. This helps explain the low level of variation in men's "chances". The particularly masculinist culture in that university was reflected in women's 1:42 "chance" of promotion to Associate Professor in 2013–2015; in the total lack of transparency in the procedures and in the very designation of the Associate Professor position as personal professor which served to create further difficulties for women and to embed male privilege. Residues of these remain: the net effect being that although women's "chances" in the Case Study University have improved (and at 1:13 are close to the national average of 1:11) men's have also increased and at 1:4, are now the highest in the country (compared to a 1:7 average across all Irish universities).

Despite an overt concern with the under-representation of women in senior positions, the masculinization of line management positions has continued and is being effectively ignored. There has been no attempt to see the problem as an organizational one and to challenge the "core mission" of the university but instead the focus is on "fixing the women", reflecting Agócs (1997) second form of institutional resistance. There has been slippage in women's representation on committees, in line management positions and in the implementation of policies in a number of areas, as well as foot dragging on a number of fronts, despite a large amount of "soft" activity (these being seen as reflecting Agócs, 1997 third form of institutional resistance). Thus, it is almost as if, losing ground on some fronts, institutionalized resistance ensured that it was gained on other fronts, through the exercise of hidden or stealth power.

It seems possible to conclude that in Case Study University (as indeed in all Irish universities) improvements in women's position will only be accepted if men remain ahead of them. However, this pattern is heightened in the Case Study University, most recently as reflected in an attempt to consolidate the superior status and salary of the full professor; in the slow increases in the proportion of women at this level-and the

effective acceptance of this slow pace as reflected in the sleight-of-hand foot dragging around the national quota of 40% of women at full professorial level by 2024. Thus, in the Case Study University although there has been some progress for women, it has not been at the expense of male power and privilege.

RECOMMENDATIONS TO CIRCUMVENT INSTITUTIONALIZED RESISTANCE

Institutionalized resistance needs to be addressed at the institutional level. Exposing the way in which power operates in organizations, in particular how those who hold power can use it to frame interpretations of the "problem" of gender inequality and circumscribe solutions to those problems by the exercise of hidden or stealth power through structures, legitimating discourses, processes and micropolitical behaviors is crucial. At the very least, the inevitability of institutional resistance needs to be surfaced and recognized. Only then can change agents start to dismantle it.

In particular the uncritical assumption that a meritocratic approach is gender neutral needs to be challenged. This has been identified in a number of studies. Since academic institutions can be relied on to robustly defend their activities as meritocratic, this will require innovative and creative approaches, beyond traditional information sessions. Drawing on dedicated resources such as the FESTA handbook on resistance to gender equality in academia (Saglamer et al., 2016) may be a useful entry point since it aims to facilitate a deeper understanding of institutional resistance, with practice-based, exemplary vignettes, presenting its causes, indicators and ways of dealing with it.

The significance of data was clearly acknowledged by the national Expert Group in their recommendations for year-on-year statistics on the percentages of women in senior positions across Irish Higher Educational Institutions (Higher Education Authority, 2016a). Although a limited approach, the availability of data can make a problem and the solution visible. The annual publication of gender profiles since 2016 has made resistance through denial of gender equality less viable. Collecting and publishing national data at a more granular level on individual institutions, including the gender breakdown of all stages of the applications, including withdrawals/resignations and retention,

length of time in each position and the gender profile of principal investigators/Directors of Research Centers can help reveal fault lines and benchmark successes. The public availability of the CVs of successful candidates would be very helpful in such benchmarking. Monitoring women's and men's "chances" of securing senior posts, as we have done here, would a useful addition to institutional profiles. The role of the Higher Educational Authority is important in ensuring that the targets identified are compatible with national policy and that resources to achieve them are identified internally, with their achievement related to state funding.

The findings here are consistent with many other studies that reveal a reliance on "adding women to things" (e.g. Committees, interview boards) or "adding things to women" (e.g. CV writing or leadership skills). We strongly recommend moving the focus from women to institutional structures and processes that privilege men. Privilege and the mechanisms that maintain it must be exposed, if institutional resistance is to be successfully dismantled. Higher Education Institutions might benefit from training materials developed to surface white privilege (see for example McIntosh, 2010). Finally, case studies involving the structures, processes, procedures and leadership in those higher education institutions that exemplify best practice in this area would also be important in moving the issue forward.

DATA AVAILABILITY STATEMENT

Publicly available datasets were analyzed in this study. While the data used in this study (documents) is publicly available, we are bound to protect the identify of the organization.

AUTHOR CONTRIBUTIONS

MH and PO'C contributed to the design of the study (60%/40%). MH accessed the documentary material, MH and PO'C conducted the analysis (70%/30%), MH and PO'C contributed to the theoretical section (40%/60%) MH and PO'C drafted the paper and revised drafts (30%/70%). MH uploaded and is the corresponding author. PO'C approved for submission. Total: 50%/50%.

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Quotas and Gender Competence: Independent or Complementary Approaches to Gender Equality?

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Austrian gender equality policy in higher education is characterized by the successful implementation of a comprehensive set of gender equality policies and persistent gender imbalances. After the introduction of a legal quota for university bodies, for instance, female representation in decision-making bodies increased significantly within a short period of time. However, this did not lead to a cultural change or the abolishment of barriers to women's careers. Research has attributed this paradoxical situation to a lack of reflexivity because the current gender equality policies do not force institutions or individuals to challenge traditional practices, which are perceived to be merit-based and therefore gender neutral. To overcome this paradox, the Austrian Federal Ministry of Education, Science, and Research launched a policy process aimed at strengthening gender competence in all higher education processes—management, administration, teaching, and research. This paper provides a critical discussion of the Austrian quota regulation and its implementation. It also introduces the concept of gender competence and outlines the underlying assumptions as to why the new policy is expected to contribute to change. Following a critical reflection on these assumptions, the paper also discusses how existing steering instruments have to be adapted to support individual and institutional reflexivity.

Keywords: gender equality policy, quota, higher education institutions, gender competence, Austria

INTRODUCTION

The Austrian university sector is dominated by public universities and the ideal of open access to university education (universities should be open for all talented students). Hence, the major source of funding is the Austrian state; there are no or only very low fees for students. Although universities are publicly funded, they enjoy far-reaching autonomy in terms of budget distribution, staffing, strategic planning, and governance (Höllinger and Titscher, 2004). The relationship between the state and the universities is based on performance agreements, which define the budget of a university as well as its main duties for a 3-year period (Biedermann and Strehl, 2002). Universities report their performance to the Federal Ministry of Education, Science and Research on an annual basis in the form of an intellectual capital report, which is based on a set of key indicators (e.g., student and staff numbers, courses offered, third party funding).

The character of the higher education system in Austria is shaped by the Humboldtian tradition. Academic careers are thus structured in the typical pattern for the Humboldtian university, which is based on unity in teaching and research, freedom of study, and corporate autonomy for universities despite their being funded by the state (Münch, 2007). This model is characterized by a strict hierarchical division between full professors and academics at lower stages of their careers. A

successful academic career leads to a professorship, and academics remain dependent on the chair to which their position is assigned until this is achieved (Pechar and Andres, 2015). This career model is highly compatible with the ideal notion of a good scientist developed by Max Weber in the early 20th century (Gerth and Wright Mills, 1946), whereby an ideal scientist is able to devote his life entirely to science without restrictions due to other commitments like care responsibilities. This perception was developed at a time when women were formally excluded from universities and refers to a typical male career. Criteria to identify excellence are still derived from it, and it also defines selection practices and procedures in academia.

The combination of the Humboldtian university tradition and the broad patterns of female labor market participation significantly limits the prospects for equal career outcomes for women in academia. In general, women's labor market participation in Austria still relies on the conservative welfare state model, which is characterized by a modified male breadwinner (Crompton, 1999; Buber-Ensser, 2015; Behrens et al., 2018). This supports women working part-time to reconcile their unpaid and paid work–in the labor market in general as well as in academic professions and despite the fact that highly qualified women tend to return earlier after maternity leave, postpone their family planning to suit the dynamics of academic careers, and on average have fewer children (Beaujouan and Berghammer, 2019). Working part-time also limits women's career prospects in academia. This is mainly due to the assumption that high-profile jobs or management positions cannot be accomplished on a part-time basis. Consequently, more women than men work part-time in higher education and research. According to the recent She Figures (European Commission, 2019a), 22% of women and 11% of men work part-time in higher education and research in Austria.

Beginning with the education expansion in the 1960s, increasing numbers of women gained the necessary qualifications to enroll at university. The development of female participation in higher education in Austria is no exception: since the turn of the 21st century, more women than men have enrolled at university, and women now also make up the majority of graduates. However, the "leaky pipeline" phenomenon (Blickenstaff, 2005; Connolly and Fuchs, 2009; Emerek and Larsen, 2011) is very persistent, with the share of women decreasing in higher status positions, and the share of female professors remaining below the European average (23% in 2016, European Commission, 2019b). Gender-segregated degree choice is another very persistent phenomenon (European Commission, 2019a): in Austria, women are overrepresented in the education sector (share of women among PhD graduates in 2016: 76%) and underrepresented in the engineering, manufacturing, and construction sectors (share of women among PhD graduates in 2016: 26%).

In the early 2000s, the organization of universities in Austria was fundamentally reformed. The new organizational law, the Austrian Universities Act 2002, gave universities autonomy over budgetary and personnel matters (Höllinger and Titscher, 2004). The Act also constitutes the legal foundation for gender equality in higher education and formulates gender equality and equal opportunities as guiding principles (§2) and duties (§3) of universities. Each university has to establish an equal opportunities working group which is responsible for preventing discrimination in appointment procedures (§42), set up an organizational unit responsible for the co-ordination of activities relating to equal opportunities, the advancement of women and gender research (§19) and publish a female advancement plan and a gender equality plan (§20) as part of the university statute. The 2009 Amendment to the Universities Act also establishes a quota regulation for the composition of university bodies (Hölzl and Neuwirth, 2020).

Austria has a long tradition of gender equality policies in higher education that started in the 1980s (Schaller-Steidl and Neuwirth, 2003). The initial policy mix comprised measures to support qualified women in higher education (first among students and later among professors), prevent discrimination and institutionalize women's and gender studies, and was developed prior to the universities gaining autonomy. It was subsequently expanded in the late 1990s when Austria began implementing gender mainstreaming in higher education (Wroblewski et al., 2007). The policy mix was based on Rosabeth Kanter's (1977) theory of the critical mass and the assumption that an increasing participation of women in higher education would lead both to an increasing share of women in top positions as well as to cultural change.

In the last decades, university organizational reforms have seen gender equality goals introduced into steering instruments (Ulrich, 2006) and the related monitoring instruments in higher education (Eckstein, 2017; Wroblewski, 2017). Each university in Austria formulates its own gender equality goals and measures in its performance agreements. Since universities in Austria gained their autonomy, a heterogeneous bundle of gender equality measures has emerged, albeit with different priorities, target groups, and intensities (Wroblewski and Striedinger, 2018). To monitor progress towards gender equality goals, gender monitoring was introduced based on the obligatory annual intellectual capital reports submitted by the universities. This gender monitoring contains indicators on the representation of women and men in all areas and at all hierarchical levels (including management and decision-making bodies and committees), the career advancement opportunities open to women and the gender pay gap.

Universities are not the only establishments in Austria that are required to formulate concrete gender equality objectives. Since the introduction of the outcome-oriented approach for government spending in Austria, each Federal Ministry is obliged to formulate corresponding targets (including one gender equality objective[1]). In this context, the Federal

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[1]Austria has incorporated gender budgeting into its constitution. Since 2009, the objective of *de facto* equality between women and men in the budgetary planning context is enshrined in the Federal Constitution. Article 13(3), which is applicable to all authorities, states that the "federation, Länder and municipalities have to aim at the equal status of women and men in the budgeting." Since 2013, gender budgeting must be implemented at the federal level. De facto equality between women and men has to be considered in all stages of administrative action–from the formulation of objectives to their implementation and evaluation.

Ministry of Education, Science and Research developed corresponding gender equality goals that are incorporated into the university performance agreements. Austria is also committed to the current gender equality policy in the European Research Area (ERA) and has included the objective to achieve gender balance in decision making in its ERA Roadmap 2016–2020 (Federal Ministry of Science, 2016).

The paper describes the Austrian quota regulation and women's representation in decision making positions as well as a recent policy aiming at strengthening gender competence in higher education processes. These policies and achieved or expected results regarding gender equality are discussed from a feminist institutionalist perspective (Kenny, 2014; Krook and Mackay, 2011; Mackay et al., 2010) and a practice theoretical point of view (Schatzki, 1996; Schatzki, 2003). Hence, the effective implementation of gender equality policies to achieve cultural change requires a change of organizational gendered practices (Acker, 1990; Martin, 2003; Martin, 2006). For example, regulations aiming at a reduction of implicit gender bias in procedures only contribute to change if they are known, accepted and followed by relevant stakeholders.

QUOTAS FOR UNIVERSITY BODIES

Although women conquered universities in Austria at student and researcher level, they initially remained excluded from top positions like full professorships and top management (Wroblewski and Striedinger, 2018). Hence, after the turn of the century it became clear that the assumption on which gender equality policies have been based since the 1990s does not hold. The development of first gender equality policies in Austria followed Rosabeth Kanter's hypotheses that after a critical mass of women entered the system, culture will change, and women will find their way into top positions (Schaller-Steidl and Neuwirth, 2003). To rectify this situation and to increase women's representation in decision making, a quota for university bodies (rectorate, university council and senate) was introduced in 2009 through an amendment to the Universities Act 2002 (Schulev-Steindl, 2010).

Along with the council and the senate, the rectorate is the highest management body in a university. The rectorate manages the university and represents it in the outside world. The rector is the head of the rectorate and also acts as its spokesperson (§ 22, Universities Act 2002). Rector positions must be publicly advertised. A rector is appointed by the university council for a period of 4 years from a shortlist of three candidates proposed by the senate. Vice rectors are appointed by the university council on the recommendation of the rector following a senate hearing. Their term of office corresponds to that of the rector.

The function of the university council is defined in the Universities Act 2002 (§21) and corresponds roughly to that of a corporate supervisory board. A university council consists of either five, seven, or nine members (the actual size is determined in each case by the university's founding convention). Two, three, or four of the members (depending on the size of the council) are elected by the senate, and the same number are appointed by the

Federal Government on the proposal of the Federal Minister of Education, Science and Research. The remaining member is appointed by mutual agreement by the members of the university council.

The university senate is made up of representatives of professors, scientific non-professorial staff, general university staff, and students. The senate is dominated by professors, who represent 50% of its members. Students make up 25% of senate members. The tasks of the senate include the approval of the university's development and organizational plans, the preparation of proposals for the election of the rector (together with the university council), the acceptance of curricula and the adoption of the university's statutes.

The Austrian Quota Regulation

Austrian equality law establishes a general duty on the part of the public sector to give preference to female candidates as long as the share of women in the respective category has not reached 50% (Federal Act on Equal Treatment in the Public Service, Bundesgleichbehandlungsgesetz § 11). In line with this regulation, the quota regulation for decision-making bodies at Austrian universities was introduced in 2009 through an Amendment to the Universities Act 2002. University bodies like the rectorate, council, senate, and all commissions installed by the senate are required to fulfill a quota of female members (Schulev-Steindl, 2010). Until 2014, the quota regulation foresaw that all university bodies had to consist of at least 40% women. In 2014, the quota was increased to 50%.

Since the law also contains sanctions for non-compliance, the quota regulation can be interpreted as a strong one (Guldvik, 2011). If a university body does not fulfill the required quota, the equal opportunities working group may request a new composition of the body, which makes all decisions taken by it invalid. The equal opportunities working group may also explicitly agree to a university body not fulfilling the quota based on a justification report provided by the authority responsible for its setup (e.g., if there are no women professors available or willing to join it). At some universities, the working groups for equal opportunities have also stated that they will not object to imbalanced committees if their members can demonstrate competencies in regard to gender issues (Wroblewski, 2015).

The quota regulation aims at increasing women's participation in decision making and not at gender balance. This is evident in the formulation used in the law, which stipulates a quota of at least 50% women in university bodies. According to the legal formulation, there is no problem with an overrepresentation of women. The law does not talk about abolishing a gender bias in decision making related to gendered decision-making criteria. Nevertheless, in the parliamentary debate on the quota regulation it was assumed by representatives of most political parties that an increasing participation of women in decision making would lead to more gender-fair decisions (Wroblewski, 2019a). Referring to the work of Sarah (Childs and Krook, 2008), the Austrian quota regulation focuses explicitly on numeric representation, i.e., the number of female representatives, and aims only implicitly for a stronger attention to women's concerns or a reduction of a gender
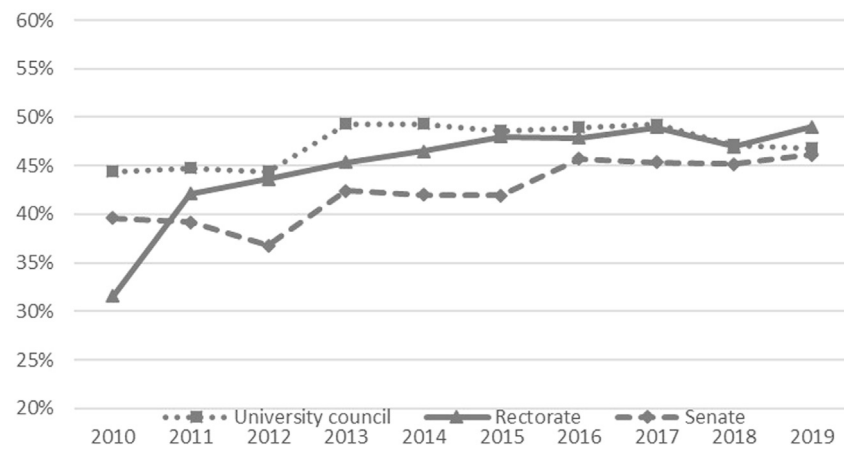
FIGURE 1 | Share of women in rectorates, senates, and university councils 2010-2019.

TABLE 1 | Share of women in university councils, rectorates, senates, and senate committees (2010–2019).

	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)	2012 (%)	2011 (%)	2010 (%)
University council total	47	47	49	49	49	49	49	44	45	44
Head	36	32	41	45	45	45	45	27	23	23
Other members	49	50	51	50	49	50	50	48	49	48
Rectorate total	49	47	49	48	48	46	45	44	42	32
Rector	29	33	33	38	36	27	24	20	19	5
Vice rectors	55	50	53	51	51	52	51	50	49	40
Senate total	46	45	45	46	42	42	42	37	39	40
Head	36	18	18	18	14	18	18	27	27	27
Other members	47	46	47	47	43	43	44	37	40	40
Habilitation committee	43	42	42	44	42	40	38	39	37	35
Appointment committee	44	45	44	43	42	41	42	43	40	34
Curricular committee	46	43	43	44	40	40	40	38	37	38
Other senate committees	52	51	53	52	46	46	46	44	44	47

Source: Repository of the federal ministry of education, science and research, www.unidata.gv.at.

bias in decision making processes and criteria (substantive representation).

Women's Representation in Decision Making

The implementation of the quota regulation is monitored by the Federal Ministry of Education, Science and Research. Data on the composition of university bodies is available for the period since 2010. Women's representation increased significantly immediately following the introduction of the quota regulation (see **Figure 1**). The share of women in rectorate positions increased from 22% in 2005 to 49% in 2019. The most significant increase was seen in 2011, when the share of women in rectorates increased by almost 10 percentage points (from 32% in 2010 to 41% in 2011). In other words, only 2 years after the introduction of the quota regulation, the overall share of female rectorate members lay at over 40%. The development in

women's participation in university councils started from a higher level and already reached parity in 2013. In 2018 and 2019, the share of women among council members decreased to 47%. Compared to rectorates and university councils, senates appear to face more difficulties in meeting the quota. This is due to a combination of the underrepresentation of women among full professors and the dominance of professorial members in the senate. The share of women among senate members varies between 37 and 46%.

The figures presented above show the average over all universities. Since 2013, almost all university councils and rectorates have fulfilled the quota regulation. As already mentioned, the situation is different when it comes to senates: since 2013, about half of the senates have met the quota.

A more differentiated look at the composition of university bodies reveals that women's representation is higher among ordinary members than in leading positions (see **Table 1**). In 2010, although women already represented about half of ordinary

council members, only 23% of university councils were headed by a woman. In 2019, one third of university councils were headed by women, and gender parity had been reached among members.

The development in rectorates is fairly similar: as far as vice rectors are concerned, women already accounted for 40% in 2010 and have made up the majority since 2012. While women are still underrepresented among rectors, the number of female rectors has at least risen from its initial low level. In 2007, there was just one female rector in Austria; from 2011 onwards, more and more women were appointed to this role, with their share reaching its peak in 2016 at 38% (2019: 29%).

Compared to university councils and rectorates, senates show a pronounced difference between heads and members. The share of women among senate heads varies between 14% (2015) and 36% (2019) with upward and downward trends. The share of female senate members, in turn, varies between 37% (2012) and 47% (2019).

We can therefore conclude that Austria's introduction of a quota for decision-making bodies in universities has had the desired result. The quota forces those who are responsible for the composition of a body to search for qualified women members. And as the results show, they have been successful in doing so. However, some barriers do still exist as women remain underrepresented among heads of university bodies. Interestingly, a recent empirical study on women in university management shows that, on average, women take up a position as rector or vice rector at a younger age than their male counterparts and are less likely to have held a full professorship prior to entering the rectorate (Wroblewski, 2015). Hence, their situation differs: men often hold rectorate positions in the final stages of their academic careers and retire after their term in office. Women, in contrast, hold this position earlier in their careers but do not have the option to return to a chair afterwards.

In contrast, it should however be noted that the increase in the share of women among full professors in Austria has been far more moderate (from 16% in 2006 to 25% in 2018). When compared with other countries, Austria ranks above the EU average for female heads of universities yet below the EU average for the share of women in Grade A positions (European Commission, 2019b). The moderate increase in the share of women among full professors point out the limits of the quota regulation for decision making bodies and illustrates the discrepancy between numeric and substantive representation. It shows that an increasing share of women in decision making does not automatically lead to an adaptation of biased decision making criteria or processes.

Assessment of the Quota Regulation and its Implementation

In the public debate, increasing female participation in rectorates is seen as progress towards gender equality. While this assessment is strengthened by the fact that women are not only assigned "soft" rectorates (e.g., responsibility for student affairs or human resources), they are nonetheless still underrepresented in vice rectorates responsible for research, most of which are headed by full professors.

In the literature, increasing participation of women in gatekeeper positions (Husu, 2004) is also identified as a potential for cultural change, since it is often assumed that women in decision-making positions will promote women and put women's issues on the agenda (EC 2004). But does this prove true in practice? To what extent does the increasing participation of women in decision-making bodies contribute to cultural change? Dalhoff (2021) recently discussed the limited effects of gender equality polices in the past decades due to a lack of reflexivity not only regarding causes of inequalities but also regarding gender equality objectives–including the objective of cultural change. She calls for cultural change in terms of a change in disciplinary cultures and in university processes and structures. A recent study among Austrian female rectors and vice rectors sought to answer the question to which extend women in rectorate positions feel responsible for gender equality in general and cultural change specifically (Wroblewski, 2015).

In some cases, women head the vice rectorate that is, formally responsible for gender equality, diversity or the advancement of women at their university. All of these women embrace this responsibility and see these topics as priorities for the rectorate. They also interpret the reference to gender equality, diversity, or advancement of women in the name of their vice rectorate as a demonstration of the rectorate's commitment to these topics. However, while most of them did not actively seek this responsibility, they recognize and accept its importance.

Those female vice rectors who are formally assigned this competence pursue different priorities in this regard during their terms of office (e.g., advancement of women, involvement of fathers in unpaid work). These priorities and the concrete measures taken depend both on the level of importance accorded to gender equality at their university when they were appointed to the rectorate as well as on their own corresponding experience. Those of them who work at universities with longer traditions of gender mainstreaming and the advancement of women and/or those with expertise in these fields (e.g., through participation in a working group for equal opportunities or knowledge of gender research) build on the structures that are already in place and work closely with the corresponding experts in their organizations.

At the other end of the scale are the female vice rectors who are not–and did not want to be–formally responsible for gender equality, advancement of women or diversity. These women also formulated clear reservations towards positive action or specific measures (e.g., the quota regulation) and assigned the responsibility for gender equality to experts in the organization. Consequently, they did not consider gender equality to be a main task or priority of the rectorate and considered other topics to be more relevant than gender equality.

Formal competence or non-competence for the advancement of women, gender equality, and/or diversity also cannot be linked directly to a feminist background or gender expertise (or lack thereof). While most of the participants in the study who are formally responsible for these topics do have a feminist background, some of those who are not are also feminists and/or gender experts (Wroblewski, 2015, 8). Regardless of their formal competence, those who see themselves as

feminists all seek to change the structures and processes in their area of responsibility and take a closer look at the actual situation for both women and men. They also realize that people expect female managers to adopt a different style of management to men.

They do, however, also take issue with the general assumptions that female rectors or vice rectors are frequently confronted with. These include, for instance, the assumption that the gender equality problem is "resolved" with the appointment of a woman or the expectation that women in rectorate positions will change the system and "do something for women" (like putting women's interests on the agenda and promoting qualified women).

To conclude, experiences with the Austrian quota regulation show that increasing female participation in decision making does not automatically initiate cultural change. Moreover, male members of the rectorate ascribe gender competence and the responsibility for gender equality to women. Women with a feminist background who hold a vice rectorate position which focuses on gender equality and/or diversity formulate a gender equality goal for their term in office and aim at initiating sustainable change. They do so by adapting decision-making processes or criteria, putting women's issues on the agenda or actively promoting women. However, since gender expertise is not yet included as a selection criterion for rectorate positions, it does not seem realistic to rely purely on feminists in rectorate positions to initiate cultural change.

GENDER COMPETENCE POLICY

Description of the Policy Process

After the introduction of the Austrian quota regulation, women's participation in decision making increased significantly. However, this did not initiate cultural change for several reasons. First, and probably most importantly, cultural change has not been explicitly formulated as a goal in the quota regulation context. Second, selection criteria for members of university boards do not include gender competence or experience with gender equality policies if gender equality or diversity is not the focus of the actual vice rectorate. Third, it is generally expected that women in decision-making positions will take responsibility for gender equality. Consequently, most men either do not feel responsible for gender equality or don't see any need for action in their field of responsibility.

To complement the existing gender equality policy mix and to increase their impact, the Austrian Federal Ministry of Education, Science and Research initiated a political discourse on gender competence in higher education. The Federal Ministry of Education, Science and Research assumes that building up gender competence will also strengthen the implementation of existing policies and thus contribute to cultural change in higher education institutions. "Those responsible for the cultural change are members of higher education institutions, whose actions shape the structures and processes in a gender competent way. It is therefore indispensable that the higher education institutions take a clear stance on the necessary change of culture and

implement the recommendations to strengthen gender competence." (Federal Ministry of Education, Science and Research, 2018, 7). The process started in October 2016 with the establishment of a working group[2] set up by the Austrian Higher Education Conference[3]. This working group was moderated by a departmental head at the ministry and was given the mandate to develop recommendations to raise gender competence and awareness for gender diversity among managers of higher education institutions. These recommendations should be concrete, action-oriented and address all relevant stakeholders (individuals and committees). Targets and background information should be provided for each specific recommendation.

As a first step, the working group developed a definition of gender competence that distinguishes gender competence from gender expertise and follows both the gender mainstreaming tradition (Rees, 1998; Holzleithner, 2004) and a pedagogical concept of competence (Klenk and Langendorf, 2016).

"Gender competence comprises of the fundamental recognition of the relevance of gender attributions in one's own work and sphere of influence (knowledge). This recognition is connected with the willingness (desire) and ability to deal with these issues in day-to-day work and study life–if necessary, supported by gender experts and with knowledge from gender theories–and to take action based on this knowledge (skills). Recognition, discussion and action are subject to a constant process of reflection (reflection)." (Federal Ministry of Education, Science and Research, 2018, 33).

Gender competence also requires the ability to act on the basis of this reflection and set actions which tackle these gender attributes and their gendered consequences. Hence, gender competence requires constant reflection on the gender dimension in one's own field of work. Gender competence is a basic competence that all stakeholders should have. University lecturers, researchers, administrative staff, managers, and students should all be gender competent. Gender expertise, in contrast, is defined as profound knowledge of gender theories and/or experience with gender mainstreaming implementation processes.

The working group prepared a position paper containing a total of 36 recommendations for building up gender competence and ensuring its consideration in all higher education processes and tasks. These recommendations are divided into four sections–gender-competent management, administration, teaching, and research. Each of these sections explains the central idea for this particular area and includes 2 to 18 recommendations–along with details of the rationale behind them (i.e., why they are relevant for gender equality), the responsible stakeholders and the groups who will benefit.

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[2]The working group consisted of representatives of higher education institutions, student and staff associations, the Federal Ministry of Education, Science and Research, and gender experts.

[3]The Austrian Higher Education Conference (*Hochschulkonferenz*) is a consortium of all higher education institutions in Austria which aims at facilitating cooperation between institutions and formulating common positions for higher education policy.

The guiding principle for the "gender competent management" section in the position paper assigns university management the duty to "make use of and develop opportunities for change and innovation, and for quality assurance." (Federal Ministry of Education, Science and Research, 2018, 9). The working group formulated 18 recommendations for this section. Among others, they recommend formulating an explicit commitment to strengthening gender competence, setting concrete objectives, and implementing measures. They also recommend integrating this commitment into existing strategic documents and assigning responsibility for strengthening gender competence to one member of top management (vice rectorate).

Recommendation six focuses on gender competence in decision-making bodies. "The working group recommends that higher education institutions include gender competence into the requirement profile for university commissions/committees." (Federal Ministry of Education, Science and Research, 2018, 12) The university management is responsible for implementing the recommendation, while committee members and (future) applicants will benefit from the outcome. The working group justifies this recommendation by noting that committees and bodies in higher education institutions take numerous personnel and strategic decisions. Hence, they are of central importance when it comes to avoiding gender-biased decisions. Higher education institutions could offer training measures for entire committees or individual committee members to teach them about gender competence and its relevance for appointment procedures. In order to act in a gender competent manner, the whole committee–and not just individual members–has to be gender competent. The recommendation closes by referring to concrete training measures that have already been implemented at some universities in Austria (e.g., anti-bias training) as well as to existing guidelines for gender-fair appointment procedures.

First Implementation Steps

The members of the working group used the slogan "Because it is 2019!"[4] as a springboard for their discussions and recommendations. This slogan expresses their commitment to supporting gender equality in higher education institutions. However, the policy paper, which was adopted by the Austrian Higher Education Conference in early 2019, is first and foremost a declaration of political will. To achieve change it is necessary to embed it in a policy discourse and to develop accompanying measures which support the implementation of recommendations. The policy paper has been presented and published, which is a precondition and the starting point for a policy discourse.

The Federal Ministry of Education, Science and Research committed itself to supporting a policy discourse on gender competence in higher education processes. As a first step in this

direction, the ministry conducted a survey among Austrian higher education institutions to determine which of the recommendations had already been implemented in the past, which concrete measures are in place and where institutions themselves see a need for action (Federal Ministry of Education, Science and Research, 2021). Almost three out of four higher education institutions participated in the survey (return rate: 73%). All the universities who participated in the survey already follow at least one of the 28 recommendations that address universities. The numbers of recommendations already implemented vary between 1 and 27. On average, universities have already implemented measures relating to 16 of the recommendations. However, the survey results only indicate the availability of concrete measures which address the recommendations; they do not show whether these have actually been implemented. The respondents were also asked to name the hindering factors they face in the context of strengthening gender competence. The most important such hindering factors are a lack of expertise, wrong self-assessment and lack of dedicated resources.

The survey results also indicate that most universities informed relevant stakeholders about the recommendations of the position paper by sending it to them by e-mail. 44% of universities organized internal events to present and discuss the recommendations. Hence, the majority of universities did not assume an active role in discussing the recommendations internally. Given this inactivity, it is extremely important that the Federal Ministry of Education Science and Research had committed itself to supporting a policy discourse. Based on the survey results, the ministry organized a 1-day networking meeting on October 14, 2020. The meeting took place online due to COVID-19 restrictions, was attended by more than 100 people and included a total of eight workshops with experts from Austria and Germany that focused on good practice examples and topics that had been identified as relevant. The workshops addressed different target groups relevant for the successful implementation of gender equality policies (members of rectorates, gender equality officers, members of curricula commissions, quality assurance officers, etc.).

Assessment of the Policy Process

Given the logic of existing steering instruments in higher education policy, concrete objectives now need to be formulated and used as the basis for the development, implementation, monitoring, and evaluation of measures. The ministry is asking universities to include measures aimed at strengthening gender competence in higher education processes in their performance agreements. Accordingly, the topic is addressed in the negotiations that accompany these performance agreements, and universities will include such measures in their performance agreements. However, this does not guarantee that the measures will be implemented effectively and contribute to real change. There is still a risk that measures remain paper tigers and do not gain relevance in everyday practices. The ministry has therefore committed itself to continue organizing networking events to complement these activities and support a political discourse on gender competence. These networking activities should lead to a

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[4]This is an adaptation of a quote from the Canadian Prime Minister Justin Trudeau, whose response to a question regarding the gender balanced and diverse composition of his cabinet was: "Because it is 2015!".

common understanding of the relevance of gender competence and should focus on exchange of experiences and mutual learning, e.g., regarding good practice measures. They could also establish the basis for joint or common initiatives.

A crucial aspect of the plans outlined above is how seriously the goal of strengthening gender competence in higher education processes will have to be incorporated into existing steering instruments. If the process only requires simply mentioning measures, the instrument will remain ineffectual. If the formulation of concrete, ambitious, realistic, and measurable goals at an institutional level is required, related monitoring indicators to measure gender competence in higher education institutions will have to be developed. To date, the monitoring system for the performance agreements does not contain any indicators that focus on gender competence. Given the complexity of the gender competence construct, the development of such indicators will be a challenging endeavor. But it will also constitute an essential step towards cultural change and provide important input for the discourse on gender competence in academia.

DISCUSSION AND RECOMMENDATIONS

With the introduction of a statutory quota regulation, Austria succeeded in significantly raising the participation of women in university management functions in a short period of time. However, the positive trend in women's numeric representation in decision making did not initiate cultural change. This conclusion is supported by the stable representation of women among full professors. Thus, gendered appointment procedures and selection criteria (Van den Brink, 2009; Van den Brink et al., 2010) have not been altered.

When the quota regulation was debated in parliament, it became evident that its primary aim lay on increasing women's representation in decision making in numeric terms. It was assumed that doing so would lead to more women-friendly or gender-fair decisions (Wroblewski 2019a). Thus, it was assumed that numeric representation automatically leads to substantive representation or cultural change. This tacit expectation harbors the risk that women in rectorate positions will be automatically assigned responsibility for gender equality and thus also saddled with the corresponding load. Helen Peterson (2015) describes this risk of overload as a potential exploitation of women "in the name of gender." Cultural change, in contrast, was never formulated as an explicit goal.

While this positive development in women's representation in decision making was the result of the active search for qualified women to fill the positions, gender expertise, or competence in gender equality appear to have played only a limited role in their selection. As a consequence, women who distance themselves from gender equality objectives or deny the need for cultural change also found their way into top management positions. Hence, the increasing level of female participation in top positions indicates first and foremost that access barriers for women to these positions have been successfully dismantled.

Given the above, it is not surprising that the quota has had only limited effect on cultural change. As long as women did not actively pursue the objective of structural change–in most cases due to their feminist background–it was possible to continue with a proforma implementation of gender equality policies. Austrian higher education policy addressed this problem with its gender competence policy, which aims at strengthening the effectiveness of existing gender equality policies and can be interpreted as a renewal of the gender mainstreaming strategy (Rees, 1998). All actors should consider gender issues in their own sphere of responsibility and their everyday work processes.

To exploit the potential of the gender competence strategy for cultural change, it is recommended 1) that an explicit cultural change objective is formulated at institutional and political level and 2) that this objective is integrated into existing steering instruments. Both approaches are challenging and require a further development of existing gender equality policies.

As already described above, most universities in Austria have formulated cultural change as part of their gender equality strategy. However, their commitment to cultural change often remains solely at a rhetoric level and is not linked to concrete objectives. This missing concretization of the cultural change objective is difficult in the context of steering instruments which are based on quantitative indicators. Hark and Hofbauer (2018) raised the problem of the quantification of gender equality policies, which also supports their proforma implementation. In Austria, the Federal Ministry of Education, Science and Research currently asks universities to include measures to strengthen gender competence in their performance agreements. This allows universities to include isolated measures like voluntary gender competence or anti-bias training courses for members of appointment committees which are not integrated into a comprehensive strategy. To date, concrete objectives have not been formulated either at institutional or policy level. Possible examples for concrete objectives include the requirement that all members of appointment committees have to participate in an anti-bias training course before the committee starts working or that all lecturers must receive training on gender competent teaching. The implementation of such compulsory training measures could be monitored easily even if this does strengthen the quantification of gender equality policies and does not necessarily depict the change in selection or teaching practices.

The development of monitoring indicators related to the objectives formulated in performance agreements usually takes place in a participatory process. Representatives of the Federal Ministry of Education, Science and Research and the universities discuss concrete proposals for indicators developed by either side. When agreed on, an indicator is included in the regulation for performance agreements and subsequently becomes compulsory for all universities. So all universities have to report the corresponding data on an annual basis. The latest revision of the regulation on performance agreements was carried out in 2019, with supplementary comments published by the Federal Ministry of Education, Science and Research in 2020.

The development of input indicators that focus on the implementation of gender competence measures and

indicators to measure gender competence at individual or institutional level are complex endeavors due to the complexity of the underlying construct. They would also represent a further development of the existing set of indicators, which have a lower level of complexity.

An explicit gender competence objective should also be formulated as a requirement in the tasks of university management, and gender competence should be a prerequisite for all rectorate members regardless of their gender. Consequently, it should be a mandatory qualification requirement for rectorate positions and should be verified during the selection process. This would also entail the inclusion of gender competence in training and qualification programs for higher education managers. Making gender competence a general requirement for all rectors and vice rectors would also allow us to challenge the problem raised from a feminist or gender mainstreaming point of view that gender competence is automatically ascribed to women by virtue of their biological sex.

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

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Micro Change Agents for Gender Equality: Transforming European Research Performing Organizations

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This article explores the experiences of micro change agents for gender equality in seven European Research Performing Organizations in seven different countries. The micro change agents were all participants of an international collaborative project consortium, implementing gender equality plans (GEPs), and funded by the European Commission during 4 years. The analysis draws on empirical data consisting of information submitted by the micro change agents during these 4 years and collected using three different monitoring tools, developed within the project to follow the progress of the implementation efforts, but also to provide an arena for individual and collaborative reflection and knowledge exchange between the partners. The aim of the article is to present a systematic analysis of the change practices that these micro change agents experienced as useful and important for promoting gender equality in their different organizational contexts. A total of six such micro change practices are identified, emerging from the empirical data: 1. communicating, 2. community building, 3. building trust and legitimacy, 4. accumulating and using resources, 5. using and transferring knowledge, and 6. drawing on personal motivation. The findings illustrate the multifaceted character of micro change agency for gender equality, particularly in a time-limited project context with a designated funding period. The results from this study can be useful when developing gender equality strategies, policies and practices and can also be used to empower gender equality micro change agents that face challenges while trying to implement GEPs and promote structural change in any kind of institution.

Keywords: gender equality, change agents, action reseach, gender equality plans, implementation theory, transformative science, monitoring, structural change project

INTRODUCTION

Research within the field of critical gender equality studies has highlighted the importance of macro change agents for gender equality, i.e., organizational leaders and managers with formal, positional power who promote gender equality in their institution (cf. e.g., Peterson 2014; Kelan and Wratil 2018; O'Connor et al., 2019). There is no denying these macro change agents have an important role in achieving sustainable, structural change in any organization, including Research Performing Organizations (RPOs). Notwithstanding, this paper shifts the focus from these macro change agents to the so-called micro change agents, i.e., those who try to change their organization from within, sometimes referred to as "tempered radicals" (Meyerson and Scully 1995; Meyerson and Tompkins 2007). Although previous research has produced valuable accounts about the challenges and

successes of micro change agents, we still know less about the change practices they adopt and use, and how these vary depending on setting and how they develop and are modified throughout the duration of a change project.

To add to the already existing literature on change agents for gender equality this article explores the experiences of micro change agents for gender equality in seven RPOs in seven European countries. It adopts a qualitative methodology and a theoretical framework inspired by implementation theory and action research. Despite the interest in the change agent role, there is still a lack of studies applying a theoretically informed approach to micro change agents and their experiences. The aim of the paper is therefore to systematize micro change agents' experiences of change agency, focusing specifically on their experiences of key change practices. The analysis adopts a practice-based approach to change agency (cf. Caldwell 2012) meaning that it is based on how change agents themselves experience and describe the actual work of practicing change agency in the day-to-day work. Practices are here understood and defined as: "embodied, materially mediated arrays of human activity centrally organized around shared practical understanding" (Schatzki 2005, 11).

The purpose of the article is therefore to explore how change agency is experienced by actors tasked with promoting and enacting gender equality in their organizations. The paper thus addresses the following main research question:

Which change practices do the micro change agents use to promote and enact change towards increased gender equality in their organization, even when their resources might be limited or restricted?

The paper continues with a brief background that introduces the specific context in which the micro change agents in this study are embedded. After that follows two sections where the previous research and the theoretical framework is introduced. This is followed by a section which describes the methodology and method adopted to produce the empirical data analysed in the paper. The subsequent section introduces the results and the analyses. The paper ends with a discussion and conclusion.

BACKGROUND

Since 2010, the European Union has made significant efforts to promote structural change in RPOs with the aim to overcome institutional barriers that hinder these institutions in achieving gender equality (European Commission 2012). Gender equality plans (GEPs) serve as a means of accomplishing this objective. Since 2014 institutions participating in projects funded within the Horizon 2020 Framework Programme (H2020) have drafted GEPs to be implemented during the project period. The content of the GEPs is oriented towards the three gender equality goals for fostering institutional change defined for the European Research Area: 1. removing barriers to the recruitment, retention and career progression of female researchers, 2. working towards a fair gender balance in decision-making processes and bodies, and 3. taking the gender dimension into account in the content of research and innovation (European Commission

2020). Speaking in numbers, until 2020 18 GEP consortia received funding in H2020, which translates into a budget of 43.9 € million for 168 participating institutions of which 130 RPOs are involved as partners implementing GEPs. The remaining beneficiaries are either involved in an evaluating, technical or consulting role (ibid, 22). For all funded projects, accompanying monitoring and evaluation is mandatory in order to identify successful institutional strategies and gender equality measures and make them transferable to other stakeholders. This process also enables the identification of structural and individual challenges, as well as the discussion of experienced resistance. The micro change agents, whose experiences are analyzed in this article, were active within one of these structural change projects funded in the predecessor program of H2020, the 7th Framework Programme of the EU Commission. The project aimed at identifying and implementing the best systemic approaches to increase the participation and career advancement of women researchers through the implementation of a tailor-made GEP in seven European RPOs in seven European countries.

Recently, the European Commission went one step further and announced that GEPs will be an eligibility criterion for public institutions in EU Member States and Associated Countries seeking funding under the new Horizon Europe Framework Programme from 2022 onwards. In order to be recognized, institutional GEPs must fulfil certain requirements, including the publication of the document signed by top management, the presentation of specific resources and expertise in the field of gender equality, the collection and annual reporting of sex/gender-disaggregated data, and finally the provision of gender equality training for staff and management (European Commission 2021). These new political developments are now forcing public RPOs that have neglected or not systematically focused on gender equality as an institutional task to address this issue if they want to successfully apply for funding. As a result, a new generation of micro change agents will evolve who will have to face the challenges of structural change.

PREVIOUS RESEARCH ON CHANGE AGENCY

Change Agents for Gender Equality

Change agents are actors who facilitate, promote, coordinate, champion and implement change in organizations (Caldwell 2006). They can play an important role when it comes to changing organizations towards increased gender equality (Meyerson and Tompkins 2007). Previous research has pointed out primarily three key factors as essential for efficient change agency within the field of gender equality. First of all, change agents need to be willing to take on the role as change agents (Parsons and Priola 2013). Second, change agents need awareness of gendering processes in organizations. A sensitivity to gender inequalities have been described as an important prerequisite for change agents for gender equality (Peterson 2014). Previous research suggests that this kind of awareness can develop through direct experiences of being marginalized,

which implies that women are more motivated to initiate change than men (Meyerson and Tompkins 2007).

Many women with the awareness and will to act as change agents, however, are in practice restricted by their marginalized position in organizations, which leaves them with a lack of power, influence and resources necessary to initiate change (Wroblewski 2019). Consequently, awareness is in itself insufficient to produce effective change agents for gender equality (Parsons and Priola 2013). Therefore, the third key factor, necessary for change agency, is the authority to disrupt and challenge those organizational routines and practices that reproduce gender imbalance and inequalities (Linstead et al., 2005). Senior managers possess the authority to set strategic goals and implement them, and their commitment has proven to be important in facilitating change and engaging employees to also commit to change (McRoy and Gibbs 2009; Kelan and Wratil 2018). Women managers in further and higher education have for example displayed managerial practices infused by gender awareness and change agency to reduce the impact of the glass ceiling (Deem et al., 2000; Mavin and Bryans 2002; Neale 2011; Cook and Glass 2014).

Micro and Macro Change Agents

This article makes the distinction between so-called "micro" and "macro" change agents, as defined by Kelan and Wratil (2018). Macro change agents are CEOs and other top-level managers and leaders committed to "drive change toward gender equality, diversity and inclusion in their organisations" (Kelan and Wratil 2018, 6). They use change practices characterized by being in control and taking charge. In contrast, micro change agents use tools and tactics to change their organizations from within, and are doing so from "their individual sphere of influence" (Kelan and Wratil 2018, 6).

Kelan and Wratil (2018) equals micro change agents with so-called "tempered radicals," a concept first used by Meyerson and Scully (1995), referring to individuals who are committed both to their workplaces and to an ideology or to a cause that is at odds with the dominant culture at work, motivating them to wanting to change the status quo in their organization. Tempered radicals have a marginalized position in their organization and lack authority, legitimacy and resources to mobilize change and therefore need to: "rely on incremental and subversive change tactics that range from subtle, identity-based moves to small, isolated acts to grass-roots coalition building" (Meyerson & Tompkins 2007, 310). We do not adopt the definition of tempered radicals throughout this article because the micro change agents in our study did not all share all of these circumstances and characteristics. This article, however, focuses on micro change agents as insiders (Ackers 2000), who are trying to change the organization that they themselves belong to, but who are also tied to, and committed to a community of other change agents in other organizations, via a structural change project. Certain aspects of the tempered radicals thus applied to several of the micro change agents, as the analysis below will highlight.

Challenges for Change Agency

The implementation of gender equality change in organizations commonly encounters manifestations of resistance and the reasons for this are complex and multidimensional (Benschop and van den Brink 2014). Gendered organizational structures and practices and masculine cultures are notoriously persistent, rigid and resistant to change (Acker 2000; Thomas and Davies 2005). Gender equality change challenges norms, practices and assumptions regarding the relationships between women and men, but also calls into question personal identities and beliefs (Lombardo and Mergaert 2013). Change efforts also necessarily threaten existing power structures and relationships built on privileges and dominance of certain groups (cf. e.g., Linstead et al., 2005). Micro change agency is thus a difficult task and change agents for gender equality often face both explicit and implicit resistance (Lombardo and Mergaert 2013).

It is therefore of interest to understand which practices micro change agents and tempered radicals use to promote their causes, to receive resources for their causes and/or build a collective movement in their organization. Kelan and Wratil (2018) identify six such change practices for macro change agents who want to drive change toward gender equality, diversity and inclusion: communicating, building ownership, creating accountability, spearheading initiatives, leading by example, and driving culture change. This article similarly identifies six practices for micro change agents who want to drive change toward gender equality in their organizations.

THEORETICAL FRAMEWORK

Action Research

The study that this article draws on was informed by an action research approach and the analysis of the empirical data is produced within the framework of some of the key concepts of this approach. The purpose of undertaking action research is to bring about change in a specific context. It is a method used for improving practice and implementing changes in practice. An action research project demands careful planning and researchers that can generate solutions to practical problems and involve practitioners in the implementation and development activities (McNiff and Whitehead 2005). Evaluation, monitoring and critical reflection on the process and the outcomes of change is essential (Coleman and Ripping 2000). Action research also generates knowledge based on systematic enquiries and observations conducted within specific and practical contexts. Knowledge is produced when the researchers and participants reflect on processes of change and obtain greater and enhanced understanding, which can lead to revision of initial plans for action (Reason and Bradbury 2008). The character of the knowledge is very specific as it can be used to inform practical application and solutions to specific problems.

Coleman and Ripping (2000) emphasize the importance of working collaboratively in organizational change projects and develop a specific collaborative action research approach to gender organizational change. They involved people inside of the organization they studied as organizational co-researchers

through a process of collaborative inquiry which aims to interrupt the power dynamics of research on people and instead focus research with people. Involving people inside of the organization also has the benefit of increasing the chances that changes implemented will be long-term and sustainable by strengthening the internal capacity for both identifying and changing gender inequalities. Coleman and Ripping (2000) describe two types of collaborators that they formed different kinds of partnerships with. The first type are the "internal partners" that the researchers started negotiating with and that acted as gatekeepers in setting up the details of the project. The second type is the "work groups," consisting of people that were part of the project because the project targeted their work setting. For the researchers it was important to generate a deeper commitment for the project from these groups. In relation to both these types of partners the collaborations should establish trust and allow them to be active partners, as this is of essence for a gender equality change project.

Feminist theory as activism means keeping in mind, while doing research and writing theory, also focusing explicit attention to how this can contribute to informing and transforming society (Risman 2004). Risman (2004) emphasizes the importance for critical feminist scholars to ask what mechanisms construct gender inequality and how these can be transformed in order to create a more just world. Hence, feminist researchers must "seek to understand how and why gender gets done, consciously or not, to help those who hope to stop doing it" (Risman 2004, 445). She also emphasizes that although organizational rules and institutional laws have by now been rewritten to be gender-neutral, gender inequality persists. It is therefore important to focus the social change agenda within feminism on the interactional and cultural dimension of gender.

Gender activists need to understand the mechanisms of when and how inequality is constructed and reproduced in order to be able to develop strategies that can challenge and change it (Risman 2004). One such strategy involves consciously disrupting interactive processes, status expectations and cognitive bias in our immediate social setting that re-create hierarchies in everyday life. This type of disruption can for example be done through not accepting or adapting to a subordinate position.

Implementation Theory

This study adopts a theoretical framework which combines the action research approach with implementation theory to systematize, conceptualize and theorize micro change agents practices.

Implementation research is: "the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practices" (Eccles and Mittman 2006, 1). Implementation involves efforts, activities, actions and practices carried out to put programs or plans into practice to accomplish a formal, clearly identified goal (Fixsen et al., 2005). Typically, implementation is understood through a model which distinguishes between different stages in a policy cycle where implementation is preceded by agenda-setting, policy formulation and decision-making and followed by

evaluation and termination (Jann and Wegrich 2007). The implementation stage is often a long process, often spanning during several years, can involve complex processes and is ideally constituted of at least the following so-called core elements: specification of details regarding the execution, allocation of resources (budget, personnel etc.), and decisions about practices and activities to be executed (Jann and Wegrich 2007).

Implementation is a complex process where decisions are executed and activities initiated under varying conditions (Carey et al., 2019). It is also a critical process as execution is often changed, distorted, delayed or blocked (Jann and Wegrich 2007). Implementation is thus associated with several problems for example due to the complexity of operations in the particular implementation context, where different and sometimes contradictory values and goals need to be considered (Eccles and Mittman 2006). It has, however, also emerged that some of the problems encountered in the specific implementation settings can be removed by collaborations between researchers and stakeholders, professionals, users and/or decision-makers (Carey et al., 2019).

METHODOLOGY, METHOD AND EMPIRICAL DATA

This article draws on empirical data produced during a 4-year action research project, which targeted gender inequalities in science and research, and involved partners in eight European countries and ten RPOs. In seven of the ten RPOs tailor-made GEPs were implemented during the 4 years of the project (2013–2016). The overall purpose of these GEPs was to contribute to closing the gender gap in science and research. The seven tailor-made GEPs were developed within the structural change project by the micro change agents (and formally accepted and adopted by the seven RPOs). The GEPs contained a total of over 100 different gender equality measures that targeted a range of organizational and administrative processes and procedures and aimed for example to create gender-sensitive recruitment, retention and promotion policies, support and improve work-life balance, establish a more inclusive work culture and raise awareness of gender issues in the RPOs. In this article, however, the specific measures implemented are not the focus of the analysis. Instead the intention is to explore the experiences of the change agents as they implemented the GEPs.

The seven GEPs were implemented by around 20 micro change agents; the number and the individuals involved in the project changed slightly over the 4 years. The reason for this was due to professional or private changes of the people involved, or contractual exits. The micro change agents involved in the implementation of the GEPs acted officially for a period of 4 years and within the context of the time limited project duration. The majority of the change agents were women and their biological age differed from their late 20ties to late 60ties. Their academic age also differed, meaning that their experience of science, research and teaching varied. The role, position and status of the micro change agents varied between the RPOs. Both educators, administrators, and practitioners were involved. Some

of the micro change agents were professors with long experience as teachers and researchers, others had more precarious positions with time-limited contracts which would terminate at the end of the project. The academic background of the change agents was also diverse. While the majority of the change agents were active within social sciences, the humanities, engineering and technology were also represented. The background and theoretical and practical knowledge within the field of gender equality change and the experience of previous change projects also varied greatly between the micro change agents, with some not having any previous experience while others possessed several years of previous involvement of practical gender equality work or theoretical knowledge of feminist theory and a gender perspective. The group of micro change agents was thus characterized by great heterogeneity, which was an advantage in the project, as everyone could contribute with their specific viewpoints and perspectives. More detailed information on the micro change agents will not be provided here due to confidentiality and research ethical considerations.

The empirical data analyzed in this article was produced by these micro change agents as they reported and reflected on the implementation process. The data was collected by the authors of the article during these 4 years using monitoring tools, developed by the authors[1], facilitating a longitudinal observation of micro change agency and change practices in different change settings (c.f., e.g., Dawson 2019).

The implementation of the GEPs and the impact of the GEPs was tracked by monitoring activities throughout the project. Monitoring was characterized by a mixed-method approach and the monitoring tools collected both qualitative and quantitative monitoring data, to ensure that reliable and nuanced information was collected (cf. Lipinsky and Schäfer 2016). The analysis in this article draws on the empirical data collected by means of three qualitative monitoring tools, which were developed based on an ethnographic approach (cf. Lincoln and Guba 1985). Using qualitative methods when monitoring implementation processes produces rich data that reveal whether the implementation is progressing satisfactorily or if some corrective measures are necessary (cf. Chen 1990; Patton 2011). Adopting an interpretative, realist and dialogue approach to monitoring, the qualitative monitoring tools were also designed to provide the micro change agents with space for personal and collective reflections and for exchanges of experiences between them during the implementation phases (cf. Coleman and Ripping 2000; Pawson and Tilley 2004).

These monitoring tools prompted the micro change agents to submit written reports and reflections, using templates specifically tailored for each monitoring tool, and with various designs including questions, tables and mind-maps to be used to structure their accounts and narratives. The written reports and reflections were sometimes produced by the micro change agents individually and sometimes collectively during discussions and workshops. The discussions and workshops were organized

during project meetings while most of the individual reports and reflections were collected between these meetings.

The first of the qualitative monitoring tools used to produce the data that this article draws on is the *Self-Assessment of Change Agent Role Monitoring Tool* which was especially developed to stimulate the self-reflection of the micro change agents by asking them to describe their personal experiences of implementing GEPs. This tool documented success factors for implementation and challenges, especially resistance, focusing on access to, and lack of, different kinds of resources important for efficient implementation. The template for the tool consisted of six questions and was designed to leave generous space to elaborate replies. The questions were simple but yet considered to be the most relevant to collect data about micro change agents' experiences of factors that strengthened and hindered the execution of change practices, for example: What could strengthen you in your role as change agent for gender equality in your RPO? The second qualitative monitoring tool, developed within the project and used in this article, was the *Most Significant Change Technique Monitoring Tool*, inspired by the most significant change methodology (Dart and Davies 2003), intended to collect information about different types of changes. Similarly, the third monitoring tool, the *Incremental Transformation Monitoring Tool* was inspired by a theoretical model, more specifically a model for organizational change, created by John P. Kotter (1995), to systematize the different practices involved in successful organizational change (cf. Chen 1990). The monitoring tools were primarily designed to capture the micro change agents own experiences and the primary function of the tools, and the templates used to collect the experiences, was to stimulate reflections, discussions and knowledge exchange.

ANALYSIS AND RESULTS

The findings in this article illustrate the multifaceted character of micro change agency for gender equality, focusing on six different change practices reported on by the micro change agents. However, it is important to emphasize that the presentation of the practices as six distinctive categories is solely the result of the authors' thematic analysis of the data in order to systematize the complex and challenging work performed by the micro change agents.

Practice 1. Communication

One of the key change practices reported on by the micro change agents in this study was also identified as essential for macro change agents by Kelan and Wratil (2018): communicating. Communication practices were described having several different dimensions, three of the most central of these communication dimensions involved *what* to communicate, *with whom* to communicate it and *how* to communicate it. The latter aspect was expressed by a micro change agent, emphasizing the importance of "using the right language" depending on the communication partners. Another micro change agent expressed the necessary aspects of successful and

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[1]Further information on the applied monitoring approach within the project framework can be retrieved in Peterson and Dahmen (2018).

efficient change agency: "knowing who to talk to and how; knowing which arguments have to be used with whom etc."

The micro change agents identified and emphasized the importance of communicating and disseminating the identified need for change, the vision for change and why change was necessary. Staying in touch about how and why change is needed with colleagues and supervisors is a constant process that is a significant part of change agency and influences and impacts more or less all other change practices. If communication practices are not included in implementation processes the desired and expected progress might soon come to a halt, thus one micro change recommended to "maintain awareness by continually raising the issues in open forums" In his developed 8-step model for change (Kotter, 1996), Kotter also emphasizes the importance of regular, easily understandable and open communication within the change process in order to involve as many organizational members as possible in it and at the same time give them room for concern.

Regarding the dimension *who* to communicate with, the micro change agents expressed and emphasized the need to target stakeholders. Key actors are essential to target with communication practices in order to receive resources and gain legitimacy in the organization, necessary for the change attempts (see below). One of the micro change agents expressed these practices as a recommendation for an efficient micro change agency: "Spend time talking to and securing support of senior colleagues." Previous research has also highlighted the importance of communication practices to persuade senior managers and leaders to support change projects such as the implementation of GEPs (cf. Bustelo 2003).

The micro change agents described the dimension of *how* to communicate as distinctly different from the communication practices that are important for macro change agents for gender equality (Kelan and Wratil 2018). For CEOs and senior leaders, communication is rather uncomplicated, involving explaining the so-called business case for gender equality and expressing organizational and personal commitment to fairness in career prospects. In contrast, for micro change agents, communication is not always as forthright. Previous research has highlighted the so-called "policy of persuasion," meaning that the success of gender equality actions depends on a personal factor (Bustelo 2003, 391). For macro change agents this personal factor is manifested in the communication of organizational and personal commitment to gender equality goals. Micro change agents need to use more elaborate strategies to persuade stakeholders to support these actions and these strategies tend to be informal and personal, for example being patient, avoiding confrontation or using a sense of humor (Bustelo 2003).

The micro change agents in this study expressed how change practices used for communication also involved using different *means* for communication: social networks, intranet as a publishing platform, newsletters and even the creation of specific meetings, referred to as "open spaces" to discuss the implementation and present ideas for change. One of the micro change agents described the important aim of these communication practices as: "selling the idea".

Communication practices were also mentioned as contributing to building communities for change and building trust and legitimacy, presented below as separate change practices.

Practice 2. Community-Building

The second practice, identified in the empirical data as an essential practice for micro change agents, involved building a community of committed and engaged colleagues, co-workers and organizational leaders in order to mobilize both stakeholders and change "targets" (i.e. those who the change practices target) in their organization. The micro change agents community-building practices thus targeted both the two groups which Coleman and Ripping (2000) emphasize as important. Previous research has also emphasized the need to recruit so-called "allies" in the organization (cf. e.g., Eriksson-Zetterquist & Renemark 2016). One of the goals of these community-building practices was to build commitment to change goals among organizational members. To build such communities the communication practices (see above) were essential. But communicating was not enough, also other resources and strategies were necessary for the communities to be established and enduring. And several different reasons were identified for why community-building was so essential for micro change agents. Several of them emphasized the importance of: "Having contacts, knowing the right people." This often referred to gate-keepers, stakeholders and decision-makers: "I am now free to contact the Rectorate [i.e., Vice-Chancellor] directly".

For macro change agents (who often themselves belong to the groups of gate-keepers, stakeholders and decision-makers) the equivalent practice, as identified by Kelan and Wratil (2018), is building ownership. This was also acknowledged by one of the micro change agents who emphasized the importance of spending time on: "trying to engage people in the organization to take ownership of the actions planned, as there was possibly too much for one person to drive forward." Community-building could thus be a necessary practice in order to cope with an extensive change project.

Accordingly, one of the most conducive factors for a micro change agent was to have other, more formal roles in the department, institution, or workplace in addition to the change agent role, a role that tends to be informal in organizations such as these. Having a formal role in HR or as staff council, for example, was an advantage because it provided a platform to build a network within the organization or to use already existing professional relationships for the cause. In addition, such a position can also facilitate access to information, which in itself can be challenging for individuals who are hired, for example, only for the duration of the project and are unfamiliar with organizational structures and the prevailing culture. For the latter group, it is essential that they network internally or that they can draw on the network resources and contacts of senior staff members. One of the micro change agents explained this aspect of the community-building practices: "I was proactive in talking to and maintaining relationships with people in the organization, which facilitated

successful action plan implementation." An additional recommendation for community-building by one change agent was pursuing an interdisciplinary approach by involving people from different fields and status groups, to benefit from their specific institutional insights.

Another important aspect in relation to the practice of community building and networking with like-minded people is the mutual empowerment and collective processing of setbacks, which can occur directly, for example, by actively blocking equality policy measures, or in a more subtle, indirect way, such as through information gatekeeping (c. Husu 2004). One of the micro change agents exclaimed: "I see this project as an empowering activity." Community-building was thus not only a practice of direct use for implementing change. It also had a more indirect purpose of providing motivation and support for the micro change agents, especially, but not exclusively, in critical situations (see practice 6 below). In addition to establishing and maintaining relationships within the organization, networking with other micro change agents from similar institutional settings was therefore very important to many of the micro change agents. This exchange helps to reflect on one's own experiences and at the same time supports mutual learning, be it formal, through information on successfully implemented gender equality measures, or informal, through reports on individual actions with resistance and possible ways to counter them. Specific networks for female researchers and feminist institutional networks were also mentioned as helpful and supportive by two individuals.

Practice 3. Building Trust and Legitimacy

While macro change agents can usually legitimize and account their commitment to structural change by virtue of their professional role and the associated hierarchies, this is more difficult for change agents below management level. One of the most notable differences, however, is that macro change agents also cite external pressures as the reason for their commitment to gender equality policy (Kelan and Wratil 2018), while micro change agents in our case do so in part to an intention of social justice or personal experiences of injustice (see practice 6 below for more information). But the micro change agents also mentioned other manners of building trust and legitimacy for their cause.

Outside acknowledgment, in this case, in the form of public funding to implement gender equality plans, helps legitimize the commitment and work of micro change agents inside the RPOs. And the new EU policy of mandatory GEPs for public institutions, which apply for funding, even further underlines this legitimacy. One micro change agent highlighted that receiving funding for a gender equality change project challenged the research imperative that what was announced in the proposal is correctly executed, and thus it legitimized to address the issue of gender inequities at the organizational level in the first place in some of the cases presented. Furthermore, external funding was seen as an important signal within the institution to show that research funding organizations, in this case the EU Commission, are committed to advancing gender equality in science and research institutions: "Getting third-party funding for a project dealing solely with gender equality matters is a good sign for people inside the institution." And that this signal can help to sensitize some of the colleagues and change targets in the RPOs to be more open to the topic. Apart from this, there is of course also the possibility of a contrary defensive reaction, for example, by colleagues questioning why "such topics" are funded publicly at all.

Another essential point to support the legitimacy of micro change agency are national or regional policies. The micro change agents described how they could use reference to these policies to strengthen their position and have their voices heard:

> "Change Agency needs to have funds for implementing positive actions for equal opportunities, needs to have the possibility to counter this mechanism and if necessary to utilize some laws that foresee some kinds of penalty for the institutions. To measure gender equality policies through gender equality indicators is an important step to gain this . . . not only words!"

The legitimizing effect of policies and regulations was especially experienced by those micro change agents who had a more precarious position in the organization. They particularly found that policies invoked their existence to implement change within the institution and some of them described a new law on gender equality in their country as a window of opportunity for them to increase their efforts and have greater impact with their micro change agency. As reported, policies are thus an important argumentation aid, especially if their non-fulfillment is accompanied by possible sanctions (of a monetary nature). The policies and the sanctions were however something that varied between the different country contexts.

The majority of the micro change agents in the seven RPOs lacked the authority and legitimacy in the organization needed to initiate and stabilize change practices. Instead they used other strategies to compensate for this lack. An important practice described was therefore to form alliances with senior managers (Head of Department, Vice-Chancellors, etc.) who could support and act as sponsors for the change project, thereby increasing the commitment to change in the RPO. The importance of ensuring a top-level support was taken as self-evident by the micro change agents: "top-level executive support is crucial" and as already described change practice 1 (see above) involved communicating with senior colleagues in order to secure their support. A micro change agent emphasized the importance of this to gain trust for the change efforts in the RPO:

> "Their buy-in is important to ensure effective implementation on a number of levels. [. . .] Their involvement will encourage other staff to participate or help out and their endorsement will provide legitimacy to the project".

In the present project, this alliance forming practice (cf. Eriksson-Zetterquist & Renemark 2016) was formalized and institutionalized by introducing the position of the so-called

transfer agent, persons from higher management levels who supported the core project staff responsible for the operational project activities in each implementing institution (Thaler 2016). These transfer agents (TAs), who could also be categorized as macro change agents, functioned as an extended branch of the project who could, due to their position and/or seniority, facilitate the change agent's access to data and at the same time act as ambassadors of the project goals within their institutional network. During the implementation phase, and also looking back at the end of the project, the micro change agents reported how beneficial they found the interaction and alliances with their respective TAs.

Practice 4. Accumulating and Using Resources

The ability to use various forms of resources is essential for change agents. But before they can be used, they must be accumulated and mobilized. This can be a dilemma especially for those among micro change agents who do not hold a formal position dedicated to organizational change issues, for example, as Equality or Diversity Officer of their RPO, which is connected to dedicated resources. For other organizational members change agency can be regarded as a kind of honorary work. In this case, the advocates for gender equality obtained their own resources by participating in a successful EU application, which resulted in the corresponding funding. This may be a rather unusual practice, and one that is also not often available, as funding policy calls of this nature are rare. Funding is however only the means to gain what is the primary resource necessary for a change project: time. As a non-monetary resource, time, gained through project embedding, was a main focus in the micro change agents' narratives. Through the official allocation of working hours, which are accounted for within the project, change agents can act without neglecting their actual work. Without project funding, this is problematic and means permanently weighing up how much advocacy work is possible.

In addition to finding their own time resources, change agents are also dependent on the time generosity of colleagues. This was significant for the change agents interviewed in different project phases, something that the micro change agents were aware and grateful of: "We are indebted to all the persons who gave us their time." For example, at the beginning of the project, when interviews and focus group discussions were conducted to identify staff needs, or when it was a matter of motivating colleagues to participate in an online survey aimed at providing information about the current status of gender equality at the institution. As the project progressed, resources such as access to information by colleagues or supervisors became necessary, as did support from administrative staff not directly associated with the project team who provided input on the collection of personnel data for employment analysis. It was however also noted that colleagues not always could contribute with their time: "Although staff members have been generous with their time, there is still a lack of resources (as time has to be cross-funded with other projects)." This meant that the

micro change agents had to be creative with how to accumulate and transfer knowledge in the organization.

To have the resources of others made available for change agency highlights the importance of the three change practices listed above as they were described as vital in securing these resources. One of the micro change agents expressed how accumulating resources was linked to for example change practices related to the communicating practices and the community-building practices which aimed at securing commitment and support: "According to me, changes in the mentality are prerequisite to make any gender measure possible and to obtain a specific budget for the implementation of gender actions." In order to contribute to a possible change in awareness of others pro gender equality, besides excellent communication skills of micro change agents, a sound expert knowledge is necessary to be able to educate uninformed people in a fact-based manner and thus contribute to their capacity building. Practice 4 is thus closely interlinked with also the next practice of using and transferring knowledge.

Practice 5. Using and Transferring Knowledge

The use of knowledge as a practice is closely related to the two practices of building trust and legitimacy and communication. Knowledge can be distinguished in two ways here, firstly into evidence-based gender expertise, and secondly into organization-based knowledge. Change agents committed to gender equality often face critics whose attitudes are based on everyday gender knowledge, which they then use as a basis for argumentation to undermine institutional gender equality efforts or to declare them unnecessary. Therefore, it is of high importance that change agents have gender equality knowledge relevant to their institution (Dahmen-Adkins et al., 2019) in order to be able to address specifics, be it by implementing practical measures as well as by presenting and interpreting organizational facts, such as gender disaggregated data on different career stages, decision making boards, pay gaps etcetera. This change practice; using knowledge, thus involved a wide variety of sub practices for the micro change agents, for example collecting and analyzing organizational data and presenting it together with the change visions for organizational members and change targets. In contrast to the practices of macro change agents, micro change agents in most cases have proven gender equality knowledge, while macro change agents invoke the knowledge of experts and practitioners who initiate change by proxy.

Some actors reported that in their work as change agents they can draw on results from previous gender-related research projects or practical consultancy work, which is a valuable knowledge resource for them. The majority of the change agents interviewed were also gender scholars, an aspect that should not come as a surprise, since the consortium's gender expertise also had to be demonstrated in the course of the project application. This type of knowledge was thus a requirement for joining the project. Some of those acting as micro change agents in this project had also actively advocated for gender equality

within their institutions before and after the finalization of the project.

The other type of knowledge, organization-based knowledge, is necessary not only in order to initially produce a GEP, tailor made to address the specific issues at hand in the organization. Knowledge about organizational structures, cultures, traditions etcetera, is essential during different implementation phases, for example in order to deal with resistance. It is also a necessary prerequisite for strategically developing the four previous change practices, described above. Contrary to the gender expertise, not all micro change agents possessed this knowledge at the start of the project, sometimes due to lack of transparency in the organization, but reported on how they acquired it during the duration of it. Access to important information was also provided by other organizational actors. One micro change agent here referred to one more reason to ally with senior colleagues, because: "they know a lot about how the organization works." This type of knowledge is particularly important for micro change agents for gender equality addressing institutional structures and aiming at structural change in RPOs, rather than targeting individual women through for example training efforts (the so called "fix the women" approach', cf. Ely and Meyerson 2000).

Knowledge transfer and making relevant gender equality knowledge accessible to people within the institution also represents an important component in ensuring the sustainability of gender equality measures. Only if the rationale behind the introduction of intervention measures or changes in institutional policies is understood, there is a likelihood of acceptance and, in the best case, support.

Practice 6. Drawing on Personal Motivation

Similar to previous studies (cf. e.g., Parsons and Priola 2013) on change agency, it was also found among the micro change agents involved in the project that a crucial indicator of their activist engagement was rooted in their own experiences of discrimination or exclusion: "There is a personal aspect: as a woman I experienced discrimination and sexism etc. and I see the value of a gender equal and inclusive working culture, so I am very much personally involved." In this case, being affected by discrimination or exclusion leads to the desire to change one's own situation, but also that of people in similar situations of inequality, and thus to contribute to an improvement of the working environment. Another micro change agent expressed it similarly: "I can use my personal experience for the process." Kelan and Wratil (2018) found similar statements among the macro change agents they interviewed. Some of their interviewees also based their commitment to gender equality and/or an inclusive work environment on their own experiences or those of family members.

Drawing on personal motivation can be regarded as a decisive impetus for change agency, even if it does not by definition reflect any concrete action. In addition to the above-mentioned personal experiences as a motivation to work for equality, the general personal commitment to social justice and against inequalities of all kinds, regardless of gender, was also mentioned as an incentivizing motive:

"But then I am also a social justice advocate (. . .) and I hate unfair situations/conditions. E.g. when people say it is all about performance, everybody can achieve the same things they just have to perform etc. and then decisions are made in favor of persons who did not perform better, but talked at the right time to the right people, then I am alarmed."

This intrinsic drive for change agency commitment can be particularly helpful when facing setbacks or when critical dissenting voices are raised. Being persistent and unafraid were mentioned as important characteristics by almost all micro change agents. One of them also emphasized the need to keep up the motivation, even when facing obstacles: "Do not get discouraged!". Therefore, personal motivation, and having strategies for keeping that motivation up also when confronted with resistance and challenges, can be seen as a passive practice whose existence sustains the active action of micro change agents. The personal motivation was fueled by both positive and negative emotions and experiences. The negative experiences that fueled motivation were related to unfair treatment and inequalities as described above, while the positive experiences were based on visible progress and achieved change, even if only small wins (Benschop and Van den Brink 2014).

The perception of positive changes, on an individual as well as on an institutional level, was an important factor that helped the change agents involved to maintain their motivation, as this represents direct and indirect feedback on their own change agency work. On an individual level, these include gaining knowledge about gender equality policy (national, local and organizational), or empowerment of one's own professional role, partly linked to new work tasks and content: "Management board includes me in many more issues because I could help improve certain topics with my gender knowledge, which is valued". The observed institutional changes were related to cultural aspects, such as increased gender awareness or transparency, to aspects regarding adapted policies and practices, such as the introduction of a new (gender equal and fair) salary scheme or the implementation of new career indicators, and finally to structural aspects, such as the establishment of a stakeholder network for gender issues and new processes of cooperation: "For example, in the university a cross-process has started at the various administrative services, shared by the governing bodies, for the preparation of Gender Budgeting."

One last motivating aspect which was mentioned was having an intellectual interest in tackling inequalities, especially in combination with a project which follows an action research approach, which highlights in this case a fluidity between the change agent role and the role of a researcher.

DISCUSSION AND CONCLUSIONS

The EU Commission's recent announcement of a mandatory requirement for institutional GEPs for applicants for EU funding

in Horizon Europe underlines the need to focus on change agency and change agents' scope for action on different organizational levels. Because of this new regulation, especially in institutions that have not yet officially dedicated themselves to institutional gender equality work, individuals will be assigned with this kind of organizational care work, which might not have been the core of their professional life so far. This is a scenario which suggests a future wave of new micro change agents. As reported above, national policies were described by the involved micro change agents as an important asset for establishing legitimacy in relation to their GE change agency work. An aspect that should not be underestimated in this context is the existence or non-existence of national resource centers. In countries without a corresponding GE policy, support mechanisms for change agents are lacking. These can be consulting centers for gender equality issues, national contact points, or (in-)formal networks for the exchange of knowledge and experience. This illustrates that besides increasing the legitimacy of organizational change measures, policies are also directly related on an individual level to the presented practices of community-building, and using and transferring knowledge.

Our analysis of the practices of micro change agents shows clear differences between these and the practices of macro change agents described in the literature. The two groups differ significantly in their access to individual and organizational resources. However, although macro change agents formally possess great organizational resources and micro change agents usually have to adopt a range of different change practices to compensate for a lack of such resources, micro change agents can also draw on personal resources which facilitate change practices and implementation, for example personal motivation.

One issue that challenged our micro agents across institutions, is the fact that RPOs, and universities in particular, have one structural level which determines institutional practices, but slightly different subject-specific cultural levels, which in turn have formal and informal rules and peculiarities. Thus, when talking about the importance of knowledge about one's own institution, it is beneficial in certain contexts to break this down to departmental or faculty level as well, which emphasizes the importance of Coleman and Ripping's (2000) collaborative action research approach. Efficiency of change agency can benefit from including institutional members of different fields, all genders and different organizational levels, by making use of their specific formal and tacit knowledge.

Furthermore, we have shown that besides practices with an active character, a practice has emerged that can rather be classified as passive: drawing on personal motivation. In order to persistently maintain this motivation, especially in situations of setbacks or experiences of resistance, micro change agents need to actively develop a certain degree of resilience. Disrupting means questioning existing traditional structures, challenging embedded processes and identifying (hidden) mechanisms of exclusion and inequality. Science and research, and particularly academia, are highly competitive environments where advocacy for change and equality will not be received positively by all organizational members. All involved change agents experienced drawbacks

during the project duration to different extents regarding for example lack of resources (primarily time and funding) and explicit and implicit resistance. Managing negative experiences and emotions, such as resistance to implementation measures, as a change agent in a professional organizational context requires learning new strategies for dealing with them, or resorting to tried and tested strategies. The enormous importance of exchange with like-minded people was stressed by all interviewees independently of each other, be it with fellow change agents or allies within the organization, or within national/international networks, and in this case also especially with colleagues within the project consortium. Even though the respective institutional, national and cultural backgrounds of the consortium members were partly very diverse, the exchange on a meta-level about potential strategies to overcome resistance and to reflect on obstacles within specially established monitoring sessions was perceived as highly beneficial.

In addition to the previously mentioned development of resilience to cope with critical situations, micro change agents should also practice self-care. Although this was not explicitly expressed by the interviewees during the monitoring process, it became clear in informal exchanges and talks. Besides personal self-care, this also concerns the individual institutional well-being of micro change agents and their continuing professional career. This aspect is particularly crucial for micro change agents with temporary contracts in change projects, who find themselves in a dilemma: On the one hand, they need to raise their voice to advance the issue of gender equality; on the other hand, it is a rather uncomfortable topic for many institutions, especially for actors in the system who fear losing or sharing some of their privileges. Thus, by advocating the issue, temporary change agents increase their own visibility within the institution, which can lead to positive effects, but also can reduce their chances of getting follow-up assignments. A consequence actually observed or feared by some of the change agents involved.

The importance of self-care and also resilience for micro change agents is an aspect that has been neglected in previous research on this topic. Micro changers often represent a vulnerable group, who need a high degree of resilience: may it be because of their insecure employment conditions, their low degree of power and influence in the organization, or simply because they make themselves visible through their activism for injustice and thus offer a potential target for attack. Related to this is the duty of care of supervisors and macro change agents, who should be aware of the precarious situation micro change agents can find themselves in and not expose them to support their agenda.

The discussion of the results therefore emphasizes the importance of adopting an individual monitoring approach in these projects, to complement the organizational focus, to support and encourage these micro change agents. In order to actively disrupt the existing system, the change agents included in this paper made use of different practices, which were similar to, but yet distinctly different from, macro change agents' practices.

Finally, we want to emphasize that the use of the different qualitative monitoring tools, developed within the project to provide the micro change agents with possibilities for individual and shared reflections, also facilitated several of the micro change

agent practices. Most notably the monitoring tools helped the micro change agents to share stories to keep the motivation up (practice 6) and build a community together (practice 2).

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because they contain confidential identifiable data. Requests to access the datasets should be directed to JD-A, jdahmen@soziologie.rwth-aachen.de

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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Womens' Career Progression in an Australian Regional University

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This article examines the link between terms of employment (full time, part time and casual) at an Australian regional university and women's career progression. The literature identifies lack of transparency in recruitment, promotion and retention; mobility and location; and management perceptions of women's choice to work flexibly as factors impacting on career progression. However, the voices of women working in regional universities and particularly those of professional staff are often not present in current research. This study moves towards addressing this research deficit. Feminist institutionalism is used to analyse the relationship between national legislation, university policies and informal institutional practices in relation to women's career progression In early 2020, twenty-one women provided written responses to questions on the link between terms of employment and career progression. The main findings tend to support other research about women working in universities; that is, carers need flexible work arrangements. But there are particular differences for women in regional universities who have to travel between dispersed campuses, which brings an added dimension of complexity to career progression. Their choices about terms of employment and fulfilling carer responsibilities resulted in insecure employment for some participants which had an impact on wellbeing and confidence. In addition, care/household responsibilities and the choice to work flexibly had a negative effect on career progression, and managers did not necessarily support flexible work options (despite national legislation that enables employees with child care responsibilities to negotiate flexible work arrangements with managers, and institutional gender equality policies).

Keywords: gender, higher education, terms of employment, career progression, flexible work arrangements

INTRODUCTION

Aiming to address the gap in current literature about the experience of women working in Australian regional universities, especially professional staff, this article examines the terms of their employment (full time, part time and casual) and how this might connect with/impact on career pathways and advancement. The research question, therefore, is how might terms of employment affect the working lives, career aspirations, and career progression of women in regional universities.

Twenty-one women participated in the study in February 2020, and were almost equally divided between academic and professional (administrative) staff.

The regional university sector comprises seven universities based in regional Australia; that is, in regional cities rather than metropolitan areas. They have formed the Regional University Network (RUN). Even though regional universities are often central to rapidly growing areas outside metropolitan locations that have witnessed the largest net inflow of population in the past

2 years (ABS, 2021), there was a gap in the literature on women in regional universities that we aimed to start addressing with our research and thus help to contribute to the growth of regions (RUN, 2021). Regional universities attract and retain diverse cohorts–including first-in-family (FiF) and regional and rural students and staff. Goriss-Hunter and Burke (2015), p. 112 note that there are "interconnections between the regional university, a diverse student population, and the local community".

Like other regional universities, this university is located in a region outside a metropolitan area, has dispersed campuses and is strongly connected to the local community and economy. So, it provided a good case study for our reseach. Women comprise over 70% of professional staff and just over 50% of academic staff (Universities Australia UA, 2020) of the 1,000 plus workforce. Professional staff, sometimes called administrative staff, are defined as those staff not employed to undertake academic work.

LITERATURE REVIEW

Various barriers influence women's career progression in higher education (HE). One is the continuing lack of transparency in recruitment, promotion and retention (van den Brink, 2009; Morley, 2014; Acker, 2014), despite universities having equality and diversity policies (Fitzgerald and Wilkinson, 2010). Interventions such as the UK's Athena SWAN (AS) place university equality and diversity policies under the microscope and would hopefully produce better outcomes for women (Rosser et al., 2019). The Athena SWAN Charter was established in 2005 to address the unequal representation of women and to encourage and recognize commitment to advancing the careers of women in science, technology, engineering, mathematics and medicine (Barnard, 2017). However, Athena SWAN does not foster a bottom-up approach to gender equality (O'Mullane, 2020) and hence the reforms required to facilitate more women moving into leadership. Rather, as Barnard (2017) found, the old masculinist culture remained, with a focus on "fixing" early career women and therefore the commitment to gender equality was more difficult to identify.

Mobility and location can also act as barriers. Limited geographic mobility (González Ramos and Vergés, 2012; White, 2014) can adversely impact on women's careers. Zippel (2017) demonstrated how women academics can build international networks and be taken more seriously as researchers internationally than at home. Thus, being a woman and a foreigner in another country can be a positive combination rather than 'an accumulation of disadvantages' (Zippel, 2017, p. 26). But for some women in regional universities even relocating to another area in Australia can be a challenge because of their responsibility for children and/or elder care (Thomas et al., 2019; Manyweathers et al., 2020).

In addition, the issue of equity policies and practices in relation to women taking up flexible working conditions can be a barrier. It should be noted that the university in this study is committed to providing "reasonable adjustments/flexible working arrangements to the learning and working environment as required, and will use inclusive practices wherever practicable, to ensure that all people have equal opportunity to access and participate in University activities". It is also obliged to implement national legislation (the Fair Work Act) that enables employees (other than a casual employee) who have worked with the same employer for at least 12 months to request flexible working arrangements if they: are the parent, or have responsibility for the care, of a child who is school aged or younger; are a carer (under the Carer Recognition Act, 2010); have a disability; are 55 or older; are experiencing family or domestic violence, or provide care or support to a member of their household or immediate family who requires care and support because of family or domestic violence. Casuals can request flexible working arrangements if they have been working for an employer for at least 12 months, but they are not entitled to paid days off or notice of termination (Fair Work Ombudsman Australia, 2021).

Early qualitative research suggested that flexible work was critical to women juggling career and family responsibilities and the only way to reconcile work and family (Lewis et al., 2008). While it did alleviate work/life conflict, it often made women who chose flexible work the target of conventional thinking about women being primary carers whose career progression did not need to be supported. Hence, they remained in lower paid work where flexible working hours were acceptable, sadly trading their ambition for this flexibility (White and Burkinshaw, 2019). Most women are keen to progress if only flexible working at senior levels was an option (see White, 2017; Matthews 2019). However, Padevic et al. (2019) found that flexible work options alone would 'not dismantle the culture of overwork, nor will they dislodge the deep-rooted . . . association of women with family and men with work" (p. 43). Meekes (2021), p. 5 argues that government and employers could encourage men to share childcare responsibilities by "increasing men's access to parental leave or by prioritising flexible work arrangements for men". Targeting policy on job flexibility in Australia, he asserts, could further close the gender gaps in employment and income. Unless there are provisions in policy for men to take up flexible options and encouragement to do so, perceptions of effective career progression will not change. However, "taking parental leave does not have the same consequences for the career progression of mothers and fathers" according to Le Feuvre (2015), p. 39 who points out that even in countries with generous support for working parents "men tend to reap a "paternity bonus" in terms of career progression, while women continue to pay a "motherhood penalty""". Therefore, the decision to work flexibly can produce unequal outcomes, change career trajectories and push women into career cul-de-sacs (see also Barrett and Barrett, 2011).

Thus, women working in universities can experience multiple forms of disadvantage which, not surprisingly, lead to increased stress (Morrish, 2019) and become evident throughout their careers (Pyke, 2013; Kefting, 2003) as they are blocked for promotion (van den Brink 2009; Kandiko Howson et al., 2018), passed over for higher duties, pushed side-ways (White, 2013) and not acknowledged for their contribution to the work team (Bevan and Gatrell, 2017). Understandably, some women

may experience self-doubt and/or resistance to their current working environment (Blackmore and Sachs, 2007; Morley and Crossouard, 2016) and eventually find themselves positioned as outsiders on the inside (Gherardi, 1995).

A good deal has been written about women's academic career progression in Australia (see for example, Currie et al., 2002; Chesterman et al., 2003; Winchester et al., 2006; Blackmore and Sachs, 2007; Fitzgerald and Wilkinson, 2010; Marchant and Wallace, 2013; Lipton, 2017; Sharafizad et al., 2018), including analysis of why affirmative action initiatives have had minimal impact despite considerable investment over the past 30 years (Fitzgerald and Wilkinson, 2010; Diezmann and Grieshaber, 2019). But there is little research on the careers of professional women in HE. Wallace and Marchant (2011) found that women professional (administrative) managers experienced long hours and presenteeism and needed to adopt a style that privileged a conventional masculine approach to management in order to succeed, while Lawless's (2017) case study of a junior female professional staff member indicated that sexism, gendered roles and silencing reduced her agency. Meanwhile, Bailey et al., 2017 examined the impact of part-time work on career advancement, and Gander (2017) identified a mismatch between career and promotion aspirations, and opportunities provided by the institution. Other research identified a "them and us" divide between professional and academic staff (Graham and Regan, 2016), and misunderstanding or misrepresentation of the scope of the work and decision-making authority of professional staff (Conway and Dobson, 2003).

In relation to the careers of women in Australian regional universities, two studies examined the impact of Athena SWAN in a regional university. Nash et al. (2021) argued it could potentially be undermined by unintended reproduction of gender inequality in the academic workforce, while Manyweathers et al. (2020) observed that a key policy in the institution's AS application providing support for care-givers travelling on university business was subject to gate-keeping, which meant they could not access the funds. Redmond et al. (2017) provided case studies of women leaders often from a rural background and the first in family to go to university. Regional location generated challenges for women in attending conferences or meetings within their discipline, and accessing mentoring and professional development (Wallace, 2005). Moreover, the need to travel could become a barrier to progression and career trajectories, as well as networking opportunities (Manyweathers et al., 2020). Although the use of video conferencing and Skype could overcome these barriers (Thomas et al., 2019; Herman and Hilliam, 2018, p. 186) a United Kingdom study found such technology isolated women on outlying campuses and reduced 'their opportunities for career enhancing roles and access to informal and formal networks'. That institution therefore invested in new technology to enable remote participants to actively engage in large face to face meetings.

The current study will examine whether or not the terms of employment of women at an Australian regional university affected their working lives, their career aspiration, and career trajectories, and if barriers to career progression identified in this literature review impacted on them.

The theoretical framework is feminist institutionalism which acknowledges that gender exists in the practices, processes, ideologies and distribution of power in institutions (Acker, 1990) and provides a means of addressing the gendered nature of institutional change. Mackay et al. (2010, p. 580) argue that gender is an element constituting 'social relations based upon perceived (socially constructed and culturally variable) differences between women and men, and as a primary way of signifying (and naturalising) relations of power and hierarchy'. Feminist institutionalism thus exposes how informal (gendered) interpretation of institutional rules impedes gender equality by highlighting 'their informal and implicit nature' (Clavero and Galligan, 2020, p. 662). It can therefore provide a framework to address the gendered nature of institutions and institutional change.

METHODOLOGY

The principal researcher circulated an email via the university's daily e-newsletter inviting all women staff to participate in a research project on the challenges for women working in Australian regional universities, which had approval from the university's Human Research Ethics Committee. Potential participants were advised that if they agreed to take part in the project, they would be invited to give written responses to questions provided. Because there is a gap in this area of research, the researchers wanted to listen to women's voices and provide an opportunity for them to be heard. They considered a qualitative methodology was more appropriate than a quantitative one in facilitating women's narratives and their experiences being shared. To ensure women had the opportunity to tell their stories and to gather data from a wide range of sources, the researchers made a decision to work with every response received. The written narratives allowed women to tell their story in their own way so that it was agentic and personalized. It also meant they could answer the questions in their own time and as these women were often time poor and preferred flexible arrangements it seemed like this approach would be helpful for them. Such written accounts were an efficient means of gathering rich data and could provide more highly focussed and reflective data than oral interviews (Handy and Ross, 2005). They could also save the expense and time involved in face-to-face interviewing. While the relationship between the researcher and respondent may be more physically distant (Handy and Ross, 2005), the detail and quality of the information, described as "thick descriptions" (Miles and Huberman, 1994, p. 10), can enable the researcher to get to know the respondents.

The written responses were organised into categories that corresponded with the questions, and data was coded within these main categories, to form sub-categories (Kuckartz, 2019), and then analyzed. Direct quotes from these responses are listed by number; for example, Participant two appears as (P2). We gave a great deal of thought to preserving anonymity of participants. We did not collect data on age or the position which they held.

Where appropriate in the results section we identify participants as either academic or professional staff and/or as managers. We have tried to provide context for quotes while at the same time preserving anonymity.

In Australian universities, professional staff are categorized as Higher Education Workers (HEW), beginning at Level 1. Staff members at the base of this level would not be required to have formal qualifications or work experience upon engagement. Higher levels would require post-secondary qualifications, while those working at the highest levels, Levels 9 and 10, would often have post-graduate qualifications. Academic staff at Level A are lecturers who work with support and direction from those at Lecturer level and above. Level B are lecturers, Level C senior lecturers, Level D associate professors and Level E full professors. Professional women working at HEW levels 9 and 10 would generally be managers and academic level E would often be heads of department or have a leadership role within their faculty.

This article focuses on responses to questions about employment which followed initial questions about participants' identity–where they grew up, the languages they spoke and whether or not they identified as carers. In relation to employment, they were asked: What is your employment level? Eg. Academic A, B, C, D, E (full professor) or Higher Education Worker (HEW) level (for professional staff)? What is your employment status? - Sessional, part-time contract, full-time contract, part-time ongoing, full-time ongoing? For how many years have you worked as an academic/professional staff. In addition, a later question on the list asked: Do you feel the terms of your employment (fraction, employment/contract-type) have impacted on your career progression? The concept "terms of employment" therefore has three categories: full-time, part-time, and casual. But it has two dimensions, each with two categories: full-time/part-time (hours per week); and temporary/permanent (the former also known as casual or contract-based). It is estimated that in some Australian universities more than 80% of staff under the age of 30 are insecurely employed (Bone, 2019). Casual academic work can be a "double-edged sword" (Richardson et al., 2019). While some enjoy the flexibility of not having to attend meetings and annual performance reviews, they miss out on being part of an academic community which includes opportunities for conference travel, professional development and promotion. Much attention has been focused on academics as sessionals, but professional staff can also be casuals and only paid on an hourly basis. Casuals do not receive holiday or sick leave and can be unpaid during the midyear and summer breaks (Heffernan, 2019). An investigation found that 63% of workers at the eight largest universities in the state of Victoria in Australia were casual or on fixed-term contracts, and women accounted for 57% of these workers (Heffernan, 2019). In 2020 an Australian Senate parliamentary inquiry into wage theft of casual employees in universities called some universities to account for their employment practices. The enterprise bargaining agreements (EBAs) of universities – which regulate terms and conditions of employment and are negotiated by the union branch at each university and institution management and are voted on by employees - provide casuals with few employment rights and casual academics can effectively be

paid by results rather than an hourly rate (Fenton and Kane, 2020); for example, there were claims that casuals were given only 10 min to mark each student's examination paper (Maslen, 2020).

RESULTS

Ten of the twenty-one participants were professional staff working at HEW 2, 5, 6, 7, 8 or 9. Eleven were academics, half of them at Level B or lecturer level. The employment status of participants was mainly full time ongoing (13) with the remainder having full time fixed-term contracts, 0.8 contracts (that is; working 4 days a week), part-time contracts and two were sessionals (short fixed term contracts).

Years of service of participants in this study varied from a few months to 21 years. Mostly, those who had been at the university for more than 10 years had full-time ongoing employment, although one academic with 2 decades of employment was still on a fixed term contract. Several participants had started their careers as casuals/sessionals and progressed to contracts before securing ongoing positions. This mirrors findings on the growth of contract and casual positions in academia, often resulting in slower career progression for women (Strachan et al., 2016) who are more likely to be employed as sessional workers, at lower pay levels and have interrupted career development. They are therefore effectively held back in ways that men are not, often making tenure and progression elusive (Pyke 2013).

The responses of participants regarding how their employment affected careers varied. About half reported that it had no impact on them personally but some of these women acknowledging it had impacted on colleagues. Forty per cent of these were professional staff, and 60% were academic staff. The other half thought it had a significant effect on their careers. They also addressed how management responses to the terms of their employment affected career trajectories.

Ten participants in the current study said employment status had no impact or was not applicable to them; for example; one had full-time ongoing employment "so probably this has been positive" (Participant 1 (P1)). Another reported that it had no impact, adding that she "always had choices" and had adjusted working conditions to suit particular circumstances. The most difficult time had been returning part time after a year's maternity leave "as I felt that I was not as connected to the workplace and the team, but this feeling has eased now that I have increased my days" (P2). While the following woman was clear that the terms of employment had not affected her personally, she alluded to the effect of broader organisational pressures; it was "more about the culture and work arrangements that have impacted' (P8), and others complained about the lack of flexibility in working conditions (P9) and high workloads which delayed career progression (P17).

Even for this group, whose terms of employment had not affected career development, flexibility was key. One preferred short-term contracts, although she could see that "for a person with different personal circumstances, not knowing if your contract will get renewed it can be really stressful and a

reason to look for a more secure job" (P7)' Another had changed from full-time to part-time work to suit her particular circumstances (P14). In one work team, some members actually wished to work as sessionals to juggle various responsibilities, while others favoured fixed contracts:

> have team members who prefer to be employed on rolling 13-weeks sessional contracts rather than fixed term arrangements as they believe this is more flexible for them in terms of managing other responsibilities outside of work. Others definitely prefer knowing that [their] employment is locked in for more significant periods (P16).

This comment suggested that women may make conscious choices about terms of employment to suit their particular needs. As Barrett and Barrett (2011, p. 152) observe: "career progression for women in HE is a stubborn, complex, equality issue". Therefore, it was not surprising that the remaining 11 participants thought that their employment status had had an impact on their career progression or that of colleagues and their narratives often focused on the choices available to them. Their careers had not followed the typically male linear career model (White, 2014). They had often been pushed to the organisational fringe (White, 2013) where their contribution was not acknowledged and they did not feel part of or valued by the institution. Their status reflected what Crimmins (2016, p. 50) calls the "marginalised space" precarious academics feel they occupy. One woman described how she had moved from one short term contract to another:

> I felt insecurely employed as a PT researcher on rolling 12-weeks contracts . . . In my current role the contract is longer and more substantial (12-months, full time) – I feel more securely employed now. I believe my career progression is partly hindered by these employment types, but perhaps more so by my levels of ambition, confidence etc. I feel capable of bigger things in one respect (I have the interest and ability) . . . but when it comes to practically navigating a more challenging career I don't cope as well and don't feel cut out for the uncertainty (P3).

This narrative suggests that career aspirations affect choices around flexible work and therefore terms of employment. Her career had been characterised by part-time, short-term contracts followed by her current 12-months full-time contract and consequently she felt "more securely employed now", a common pattern in Australian universities (Strachan et al., 2016; Heffernan, 2019). It mirrors Crimmins (2016, p. 51), observation about "financial stress and anxiety" resulting from insecure jobs. This precarious employment had taken its toll on her wellbeing, reflecting Morrish (2019) findings; she did not "feel cut out for the uncertainty". She tended to see her career progression being hindered by "my levels of ambition, confidence etc." as well as short term contracts, but did not articulate a possible link between the two. Morley and Crossouard (2016, p. 164)

describe this situation as misalignment where self-doubt, shame and humiliation, but also anger and resistance, risk the misaligned or 'alien bodies' simply 'disappearing' from view'. While she felt "capable of bigger things" she was exhausted by the challenge of navigating career progression, echoing the sentiments of women in White (2005), Kloot (2004) and Pyke's (2013) studies.

This sense of being marginalised and disconnected from the institution by employment status was reflected in the narratives of several women at lower teaching levels, but other research suggests that even more senior women can be marginalised and see themselves as outsiders (Burkinshaw and White, 2017). Some women in this study were not permitted to fully participate in the university. One was a sessional academic who reported that she didn't "feel part of the [university] community . . . would love to have an ongoing, permanent job" (P 5) while another sessional low-level academic was angry about the negative impact of her employment status on her career:

> YES–Hell yes. I am not allowed to be on a committee and I can't contribute to the university in that way. I cannot do the research that I want to because I have to work with someone else. As a sessional I cannot get ethics approval to be the principle (sic) researcher (P 6).

She considered that the university limited her participation in the broader academic community and saw sessionals as teachers, not researchers. Her perception of the unfairness of workload/ task allocation, reflected the unfair treatment in Pyke's 2013 study and also Barrett and Barrett (2011) observation that women were being railroaded in their career ambitions. All three of the previously mentioned participants were positioned as outsiders on the inside (Gherardi, 1995), that is, having a sense of not belonging in their workplace or, as Crimmins (2016, p. 51) notes of sessionals in her study: "the lack of fulfilment leaves them with a sense of exclusion or 'outside-ness'".

Regional location featured in discussion about choice and careers. Several participants commented that living and working in a regional location provided more flexibility. One mentioned "the opportunity to live and work in a regional location and to be able to work flexibly as needed when family and other circumstance require this" (P16). Two others (P1 and P2) said that the university being close to home was a benefit, and a third added: "local, not travelling to [other cities]" (P13).

However, one recognised that the regional location of the university and lack of mobility had affected her career.

> I do believe that my lack of experience at other Universities has hindered my ability to progress or be considered for other roles, but staying in [a regional location] has been as a result of my family commitments . . . I have prioritised my family's needs for a stable environment and therefore have not been able to get the broad experience that seems to be required to progress within the organisation (P4).

The choice to live in a regional area was guided by the need to provide a "stable environment" for her family. But it came at the

cost of career progression in the university where she perceived that "broad experience" was required to change roles or move into more senior ones. This concurs with Wallace (2005) and Thomas et al. (2019) research at other Australian regional universities which concluded that regionality and the need to travel were additional complexities that could impact on other opportunities.

Four participants in the current study considered that the choices they made in order to balance work and care/household responsibilities had impacted on career progression. Lynch et al. (2012) argue that only women who divest themselves of care by not having children or if they have them waiting until they are grown up or ensuring they have a partner who supports them, will succeed in senior jobs in universities. Implicit in this view is that in the early career stage where the demands of family and work collide (Caprile, 2012), women will experience challenges in building careers.

One participant discussed the limited choice for job sharing or part-time roles in more senior positions.

> Yes, when I first returned on a part-time basis due to my parenting and carer role, my opportunities to take on other roles were limited by my availability. Not many part-time roles are available at the higher . . . levels, nor job-sharing a common practice here (P19).

This narrative echoes Barrett and Barrett's (2011, p. 153) reflection that while inevitably some women 'will have slower progression in HE owing to personal choices that result in career breaks and/or a higher incidence of part-time working'; there was 'a danger of this being exacerbated by inequitable treatment'. There is a tension here between the woman's "choices" and perceptions that accommodating these would impact negatively on the organization. However, while job-sharing and part-time roles are often not available or encouraged at higher levels in universities (see White, 2017), they can have a positive impact on the organisation in terms of productivity and communication, and on the women job-sharing and their leadership development, as Watton et al. (2019) found.

Health issues as well as care commitments could also affect employment status, choice and career progression: "Yes definitely! I need the time to manage my health. . . . I also work part-time due to household responsibilities" (P 12). Another considered that her choice to take a gap in her career for carer responsibilities in an earlier job, had had "greater impact" "in that I have missed out on much further career progression that would have taken place during those gap" years (P15). This preference for part-time work, short-term contracts and taking time out of the workforce as a way of managing competing demands reflects the findings of Lewis et al. (2008, p. 25), that this was "recognisably *the* way of reconciling work and family". Nevertheless. when a fractional appointment could be successfully negotiated it could be beneficial, as one participant noted: "so in fact it has benefitted me" (P 14). Another health issue was that the travel required between campuses could be logistically difficult, exhausting, and add to an already heavy workload; but this

was not acknowledged by management: "Travel can be tiring; however, the University does not recognise the impact on time lost whilst traveling, excess hours worked and the work that needs to be made up due to the travel time" (P13). The implication here was that the university lacked any formal policies or acknowledgement of the time and impact of travel on employees. Travel between campuses was deemed to be a private matter that staff sorted out for themselves. The time taken to travel was not factored into the workload on their home campus. Other participants also mentioned that travel was tiring but necessary and impacted on their responsibilities as carers: "I find it more tiring than just working at my local campus BUT if it means more work (and more pay) then you just have to make the sacrifice" (P6), and "I get very tired driving . . . I find that I am less present for my family following travel due to fatigue". (P4). There was no sense in these narratives that the requirement to travel could be negotiated with managers.

Several participants talked about their choice to work flexibly and less than full time, which can be contested territory in higher education. On the one hand, institutional gender equality policies support flexible work options for women (Fitzgerald and Wilkinson, 2010), but on the other, managers can be reluctant to support flexible work arrangements and can even question commitment to the job of women who seek such arrangements. This can lead to the derailing of careers for women with and even those without caring responsibilities (the potential of their maternal status can be 'a hidden obstacle') (Bevan and Gatrell 2017, p. 133). While one participant was able to purchase additional leave (known as 48/52; that is, purchasing an extra 4 weeks leave on top of the standard 4 weeks leave each year) (P 9), another remarked that her employment status had not affected her career because she had worked full-time in ongoing positions, but was aware that if she

> . . . wanted to work at a reduced fraction it would be viewed negatively and seen as a lack of commitment to the organisation rather than a wish for better work-life balance. Whenever I advocate for my fractional staff or requests for workplace flexibility for my full-time staff (48/52 etc) I am made aware that it's not the preference of my [manager] and have to fight to maintain fractional staff or implement flexible options (P11).

Here, a woman in a managerial role knew that the institution would not support her working less than full time and regarded any request to work a "reduced fraction" as a "lack of commitment to the organisation" and reinforced the sense that careers should follow a male linear model. These comments reflect the previously expressed views of Participant 19 about the lack of part-time roles at higher levels and corresponds with White's (2017) observation that if senior women request part-time work, this can be seen as demonstrating less commitment to the organisation and thus a career limiting move. Another participant reflected on how the inability to travel could leave women conflicted between the desire to undertake training as expected by managers and family demands:

Theme 1	insecure employment of some participants had an impact on wellbeing and confidence
Theme 2	care/household responsibilities had a negative effect on career progression
Theme 3	the choice to work flexibly impacted on careers
Theme 4	managers did not necessarily support flexible work options such as working part time or reduced hours or job sharing, and they did not support women who had to juggle travel between campuses with high workloads/care responsibilities

This is highly difficult. I understand it is a part of the role. However, with limited options, sometimes this can be very conflicting. I often miss opportunities. Often, I would like to attend but am unable to–or I am unable to justify the upheaval required for my own wishes. This is conflicting for the role/uni and for my family. This is often a no-win situation, feeling either burdensome and guilty or unreliable/uncommitted (P9).

Disturbingly, these narratives suggest that choices can be limited and some senior managers did not endorse flexible work options despite university policy promoting such flexibility. It was not clear if they opposed these options or if they labelled women who took up flexible options as ultimately privileging the domestic sphere above the professional career domain. Moreover, it indicates the challenges for line managers who try to advocate for fractional staff or flexible work options for themselves and/or their full-time staff; and concurs with Bailey et al., 2017 findings that few senior women professional staff in HE worked part time. In addition, the travel required between campuses was not recognised by management as work time and women with children were not necessarily supported to undertake training away from their campus. While there are questions about how the choice to work flexibly could lead to different and lesser career paths (Padevic et al., 2019), some women in this study were not given a choice about working part time or flexibility within full-time positions, despite such choices being enshrined in federal legislation. Whether this was the result of informal expectations of managers that committed workers would be in full-time and fixed positions or whether these options were not apparent in policy and practice in the workplace, the data clearly indicated that flexible work options were not always supported by management.

DISCUSSION AND CONCLUSION

This study examined how women working at an Australian regional university perceived that the terms of their employment had impacted on career progression. While ten women reported it had no impact on their careers, some were aware of the influence on colleagues who preferred to work as casuals or to have ongoing employment. Nevertheless, this group identified employment issues such as difficulties when returning from maternity leave, lack of flexibility in working arrangements, the broader institutional culture, and high workloads, also noted in other research (see for example Burkinshaw and White, 2017). But half the participants did consider that the terms of employment impacted on career progression.

Four main themes emerging from the data were: insecure employment and the impact on wellbeing and confidence; the effect of care/household responsibilities on career progression; the impact of the choice to work flexibly; and managers not necessarily supporting flexible work options.

Insecure employment for women in Australian HE has been widely recognised (for example, Strachan et al., 2012; Strachan et al., 2016), especially for those under the age of 30 (Bone, 2019). Insecurity for participants was sometimes exacerbated by living in a regional location with limited alternative job options. Moreover, some women in this study who were casuals emphasized their precarious employment and did not feel that they were part of the university; they had a sense of not being connected or valued, which concurs with Francis and Stulz (2020) research. Their difficulty in settling into their role led to uncertainty and stress. They could not sit on university committees or submit ethics applications to undertake research projects, and perceived that they were unable to influence institutional policy or effectively be part of the organisation; they were essentially outsiders on the inside (Gherardi, 1995; White, 2013). There appeared to be a link between casual employment and confidence in their abilities, which tended to keep women at the margins (Bevan and Gattrell, 2017) rather than believing they could advance in their careers (Burkinshaw and White, 2017). Being on the outside or what Crimmins (2016, p. 53) describes as "otherness" suggested a two-tier employment model where sessionals/casuals in this study were not appreciated by management and were exhausted by the uncertainty of insecure employment, like academics in Crimmins (2016), p. 53 research who felt marginalised "on the periphery of academia, with little opportunity of becoming an ongoing academic or informing policy".

The second theme was the effect of care/household responsibilities on career advancement. Those women who decide to combine motherhood with a career can experience a maternal wall (Williams, 2004); that is, colleagues can view mothers or pregnant women as less competent or less committed to their jobs. Thus mothers (and some fathers) can be penalised in their careers (White, 2014). As Bevan and Gatrell (2017, p. 180) observe, women's motherhood or even potential for motherhood can place them "on the sidelines … as they struggle both with the practical challenges of managing a home and career as well as experiencing unfair assumptions about their career orientation". Some women in the present study had prioritised family over career, had tried to negotiate part-time roles, had taken time out of the workforce, and had requested job sharing. Their experience reflected Bailey et al., 2017 findings that part-time work, which can impede career advancement, was used extensively by lower classified professional women in Australian universities, but rarely by higher classified women. These women talked about missing out on career advancement because they had prioritised caring over careers. Some also expressed a strong preference to live in a regional location as compatible with their

sense of belonging (Goriss-Hunter and Burke, 2015) and family responsibilities, even though this might reduce career mobility, networking and development opportunities, as Thomas et al. (2019) also found.

The third theme, the impact of choosing flexible work options, was often negative. While there was evidence that certain women chose to work as casuals or sessionals as a way of managing work and other responsibilities, it was a double-edged sword (Richardson et al., 2019). Strachan et al. (2016) and Crimmins (2016) would argue that sessional workers in HE were not sessional by choice, although some might choose casual employment as an entry level position into academia but then end up being trapped. Other women in this study purchased extra leave, which gave them 8 weeks leave per year. But even this type of limited flexibility might not be supported by managers. Flexibility then, could be a career-limiting strategy and place women on a different, and lesser, career trajectory to other employees in the organisation (Barrett and Barrett, 2011; Padevic et al., 2019).

The fourth theme demonstrated how informal, gendered rules can predominate in universities. Managers did not readily support flexible work options, despite institutional and national imperatives, supporting instead a conventional linear male career model. There was evidence that some senior managers preferred staff to be in full-time roles, to juggle travel between campuses with high workloads/carer responsibilities and did not support line managers negotiating flexible work for themselves or for their fractional or full-time staff, as also noted at another Australian university (White, 2017). The experience of several women in this study mirrors Tutchell and Edmonds (2015, p. 216) observation that women often considered they could not take the necessary breaks "without damaging their jobs and promotional prospects" and being confident that a career with "the pauses, the deviations and the changes from full time to part time and back again that women need, is valued as highly as the linear uninterrupted career conventionally worked by men".

Even greater strain will be placed on university employment and budgets by COVID-19 (Blackmore, 2020). Women are shouldering more of the caring responsibilities and could be at greater financial disadvantage, particularly during COVID-19 lockdowns with remote schooling, domestic chores and working from home (WGEA, 2020). The impact is that women, especially those in regional areas with a lack of alternative employment, are likely to experience even more insecure employment and pressure in their jobs (Ferrari, 2020).

Feminist institutionalism has been a useful framework for this study. It has enabled us to understand why the participants experienced difficulties with career progression. While the university in this study, like all Australian universities, has policies and strategies to achieve gender equality for staff, the informal practices or what Clavero and Galligan (2020, p. 662) call "informal (gendered) institutional rules" demonstrated an active institutional resistance to gender equality, including little support for women and men who wished to explore more flexible work options that better suited their need to balance work and other responsibilities (Meekes, 2021). Several of the women were employed either part time or as sessionals and their working conditions assigned them to the margins of the university, as though gender equality policies did not apply to them which begs the question of

how effective gender equality policies in Australian higher education have been (Diezmann and Grieshaber, 2019). Others considered they were penalised for requesting fractional appointments or job sharing that might make it easier to balance work and caring responsibilities, despite national legislation giving them the right to negotiate these arrangements. The most overt examples of informal and gendered institutional rules that discriminated against women were senior managers favouring a linear uninterrupted male career model by refusing requests from line managers for their female staff to have various flexible work options, and no recognition of how travel between campuses impacted on workloads and carer responsibilities. These practices demonstrate that the masculinist status quo in universities is resistant to change (Ash, 2021). Until managers seriously address gender equality in higher education institutions and it becomes embedded in workplace culture (Wroblewski, 2017), women's career progression will continue to be precarious.

In conclusion, this study of women working at an Australian regional university examined the link between levels of employment and career progression. It found that their employment was possibly more precarious than for women at metropolitan universities, because of limited alternative job options. Moreover, some senior managers endorsed a linear male career model and did not support requests for flexible work options, while also marginalising casual (sessional) employees, and not acknowledging the impact of travel between campuses on workloads. Hence women could be dissuaded from requesting fractional appointments or job sharing that might enable them to combine work and caring responsibilities. These informal practices of some managers were inconsistent with both the university's obligations under national legislation that enable employees with responsibility for the care of a child to negotiate flexible work arrangements, and implementation of its institutional gender equality policies.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because the data set has been anonymised and is held in a secure location by the researchers. Requests to access the datasets should be directed to kate white kate.white@federation.edu.au and anitra goriss-hunter, a.goriss-hunter@federation.edu.au.

ETHICS STATEMENT

The researchers obtained the necessary ethics approval from their institution. The participants provided written informed consent to participate in this study.

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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Certifying Gender Equality in Research: Lessons Learnt From Athena SWAN and Total E-Quality Award Schemes

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In the past 2 decades, many Certification and Award schemes (CAS) related to gender equality, diversity and inclusion have emerged in the higher education, research and industry sectors. According to a recent report, there are as many as 113 CAS which have been identified across Europe and beyond. These CAS aim at addressing inequalities in relation to the grounds of sex, gender, race, sexual orientation, and disability among others. The high number of CAS, and their continued growth, has taken place in parallel to the shift of policies and efforts from "fixing individuals" to "fixing the system." In these schemes, gender equality is often understood as a structural, systemic challenge, with a recognition that advancing gender equality is complex and requires drivers and interventions at micro, meso and macro level. Studies focused on analysing and evaluating gender equality initiatives in higher education have been scarce, and often limited to specific schemes. This paper aims to fill this gap by providing a better understanding of the CAS landscape through comparing two of the main gender equality schemes used by research-performing organisations in Europe Athena SWAN (in the UK) and Total E-Quality Award (in Germany). Based on qualitative interviews with stakeholders across Europe and document analysis, this paper focuses on strengths, challenges faced by and the impact of these CAS. This comparative exercise highlights particular learning points that can inform potential reviews of existing schemes and/or the development of new schemes such as a Europe-wide scheme. The latter is the focus of a Horizon 2020 project entitled CASPER (Certification-Award Systems to Promote Gender Equality in Research), which aims at making recommendations to the European Commission as to the feasibility of a Europe-wide CAS for gender equality in research organisations.

Keywords: certification, award, gender equality, higher education, research, Europe, Athena SWAN

INTRODUCTION

Higher education and research organisations are increasingly undertaking gender equality efforts to address entrenched inequalities in the academic system. Those efforts are often translated in Gender Equality Plans (GEPs) which are perceived as significant mechanisms for organisational change and gender equality (EIGEECC, 2012; EIGEECC, 2016; Clavero and Galligan, 2021). A gender action plan is considered as a set of actions which aim to "conduct impact assessment/audits of procedures

and practices to identify gender bias; implement innovative strategies to correct any bias; set targets and monitor progress *via* indicators" (ECC, 2012, p.13).

At European level, the European Commission has awarded an increasing amount of European funding (since the sixth Framework programme) on cross-national consortia aimed at providing resources to institutional teams to design and implement GEPs. These funding programmes - Coordination and Support Actions-are aimed at triggering structural and cultural change in Higher Education Institutions (HEIs) across Europe, knowledge exchange and the dissemination of good practices in the wider European higher education community. In addition, many research programmes have been funded to better understand implementation and evaluation of gender equality efforts such as CASPER (Certification Award Systems to Promote Gender Equality in Research), which aims at exploring the feasibility of a Europe-wide scheme on gender equality through mapping and assessing existing Certification and Award schemes (CAS), on which this paper draws.

Certification also often requires a gender action plan, and this is typically a central feature of any assessment mechanism within each scheme. Because CAS predominantly operate at national level (with the exception of some that have been transferred and tailored to other national contexts), there is a plurality of formats, understandings and priorities that co-exist. Increasingly, however, existing schemes highlight gender equality as a structural issue in research organisations hence mirroring the focus of the EC. While they initially focused on careers and other HR-related gender equality issues, there is a growing recognition of other topics and/or a questioning of the concept of excellence in research and innovation. The growth and endorsement of these schemes by various national and European organisations also reflect the shift of policies and efforts from "fixing individuals" into "fixing the system," i.e., teams, organisations, institutions and their cultures. There are numerous CAS addressing gender equality and diversity and inclusion, with no fewer than 113 schemes across Europe and beyond identified by a recent report (Nason and Sangiuliano, 2020).

Despite this plethora of schemes, there is no agreement nor shared understanding regarding the terminology used. Indeed, there are blurry boundaries between the terms "certification" and "award" schemes. In this paper we opt to define as certification those schemes that assess organisations at multiple points in time, with an element of "renewal," rather than just at a single point. Single-point assessments are considered to be an "award," notwithstanding the fact that schemes such as "Total E-Quality award" (in Germany) and the "Athena SWAN" (with the Bronze, Silver and Gold awards) which we perceive as certification, use the word award, thereby adding to any confusion.

In light of the recent announcement from the European Commission where GEPs have become an eligibility criterion for Horizon Europe funding (EC, 2021), there are concerns that their development and subsequent implementation may become a box-ticking exercise. To alleviate this, a wider structure might be needed to ensure that GEPs do not become off-the-shelf products, but are instead implemented and evaluated as drivers for change

in organisations and institutions. At national level, discussions are also taking place on the introduction of certification schemes that would help and support institutions in meeting this criterion and advancing gender equality in a more systematic and collective way.

Studies focused on analysing and evaluating gender equality initiatives in higher education have been scarce, and often limited to single case studies, drawing predominantly on Athena SWAN in the UK (Caffrey et al., 2016; Ovseiko et al., 2017; Tzanakou and Pearce, 2019; Ovseiko et al., 2020; Xiao et al., 2020; Drew, 2021). CAS have been underexplored, despite their growing number and potential influence. We know little about how they are operationalised, what their strengths, challenges and impact are to date. Limited efforts have been undertaken to compare and contrast them[1]. This study aims to contribute towards filling this gap by providing a better understanding of the CAS landscape through comparing (gender) equality schemes that target research-performing organisations in two different countries. This paper critically reviews the contribution of CAS in the academy to support gender equity, looking specifically at Athena SWAN and Total E-Quality (TEQ). It enables the identification of the lessons that can be drawn from existing - quite successful in their context - CAS and contributes to the development of comprehensive, impactful CAS that can result in structural and cultural change in organisations.

CONCEPTUAL AND THEORETICAL CONSIDERATIONS

Gender equality initiatives in higher education have proliferated across Europe in the past 2 decades in an effort to address entrenched inequalities in academic systems. However, there is still limited evidence about what works (Bohnet, 2016) and what could lead to meaningful and sustainable structural and cultural change. In this context, GEPs have been recognised as important vehicles for change (Kalpazidou Schmidt et al., 2020) entailing multiple benefits for individuals and organisations:

> The process of producing a GEP can provide the setting for reflexivity, consensus-building, and interrogation of the gendered norms (both formal and informal) that underpin the assignment of epistemic authority' (Clavero and Galligan, 2021, p.)

This said, a comparative critical analysis of GEPs implementation process in different universities have highlighted how context matters in the way GEPs are framed, implemented and enacted (Ní Laoire et al., 2021). Thus, GEPs can be pivotal tools for organisational change insofar as they can be contextualised by reflecting the needs of the local situation of an

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[1]One previous study (Rosser et al., 2019) makes a comparison and looked at the effectiveness of and lessons learned from Athena SWAN and ADVANCE, but the latter is a grant rather than certification and award scheme

institution, as well as the wider environment in which these institutions operate. This interaction and co-construction of the micro-, meso- and macro-level has been increasingly highlighted by scholars. Ní Laoire et al. (2021) introduce a conceptual framework demonstrating how macro-level policy and meso-level organisational (gendered) logics can be useful in better understanding how GEPS are interpreted, mediated and (re) produced across different organisational contexts. O'Connor and Irvine (2020) emphasise the significance of gender equality measures simultaneously undertaken at micro-, meso- and macro-level to support change. They alert us to the conditions of "leveraging change":

> "the best possibility of leveraging change arises when measures to promote gender equality are driven at the state (macro); the HEI (meso); and the situational (micro) level simultaneously. Linking state funding to indicators of structural and/or cultural change will help to encourage the use of effective tools to tackle different aspects of gender equality." (ibid, p16)

The complexity of advancing gender equality involves cultural, structural, institutional and economic factors that create barriers for gender equality in higher education and research - also operating at different levels, micro, meso, macro - to be addressed (Kalpazidou Schmidt and Cacace, 2017). Addressing these barriers requires an equally integrated and sophisticated response–to be operationalised in an evaluation approach that enables a more realistic assessment of the complex ways in which certain gender equality measures promote change. An evaluation is never a value-neutral process, but rather the prolongation of politics by other means. The quality criteria used are not neutral but require political decisions. This adds further to the complexity of certification and to the needs to be considered, by incorporating mechanisms of consensus-building among stakeholders. This is why previous evaluation methodologies and reports of existing schemes (Munir et al., 2014; Graves et al., 2019) have been collected and analysed prior to this analysis, to ensure that it is grounded within the perspectives and recommendations from the wider community of stakeholders.

A certification system does not operate in a vacuum but operates within higher education institutions that are confronted with decreasing public funding which coincides with a heightened need for accountability. The introduction of New Public Management principles that aimed to reduce and streamline a supposedly oversized and inefficient public sector has certainly affected public universities and research institutions (Hood 1991; Newman 2005). A new managerialism tied to the introduction of Total Quality Management principles (Owlia et al., 1997), for example, as well as a marketisation of the public sector have undermined the autonomy and independence of the academy and provoked considerable resistance especially from gender scholars (Thomas and Davies 2002; Anderson 2008; Mountz et al., 2015). The increased resources dedicated to certification can lead to potentially detrimental effects for the advancement of gender equality,

where there is resistance and where the exercise becomes devoid of its original value. Ahmed criticises the "new politics of documentation" in this respect, where the circulation of documents related to (race) equality becomes an end in itself and a sign of performance supplanting the actual equality work (Ahmed 2007; Garforth and Kerr 2009; Davis, Kingsbury, and Merry 2010). Equality work can become reduced to paperwork, to "ticking the box" in order to satisfy (external) accountability requirements without engendering real change within the institutions.

The problem goes right to the heart of any certification scheme, in that it needs to be balanced between quality assurance based on process versus quality assurance based on content assessment (Daemen and van der Krogt 2008). Since certification involves standardisation and requires resources, there is always a tendency to focus on easily quantifiable performance indicators instead of context-specific evaluations of content, and the value it represents. In-depth analysis, often requiring costly peer-review, competes with compliance of simple-to-implement indicators that are easy to tick-off but might conceal or even reproduce existing (gendered) power structures (Garforth and Kerr 2009). However, documentation and bureaucratic tasks involved in certification schemes can indeed have a positive impact in terms of contributing to a more transparent organisation, for example in terms of making promotion criteria publicly available (Roth and Sonnert 2011).

It is clear that there can be many benefits to CAS, but it is also crucial to also bear in mind concerns about how CAS might not fulfil the envisaged aim of structural and cultural change in a meaningful and sustainable manner (Ovseiko et al., 2017; Tzanakou, 2019; Tzanakou and Pearce, 2019; Caffrey et al., 2016; Zippel et al., 2016). GEPs, and the wider framework of CAS which promote them, can be gamed and used to reproduce inequalities. This is particularly so when institutions implement activities that just tick boxes and pay lip service while under-represented and marginalised groups are called upon to bear the resulting administrative burden (Tzanakou, 2019; Tzanakou and Pearce, 2019; Ovseiko et al., 2017) sometimes with personal costs for individuals involved in these processes (Tzanakou and Pearce, 2019). This paper will further these debates by exploring CAS as part of macro-level considerations and how they interact with meso- and micro-level considerations comparing two schemes in two different national contexts: the Athena SWAN in the UK and Total E-Quality Award in Germany.

SETTING THE SCENE: THE ATHENA SWAN AND TOTAL E-QUALITY SCHEMES

The Athena SWAN (AS) and Total E-Quality Award are both voluntary CAS that are highly esteemed and recognised in their respective national context. Athena SWAN, originating in the UK, is arguably the most prominent and well-known certification system for research organisations, whereas the German Total E-Quality Award extends beyond research with a multi-sectoral base which includes industry and public sector organisations. In

this paper we refer to organisations to include HEIs, RPOs but also other organisations that the TEQ targeted.

The Athena SWAN Charter[2] is a certification scheme that was established in the UK in 2005, aimed at research-performing organisations (RPOs). Its original purpose was to encourage and recognise commitment to advancing the careers of women in science, technology, engineering, maths and medicine (STEMM) employment in higher education and research. In May 2015, the charter itself was expanded to recognise work undertaken in arts, humanities, social sciences, business, and law (AHSSBL), and in professional and support roles, and for trans staff and students. The charter now recognises work undertaken to address gender equality more broadly, and not just barriers to women's progression. It is applied nationally though has also expanded into Ireland in 2015[3], the USA in 2017[4], Australia in 2018[5] and Canada in 2019[6] with a pilot in India[7]. A transformed framework was launched for new and existing UK members to use from June 30, 2021. The following description focuses primarily on the post-May 2015 framework, as this was in operation during the period of the CASPER fieldwork and follow-up scenario development and validation process. However, where helpful and relevant, the post-June 2021 version is introduced. According to AdvanceHE, as of July 2021 currently 962 awards in total, with 164 held by institutions and 798 by departments.[8]

Since 2011, there has been a move to link the charter with funding, beginning with the National Institute for Health Research (NIHR) announcing that a Silver Athena SWAN award would be an eligibility criterion for accessing NIHR funding. This requirement has been recently removed to reduce administration during COVID19 pandemic[9]. Although Research Councils UK (RCUK) does not link AS to funding[10], in January 2013 it launched a statement of expectations that it expects those in receipt of funding to provide evidence of ways in which equality and diversity issues are managed, with recommendations that evidence include participation in schemes such as Athena SWAN and Project Juno.

AS presents three levels of awards, which are available for HEIs and/or their departments. Members are encouraged to work through the levels from Bronze to Silver and Gold. Bronze institution awards recognise that the institution has a solid foundation for eliminating gender biases and developing an inclusive culture that values all staff. Silver institution awards recognise improvement on Bronze level achievement and a significant record of activity and achievement by the institution in promoting gender equality and in addressing challenges across different disciplines. Gold institutions must be beacons of achievement in gender equality and should champion and promote good practice in the wider community. A Gold institutional award recognises a significant and sustained record of activity and achievement addressing challenges across the full range of the institution in and promoting gender equality within and beyond the institution. Both silver and gold applications need to demonstrate AS principles as embedded, with strong leadership promoting and championing the charter principles. Certification is renewable either 3- or 4-yearly, according to the level of the award.

The Athena SWAN Charter is based on ten key principles, and participating institutions commit to progressing the Charter and adopting these principles within their policies, practices, action plans and cultures. A targeted self-assessment framework is used to support applicants in identifying areas for positive action and recognising and sharing good practice. Downloadable resources are provided to enable self-assessment teams in a thorough analysis of their institution's issues and producing an action plan. The intention is for the framework to empower organisations in identifying the barriers and norms that are unique to their institution and producing targeted actions.

AS Charter award applications are assessed by peer review panels of academics and practitioners that recommend decisions on awards. Both processes and outputs are measured. Evidence for panels includes the themes of communication, senior or high-level commitment, effective analysis of the data, how impact will be measured, self-reflection, honesty, and engagement, based on intersectional qualitative and quantitative data and policy documentation. Consultation is required across the organisation. Clarity of evidence, links to the organisation's strategic mission and goals and how success was measured and evaluated along with how innovative and sustainable activities are considered. Panels provide unsuccessful candidates with detailed feedback with AdvanceHE operating in a moderating role, supporting internal quality of the process by providing guidance on the application and assessment process and ensuring compliance and consistency. Setting the national legal context is the 2010 UK Equality Act, which includes a Duty aimed at public sector institutions and is associated with reporting requirements and protections for equalities characteristics in addition to protection from discrimination.

The Total E-Quality Award, comprising both an award and a certification scheme, was established in Germany in 1996. It is aimed at the private sector, as well as research and HE sectors. It is presented annually for exemplary human resources management practices that are aimed at providing equal opportunity, with just one level of award. TEQ requires the commitment of

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[2]https://www.ecu.ac.uk/equality-charters/athena-swan/

[3]See Drew, (2021). Navigating unchartered waters: anchoring Athena SWAN into Irish HEIs. Journal of Gender Studies, DOI: 10.1080/09589236.2021.1923463

[4]The SEA Change initiative, inspired by Athena SWAN and piloted in 2017 https://seachange.aaas.org/

[5]https://www.advance-he.ac.uk/news-and-views/SAGE-athena-SWAN-gender-equity

[6]Dimension, https://www.nserc-crsng.gc.ca/NSERC-CRSNG/EDI-EDI/Dimensions-Charter_Dimensions-Charte_eng.asp

[7]https://www.natureasia.com/en/nindia/article/10.1038/nindia.2020.41

[8]AdvanceHE (2021). Athena Swan Charter participants and award holders, https://www.advance-he.ac.uk/equality-charters/athena-swan-charter/participants-and-award-holders#:~:text=There%20are%20currently%20962%20total,and%20798%20held%20by%20departments

[9]More can be found here: https://www.nihr.ac.uk/news/nihr-responds-to-the-governments-call-for-further-reduction-in-bureaucracy-with-new-measures/25633

[10]Athena SWAN is linked to funding in Ireland far more comprehensively than in the UK: https://www.sfi.ie/research-news/news/irish-funding-bodies-to-require-athena-swan-gender-equality-accreditation-for-higher-education-institutions/

organisations to implement equal opportunity-without requiring additional legal guidelines and going beyond already existing guidelines. The award comprises a certificate and an achievement award for sustainability, in combination with the Total E-Quality logo, which can be used by the organisations in all internal and external relations for presentation and image cultivation[11]. Certification also offers a "diversity award"—when applicants address requirements of a newly-introduced diversity add-on module–and an honorary "sustainability award" for organisations that have renewed five times. It aims to measure exemplary activities in terms of human resource management aimed at providing equal opportunity. In this respect, it bears a similarity to the Australian, US and Canadian expansions of Athena SWAN, all of which include diversity dimensions in addition to gender.

In contrast to AS, TEQ is given at a single point in time, on an annual, renewable basis. An award ceremony features a high-profile programme of presentations and discussions and includes a press interview. It is granted for 3 years, with awards thereafter given if a renewed application shows sustainable success and further progress in establishing equal opportunities. In terms of its impact, a survey among award winners demonstrated that the Total E-Quality-Award improves the image of a company and promotes gender equality within the organisation.[12] As at July 2021, 901 awards have been presented to 339 organisations.[13]

The assessment criteria for TEQ are underpinned by the applicants' ability to strike a balance between economic requirements and the interests of their employees by implementing suitable human resources strategies to establish equal opportunities A self-assessment tool is provided to give ideas and support, and this sets a series of prescribed questions asking, for example, whether women are employed in scientific and non-scientific managerial positions, are part of selection committees or addressed in tender procedures, or whether women are supported, e.g., in mentoring programmes or through childcare. There are also questions relating to the mainstreaming of gender equality policy into the organisation's planning and control instruments, such as evaluation procedures and if up-to-date findings from women and gender research are integrated into delivering their research and education. An independent panel of judges then evaluates all applications on behalf of the association and decides on the winners, taking each organisational context into account. Definitions of excellence and quality for the award are based on criteria and standards within the Research-Oriented Standards on Gender Equality developed by the German Research Foundation (DFG, 2008)[14]. These structural and personnel-related standards correspond to the criteria of consistency, transparency, competitiveness and forward-looking orientation,

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11https://www.total-e-quality.de/en/award/award/

12Technical University Dortmund, https://www.total-e-quality.de/media/uploads/global_assets/teq_10punkte.jpg

13https://www.total-e-quality.de/en/award/award/#:~:text=Organisations%20from%20the%20private%20sector,been%20presented%20to%20339%20organisations

14https://www.dfg.de/download/pdf/foerderung/grundlagen_dfg_foerderung/chancengleichheit/forschungsorientierte_gleichstellungsstandards_2017_en.pdf

TABLE 1 | List of interviewees.

Interviewee ID	Certification/Award scheme group	Rule (ie, scheme user, manager, expert)
Interviewee 1	Athena SWAN	User
Interviewee 2	Athena SWAM	Expert
Interviewee 3	TEQ	Manager
Interviewee 4	Athena SWAN	Manager
Interviewee 5	TEQ	User
Interviewee 6	Athena SWAN	User
Interviewee 7	Athena SWAN	User
Interviewee 8	Athena SWAN	User
Interviewee 9	Athena SWAN	User
Interviewee 10	TEQ	User
Interviewee 11	TEQ	User
Interviewee 12	TEQ	User
Interviewee 13	TEQ	User
Interviewee 14	TEQ	User
Interviewee 15	Athena SWAN	User
Interviewee 16	Athena SWAN	Expert
Interviewee 17	Athena SWAN	User
Interviewee 18	Athena SWAN	User
Interviewee 19	Athena SWAN	Manager
Interviewee 20	Athens SWAN	Manager

and competence. As a backdrop in Germany there is a national requirement for organisations to implement a GEP which acts as the prevailing legal context and prescribes equality work in a quite detailed manner.

Having provided an overview of the Athena SWAN and TEQ schemes, the paper now outlines the materials and methods it is based upon, before presenting and discussing its findings.

MATERIALS AND METHODS

This article draws on the European H2020 CASPER project, which focused on mapping and assessing existing schemes on inequalities (primarily on gender although schemes on various inequalities were explored) and understanding the feasibility of a Europe-wide scheme on gender equality for RPOs. This entailed extensive fieldwork, by a team of interviewers located across four institutions, with qualitative and quantitative data collected from 74 participants during the course of 67 semi-structured interviews, undertaken with key stakeholders and policy-makers throughout the EU and beyond, national machineries for gender equality (e.g. government policy units), research performing organisations and other bodies engaged in existing or past CAS.

For this paper we draw on the overall analysis of the fieldwork and, more specifically, on the 20 interviews dealing with TEQ and Athena SWAN (see **Table 1**). These included stakeholders running or managing a CA scheme, stakeholders using a scheme (e.g. RPOs, HR, or EDI) and others with involvement in a scheme, policy-makers or known experts on gender issues. Regular fieldwork meetings were scheduled online during the fieldwork to enable partners to discuss potential challenges and coping strategies but also ensure consistency in conducting and analysing the interview data. Consistency in the data analysis and

synthesis approach was further supported by the interviewing partners' experience and expertise in conducting research and qualitative fieldwork on gender issues and diligent adherence to the guidelines. Participants were purposively selected due to their role (e.g. responsible for managing the respective CAS) and/or for their long engagement and experience with respective CAS and gender equality in organisations.

A topic guide for semi-structured interviews was developed drawing on existing literature, early analysis of CAS and stakeholder identification, with a guide tailored to each of the stakeholder groups. A set of closed questions was developed on key parameters of CAS, creating a set of quantitative indicators on various CAS dimensions. Those who agreed to an interview upon invitation were sent a consent form and participant information sheet by email, and, if requested, the questions they would be asked. Due to the need to "socially distance" because of COVID-19, all interviews were conducted remotely using Zoom or Skype and their built-in recording mechanisms. The study took place between first May and July 31, 2020.

The topic guide included questions regarding 1) the experience and current role of the interviewee (e.g. role, capacity and experience with gender equality certification); 2) their experience, and personal evaluation of the scheme (e.g. strengths, challenges, impact) by the interviewee and 3) their views about the feasibility of a Europe-wide scheme (e.g. whether it is required, its architecture). The procedure for the study was approved by an institutional research ethics committee. Once completed, each interview was written up as a summary or transcript in English and sent to the interviewee for validation and feedback. After agreement was obtained from the interviewee (and any requested changes integrated), the interviewing partners transferred the summary into a de-identified analytic interview summary template. These were collated in an online platform by the authors to review.

For this paper, the authors read the relevant transcripts and summaries and created a coding table providing a critical overview of CAS characteristics (reporting strengths, weaknesses, enablers, challenges, impact, potential for a Europe-wide scheme).

The authors have been involved in CAS as part of gender equality and structural change efforts in their current and past affiliated organisations, which has informed how CAS have been operationalised. While we are critical of the efforts on advancing gender equality in organisations through CAS, which could be seen as moderate feminist practices (Tzanakou and Pearce, 2019), we do consider it important to discuss their strengths, challenges and impact to identify ways to improve them and make them more radical and transformative. In the coding and analysis phases, authors cross-checked the interpretation of participants' responses to mitigate the infiltration of personal views.

RESULTS

The Wider Environment for the CAS

In both the UK and Germany, the wider positive legal environment around gender equality work fostered the engagement of institutions with CAS. In Germany, the national requirement to implement a GEP prescribes equality work in a quite detailed manner. This creates a wider environment where gender equality capacities and resources are already in place. The TEQ is endorsed at a high political level and well-recognised by organisations nationally. The scheme has achieved high levels of adoption and hence there is a positive "critical mass effect" which encourages those who do not have it yet to join. Although TEQ is not required to access funding, the certificate is implicitly "good to have" for evaluations of excellence initiatives. As the scheme has been adopted across research centres, a certain "soft" pressure was described for all institutes to comply. In addition, as the TEQ scheme is well known within Germany, there is scope to generate publicity for the applicant organisation and generate positive public relations. In the UK there is also favorable positive context for sectoral responses such as AS to emerge, particularly since the introduction of the 2010 Equality Act, which is associated with reporting requirements and protections for equalities characteristics. While interest in Athena SWAN was moderate in the beginning, engagement increased steeply when the scheme became linked to access to research funding (NIHR), particularly amidst senior leadership in UK HEIs. Currently, about 15°years later, AS is considered - as one of the interviewees mentioned - as:

> "... now embedded enough in UK Higher Education to be significant that people will feel they will have to engage with it, I think it has got to that point now where it is kind of normal and expected." (Interviewee 1)

Those implementing Athena SWAN cite drivers for involvement as a longstanding shortage of women across STEMM, strong leadership particularly from the HE and research sector and the link to improving practice/best practice around gender equality. It was also felt that the business case is strong, because of potential for gender equality to be linked to better organisational performance.

Strengths of CAS

Both the TEQ and Athena SWAN schemes present strengths in terms of how they are organised (i.e., the processes and tools involved), and their ability to adjust to the latest developments in gender equality and diversity. Each can be identified as a certification scheme that includes self-assessment and encompasses an intention to improve and advance through progressive approaches and renewals/re-audits, rather than simply assessing achievements in the past. This model was therefore perceived favourably in terms of achieving structural change, in contrast to awards that, due to their time-limited character, do not allow for the follow up and continuous improvement afforded by certification. In terms of process, both schemes require a self-assessment and an audit of the organisation in relation to gender equality. This was perceived as a particular strength since it initiated a reflective process that not only cut across internal committees and processes but

also had the potential to engage various stakeholders within the organisation regarding gender equality. An AS user commented in relation to this:

"(The) . . . Athena SWANprocess has the strength in the process itself. The certification at the end is almost like the icing on the cake, and all of the learning happens in that reflective process looking at the attitude of the people and culture in your department and pulling it apart, and looking at it." (Interviewee 2)

TEQ users echoed that the scheme was larger than the sum of its parts, with one identifying:

" . . . an institutionalisation and reflective process regarding gender equality which transcends the established organisational channels and mechanisms as different working groups are set up." (Interviewee 3)

Both schemes were also complemented by the comprehensive and structured frameworks they provided for auditing, analysing and designing gender actions plans in both Germany and the UK. The tools used by both the Athena SWAN and TEQ were perceived as particularly flexible as they enabled the tailoring of the application and associated action plans to the specific contextual needs of not only institutional but also departmental levels as highlighted below:

"I do think the department level applications are a really key aspect of Athena SWAN and I do think they drive change because as I said before, so much depends on your local experience and what goes on in that area . . . " (Interviewee 1)

". . . it's still context flexible, [Athena SWAN] allows people to progress their work in a way that is appropriate to them while still be recognised by a nationally standardised award" (Interviewee 4)

The structured process and tools used by AS were seen as key to enable teams and institutions starting to work on gender equality because these provide a template and time constraints. As one participant explained:

" . . . without a formalised process of analysis they would be re-inventing the wheel but also it could go on forever . . . " (Interviewee 2).

AS was providing a place to start, identifying what things those actors responsible for gender change needed to consider, which was seen as important for those without much experience of gender equality work. TEQ was also perceived attractive for "new starters" in equality work since it was felt that the threshold for participation is relatively low, and it was seen as low cost with no need to involve external consultants.

Both schemes were dynamic in terms of reviewing and evaluating their scope and content. TEQ was felt to reflect recent academic developments in gender and equality research,

with the diversity add-on being seen as inspiring. One TEQ user commented:

"There is . . . room to add your own measures which fall outside the specified . . . areas—such as gender mainstreaming for example. In this sense, it provides a stage to also demonstrate and showcase your commitment to equality beyond box-ticking and standard areas of intervention . . . "(Interviewee 5)

Athena SWAN has always been primarily focused on gender and academic staff in STEM, it has expanded its scope to include professional and support staff from all academic disciplines and integrate intersectional analysis where possible and appropriate, at all levels (Bronze, Silver, Gold). The primary focus of AS on gender had served a purpose of drawing attention to entrenched gender inequalities in academia. However, during the CASPER project it was apparent that an evolution to a more intersectional approach was timely, with some participants expressing concerns about a continued, singular focus of attention and resources on gender alone with one stating that though this can be a strength, it can also be detrimental:

". . . I am also very aware that by having that focus you are taking resources away from other protected characteristics and that makes me very uncomfortable" (Interviewee 6).

One of the key strengths of Athena SWAN was the requirement to have support from the senior leadership team at departmental or university level since it will affect the application and the approach adopted as illustrated in the following quote:

"The fact that it requires senior buy-in, the first thing you read is that you have a letter from the Head of Department (HoD). That sets the tone for the whole application, the whole process, and I think without insisting on that senior buy-in that again the award would not have the strength that it does and having it linked to funding is the thing that makes people sit up . . . " (Interviewee 6).

The TEQ was also felt to offer support to actors that wished to innovate within their respective organisations, with one stakeholder saying that:

"Since the TEQ is not a box-ticking exercise but requires some investment from the organisation, it indeed is perceived as an instrument of real change . . . external feedback from TEQ in the form of the jury comments as well as through the support given by the interviewee, provides real leverage to get things going and overcome potential resistance from management." (Interviewee 3)

The AS progressive approach of Bronze, Silver and Gold awards was also seen as a strength for its ability to allow

institutions to recognise and demonstrate progress taking in different starting points, which TEQ does not have. Compared to TEQ, Athena SWAN was also favourably commented on for its potential to enable benchmarking and monitoring opportunities (in relation to its structured template) which helped institutions to have a clear focus on the key issues.

Challenges

TEQ and Athena SWAN shared two main challenges related to assessment/evaluation of applications and support/feedback mechanisms.

TEQ and Athena SWAN users highlighted a lack of transparency in evaluation in relation to criteria, but also in how the evaluation process was consistent across different applications. For example, TEQ implementers considered that the evaluation criteria were not clear in terms of what is applied by the jury to award or reject the certificate. Furthermore, little detail was provided to applicants to justify a rejection and a lack of continuity between subsequent applications. Similarly, AS users reported a misalignment of the AS principles with assessment criteria along with variation of assessment panels that led to inconsistent decisions and feedback, the latter being summarised in the following quote:

"... sometimes some of the feedback that you receive, is just like, you might put it in one application and they (the panel) might say 'oh that was really good' and then you might put it in another application and they say 'why have you done this?' And it's like well, but you said it another one that that was a good thing to do, and now in your feedback for another application you are questioning why we are doing this, so I think the consistency needs to be looked at as well" (Interviewee 7)

Linked to evaluation challenges, for both Athena SWAN and the TEQ, concerns were expressed about lack of support and guidance through the process. TEQ users identified limitations on feedback mechanisms from the jury, with assessment reviews being superficial with absence of in-depth feedback to applicants which could help them improve their efforts and actions. There were also limitations in the guidance provided, for example in what activities might be involved and how these could be implemented, with little inspiration for concrete quality work and measures in the organization.

Athena SWAN users also perceived the scheme as not supportive as illustrated by one of the interviewees:

"I think the Athena SWANis very much a 'pay us the money and we will tick some boxes and we will let you know if you have done alright.' But you will not get anything from Athena SWAN other than a certificate." (Interviewee 8)

In relation to the renewal process for both schemes, similar concerns were raised about monitoring the progress between applications. TEQ users highlighted the lack of monitoring the progress of implemented actions or achievement of targets between the first application and the *renewal* application; the application form does not provide room to detail which actions have been achieved and which ones have not. In the Athena SWAN, the previous action plan was not included in the renewal process, but applicants could refer to actions implemented or moved to the new action plan. However, this has changed in the transformed Athena SWAN charter where one of the three sections of the University Renewal Application is devoted to "Evaluation of university's progress and issues" which asks for reporting progress against previous action plan.[15]

Particular challenges were identified for Athena SWAN in relation to content. There was a need to establish a common set of key indicators (for reporting on or analysing information) and aligning data reporting in ways that avoid creating additional work. While this was sometimes amplified by the need to report intersectional data, the benefits to the Charter from a more intersectional approach were still recognised.

Linked to data collection, the administrative burden of implementing the charter was seen as a challenge, and many voiced concerns about the need to involve more men in gender equality work, as the burden for implementation "*still falls disproportionately to women*" (Interviewee 9), sometimes with a negative effect on their career progression and work life balance in alignment with previous studies (Tzanakou and Pearce, 2019; Ovseiko et al., 2017; Caffrey et al., 2016). In relation to resources and the commitment of staff, it was commented that AS could become more specific about the level of resources committed to AS in terms of budget available for also persons devoted to support application and implementation of AS. Furthermore, users identified difficulty in shifting focus from implementation of the action plan to evaluating actions and understanding impact. There were also concerns about unintended consequences of the charter, including that AS risked becoming a "box-ticking" exercise, and potentially contributing to "gender fatigue" (Kelan, 2009) in RPOs.

Impact

This reflective process raised awareness of departmental/ institutional culture and attitudes and encouraged those involved to take ownership in both schemes. In the case of Athena SWAN, it was also widely perceived as having raised awareness of gender equality issues more broadly across in the higher education sector, allowing people to feel comfortable about discussing gender matters:

"I think you would be hard pushed to find someone within our department who has not heard of Athena SWANand hasn't heard of gender equality, so I think as

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[15]More information can be found at the Transformed UK Athena SWAN Charter: Information pack for universities, available at: https://s3.eu-west-2.amazonaws. com/assets.creode.advancehe-document-manager/documents/advance-he/ AdvHE_AS%20University%20info%20pack_FINAL_1625130696.pdf

I say it has really brought it to the forefront … " (Interviewee 6)

AS users interviewed identified a wide range of impact in their institutions, including increased representation of women in senior positions and decision-making bodies–in alignment with previous research (Gregory-Smith, 2018) -, more gender-balanced shortlisting and appointments and greater investment in training for women, which improved their promotion prospects, with one interviewee confirming:

"We invest more in our training; we send women on courses like women transforming leadership. We have sent 11 women on that course and every single one has now been promoted, had significant promotion, has won significant grants since being on those courses." (Interviewee 6)

A TEQ user identified that the certification could provide a competitive advantage, and for example "… *might be attractive for attracting talent as they show that the organization is committed to equality.*" (Interviewee 5).

Respondents with experience of TEQ and AS also recognised the challenge of attributing change and impact to a specific CAS when other equality work is taking place, where organisations might already have a strong equality culture. For example, a representative of an organisation that had increased the percentage of women in leadership positions considerably noted positive developments, but were unable to demonstrate an actual causal relationship with the implementation, as "these can't really be tracked back to the certificate (TEQ) only" (Interviewee 5).

In the case of Athena SWAN, some observed that the wider community did not recognise its impact because of a lack of "branding." One interviewee, for example, recollected the following:

"So, for example in one department which is coming up to renew their silver award, obviously for silver you have to look for impact and they were talking to people and trying to see 'what do you think Athena SWAN has done?' They had one comment from I think a senior academic basically saying that 'Athena SWAN is a waste of time, I know you guys are on that committee, but I have not seen you do anything as far as I know you just write this application, you get an award, it doesn't seem to mean anything." So, they then said, 'well what about all these activities and bring your children to work day or the support for postdocs going to conferences in terms of travel funding or x, y and z'. Then the person said, 'I think all those are brilliant and great, I just did not realise that they were from Athena SWAN'. So … and sometimes I think there is an issue around….there is a discussion to be held around branding…." (Interviewee 1).

DISCUSSION

O'Connor and Irvine's work (2020) identifies the necessity of drivers at macro-, meso- and micro-levels to successfully leverage change. The success of both TEQ and Athena SWAN can be viewed within this framework. For the TEQ, endorsement at a political level and the national requirement to implement a GEP creates an environment where gender equality is a societal and business goal. In the case of Athena SWAN, a sectoral top-down response by higher education institutions in the UK was supported by the wider ecosystem when the 2010 Equality Act created expectations for proactive equalities work. While AS was slow at getting traction in the first few years after its creation in 2005, the link established in 2011 with research funding led to all UK HEIs developing an active interest in securing an award. This fostered the development of associated organisational networks and stakeholder buy-in, with structures that support the development of gender expertise. At the meso-level, organisations themselves are motivated to implement the scheme by seeking to gain a competitive advantage, for example through enhanced reputation and attracting staff. Creating this favourable environment can become a particularly desirable outcome for institutions in an increasingly marketised sector. A wider societal and organisational ethos of gender equality as the norm will, in turn, support attitudinal change in individuals at the micro-level, and empower these organisations to challenge inequalities.

A key differentiation between AS and TEQ was that the former was a sector-specific response to challenges in higher education, while TEQ targeted organisations beyond HEIs and RPOs. This had implications for the drivers and the framing as to why organisations should engage with these CAS. It was notable that the TEQ users identified the reputational and talent acquisition aspects of the award, therefore focusing on more generalised "business case" benefits, which may reflect the multi-sectoral nature of TEQ and its implementation across a non-homogeneous group of organisations. On the other hand, some drivers that were apparent for Athena SWAN, such as a shortage of women in STEMM, were not identifiable in feedback from the TEQ stakeholders (consisting of research and public administration institutions). That this was not an issue to them may be attributable to the pre-existence of a strong culture of gender equality supported by the widespread GEP implementation.

Gender equality work is dynamic and co-constructed between the macro- and meso-level as demonstrated in the two CAS compared herein. When AS was first introduced, the Bronze award (the first award in AS) was considered as having a low threshold - as with the TEQ - with the aim of recognising applicants' efforts to start collecting, analysing and reflecting on data, identifying challenges and developing the actions relevant to their institution. However, the expansion and success of institutions and departments in securing AS has led to concerns about "shifting goalposts," with a much higher threshold in terms of requirements in achieving a Bronze award (Pearce, 2017). The dissemination and exchange of knowledge on gender equality work and actions and their

subsequent adoption and transferability in different institutional contexts led to raising the bar even higher, beyond that which had been required in the past. While this was unfortunate for departments and institutions that felt let down by this process, it is important to welcome a shift in standards that contributes further to gender equality. What is important for retaining engagement and commitment, though, is to remain transparent and clear about such a shift.

In the light of the recent EC announcement that GEPs will be required for accessing Horizon Europe funding from 2022 and the possibility that these GEPs might be linked with and/or supported by a Europe-wide CAS - to mitigate any risks of off-the-shelf GEPs and box-ticking exercises - what can we learn from existing schemes such as TEQ and AS? Discussions during the CASPER fieldwork indicated that, at national level, the introduction of certification schemes to support institutions in meeting GEP criteria and advancing gender equality in a more systematic and collective way are already taking place. It is therefore helpful to identify several important learning points which could feed into the development of a Europe-wide CAS scheme.

A willingness to remain dynamic and able to evolve is key. This has been demonstrated in multiple ways through the AS and TEQ. It has been clearly illustrated by activity since the completion of the CASPER fieldwork in July 2020, since both TEQ and Athena SWAN have been working on updating their content. In June 2021, the Transformed Athena SWAN Charter was introduced with a series of questions on intersectionality being included in applications (at all levels) while in TEQ, the PDF application required is currently converted into an online portal that will not only focus on gender but will capture diversity issues as well. The Transformed Charter has relied on recommendations from a wide sector consultation and various evaluation exercises by external organisations that Advance HE procured to understand the impact of the scheme in the sector and identify ways for further improvement[16]. Stakeholders driving CAS should continuously reflect and review on whether the CAS are relevant, appropriate and responsive - e.g., continue to seek feedback from users - to the dynamic needs of organisations in relation to advancing gender equality.

A comprehensive framework with structured processes and tools was pivotal in encouraging even new starters in gender equality work to make their first steps. Flexibility and allowing for the tailoring of actions to the local context was seen as key for CAS to achieve change taking the specific needs and challenges into account, as highlighted by Ní Laoire et al. (2021). Thus, policy-makers and stakeholder organisations must ensure a balance between standardisation (structured templates, tools, processes) and flexibility to contextualise gender equality actions. This would need to be a primary consideration in the diverse landscape of organisations in the European higher education and research area for a Europe-wide scheme to be appealing and have potential to bring about change (Tzanakou et al., 2020).

Support and guidance through the certification process was seen as pivotal to help organisations to improve and learn from their efforts rather than simply focusing on how to get the award. Tailored feedback and advice to organisations was welcomed at all stages of certification, from preparing the application (e.g., how to collect and analyse data) and the design of GEP to the implementation and evaluation of activities. This support could be provided through various means such as: individuals with experience in gender equality work acting as critical friends across organisations and within communities of practice, online help desks, site visits with peers/experts (see for example Project Juno[17]), a library of actions for inspiration can all contribute to developing communities of organisations that reflect, help and learn from each other, especially for organisations with limited resources. For a Europe-wide CAS, this could take the form of potentially introducing a responsive and accessible helpdesk (national and/or EU contact points) to support and address queries and doubts, building on expanding and developing further existing communities of practice, gender experts[18] and EU-funded projects on structural change[19].

The resource-intensive character of gender equality work has been a key challenge for organisations that need to self-assess, design, implement and evaluate a GEP (Tzanakou and Pearce, 2019). Requirements for increased documentation and data collection can become burdensome (Ahmed, 2007), but equally, the impact identified by participants in the CASPER fieldwork shows that this work can lead to more than a box-ticking exercise. As this paper shows, resources are significant within the bodies that own and coordinate CAS as well. Greater resources should be allocated or redirected within the CAS to address two key challenges of applying organisations, which are: 1) resources for more feedback, tailored advice and guidance to the design, implementation and evaluation of organisational GEPs and 2) resources to ensure that evaluators of applications are appropriately trained and have transparent evaluation criteria and processes to ensure consistency and trust towards the scheme.

While interviewees identified various impacts of CAS in relation to: raising awareness on gender equality and intersectionality, stimulating discussions around the topic, increasing representation of women in senior posts and training opportunities for women, and becoming more "family-friendly," enhancing the attractiveness of the organisation, there were many challenges in attributing impact of AS and TEQ to the scheme alone. Amongst the reasons for this challenge was that activities were not always branded under the

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[16]For example, an independent evaluation into the impact and effectiveness of the Charter by Loughborough University in 2014 https://www.ecu.ac.uk/wp-content/uploads/external/evaluating-the-effectiveness-and-impact-of-the-athena-swan-charter.pdf; and In 2018, Ortus Economic Research and Loughborough University https://www.advance-he.ac.uk/knowledge-hub/impact-evaluation-athena-swan-charter-2019, the latter concluding that there was a need to streamline the application process, reduce the administrative process and increase both the consistency and transparency of the award and levels of support

[17]https://www.iop.org/about/IOP-diversity-inclusion/project-juno#gref
[18]For example, Gender Academy and ACT communities of practice
[19]Including PLOTINA and GEARING-Roles

scheme, particularly in the case of Athena SWAN. What should be noted is that the "branding" of TEQ and Athena SWAN was very successful at macro level, at national and for Athena SWAN at international level considering the adoption of the scheme in Ireland, the USA, Canada, Australia and the pilot in India. However, within institutions (meso-level) and at the micro-level, the branding seemed to be less utilised and thus less effective, increasing the challenge in identifying the benefits of the schemes compared to other initiatives and activities.

Identifying causality between actions and outcomes/impact in the context of gender equality and organisational change will remain challenging due to the complex nature of these activities. Future CAS and efforts should therefore be underpinned with logic frameworks, multiple theories of change and, more importantly, with combined expertise in the fields of organisational change, psycho-social theories, network theories, programme evaluation and many more (Laursen and Austin, 2020; Kezar, 2018).

This paper has contributed towards a better understanding of the CAS landscape, and is the first to compare CAS relating to gender and the development of comprehensive, impactful CAS that can result in structural and cultural change in organisations.

In summary, we argue that CAS should consider several key factors. Firstly, gender equality work is dynamic and co-constructed between the wider environment and the institutions responsible for its implementation and must continuously evolve. It is pivotal that CAS have flexibility in content that allows local contextualisation. Support and guidance for those implementing CAS is essential, through providing resources, training and inspiration. Those driving a CAS need to reflect regularly on the relevance and responsiveness of their schemes, preferably through consultation and evaluation. Maintaining clarity and staying transparent as these processes change are essential to keep users engaged and committed. Gender equality is a complex phenomenon to investigate, thus it requires a range of expertise coupled with comprehensive frameworks informed by theories of change to make the benefits of implementation more easily recognisable and thus enhance the confidence of users.

Limitations. The data collection comes from within a framework of RPOs, where TEQ organisations, though research-performing, are operating in a broader, business-based system when implementing the multi-sectoral TEQ award/certification. Nevertheless, the review of these schemes

and the feedback of their users, owners provide a useful framework through which to identify learning for future CAS on gender equality.

Whilst our sample is limited, this was based on the a-priori selection of participants whose role, expertise and experience with CAS enabled them to provide rich accounts from different perspectives (managing the CAS, applying to the CAS, etc). This provided expert insights into the operationalisation and understanding of CAS, which is the main purpose of this paper.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available to avoid identification of interviewees, Requests to access the datasets should be directed to ctzanakou@brookes.ac.uk.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by University Research Ethics Committee-Oxford Brookes University (L20196 study). The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

CT and KC-H have equally contributed to all sections of the manuscript. AH provided comments and edits to the manuscript.

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Professors Prioritize Increasing Female Retention in Academic Physics Over Advisee's Interests

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Decades of initiatives have striven to fix the so-called "leaking pipeline" problem—persistent high attrition of women from the career/educational path toward STEM professorship. Though these initiatives call on academics to increase female retention along this path, it remains unknown whether academics actually prioritize this goal. To investigate this, we tested whether academics would prioritize female retention at the cost of a competing goal when giving career advice to students at risk of leaving the "pipeline." We present results from a national survey in which United States professors (n = 364) responded to vignettes of three hypothetical undergraduates, rating the extent to which they would encourage or discourage each student from pursuing a PhD in physics. Professors were randomly assigned vignettes with either male or female gender pronouns. Two vignettes featured students who cogently explained why remaining in the physics pipeline would not match their individual goals and interests, while another vignette presented a student with goals and interests that clearly matched pursuing physics graduate school. Professors who received female-gendered vignettes were thus forced to choose between prioritizing striving to increase female retention in physics and acting in the best interest of the individual student. We present evidence that professors seem prepared to encourage women more strongly than men to remain in physics, even when remaining is contrary to the stated goals and interests of the student: Our logistic regression results suggest that professors have higher odds of encouraging women over men, net of vignette and other controls. We also find that male professors have higher odds of encouraging undergraduates and find no evidence that, relative to non-STEM professors, STEM professors have higher odds of encouraging women over men.

Keywords: gender bias, women in STEM, underrepresentation of women, physics, diversity, stem

1 INTRODUCTION

The metaphors we choose to describe an issue both shapes and reveals how we think about it (Morgan, 1998). In United States national reports, popular news and scholarly debate on female underrepresentation in science, technology, engineering and mathematics (STEM), the ubiquitous metaphor is the leaky pipeline (Alper, 1993; Blickenstaff, 2005; Ceci et al., 2014; NRC, 2006; IM2, 2007; Harmon, 2018; Williams and Massinger, 2016).

The metaphor captures troubling, persistent patterns of female attrition on the path toward tenured STEM professorship in the United States, with attrition conceptualized as "leaks" from the pipeline. In some fields in the United States, like physics, women have long been underrepresented at each career/educational step. Women comprise only 16% of physics faculty and leave at much higher rates than men at early stages of physics education (AIP, 2019), with only 20% of bachelors degrees in physics awarded to women (Society, 2019). Even in other STEM fields in the United States, like biology, that have made considerable progress toward gender balance, underrepresentation persists at the senior-most career milestones (Ceci et al., 2014).

A wealth of research conducted in the Western world suggests this longstanding underrepresentation is due to a thicket of entrenched injustices hindering women in STEM, causing the so-called "leaks." Stereotypes that link men but not women with scientific ability (Bennett, 1996; Bennett et al., 2007; Tiedemann, 2000), social climates unwelcoming to women (Bilimoria et al., 2008; Settles et al., 2006) and gender bias in hiring (Moss-Racusin et al., 2012; Reuben et al., 2014) are only a few such hindrances. Widespread public enthusiasm and numerous institutional initiatives have arisen in the United States to fight these injustices, especially in academia, where many scholarships, policies and workshops to support women in STEM are now common.

Although efforts to support women in STEM seek to redress the injustices responsible for underrepresentation, they often measure their success in terms of representation itself. United States universities, agencies, popular news and scholars closely track changes in female representation, celebrating gains (Hill et al., 2010; NRC, 2010; NSF, 2010; Smyth and Nosek, 2015; Kang and Banaji, 2006; Turner et al., 2008; Niederle et al., 2013; EOP, 2012; Harmon, 2018; Williams and Massinger, 2016; NAS, 2020). Scholars and reports from United States agencies and organizations highlight stagnating increases in female retention, which they cite as reasons to redouble support (AIPAAU, 2015; Kahn and Ginther, 2018; Kahn and Ginther, 2019). In this way, efforts to rectify gender injustices in STEM have created a strong imperative for everyone, and especially academics, to try to increase female retention. Given this focus on retention, the popularity of the leaky pipeline metaphor is unsurprising–the metaphor implores us to "seal the leaks."

Echoing the push to increase female representation in academic STEM, do academics prioritize "sealing the leaks?" If something is a priority, we place more importance on it than other considerations, trading off those other considerations for the sake of the thing we prioritize. "Work-life balance," for example, exemplifies this idea. What makes both "life" and "work" priorities is that we place enough importance on each of them to constantly trade-off one at a cost to the other. A clear indication that academics prioritize female retention in STEM academia would be if, when advising students on career choices, academics strive to increase female retention at a cost to a competing goal they also consider important.

When we advise someone on career/educational choices, we often prioritize that individual's best interests. It is popularly believed that the careers to which we "match" are those in our best interests to pursue (Zichy and Bidou, 2007; Christen and Bolles, 2011; Tieger et al., 2014). When seeking to "match," we fine-tune our career/educational advice with questions like "Do your interests match career X?" and "Does career X match your personal goals?" If the answer to either of these questions is no, many would move to recommend taking option X off the table for the best interests of the individual. We refer to this priority–striving to "match" individuals to career/educational paths out of the best interest of the individual–as the *matching mindset*. A strong motivation to seal the "leaks," by contrast, could propel us to keep "mismatch" career options on the table if the individual in question is a woman reconsidering plans in STEM. We refer to this goal–striving to increase female representation on the path toward tenured STEM professorship–as the *female retention mindset.*

To assess whether academics prioritize female retention, we tested whether academics would act on the female retention mindset at a cost to a competing goal–in this case, the matching mindset. The key difference between these two mindsets is this: While the matching mindset implores academics to encourage pursuing STEM academia based on to the degree to which someone–be it a male or female–seems to "match" with academic STEM, the female retention mindset implores academics to change their advice for women. In effect, a trade-off between these two mindsets would manifest as follows: Preferentially encouraging women to pursue academic STEM more than otherwise identical men across varying degrees of "match"/"mismatch" with academic STEM.

To test if academics would make such a trade-off, we used a national survey of professors (n = 364) from United States colleges and universities (Bailey et al., 2019). We presented professors vignettes of undergraduates reconsidering plans to go to STEM graduate school and asked them to rate the extent to which they would encourage or discourage the undergraduates to follow through with their plans.

To detect the female retention mindset, professors were randomly assigned male or female student vignettes. Our female vignettes depict undergraduates who are well-known as crucial "leaks": undergraduate women considering physics graduate school. The jump from college to graduate school is an important juncture on the path toward STEM professorship within the United States. This juncture marks the start of training devoted expressly to becoming an academic. For STEM fields with persistent female underrepresentation at the undergraduate level, like physics, this juncture accounts for a steep decline in female representation (Ceci et al., 2014). Physics is also a field that receives considerable resources for the purpose of increasing female representation. We, in short, presented professors with women for which the imperative to "seal the leaks" is likely strong to test whether professors would act on it.

To force a trade-off between the matching mindset and the female retention mindset, we presented each professor with three vignettes of undergraduates reconsidering physics graduate school. One vignette depicts a student who shows signs that he/she is well-"matched" to a career in academic physics. He/she has plentiful enthusiasm and merit, but, harboring unjustified self-doubt, is in need of a bit of encouragement to go to physics

graduate school. The other two vignettes describe students who show signs physics graduate school is not in his/her best interests. One undergraduate presents strong signs that he/she has permanently lost interest in physics, and the other presents a reason pursuing a physics PhD conflicts with his/her personal goals. Dead-set on becoming a physics professor, but only accepted to PhD programs unlikely to lead to professorship, he/she does not want to enroll.

Within the efforts to support women in STEM, female underrepresentation at each step on the path toward tenured STEM professorship is treated as a key metric of social progress. We reasoned that, in line with this focus on retention, female retention is a priority in the minds of academics. One clear sign academics hold such a priority would be if academics act on the female retention mindset, shaping how they advise students on career/educational choices, at a cost to a second priority that also shapes their advice. To test this, we designed our vignettes to force professors to choose between these two mindsets. We depicted two undergraduates who shows strong signs of a "mismatch" to academic physics and one undergraduate who shows strong signs of a "match," expecting to spur professors' advice toward opposite ends of the encourage/discourage spectrum and randomly assigned professors male or female vignettes. We expected that professors will have higher odds of encouraging a female undergraduate on the fence about physics graduate school than males, even accounting for whether the undergraduate in question is a "match" or not. We present this as our first hypothesis:

H1: Professors have higher odds of encouraging female undergraduates than male undergraduates, net of controls.

Studies have shown that attitudes about women in STEM differ between men and women in the United States Some work has suggested male and female STEM faculty differ as to whether they give preference to males or females in hiring decisions (Sheltzer and Smith, 2014; Williams and Ceci, 2015). Other work has shown the gender of university administrators is predictive of their preferred strategy to increase female STEM representation (Williams et al., 2017). We thus expected to find that professor gender impacts a professor's choice to encourage or discourage, stated here as our second hypothesis:

H2: The odds of a professor encouraging a given undergraduate differs between male and female professors, net of controls.

Though there is widespread enthusiasm in United States academia to support women in STEM, the STEM academy is especially rich with zeal and resources devoted to that mission. By virtue of that concentrated enthusiasm, we reasoned that the career/educational advice of STEM professors would be more closely aligned to the female retention mindset than the matching mindset, relative to their non-STEM colleagues. We thus expected to find that a professor's affiliation or lack thereof with a STEM department would influence his or her decision

to encourage. We also expected to find that, compared to non-STEM professors, STEM professors would encourage female students more often than male students, even when accounting for whether the undergraduate in question is a good "match" for academic physics or not and other predictors. We present this as our third and fourth hypotheses:

H3: Professors in STEM department(s), more than those not in STEM-department(s), have higher odds of encouraging undergraduates, net of controls.

H4: Professors in STEM department(s), more than those not in STEM-department(s), have higher odds of encouraging female undergraduates than male undergraduates, net of controls.

2 METHODS AND MATERIALS

2.1 Survey

Our contact list of professors was collected from directories on university websites from a total of 120 universities during spring 2018. To ensure our professors hailed from geographically diverse set of universities with varying levels of institutional prestige, universities were selected from United States News' 2018 lists for top public, national, liberal arts and regional universities, with 20 universities randomly chosen from each list. For this randomization, we randomly sampled without replacement from 1 to the length of the list using the sample function in R (R Core Team, 2021). Insofar as our vignettes depicted undergraduates, we surveyed professors only from departments that typically teach and work with undergraduates. (Departments of medicine and law, for example, were not used.) A total of 12,987 professors were contacted via email. Because the topic of our study–female representation in academia–could plausibly provoke social desirability bias, we veiled the precise purpose of our study, describing it as an investigation of "social influences on educational choices". We collected a total of 429 responses with a 3.3% response rate. Professors who did not complete the entire survey were excluded from the final data set, producing a final count of 364 professors. Our survey was approved by the Institutional Review Board for the Protection of Human Subjects of Le Moyne College in Syracuse, NY. We created our survey with Survey Monkey.

Respondents were presented with three vignettes, each describing the situation of a hypothetical student asking for advice. With each vignette, respondents were prompted with the question: "If you were the professor being asked for advice, to what extent would you discourage or encourage him/her to go to graduate school for physics?" ("him" and "her" set to match the gender of the vignette). To respond, they were provided a six point scale, with three possible magnitudes of each encouragement and discouragement: slightly, moderately, strongly. For each respondent, the vignette order was randomized. Respondents were randomly assigned male and

To ask for advice about graduate school, a junior physics major goes to a professor at her school. She has been planning to go to graduate school for physics for a while now, but has been having second thoughts while putting together her applications. She loves the work involved in physics and is passionate about the subject, but she frequently worries that she is not good enough at physics and the performance of other physics majors in her program is leaps and bounds better than hers. The professor, however, knows that her doubts are unjustified: She is among the top physics majors of her graduating class and her physics professors consistently praise her for outstanding work. She wants to know what the professor thinks she should do.

If you were the professor being asked for advice, to what extent would you discourage or encourage her to go to graduate school for physics?

Strongly discourage her from going to graduate school for physics	*Moderately discourage her from going to graduate school for physics*	*Slightly discourage her from going to graduate school for physics*	*Slightly encourage her to go to graduate school for physics*	*Moderately encourage her to go to graduate school for physics*	*Strongly encourage her to go to graduate school for physics*
○	○	○	○	○	○

FIGURE 1 | Example of a vignette and question pair as presented to respondents in our survey. This is the "match" vignette for a hypothetical female undergraduate. Each professor was presented vignettes of an additional two hypothetical undergraduates ("Conflicting personal goals" and "Loss of interest" vignettes). The gender of the undergraduate was randomly assigned, and all three vignettes shared the same gender.

female versions of the vignettes, differentiated only by male and female pronouns. In both cases, randomization was achieved using the built-in survey features in Survey Monkey. The gender of the vignettes was the same across all three vignettes (i.e. Each respondent was either assigned all female or all male vignettes). An example of this question and vignette pair in presented in **Figure 1**. Additionally, respondents were asked for their gender and to list the department(s) with which they are affiliated at their universities. Departmental affiliations were coded as either STEM or non-STEM, with those professors who had at least one departmental affiliation from a STEM department classified as STEM professors. In total, 113 professors worked in STEM and 251 worked in non-STEM departments; 171 were male and 193 were female.

2.2 Vignettes

Though vignettes are an imperfect tool to investigate what people believe and how they would act, our research objectives made vignettes an apt choice. We recognize that advisory conversations between professors and students are more nuanced in real life than what was captured in our survey. A professor would likely engage the student in conversation, settling on what they would advise the student only after considering many details. A professor's advice would likely be nuanced in a way that a one-dimensional scale could not capture. Ultimately, however, our objective was not to get an accurate picture of how professors act in these advisory roles. Instead, we wanted to get a snapshot of beliefs that would likely guide conversations of these sort–beliefs that would likely influence a course-grained judgment to encourage or discourage the undergraduate to remain on the STEM academic path. Indeed, vignettes are often used for this reason (Hughes, 1998)—to "clarify the judgment principles employed" in a given situation, rather than to "mirror the real world" (Rossi and Alves, 1979, p.954).

Key to our study was assessing the impact of student gender on professors' advice while accounting for how their advice was affected by whether a student "matched" to a career in academic physics or not (See introduction). Accordingly, a key dimension by which we wanted our hypothetical students to vary considerably was the degree to which each student was a good "match" for a career in academic physics. Constructing a case that most would consider a good "match" was easy to achieve with a single vignette depicting a student both exceptionally good at and enthusiastic about physics ("Imposter syndrome" vignette). What constitutes a bad "match" for a given career–and for academic physics in particular–is, however, more subjective. For this reason, we included not one, but two vignettes we judged to be cases of students who, by popular ideas of what constitutes a good "match," showed clear signs of a "mismatch" ("Loss of interest" and "Conflicting personal goals" vignettes). We reasoned that, between those two vignettes, our survey would be able to capture some of the effect of a "mismatch" on professors' choices.

We crafted our vignettes to strike a balance between two ends. First, the vignettes are meant to have enough nuance to portray students who seem realistic, so that professors could respond to them as they would to real students. Second, the vignettes needed to give readers strong reasons to interpret each student as the "match" or "mismatch" that we sought to depict. Our vignettes are shown below for the male version of the vignettes (i.e., with male pronouns). We title each vignette as the reason the given student was reconsidering physics graduate school.

2.2.1 Imposter Syndrome

To ask for advice about graduate school, a junior physics major goes to a professor at his school. He has been planning to go to graduate school for physics for a while now, but has been having second thoughts while putting together his applications. He loves the work involved in physics and is passionate about the subject, but he frequently worries that he is not good enough at physics and the performance of other physics majors in his program is leaps and bounds better than his. The professor, however, knows that his doubts are unjustified: He is among the top physics majors of his graduating class and his physics professors consistently praise him for outstanding work. He wants to know what the professor thinks he should do.

2.2.2 Conflicting Personal Goals

A senior physics major needs to make a decision about graduate school and goes to a professor at his school to ask for advice. He tells his professor that he is passionate about physics and has, for years, envisioned a career as a physics professor for himself. Unfortunately, his application was not strong enough to get him accepted into a highly ranked Ph.D. program. The one university that accepted him rarely produces graduates that go on to become professors. He expects graduate school will be a hard venture and doesn't think the struggle would be worth it if he does not go on to become a physics professor. He wants to know what the professor thinks he should do.

2.2.3 Loss of Interest

A junior physics major is having doubts about his plans to go to graduate school for physics and goes to a professor at his school to ask for advice. He is one of the top students in his class, professors consistently praise his work, and he is confident that he could handle graduate school in physics. He is concerned, however, that his enthusiasm for physics has dwindled, and that, for the past few semesters, he feels like he is just going through the motions and not enjoying his classes. He can't picture how graduate school would revive his excitement for physics. Initially, physics used to be as much as a hobby as it was his major, but now he does not touch the subject outside of his assigned coursework. He wants to know what the professor thinks he should do.

2.3 Statistical Analyses

To test our three hypotheses, we used mixed effects logistic regressions with professor's choice to encourage an undergraduate as the outcome, vignette type, undergraduate gender and professor gender as predictors, and random intercepts grouped by professor to account for each professor making multiple choices. For ease of interpretation, we exponentiated raw regression coefficients to produce adjusted odds-ratios for which we report point and interval (95% confidence) estimates. The statistical significance of individual coefficients was determined via two-tailed likelihood ratio tests (LRT) and overall model goodness-of-fit via LRTs of the target model compared with a null, intercept-only, model. All statistical analyses were performed in R v. 4.1 (R Core Team, 2021).

3 RESULTS

In this study, we aimed to assess whether academics prioritize increasing female retention on the path toward STEM professorship. As one way to detect such a priority, we sought to test if academics would strive to increase female retention at the cost of a second goal that they consider important–in this case, striving to "match" individuals to careers. Our approach, however, presumes that the professors' advice was substantially affected by whether an undergraduate showed signs of "matching" or "mismatching." In other words, that professors' advice shifted toward opposite ends of the encourage/discourage spectrum for "match" and "mismatch" vignettes. Our results suggest that our study design achieved that end. Vignette type substantially affected professors' choices. Professors almost unilaterally encouraged the "match" undergraduate ("Imposter syndrome" vignette: 98% encouragement) while their reactions were mixed to the "mismatch" undergraduates ("Loss of interest" vignette: 38% encouragement, "Conflicting personal goals" vignette: 53% encouragement).

To test our first, second, and third hypotheses, that the gender of the undergraduate and the professor's gender and departmentaliation (STEM or non-STEM) impact their choice to encourage an undergraduate, we built a mixed effects logistic regression with the professor's choice as the outcome and vignette type, undergraduate gender, and professor gender as predictors (**Table 1**). The 'match' vignette was the baseline for our model. We found that, on average professors had 47% higher odds of encouraging female than male undergraduates (OR 1.47; 95% CI: 1.003, 2.19; $p = 0.05$). Likewise, across all three vignettes, a larger proportion of professors chose to encourage female undergraduates more often than males across all three vignettes (**Figure 2**). These results also show that female professors were 43% less likely to encourage undergraduates than male professors (OR 0.57; 95% CI: 0.38, 0.83; $p = 0.004$). By the same token, for all vignettes, a smaller portion of female professors chose to encourage relative to male professors (**Figure 3**). Finally, professors affiliated with a STEM department had 300% higher odds of encouraging undergraduates (OR 3.11; 95% CI: 2.05, 4.95; $p < 0.001$).

To test our fourth hypothesis, that professors in STEM department(s) are more likely to encourage female than male undergraduates, we added to our model an interaction term between professor's department (STEM or non-STEM) and student gender (**Table 2**). However, we did not find evidence that a professor's STEM departmental affiliation increased the likelihood of encouragement for female over male undergraduates (LRT:$\chi^2 = 2.59$, df = 1, $p = 0.11$).

4 DISCUSSION

We are now decades into campaigns to create what one oft-cited national report called "an environment of encouragement" for women in STEM (Hill et al., 2010). We found evidence that, at least within academia, this project is succeeding. Our data show professors preferentially encourage undergraduate women to continue to pursue academic physics over identically described men (**Figure 2**; **Table 1**). These results echo other recent work suggesting attitudes held by STEM academics are increasingly

TABLE 1 | Logistic regression predicting whether a professor encourages an undergraduate to follow through with plans to go to physics graduate school. Professors had higher odds of encouraging if the professor was affiliated with STEM department(s), if the professor was male, when the undergraduate was a woman and when the undergraduate showed signs of "matching" with academic physics (baseline condition for the model included the one "match" vignette). The likelihood ratio test compares the target model to a null-intercept model. Number of total observations: 1,092. Number of encouraging observations: 692. Number of discouraging observations: 400. Number of respondents: 364. OR = odds ratio, P = p-value, 95% CI for OR = 95% confidence interval for odds ratio.
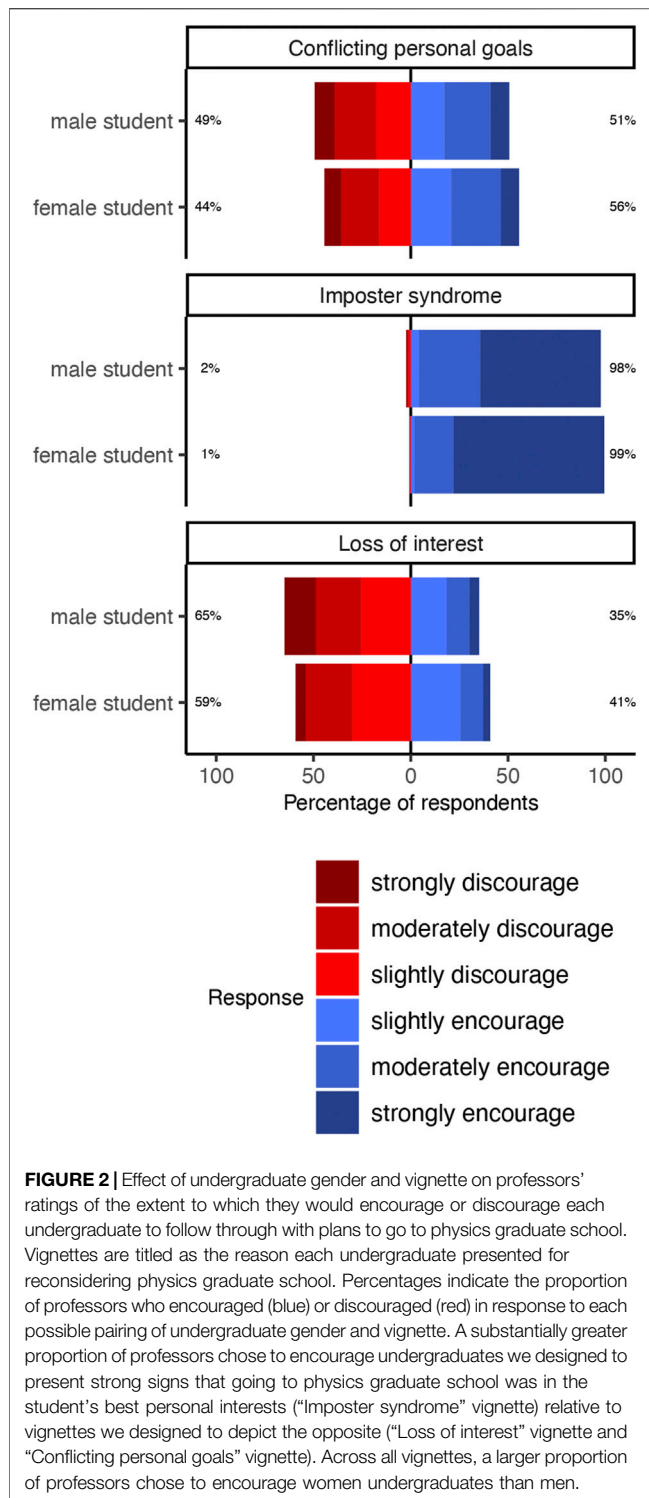
| Variable	OR	P	95% CI for OR
Vignette: Loss of interest	0.004	< 0.001	[0.001; 0.01]
Vignette: Conflicting personal goals	0.009	< 0.001	[0.003; 0.02]
Gender of student: Female	1.47	0.05	[1.003; 2.19]
Professor department: STEM	3.11	< 0.001	[2.05; 4.95]
Professor gender: Female	0.57	0.004	[0.38; 0.83]
Random effects	**SD**	—	—
Respondent ID	0.95	—	—
Overall model evaluation	$\tilde{\chi}^2$	*df*	*P*
Likelihood ratio test	448.12	5	< 0.001

FIGURE 2 | Effect of undergraduate gender and vignette on professors' ratings of the extent to which they would encourage or discourage each undergraduate to follow through with plans to go to physics graduate school. Vignettes are titled as the reason each undergraduate presented for reconsidering physics graduate school. Percentages indicate the proportion of professors who encouraged (blue) or discouraged (red) in response to each possible pairing of undergraduate gender and vignette. A substantially greater proportion of professors chose to encourage undergraduates we designed to present strong signs that going to physics graduate school was in the student's best personal interests ("Imposter syndrome" vignette) relative to vignettes we designed to depict the opposite ("Loss of interest" vignette and "Conflicting personal goals" vignette). Across all vignettes, a larger proportion of professors chose to encourage women undergraduates than men.

demographics of the STEM academy calls for trading-off other goals for making career choices. Our data show professors are willing to make such a trade-off. Professors appear to consider it an important goal to give career advice in advisees' best personal interests. It is popularly believed that those careers to which we "match" are those in our best interests, and, likewise, our data show professors' advice was strongly shaped by whether an undergraduate showed signs of "matching" or "mismatching" with academic physics (**Figure 2**; **Table 1**) (Zichy and Bidou,
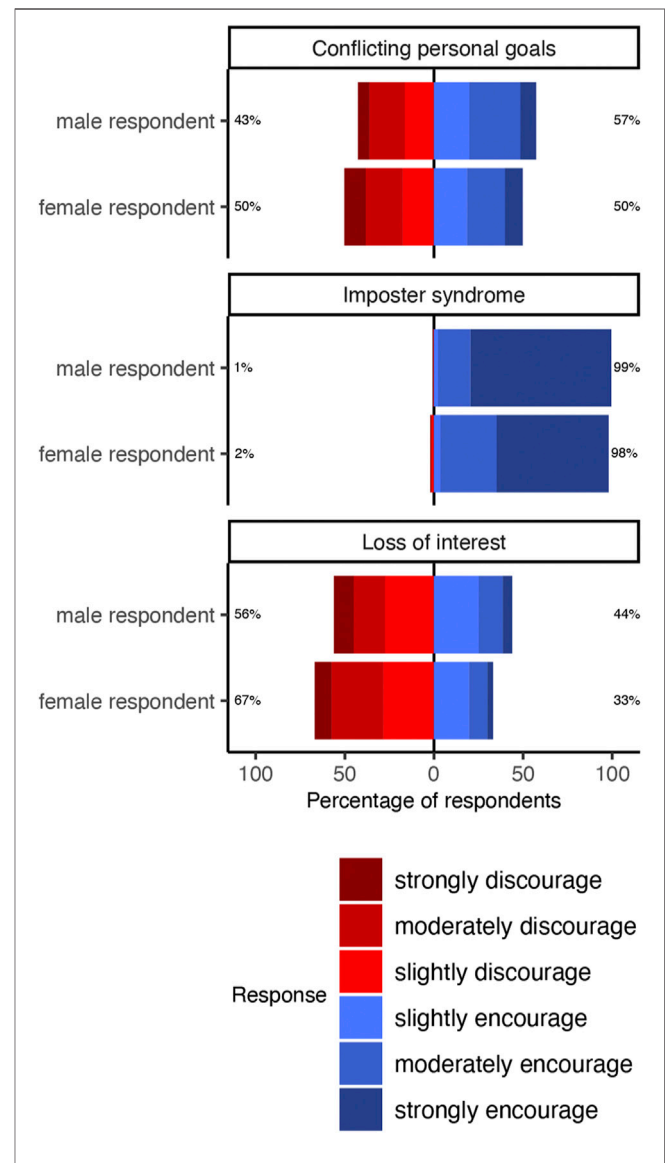
FIGURE 3 | Effect of professor gender and vignette on professors' ratings of the extent to which they would encourage or discourage each undergraduate to follow through with plans to go to physics graduate school. Vignettes are titled as the reason each undergraduate presented for reconsidering physics graduate school. Percentages indicate the proportion of professors who encouraged (blue) or discouraged (red) in response to each possible pairing of respondent gender and vignette. Across all vignettes, a substantially greater proportion of female professors chose to encourage relative to male professors.

welcoming to women–studies showing that, at least in some cases, longstanding bias in academic STEM hiring has given way to equal treatment, if not preference for women (Ceci and Williams, 2015; Williams and Ceci, 2015).

Our results suggest increasing female representation in the STEM academy is a genuine priority of professors. Reshaping the

TABLE 2 | Logistic regression predicting whether a professor encourages an undergraduate to follow through with plans to go to physics graduate school, testing for whether the effect due to whether a professor was affiliated with STEM department(s) depends on undergraduate gender. We found no evidence of a conditional effect. Predictors were identical to those used for our first model (**Table 1**), with the added interaction term between undergraduate gender and STEM/non-STEM departmental affiliation. The likelihood ratio test compares the target model to a null-intercept model. Number of total observations: 1,092. Number of encouraging observations: 692. Number of discouraging observations: 400. Number of respondents: 364. OR = odds ratio, P = p-value, 95% CI for OR = 95% confidence interval for odds ratio.

Variable	OR	P	95% CI for OR
Vignette: Loss of interest	0.004	< 0.001	[0.001; 0.01]
Vignette: Conflicting personal goals	0.009	< 0.001	[0.003; 0.02]
Gender of student: Female	1.82	0.01	[1.15; 2.95]
Professor department: STEM	4.41	< 0.001	[2.42; 8.53]
Professor gender: Female	0.558	0.003	[0.37; 0.82]
(Interaction) Gender of student, professor department	0.508	0.11	[0.22; 1.16]
Random effects	**SD**	—	—
Respondent ID	0.94	—	—
Overall model evaluation	$\tilde{\chi}^2$	**df**	**P**
Likelihood ratio test	450.71	6	< 0.001

2007; Christen and Bolles, 2011; Tieger et al., 2014). Our data also suggest professors strive to increase female retention in STEM at a cost to that goal. Female undergraduates had higher odds of receiving encouragement to pursue academic physics relative to men, net of vignette and other controls (**Table 1**).

Concretely, our results suggest that the trade-off professors are willing to make between striving to "match" and increasing female retention is this: for both undergraduates who claim they have permanently lost interest in physics and those who claim academic physics conflicts with their personal goals, professors preferentially encourage women to nevertheless pursue physics graduate school (**Figure 2**; **Table 1**). Should we be troubled that women who express such strong reasons for leaving physics are nonetheless preferentially encouraged to stay the course, compared to men who express the same reasons? Should we laud every means to "seal the leaks," including those that make us less concerned, relative to men, to help women choose careers in their best personal interests? These questions are beyond the scope of our study, but worth consideration.

In the search for strategies to support women in STEM, research has hitherto focused on how STEM academics influence women's decisions to continue on the path toward STEM professorship (Moss-Racusin et al., 2012; Milkman et al., 2015; Hill et al., 2010; Trower, 2008; Margolis and Miller, 2001; Whitten et al., 2007). STEM academics undoubtedly play an important role. We found no evidence, however, that non-STEM professors preferentially encourage undergraduate women to a lesser degree than do STEM professors (**Table 2**). In whatever ways preferential encouragement of women may be leveraged to support females in academic STEM, our work suggests non-STEM academics may be a resource. This could be valuable for diversifying the STEM academy, because many United States undergraduates who ultimately pursue STEM enter the university as undeclared or non-STEM majors. (Xie and Shauman, 2003; NAS, 2014; ACT, 2017). The non-STEM professors with whom these undeclared or non-STEM majors often interact could catalyze more women to pursue STEM.

Our study is not without limitations. First, though we sought to investigate attitudes about women pursuing STEM academia,

our vignettes only depicted undergraduates in physics reconsidering plans to continue on to a physics PhD. Attitudes may vary for other STEM fields and other junctures on the career/educational path toward STEM academia. Second, though our study necessitated that we only capture some of the effect of how professors evaluate students based whether students "match" or "mismatch," our study would benefit from a validated construct of our proposed "match" vs "mismatch" dimension (Borsboom et al., 2004; Kane, 2013). We neither know where professors perceived our vignettes to fall along our proposed dimension, nor were our vignettes designed to portray a wide array of points along this dimension. How much professors' advice shifted due to undergraduate gender, however, could be highly sensitive to the extent to which professors perceived our students to be "match" or "mismatch" cases. Indeed, studies have shown stereotypes, including gender stereotypes, most likely shape our evaluations when other criteria do not clearly suggest what conclusion we should draw (Barrantes and Eaton, 2018; Heilman, 2012), with ambiguous cases serving as "bias amplifiers" (Tetlock and Boettger, 1989). Recent research on the effects of applicant gender on STEM hiring decisions underscores the possible importance of this on our results: While one recent study found evidence of gender bias at play for candidates with a mix of application strengths and weaknesses (Williams and Ceci, 2015), another found a clear preference for female applicants between equally unmistakably strong candidates (Ceci and Williams, 2015). Without a validated "match" vs "mismatch" construct, what our results suggest about how professors place importance on female retention relative to "matching" is quite limited.

We tested only one way a priority on "sealing the leaks" could manifest within the academic community. Of course, faculty members may be eager to encourage undergraduate women to enter STEM academia, while they and the academy remain systematically and attitudinally biased against women in STEM in other ways. We hope that the evidence we found that academics preferentially encourage women to pursue physics academia more than men will help distinguish where gender bias in STEM persists and, more broadly, help the

academy fine-tune its diversity initiatives to best support women in STEM.

DATA AVAILABILITY STATEMENT

The dataset generated and analyzed for this study, as well as the code for all analyses and figures, can be found in the Harvard Dataverse at https://doi.org/10.7910/DVN/NVCCE8.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Institutional Review Board, Le Moyne College, Syracuse, NY, United States. The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

KB and DH designed research, KB and MS performed research, KB and SW analyzed data, KB, DH, SW and MS wrote the paper.

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A Meta-Analysis of Gender Differences in e-Learners' Self-Efficacy, Satisfaction, Motivation, Attitude, and Performance Across the World

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E-learning has gained popularity since the outbreak of COVID-19. This study aims to identify gender differences in e-learners' self-efficacy, satisfaction, motivation, attitude, and performance across the world. Through a meta-analysis and systematic review, this study concludes that there are generally no significant gender differences in e-learning outcomes except in a few countries. Females significantly outperformed males in Spain and the UK. In Austria, India, and mixed countries (Chile and Spain), females hold significantly more positive attitudes toward e-learning than males. In the USA, females present significantly higher self-efficacy than males. Future research into the gender issue in e-learning across the world may adopt cross-disciplinary research methods except for a meta-analysis.

Keywords: gender differences, self-efficacy, satisfaction, motivation, attitude, performance

INTRODUCTION

With the rapid development of science and technology, the new century has been witnessing growing self-efficacy, satisfaction, motivation, attitude, and performance among e-learners (Thompson et al., 2002). This significant growth has also highlighted the necessity to examine the influence of gender differences on e-learners' self-efficacy, satisfaction, motivation, attitude, and performance across the world.

Self-efficacy in e-learning, positively influencing e-learning effectiveness (Hsu and Chiu, 2004), was operationally defined as the individual evaluation of the e-learning experience and the individual ability to complete a given e-learning task (Torkzadeh and Van Dyke, 2002). Previous studies reported significant differences in e-learning self-efficacy (e.g., Chen and Tsai, 2007). Presence of males could lead to significantly higher self-efficacy than females (Baylor and Kim, 2004). Learners with higher self-efficacy could be able to obtain more knowledge by focusing on online resources, perform better by spending more time and be more motivated to engage in e-learning than those with lower self-efficacy (Pituch and Lee, 2006). Females, with lower self-efficacy, were more subject to the unskillful use of e-learning technology than males in China (Ong and Lai, 2006). Compared with males, females in China could increase their self-efficacy dependent on their family support, indicating that e-learning was closely related to social contexts of genders rather than sex itself (Chu, 2010). Motivation could also be explored since it could exert a significant influence on learning strategies (Guo et al., 2021).

Previous studies provided contradictory findings regarding gender differences in e-learning satisfaction. Motivational gender differences were generally not revealed in Malaysia (Marimuthu et al., 2013). No significant gender differences were revealed in the e-learning motivation and satisfaction although e-learning through the mobile platform—Moodle might positively influence e-learning satisfaction and motivation for both males and females in Spain and the UK (Cuadrado-García et al., 2010). No significant effect of gender and age on e-learning readiness or satisfaction was revealed in Hong Kong, China (So and Swatman, 2010). There was no significant gender difference in the e-learning motivation (Yukselturk and Bulut, 2009). There were also other studies reporting no significant gender differences in satisfaction (e.g., Ramírez-Correa et al., 2015) with and attitudes toward the e-learning approach (e.g., Hung et al., 2010) although Hong (2002) argued that gender played an important role in e-learners' satisfaction.

Nevertheless, it was reported that females, planning learning schedules and interacting with instructors more effectively, were more satisfied with e-learning courses than males among mixed participants in Spain and the UK (González-Gómez et al., 2012). Females considered e-learning effective and were thus more satisfied with it than males (Hu and Hui, 2011) although the e-learning motivation of females was significantly lower than that of males (Hu and Hui, 2011). Reverse findings were found by Lu and Chiou (2010) who reported that males were more satisfied with e-learning than females. Social presence in e-learning could improve learners' motivation and satisfaction (Thayalan et al., 2012). Males felt significantly more enjoyable and satisfied with e-learning *via* video models (Hoogerheide et al., 2016).

Previous studies arrived at inconsistent conclusions regarding the gender differences in e-learning performance (Price, 2006; Marimuthu et al., 2013). No gender differences were revealed in e-learning performance (Chen and Tsai, 2007). Gender was also considered an insignificant influencing factor in e-learning performance (Yukselturk and Bulut, 2009). Males' performance was slightly but not significantly higher than females in game-based learning (Chen et al., 2021). However, gender differences were found in the use of technology, e-instruction, technology skillfulness, and information literacy (Aydin, 2011). Besides, social presence in e-learning could decrease the dropout rate (Cobb, 2009) and improve learners' e-learning performance such as critical thinking (Garrison et al., 2000) and online communications (Danchak et al., 2001). E-learning performance was subject to several factors, e.g., motivation and learning strategies, computer competence, perceptions about discussion, critical thinking, peer learning, problem-based learning, interaction, and available help in a Chinese educational context (Zhu et al., 2009).

Gender was, however, not considered a factor that influenced e-learning performance. There was no significant gender difference in language performance, while females showed significantly higher self-efficacy than males (Harb et al., 2014). No gender difference was found in e-learning *via* video modeling examples and both males and females experienced an enhanced self-perceived competence after this e-learning model (Hoogerheide et al., 2016).

Gender differences in attitudes toward e-learning were generally insignificant although there were some different arguments. Students, whether males or females, held positive attitudes toward the e-learning platform—e-HO in China (Lee et al., 2011). Gender did not exert a significant influence on attitudes toward e-learning (Chen and Tsai, 2007). Little evidence was found regarding gender differences in attitudes toward e-learning systems (Albert and Johnson, 2011). However, significant gender differences were reported by some researchers (e.g., Jackson et al., 2001; Shashaani and Khalili, 2001). Males held more positive attitudes (Whitely, 1997) toward e-learning and Chinese learners were more voluntary to access e-learning (Ong and Lai, 2006). Male university students preferred to use e-learning compared with females (Reda and Dennis, 1992). Males held more favorable attitudes toward e-learning than females and the latter held more computer anxiety than the former (Keller et al., 2007) in Sweden and Lithuania. Females held significantly more positive attitudes toward and were more interested in e-learning medical courses with Moodle than males (Harreiter et al., 2011).

However, others found no gender differences in attitudes toward e-learning. They held that the superficial gender differences in attitudes might be caused by different social statuses, economic states, and preferences rather than sex itself (e.g., Bimber, 2000), and gender differences in the attitude were minimized with the rapid popularization of e-technologies and equally easy access to e-learning (Hanauer et al., 2004; Papastergiou and Solomonidou, 2005). For both genders, attitudes toward e-learning were positively correlated with their satisfaction in Cyprus, Thailand, and other countries (Vate-U-Lan, 2020). No significant gender differences among university faculty and students were found in attitudes toward information and communication technology-assisted learning in a university in India (Verma and Dahiya, 2016). Chinese learners' attitude toward the use of e-learning indicated the intention to use e-learning methods (Ong and Lai, 2006). No significant behavioral intention of e-learning was identified between male and female instructors in Jordan (Altawallbeh et al., 2015).

In view of different and even contradictory findings, it is necessary to meta-analytically summarize the gender differences in e-learners' self-efficacy, satisfaction, motivation, attitude, and performance across the world. The research question proposed is "are there any gender differences in e-learners' self-efficacy, satisfaction, motivation, attitude, and performance across the world?"

METHODS

This meta-analysis is implemented based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al., 2009). The review board waived the review protocol registry due to the characteristics of this study.

Eligibility Criteria

The studies will be included if they meet these criteria: (1) They focus on gender differences in e-learning outcomes rather than e-learning technology itself; (2) They are of high quality

based on University of West England Framework for Critically Appraising Research Articles (Moule et al., 2003); (3) They adopt a randomized controlled design where a control and experiment group is comparatively analyzed; (4) They can provide enough data for a meta-analysis.

The studies will be excluded if they meet any of these criteria: (1) They focus on e-learning technology itself rather than e-learning outcomes; (2) They study non-human participants; (3) They are written in a language other than English or in the English of academically lower quality; (4) They include participants fewer than nine.

Data Sources and Search Strategy

To remove duplication of this meta-analysis, the researcher searched multiple databases, e.g., the Cochrane Databases of Systematic Review, the Center for Review and Dissemination, Taylor & Francis Group, Sage Publications, Springer Nature, Web of Science, Science Direct, EBSCO, and Educational Research Complete. To include as comprehensive literature as possible, the researcher considered both published and unpublished literature written in English without time limitations. The researcher included those ranging from their inception to February 10, 2021.

The researcher adopted a three-step search strategy to include studies. Firstly, the researcher selected numerous databases such as Scopus, Taylor & Francis Group, Sage Publications, Springer Nature, Web of Science, Science Direct, Ebsco, Proquest, and Educational Research Complete. Secondly, the researcher comprehensively searched the literature by entering corresponding terms into various databases and obtained results containing a sea of literature. Thirdly, the researcher read through the literature to prevent duplication by optimizing the results.

The selection process of literature was implemented based on the PRISMA flowchart (**Figure 1**). Firstly, the obtained results were entered into the software Endnote X8 (Thomson Reuters, New York, USA) for duplication identification and removal. Secondly, two reviewers screened the irrelevant literature by perusing abstracts, keywords, titles, etc. Thirdly, both reviewers independently evaluated the literature for eligibility based on University of West England Framework for Critically Appraising Research Articles (Moule et al., 2003). Fourthly, both reviewers met together to decide the final selection. In case both reviewers could not reach an agreement on any selected literature, a third reviewer would join and determine the selection.

Quality Assessment

The University of West England Framework for Critically Appraising Research Articles (Moule et al., 2003) evaluated each article in terms of five sections, i.e., *The Introduction, the Methods Section, Ethics, the Results/Findings,* and *the Conclusions.* Each section was evaluated based on a given criterion. For example, as for the introduction part, reviewers evaluated it by proposing criteria such as whether there was a clear statement about the topic being investigated and whether there was a clear rationality for the research. As for the methods section, reviewers evaluated it based on four criteria, i.e., (1) The research design should be clearly described; (2) The research methods

FIGURE 1 | A flow chart of literature inclusion.
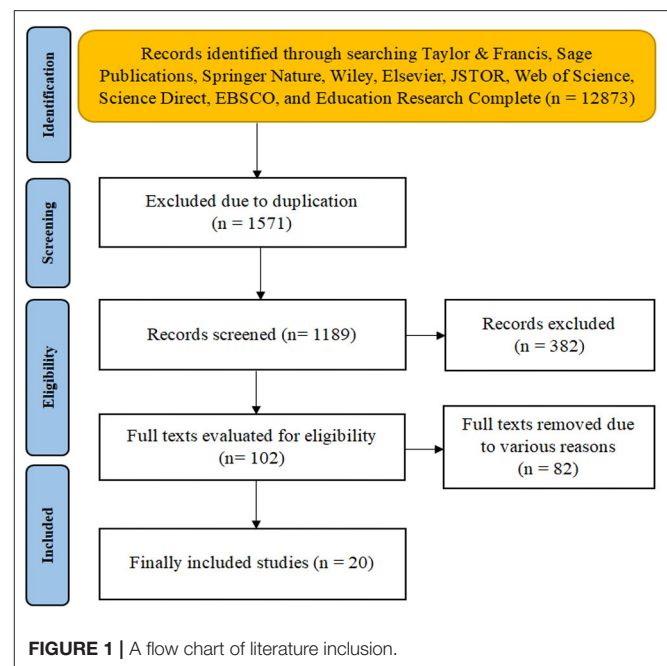
should be appropriate for the topic being investigated; (3) The researchers should acknowledge the advantages or disadvantages of the design; (4) There should be a clear statement about how the participants were selected. Each article was be scored based on the criteria. Those top-scored were included in the meta-analysis. The results/findings section required that the results be related to the literature review and the researchers acknowledge the limitations of the research design. In the conclusion section, the researchers should acknowledge the implications for future research, identify areas for further research, and propose recommendations for practice from the results or discussions.

The researcher excluded publications due to various kinds of reasons. The records ($n = 382$) were excluded due to the reasons such as no abstracts ($n = 7$), irrelevance to the educational scope ($n = 294$), non-English publications ($n = 9$), and unconvincing conclusions ($n = 72$). The various reasons for the exclusion of full texts ($n = 82$) included (1) inadequate information for a meta-analysis ($n = 27$), (2) small sample sizes ($n = 8$), (3) lack of rigid design ($n = 12$), (4) editorial collections ($n = 9$), (5) reports ($n = 12$), and (6) irrelevance to the research focus ($n = 14$).

Data Extraction

Both reviewers extracted specific data from the included studies. The extracted data included total numbers of participants, means, and standard deviations in both control and experimental groups, levels of education of participants, modes of e-learning, countries where the study was conducted, e-learning outcomes (e-learners' attitudes, motivation, performance, satisfaction, and self-efficacy), and data collection methods. In case the data were not enough for the meta-analysis, the researcher would correspond with the authors. The study would be removed if the researcher finally failed to obtain enough data for the meta-analysis. The main extracted data are shown in **Table 1**.

TABLE 1 | Characteristics of included studies.

N	References	Outcome	Data collection	Country	participant
1	Albert and Johnson (2011)	Satisfaction	Survey	USA	University students
2	Altawallbeh et al. (2015)	Attitude	Survey	Jordan	University students
3	Baylor and Kim (2004)	Self-efficacy	Test	USA	University students
4	Chu (2010)	Self-efficacy	Survey	China	Community college and senior learning center staff
5	Cuadrado-García et al. (2010)	Satisfaction	Moodle platform	mixed	University students
6	González-Gómez et al. (2012)	Satisfaction	Moodle platform	mixed	University students
7	Harb et al. (2014)	Self-efficacy	Test	Jordan	University students
8	Harreiter et al. (2011)	Attitude	Survey	Austria	University students
9	Hoogerheide et al. (2016)	Satisfaction	Test	The Netherlands	Secondary school students
10	Hu and Hui (2011)	Self-efficacy	Test	China	University students
11	Lee et al. (2011)	Attitude	e-HO platform	China	University students
12	Marimuthu et al. (2013)	Performance	Survey	Malaysia	University students
13	Ong and Lai (2006)	Self-efficacy	Survey	China	Company staff
14	Ramírez-Correa et al. (2015)	Performance	Survey	Chile/Spain	University students
15	So and Swatman (2010)	Satisfaction	Survey	China	Primary and secondary school in-service teachers
16	Thayalan et al. (2012)	Motivation	Survey	Indonesia	University students
17	Tung and Deng (2007)	Motivation	Survey	China	Elementary school students
18	Vate-U-Lan (2020)	Satisfaction	Survey	Mixed	University/secondary students
19	Verma and Dahiya (2016)	Attitude	Survey	India	University students
20	Zhu et al. (2009)	Satisfaction	Test	China	University students

Statistical Analysis

The researcher conducted the meta-analysis generally through Stata MP/14.0. Specifically, the researcher entered related data into Stata MP/14.0 to calculate standardized mean differences (SMD) or Cohen d, the lower and upper bounds of 95% confidence intervals, weights, distribution of individual studies, Q data, heterogeneity, I-squared (I^2), p values, and pooled results, which was presented by forest plots. Cohen d is calculated as the mean difference between the experimental and control group divided by the standard deviation of the learning outcome across both groups (Sedgwick and Marston, 2013).

The statistics I^2, calculated as the percentage of the total variation of all included studies, was used to measure the heterogeneity of effect sizes. The heterogeneity was considered commonly existent in different studies. Thus, the researcher measured it through Higgins and Green's criteria (Higgins and Green, 2011), i.e., the heterogeneity would be considered unimportant if $0\% < I^2 < 40\%$, moderate if $30\% < I^2 < 60\%$, substantial if $50\% < I^2 < 90\%$, and considerable if $75\% < I^2 < 100\%$. If I^2 was larger than 50%, the results would prove significantly heterogeneous. The researcher would then adopt a random-effect model to conduct the meta-analysis. If I^2 was smaller than 50%, the results would prove insignificantly heterogeneous. The researcher would thus conduct the meta-analysis using a fixed-effect model.

Z statistics was adopted to test the publication bias. The p-value being smaller than 0.05 indicated the presence of the publication bias while its being larger than 0.05 indicated the absence of the publication bias. The researcher also tested the publication bias *via* Begg's and Egger's tests through funnel plots where no-effect lines and individual studies were shown, as well as specific effect sizes and standard errors of effect sizes. The symmetric distribution of dots along the no-effect line in a funnel plot indicated the absence of the publication bias while the asymmetric distribution indicated the presence of the publication bias.

RESULTS

Study Selection

According to the PRISMA flowchart (Moher et al., 2009), the researcher obtained a total of 12,873 results from several databases, i.e., Taylor & Francis, Sage Publications, Springer Nature, Wiley, Elsevier, JSTOR, Web of Science, Science Direct, EBSCO, and Educational Research Complete. The researcher obtained 1,571 results after removing 11,302 duplicated results *via* Endnote. Two reviewers selected 1,189 results after independently screening and excluding 382 results after perusing abstracts, titles, and keywords. A total of 102 results passed the evaluation process. After removing 82 results due to various reasons such as incomplete data, improper design, and missing information, the researcher selected 20 full texts. The researcher then undertook the meta-analysis based on the included 20 studies, whose major characteristics were summarized in **Table 1**.
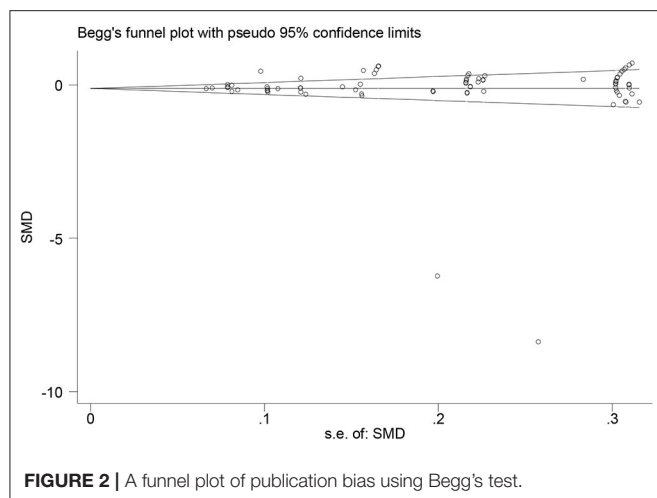
FIGURE 2 | A funnel plot of publication bias using Begg's test.

Characteristics of Studies

As shown in **Table 1**, the researcher summarized the main characteristics of included studies. The studies were conducted in various countries across the world, e.g., China, the USA, Austria, the Netherlands, Jordan, Chile, Spain, Malaysia, Indonesia, the UK, and India. The e-learning modes included a single e-learning course, multiple e-learning courses, inter-disciplinary e-learning courses, and various e-learning platforms. The educational levels of participants included university, elementary and secondary schools, and community college. The data collection methods included surveys, pre- and post-tests, a written final assessment test, e-learning platforms such as e-HO, Moodle, and online English tests. The e-learning outcomes were classified into satisfaction, attitude, motivation, self-efficacy, and performance. The included studies could be classified into peer-reviewed journal articles, conference articles, and book chapters.

Tests of Publication Bias

To enhance the reliability of the results, the researcher tests the publication bias using both Begg's and Egger's tests. As for Begg's test, the researcher tests the publication bias using "metabias _ES _seES, begg" as a command to test the rank correlation between standardized intervention effect and its standard error (data input format theta se_theta assumed). The results indicate the absence of publication bias [Kendall's Score (P-Q) = 144, Std. Dev. of Score = 227.36, z = 0.63, Pr > |z| = 0.529]. As shown in **Figure 2**, a dot indicates an individual study. The dots are distributed along both sides of the middle line non-asymmetrically, indicating the absence of publication bias.

As for Egger's test, the researcher enters the command "metabias _ES _seES, egger graph" into Stata MP/14.0 for detection of the publication bias since Egger's test can detect publication bias more sensitively than Begg's test (Egger et al., 1997). It is shown in **Figure 3** that the studies are nearly symmetrically distributed along both sides of the regression line. The researcher therefore concludes that the results indicate the absence of publication bias (t = −0.64, p = 0.523, 95% confidence interval = −3.49–1.79).

A Sensitivity Analysis

The sensitivity analysis is used to test the reliability or robustness of the meta-analysis *via* a leave-one-out method. If the leave-one-out method produces consistent results, then the meta-analysis will be considered robust or reliable. To conduct the sensitivity analysis, the researcher enters "numbers of participants, means, and standard deviations" across both experimental and control groups for the *metan-based* influence analysis. As shown in **Figure 4**, the meta-analysis estimates are all positioned between the upper and lower bounds of the 95% confidence interval if a study is omitted. The researcher, therefore, conclude that the meta-analysis results are robust or reliable.

Gender Differences in E-Learners' Self-Efficacy in Different Countries

To determine whether a random-effect or fixed-effect model was used to run the meta-analysis of gender differences in e-learners' self-efficacy in different countries, the researcher firstly tested the heterogeneity of the meta-analysis estimates *via* a forest plot through Stata/MP 14.0 (**Figure 5**).

As shown in **Figure 5**, the researcher obtains a total of 8 effect sizes to determine gender differences in e-learners' self-efficacy in different countries such as the USA, China, Jordan, and the Netherlands. Since the overall results are significantly heterogeneous ($I^2 = 70.3$, $p = 0.001$), the researcher adopts a random-effect model to conduct the meta-analysis. The diamond indicates the pooled effect of e-learners' self-efficacy between males and females in different countries. In the USA, females present significantly higher self-efficacy than males (d = −0.30, 95% CI = −0.55 to −0.06, z = 2.46, p = 0.014) since the diamond is located to the left of the no-effect line. However, no significant gender differences in e-learners' self-efficacy are shown in China (d = 0.18, 95% CI = −0.10–0.46, z = 1.23, p = 0.219), Jordan (d = −0.06, 95% CI = −0.49–0.37, z = 0.28, p = 0.778), the Netherlands (d = 0.13, 95% CI = −0.16–0.43, z = 0.88, p = 0.379), and overall results (d = 0.07, 95% CI = −0.13–0.27, z = 0.71, p = 0.478) since the diamonds all cross the no-effect line.

Gender Differences in E-Learners' Satisfaction in Different Countries

To summarize gender differences in e-learners' satisfaction in different countries, the researcher draws a forest plot using Stata/MP 14.0 (**Figure 6**).

The researcher obtains a total of 23 effect sizes to determine gender differences in e-learners' satisfaction in different countries. The researcher adopts a random-effect model to conduct the meta-analysis since the overall estimates are significantly heterogeneous ($I^2 = 57.9\%$, $p < 0.01$). No significant gender differences in e-learners' satisfaction are revealed in China (d = 0.04, 95% CI = −0.34–0.42, z = 0.20, p = 0.842), the USA (d = −0.03, 95% CI = −0.38–0.32, z = 0.15, p = 0.882), mixed countries (d = 0.06, 95% CI = −0.10–0.21, z = 0.70, p = 0.484), the Netherlands (d = 0.04, 95% CI = −0.30–0.37, z = 0.21, p = 0.832), and overall results (d = 0.05, 95% CI = −0.07–0.18, z = 0.81, p = 0.421) since all of their diamonds cross the no-effect line.
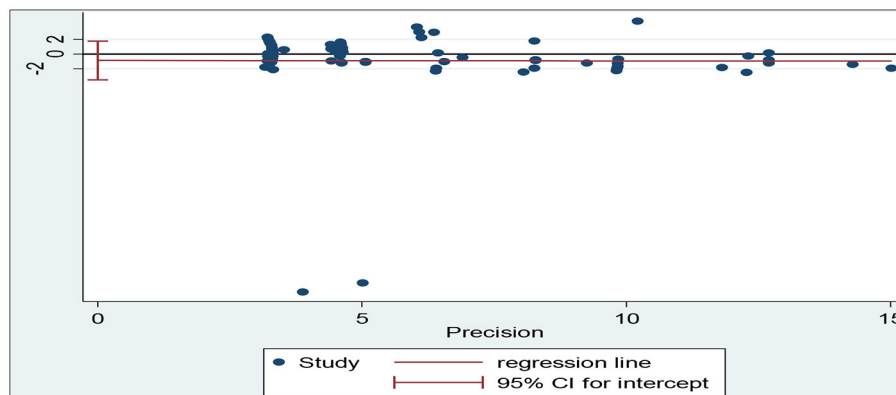
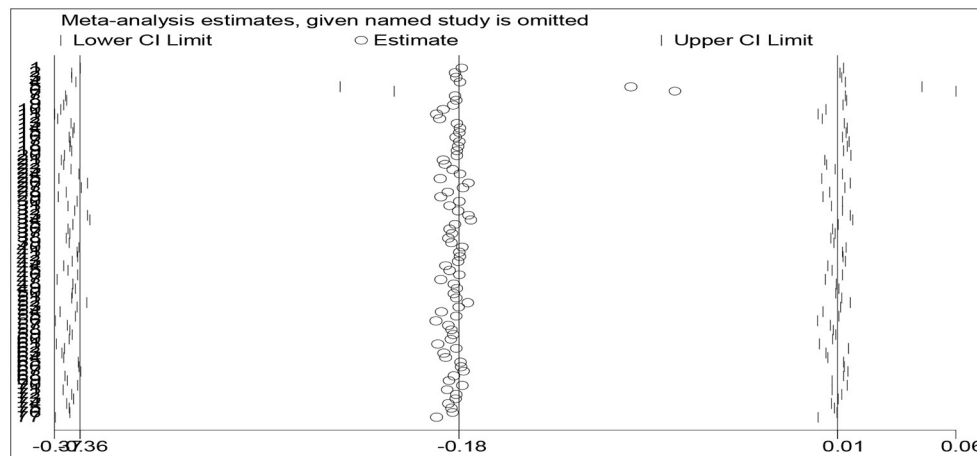**FIGURE 3 |** A plot of publication bias using Egger's test.

FIGURE 4 | A plot of sensitivity analysis.

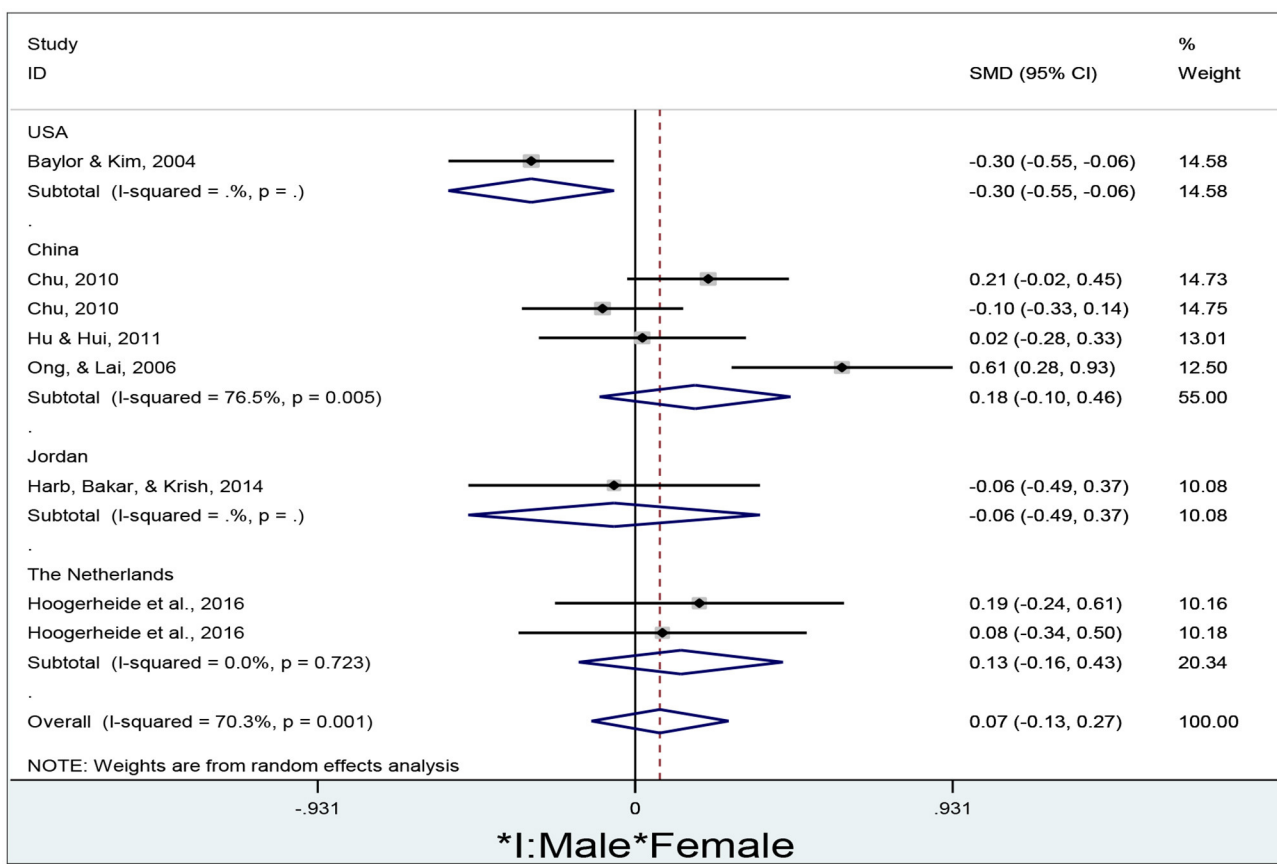## Gender Differences in E-Learners' Motivation in Different Countries

To examine the pooled effect of gender differences in e-learners' motivation in different countries, the researcher draws a forest plot using Stata/MP 14.0 (**Figure 7**).

The researcher obtains a total of 12 effect sizes to examine e-learners' motivation in different countries. Since the overall results are significantly heterogeneous ($I^2 = 52.0\%$, $p = 0.018$), the researcher adopts a random-effect model to conduct the meta-analysis. No significant gender differences are found in e-learners' motivation in mixed countries ($d = 0.07$, 95% CI = -0.21–0.35, z = 0.46, $p = 0.645$), China ($d = 0.15$, 95% CI = -0.46–0.76, z = 0.49, $p = 0.623$), Malaysia ($d = -0.20$, 95% CI = -0.59–0.18, z = 1.02, $p = 0.306$), Indonesia ($d = 0.17$, 95% CI = -0.38–0.73, z = 0.61, $p = 0.540$), and overall results ($d = 0.07$, 95% CI = -0.14–0.27, z = 0.63, $p = 0.527$) since all of their diamonds cross the no-effect middle line.

Gender Differences in E-Learners' Attitude in Different Countries

To examine gender differences in e-learners' attitude in different countries, the researcher drew a forest plot using Stata MP 14.0 (**Figure 8**).

The researcher obtained a total of 20 effect sizes to summarize the gender differences in e-learners' attitude in different countries. A random-effect model was adopted to run the meta-analysis since the overall results are significantly heterogeneous ($I^2 = 99\%$, $p < 0.01$). No significant gender differences in e-learners' attitudes are found in the USA ($d = -0.29$, 95% CI = -0.90–0.32, z = 0.94, $p = 0.346$), Jordan ($d = -0.07$, 95% CI = -0.35–0.22, z = 0.45, $p = 0.65$), and China ($d = 0.09$, 95% CI = -0.08–0.26, z = 1.05, $p = 0.292$) since their diamonds all cross the no-effect middle line. However, females' attitudes are significantly higher than males' in Austria ($d = -7.30$, 95% CI = -9.40 to -5.21, z = 6.83, $p < 0.01$), India ($d = -0.14$, 95% CI

FIGURE 5 | Gender differences in e-learners' self-efficacy in different countries.

= −0.23 to −0.05, z = 2.92, *p* = 0.004), mixed countries (d = −0.17, 95% CI = −0.25 to −0.09, z = 3.94, *p* < 0.01), and overall results (d = −0.74, 95% CI = −1.22 to −0.26, z = 3.04, *p* = 0.002) since all of their diamonds are located to the left of the no-effect middle line.

Gender Differences in E-Learners' Performance in Different Countries

The researcher obtained a total of 14 effect sizes to determine gender differences in e-learners' performance in different countries (**Figure 9**).

The researcher adopted a fixed-effect model to conduct the meta-analysis since the overall results are not significantly heterogeneous (I^2 = 24.4%, *p* = 0.19). No significant gender differences in e-learners' performance are revealed in the USA (d = −0.56, 95% CI = −1.18–0.06, z = 1.78, *p* = 0.075), Jordan (d = −0.05, 95% CI = −0.48–0.38, z = 0.23, *p* = 0.822), the Netherlands (d = 0.12, 95% CI = −0.09–0.34, z = 1.13, *p* = 0.259), China (d = −0.08, 95% CI = −0.27–0.12, z = 0.78, *p* = 0.435), and Malaysia (d = −0.21, 95% CI = −0.48–0.06, z = 1.51, *p* = 0.131) since their diamonds all cross the no-effect middle line. However, female performance is significantly higher than male in mixed countries (d = −0.22, 95% CI = −0.41 to

−0.03, z = 2.27, *p* = 0.023), and overall results (d = −0.10, 95% CI = −0.20–0.00, z = 2.00, *p* = 0.046) since their diamonds are located to the left of the no-effect middle line.

DISCUSSION

The findings of this study are generally consistent with previous research (e.g., Bimber, 2000; Baylor and Kim, 2004; Pituch and Lee, 2006; Chen and Tsai, 2007; Yukselturk and Bulut, 2009; González-Gómez et al., 2012; Marimuthu et al., 2013). As for e-learners' self-efficacy, no significant gender differences have been revealed in all of the countries except the USA. Baylor and Kim's study (2004), conducted in the USA, concluded that females had significantly higher self-efficacy than males in the e-learning context. Female agents (around 61%) greatly outnumbered males (around 39%), which might have caused gender bias. The agents, merely representing gender-specific features, might have led to results different from the real human participants although agents did play an important role in e-learning experiments. Participants working with female agents might have been positively influenced by their soft, encouraging voice and image, followed by enhanced self-efficacy.
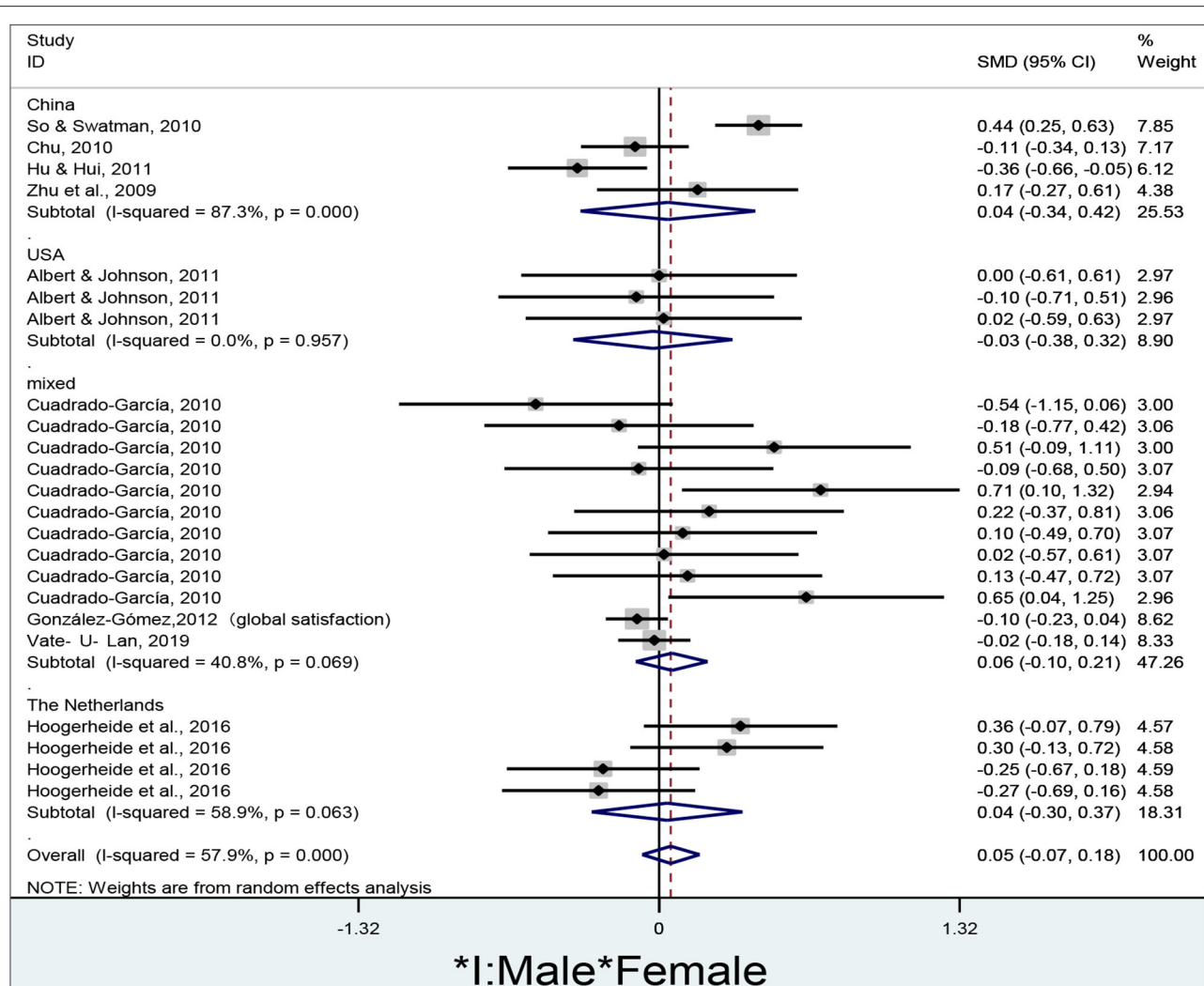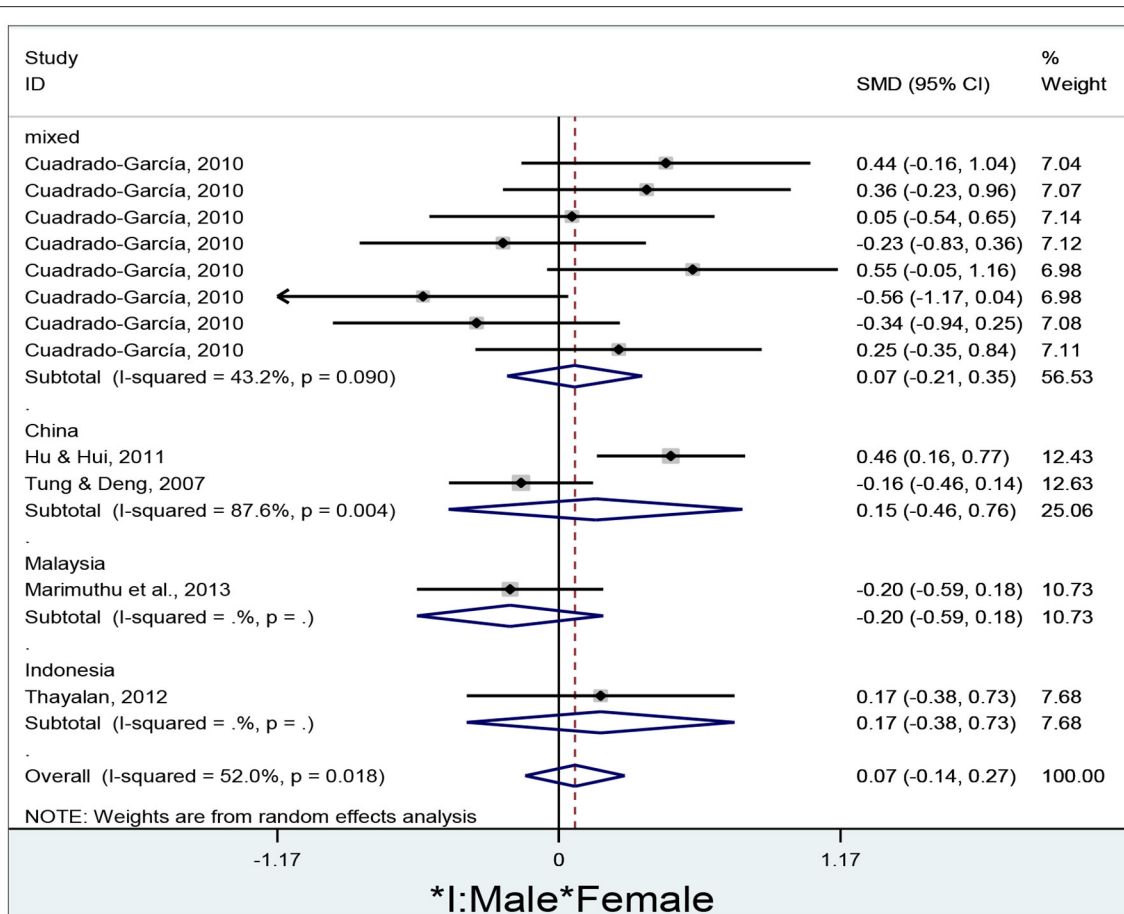
FIGURE 6 | Gender differences in e-learners' satisfaction in different countries.

The researcher did not find any significant gender difference in e-learners' satisfaction in different countries. E-learning, as an innovative learning method, drew many learners' attention whether they were biologically male or female. It could bring great convenience to them through the advanced information technologies. Learners did not need to carry any heavy learning materials with them and they could engage in learning wherever and whenever they wanted to. Through e-learning platforms, they could swiftly transfer a huge amount of data and easily had access to learning resources. They could also enhance their satisfaction with e-learning through frequent interactions with peers or teachers to solve difficult problems and arrange their learning activities. Teachers could gather enough data regarding students' feedback and decide teaching progress accordingly. This could improve both teachers' and students' satisfaction with the information technology-assisted pedagogical approach.

No significant gender differences in motivation were revealed among e-learning participants. In the e-learning environment,

learners could manage their learning activities on their own. E-learning activities were no longer limited by the physical classroom and the face-to-face teacher. They could establish learning goals, select learning contents, and determine learning styles based on their own preferences. E-learning provided unprecedented learning resources and created an innovative learning environment, where learners were greatly motivated to join the learning activities since they could conveniently learn *via* various kinds of apps, texts, videos, audios, and technologies. The e-learning environment also bridged the gap of communication through online collaborations. Learners could seek help from peers and resort to teachers for enquiry of difficult questions at will. They could also determine the learning progress and styles based on their own preferences, rather than limited to a certain style or progress. In this way, their learning motivation was improved whether they were female or male.

In the USA, Jordan, and China, there were no significant gender differences in the attitudes toward e-learning. Since both
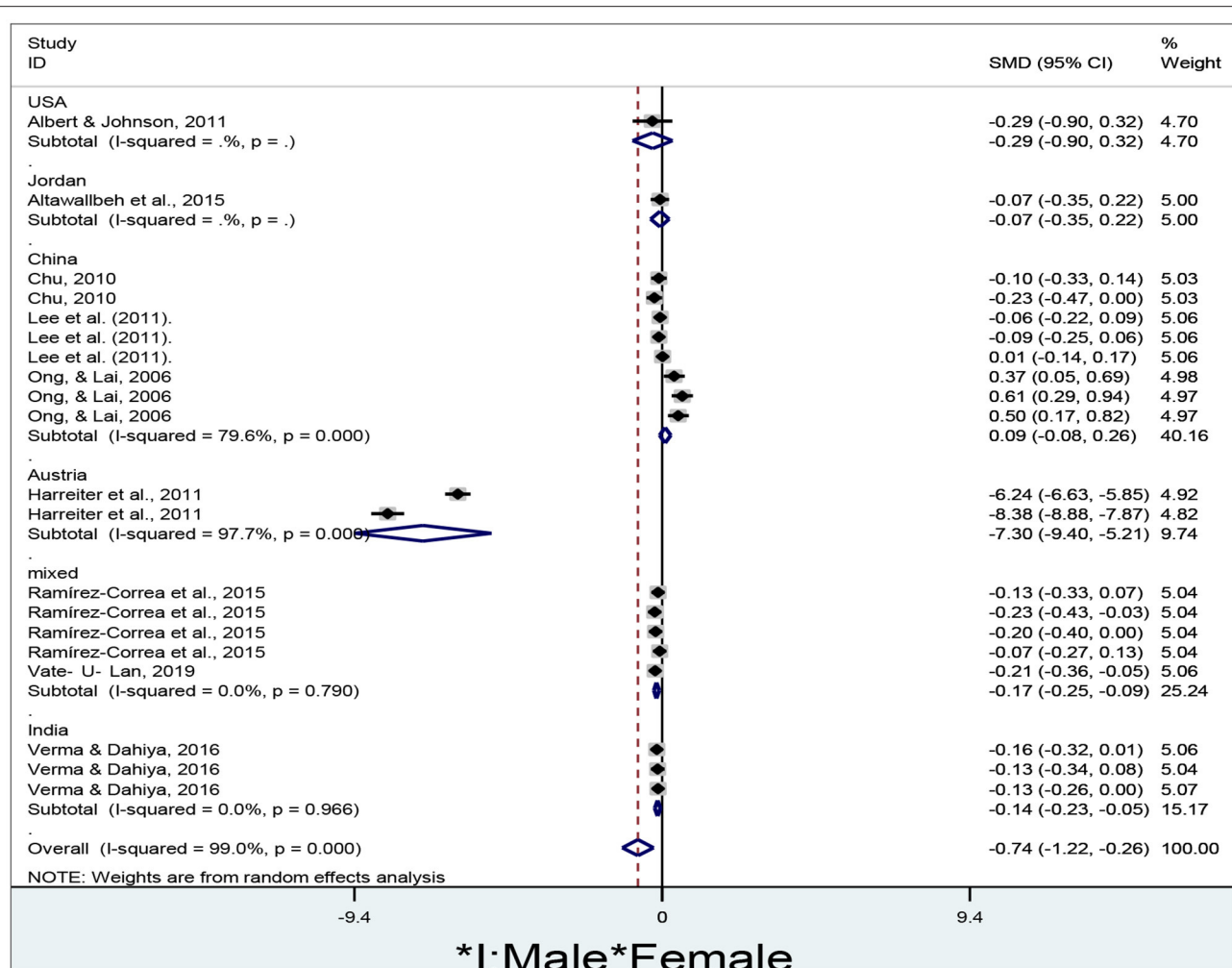
FIGURE 7 | Gender differences in e-learners' motivation in different countries.

genders held positive attitudes toward e-learning, designers and teachers might not need to cater the e-learning approach to a specific gender but to other demographics such as economic status (Albert and Johnson, 2011). When designing the e-learning strategy, teachers could comprehensively consider the age and experience of Internet use to popularize and improve the effectiveness of the use of e-learning approaches (Altawallbeh et al., 2015). Although no significant gender differences in attitudes were found toward e-learning, both genders held lower levels of communication self-efficacy (Chu and Tsai, 2009). Communication skills, different from simple clicking, surfing, or glimpsing, might need complicated cognitive involvements such as coordination of finger and eye movements and mental processing (Chu, 2010).

However, in Austria, India, and mixed countries (Chile and Spain), females held significantly more positive attitudes toward e-learning than males. Females might join or initiate more communications with peers and teachers, hold more social presence, and thus feel more satisfied with e-learning activities, followed by more positive attitudes than males who sought information rather than communication using the Internet (Johnson, 2011; González-Gómez et al., 2012). Males, mostly

aiming at personal success and higher social status, were isolated from their peers and involved in critical thinking although psychological researchers proved no gender differences in their mental inborn feedback to surroundings (Salomone, 2007). The e-learning platform could provide learners with a large number of resources and opportunities, where females showed significantly more intense interest in gender issues which were criticized by males (Harreiter et al., 2011). Females might spend more time examining contents through the e-learning approach, leading to more positive attitudes than their male counterparts.

In general, females more positively evaluate e-learning than males since the pooled diamond is situated to the left of the no-effect line (**Figure 8**). Submerged in abundant information in the e-learning platform, females could be more interested in their favorite issues such as gender-related learning materials while males aimed to seek information beneficial to their purpose. Females might concentrate more on the interesting issues than males who aimed to seek information that could improve their social status. Concerning learning issues, females might show more interest than males since the former aimed at gender-based learning issues and acquired knowledge through communication and social presence while the latter aimed at social rank issues

FIGURE 8 | Gender differences in e-learners' attitude in different countries.

(Harreiter et al., 2011). Males were distracted by a sea of information in case they could not find the information they needed. In the e-learning context, males were more likely to present personal information representing their social status, while females were more likely to enjoy the benefits of social networking when social information was reduced. Females paid more attention to learning and social process and less attention to members of a learning community than males (Flanagin et al., 2002). This might enhance female attitudes toward e-learning and reduce male positive evaluation of an e-learning method.

Significant gender differences in e-learning performance were found among students at the London School of Economics (the UK) and University of Valencia (Spain) (Cuadrado-García et al., 2010). Females significantly outperformed males. As the authors mentioned, females greatly outnumbered males, which might have caused bias in results. The researcher failed to reveal any gender difference in e-learners' performance in other countries such as the USA, the Netherlands, Jordan, Malaysia, and China. The new decade has been witnessing the dramatic development

of information technologies. Both males and females nowadays have equally convenient access to e-learning approaches in most of the countries across the world. Both genders performed similarly but in the e-learning process, males paid more attention to the competitiveness in the course, while females regarded the virtual classroom as an opportunity for online cooperative learning and cherished the cooperative e-learning environment (Arbaugh, 2002). Different preferences might have offset their different performance levels and caused insignificant gender differences in e-learning performance.

The e-learning environment could greatly facilitate discussion and opinion sharing, which could promote efficient information exchange and cultivate social relations between males and females (Wang et al., 2007). Social constructivists (e.g., Derry et al., 2000) argued that discussion and opinion sharing could help learners construct high-quality knowledge structures. Through an appropriate teaching design, teachers could encourage students to solve difficult problems and facilitate active debates by gathering them online. Through frequent
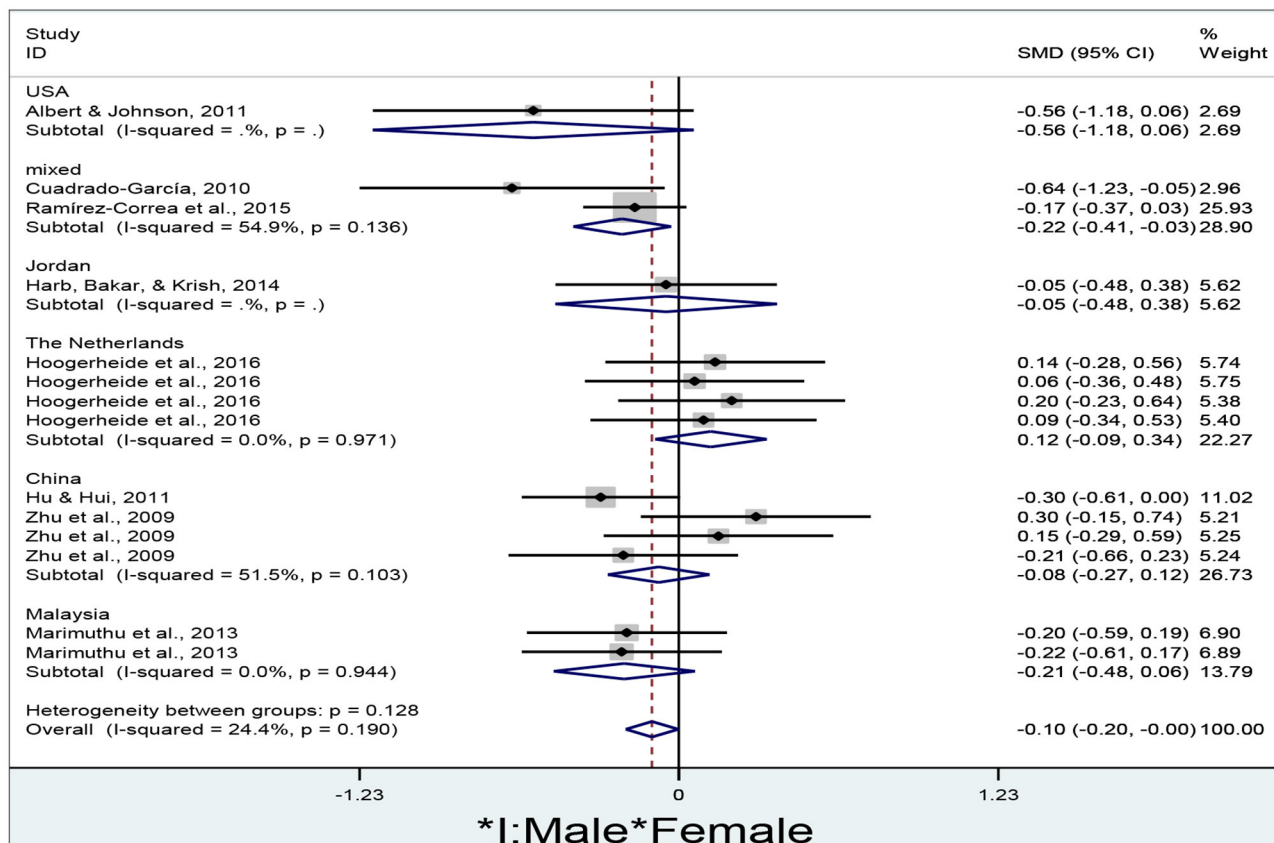
FIGURE 9 | Gender differences in e-learners' performance in different countries.

interactions and intentional organization of the teacher, balanced numbers of males and females could form an effective learning community under the supervision and guidance of the teacher, where both males and females could mutually assist for knowledge acquisition. Discussion and opinion sharing could bridge the gap of communication between males and females. They could increase their knowledge and improve their social skills, conducive to favorable e-learning performance. Different characteristics of both genders might have offset the originally different performance levels through the interactive process in the e-learning process.

CONCLUSION

Major Findings

This study, including 20 high-quality publications, meta-analytically examined gender differences in e-learning outcomes, e.g., e-learners' self-efficacy, satisfaction, motivation, attitude, and performance across the world. Generally, there are no significant gender differences in e-learning learning outcomes. Specifically, exceptions are that females significantly outperformed males in Spain and the UK, that in Austria, India, and mixed countries (Chile and Spain), females hold significantly more positive attitudes toward e-learning than males, and that in

the USA, females present significantly higher self-efficacy than males. The popularity of information technologies among males and females may have played an important role in minimizing gender differences in e-learning outcomes.

LIMITATIONS

While this study is rigidly designed based on the PRISMA flow process, there are still several limitations. Firstly, this study merely includes publications written in English, which may have caused publication bias. Secondly, this study cannot include all of the literature due to the limitation of the library resources. For instance, we did not obtain the data from MDPI, Frontiers, Dove Press, preprint servers, PubMed, etc. Thirdly, the included studies may have biases themselves, which may have caused bias in results. Among the 20 included studies, 14 studies are solely on university students. This may indicate the potential bias of the included studies.

Future Research Directions

Future research may adopt other methods to identify gender differences in the e-learning environments except for a meta-analytical review. The gender-sensitive method in sentimental analysis can also be considered to study gender differences in

e-learning since it can identify gender differences by providing immediate information of emotions (Usart et al., 2022). The analysis of posts in an online discussion forum is also a reliable method to provide plentiful resources for the research into gender differences in e-learning since it is a frequently used tool to transmit information and provide peer comments (Ogange et al., 2018). A Unified Theory of Acceptance and Use Technology model can be constructed to study gender differences in e-learning to provide references for policy makers and course designers (Alghamdi et al., 2022).

In the future, gender differences in e-learning can be examined *via* interdisciplinary cooperation such as sociology and computation. During and after the COVID-19 pandemic, future research into e-learning will be conducive to social equity and development. Future research could focus on how to provide high-quality support for the male e-learners (Noroozi et al., 2022) to improve social equity, especially in the countries where female e-learners outperform males. Gender differences and preferences can be seriously considered when multimedia technology is adopted in the e-learning process (Wang and Hung, 2022), which needs the cooperation of the computation field. In the future, more digital tools can be developed and designed to transform the traditional learning to e-learning and to bridge the digital gender gap in the e-learning era (Palomares-Ruiz et al., 2020).

Future research can also investigate the factors that may be under the influence of gender differences in e-learning. Students' perceived personalized learning support, academic achievement, and behavioral intention may significantly be influenced by gender differences in e-learning (Wongwatkit et al., 2020). E-learning designers can pay enough attention to this finding and take effective measures to minimize this gender effect. Motivation and academic achievements can more significant influence girls than boys (Hermes et al., 2021). Teachers can adopt different teaching strategies to motivate different genders. Future research

can extend and leverage the effects of gender differences to maximize the e-learning effectiveness and efficiency.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

ZY: conceptualization, design, writing, editing, and analysis. XD: writing, editing, and analysis. All authors contributed to the article and approved the submitted version.

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The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2022.897327/full#supplementary-material

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