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# Interventions on gender equity in the workplace: a scoping review

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## Abstract

**Background** Various studies have demonstrated gender disparities in workplace settings and the need for further intervention. This study identifies and examines evidence from randomized controlled trials (RCTs) on interventions examining gender equity in workplace or volunteer settings. An additional aim was to determine whether interventions considered intersection of gender and other variables, including PROGRESS-Plus equity variables (e.g., race/ethnicity).

**Methods** Scoping review conducted using the JBI guide. Literature was searched in MEDLINE, Embase, PsycINFO, CINAHL, Web of Science, ERIC, Index to Legal Periodicals and Books, PAIS Index, Policy Index File, and the Canadian Business & Current Affairs Database from inception to May 9, 2022, with an updated search on October 17, 2022. Results were reported using Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension to scoping reviews (PRISMA-ScR), Sex and Gender Equity in Research (SAGER) guidance, Strengthening the Integration of Intersectionality Theory in Health Inequality Analysis (SIITHIA) checklist, and Guidance for Reporting Involvement of Patients and the Public (GRIPP) version 2 checklist.

All employment or volunteer sectors settings were included. Included interventions were designed to promote workplace gender equity that targeted: (a) individuals, (b) organizations, or (c) systems. Any comparator was eligible. Outcomes measures included any gender equity related outcome, whether it was measuring intervention effectiveness (as defined by included studies) or implementation. Data analyses were descriptive in nature. As recommended in the JBI guide to scoping reviews, only high-level content analysis was conducted to categorize the interventions, which were reported using a previously published framework.

**Results** We screened 8855 citations, 803 grey literature sources, and 663 full-text articles, resulting in 24 unique RCTs and one companion report that met inclusion criteria. Most studies (91.7%) failed to report how they established sex or gender. Twenty-three of 24 (95.8%) studies reported at least one PROGRESS-Plus variable: typically sex or gender or occupation. Two RCTs (8.3%) identified a non-binary gender identity. None of the RCTs reported on relationships

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between gender and other characteristics (e.g., disability, age, etc.). We identified 24 gender equity promoting interventions in the workplace that were evaluated and categorized into one or more of the following themes: (i) quantifying gender impacts; (ii) behavioural or systemic changes; (iii) career flexibility; (iv) increased visibility, recognition, and representation; (v) creating opportunities for development, mentorship, and sponsorship; and (vi) financial support. Of these interventions, 20/24 (83.3%) had positive conclusion statements for their primary outcomes (e.g., improved academic productivity, increased self-esteem) across heterogeneous outcomes.

**Conclusions** There is a paucity of literature on interventions to promote workplace gender equity. While some interventions elicited positive conclusions across a variety of outcomes, standardized outcome measures considering specific contexts and cultures are required. Few PROGRESS-Plus items were reported. Non-binary gender identities and issues related to intersectionality were not adequately considered. Future research should provide consistent and contemporary definitions of gender and sex.

**Trial registration** Open Science Framework <https://osf.io/x8yae>.

**Keywords** Scoping review, Gender, Equity, Employment, Occupational health

## Summary box

### What is already known on this topic

- Our previous large scoping review of gender equity interventions within academic health research identified more than 560 studies published over 50 years, showing tremendous research interest in gender equity.

### What this study adds

- This study summarizes the evidence from extensive review and synthesis of randomized evidence on gender equity interventions within workplace settings and shows that such interventions largely succeed and elicit mostly positive conclusions across a variety of outcomes, such as improving academic productivity and increased self-confidence and self-esteem.
- Many different outcomes were used to examine the effectiveness of gender equity interventions, suggesting that standardized outcome measures are required that consider specific contexts and cultures.
- Equity variables beyond sex or gender, or occupation, such as race/ethnicity, religion and age, are under-reported, and notably sex/gender is neither reliably defined, nor are definitions consistently provided. Sex/gender terminology is conflated, and intersectionality is rarely considered. More comprehensive reporting and standardization aligned with growing community expectations for a range of equity variables are needed.
- These results can be utilized by researchers, funders, peer reviewers, and journal editors to both enhance, and establish, consistent reporting of gender equity research. More importantly, the find-

ings can be used to inform the development and implementation of interventions to enhance gender equity in the workplace.

## Background

Ahead of the 2023 International Women's Day, the United Nations Secretary General stated that "gender equality is growing more distant with estimates from other organizations (UN Women) placing it 300 years away" [1]. This suggests that the United Nations Sustainable Development goal five to "achieve gender equality and empower all women and girls" is getting further out of reach [2]. Furthermore, a recent report (2022) from the Melinda French Gates Foundation estimated that it will be 100 years until gender equality is fully realized [3, 4]. If women were equal participants, it is estimated that the global economy would grow by almost US \$30 trillion per year [5]. Women are being left behind in the workplace, and in vital sectors, including in science and technology [1]. Women are also under-represented in leadership positions with 70.0% of health worker jobs held by women, yet only 25.0% of senior leadership positions held by women [6]. Solutions are needed to address the observed gender gap [1].

Recently, we published a large scoping review, including more than 560 studies over a 50-year period, focused on examining gender equity within academic health research [7]. Most studies (65.0%) did not report how gender or sex were determined/defined or they interchanged/conflated the terms of sex and gender, and all studies classified gender as a binary variable [7]. Gender is a social construct and as such is constantly in flux. Gender encompasses concepts such as gender roles and gender identity, which are important to consider when we look at gender equity. Sex is a biological construct, which encompasses anatomy, physiology, genes, and hormones. Sex impacts how we are labeled in society, and in research, it is common to adopt a binary understanding

of man/woman, which can compromise the validity and generalizability of findings [8]. In our previous research, only three studies mentioned the intersection of gender and other variables [7]. Few studies reported the PROGRESS-Plus equity variables (i.e., place of residence, race/ethnicity/culture/language, occupation, gender/sex, religion, education, socioeconomic status, or social capital) [9], such as race/ethnicity (11.4%), religion (0.2%), and age (7.3%) [7]. Our review concluded that interventions to achieve gender equity in academia and in all workplace settings that account for actual lived experience are required [7].

This scoping review sought to summarize the evidence from randomized controlled trials (RCTs) on gender equity interventions within any workplace setting. Scoping reviews provide a high-level summary of the evidence within a concept (here it is gender equity interventions) and are useful for highlighting definitions, characteristics, and factors related to that concept [10]. As such, additional objectives were to determine whether any interventions considered the intersection of gender and other variables [11, 12] and if any studies reported the PROGRESS-Plus equity variables [9]. A scoping review approach was used, as our research question was broad, and our goal was to identify and catalogue the evidence on workplace gender equity interventions from randomized trials [13].

## Methods

### Protocol

A protocol was developed using guidance on scoping review protocols [14, 15]. The JBI (formerly Joanna Briggs Institute) guidance for scoping reviews [13] informed the conduct of this scoping review. The protocol for this scoping review was registered with Open Science Framework (<https://osf.io/x8yae>). Team demographics and positionality are reported in the previous publication [7]. Prior to beginning this review, a self-reflective equity exercise was completed [16] to create an inclusive and respectful space for the team to openly share and contribute to the project. Knowledge users from multiple organizations engaged in all aspects of this scoping review. Review results are reported using all relevant reporting guidance: Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension to scoping reviews (PRISMA-ScR [17]; Additional file 1: Appendix 1), Sex and Gender Equity in Research (SAGER) guidance [18] (Additional file 1: Appendix 2), Strengthening the Integration of Intersectionality Theory in Health Inequality Analysis (SIITHIA) checklist [19] (Additional file 1: Appendix 3), and Guidance for Reporting Involvement of Patients and the Public (GRIPP) version 2 checklist [20] (Additional file 1: Appendix 4).

### Literature search

The literature search was developed by an experienced librarian (BS) and peer-reviewed by another librarian using the Peer Review of Electronic Search Strategies (PRESS) checklist [21]. Electronic databases MEDLINE, Embase, PsycINFO, Cumulated Index to Nursing and Allied Health Literature (CINAHL), Web of Science, Education Resources Information Center (ERIC), Index to Legal Periodicals and Books, Public Affairs Information Service (PAIS) Index, Policy Index File, and the Canadian Business & Current Affairs Database were searched from inception to May 9, 2022. To ensure that all gender equity literature search terms were adequately captured, an updated literature search was executed on October 17, 2022, on all databases except for in MEDLINE, Embase, PsycINFO, and CINAHL. The literature search strategies for all databases can be found in Additional file 1: Appendix 5. Unpublished and grey literature was searched using the Canadian Agency for Drugs and Technologies in Health (CADTH)'s Grey Matters guidance [22]. A full list of grey literature sources is provided in Additional file 1: Appendix 6. Conference abstracts and dissertations identified through our literature search were screened for eligibility, and attempts were made to locate corresponding publications. Reference lists of all included trials and related reviews [7, 23–45] were manually scanned for additional trials of interest.

### Eligibility criteria

#### Population

Adults of any gender aged 18 years and above in any employment or volunteer sector, such as academia, government, education, or business.

#### Intervention

Any intervention designed to promote gender equity that targeted: (a) individuals (e.g., training in diversity, unconscious bias, mentorship, or coaching), (b) organizations (e.g., policies designed to address gender inequity, workplace code of conduct, or implementation of equity, and diversity and inclusion action plan at the government level), or (c) systems (e.g., legislation to publicly report salaries, legislation to mandate equitable representation on committees, or pay equity).

#### Comparator

Any comparator was eligible, including no comparator or usual practice.

### Outcome

Any outcome related to gender equity, such as change in attitude, bias, and/or awareness.

### Study designs

Only RCTs or quasi-randomized controlled trials were included.

### Other

No restrictions were applied based on study year, language of dissemination, or study duration.

A screening form (presented in Additional file 1: Appendix 7) was developed based on pre-defined eligibility criteria. The reviewers completed a training exercise using 50 citations to ensure adequate agreement was achieved. After completing one training exercise (achieving 75.0% agreement), all remaining titles and abstracts identified in the search were screened independently by expert pairs of reviewers (AP, HM, OC, PAK, RW, RR, VN). Discrepancies were resolved by a third reviewer.

Similarly, a training exercise (Additional file 1: Appendix 8) was completed for screening of full-text articles, using 20 articles. Two training exercises were necessary (achieving 65.0% and 85.0% agreement, respectively). The screening form was then revised for clarity and full-text articles were assigned to independent pairs of reviewers (AP, HM, OC, PAK, RW, RR, VN). Discrepancies were consistently resolved by a third reviewer (AP). A glossary of key terms that guided the team is in Additional file 1: Appendix 9.

### Data abstraction

A data abstraction form (Additional file 1: Appendix 9) was created to capture data on the following items: study characteristics (e.g., country of conduct, country economy levels, settings), population characteristics (e.g., gender, sex, age), intervention characteristics (e.g., intersectionality, sample size, duration of intervention), and outcomes (e.g., culture change, number of publications). To capture outcomes relevant to equity, the PROGRESS-Plus criteria were used [9]. Additional relevant outcomes included intersectionality theory (defined as “an analytic framework and research paradigm that consider the ways in which connected systems and structures of power operate across time, place, and societal levels to construct intersecting social locations and identities (e.g., along axes such as race, gender, class, and sexual orientation, among others [19])), definitions (if any) of sex and gender by the authors, and changes in sexism, self advocacy, and financial autonomy. Full data abstraction was completed by independently by two reviewers (AP, VN, PAK, HC, RW, RR, and OC), with discrepancies solved by a third reviewer (AP).

### Analysis and presentation of results

Review findings were summarized descriptively using summary tables, figures, and text. As recommended in the JBI guide to scoping reviews [13], only high level content analysis was conducted to categorize the interventions, which were reported using a previously published framework [46]. Conclusion statements from each included trial were classified into one of four main categories: (positive, neutral, negative, and indeterminate [47]). The conclusion statements from the included articles were categorized by one team member (AP) and verified by another (ACT). When hypothesizing the benefit of an intervention (vs. a comparator), conclusion statements were classified as: positive (i.e., non-statistically significant positive, and statistically significant positive with an associated  $P$ -value  $< 0.05$ ); neutral (effect size between 0.95 and 1.05 and the confidence interval (CI) crosses 1); negative, namely, there is an effect in favor of the nonintervention comparator (i.e., statistically significant negative with an associated  $P$ -value  $< 0.05$ , and non-statistically significant negative), or indeterminate (i.e., not able to judge; e.g., the article lists 10 primary outcomes, all of which have different results). Since this was a scoping review, a formal sex and gender-based analysis was not conducted in keeping with JBI guidance for scoping reviews [13].

### Patient and public involvement

A public partner, defined using the Canadian Institutes of Health Research glossary [48], was involved in this project from the outset (Additional file 1: Appendix 4). The public partner came from her lived experience as a woman in the workplace (EZ) and provided input and feedback on the protocol, title, and abstract screening form, full-text screening form, and final manuscript. The burden for the public partner was assessed from the outset to be no more than 2 h per month, which was agreed upon by the partner in advance. Our team uses a compensation policy that was co-produced by patient and public partners, policy-makers, healthcare providers, and researchers [49]. To support dissemination, the research team prepared and disseminated monthly progress reports to all authors for the project duration. We acknowledged our public partner's contribution by including her as an author, and the team will involve the public partner in the development of the dissemination plan to access groups and forums the research team may not be aware of.

### Results

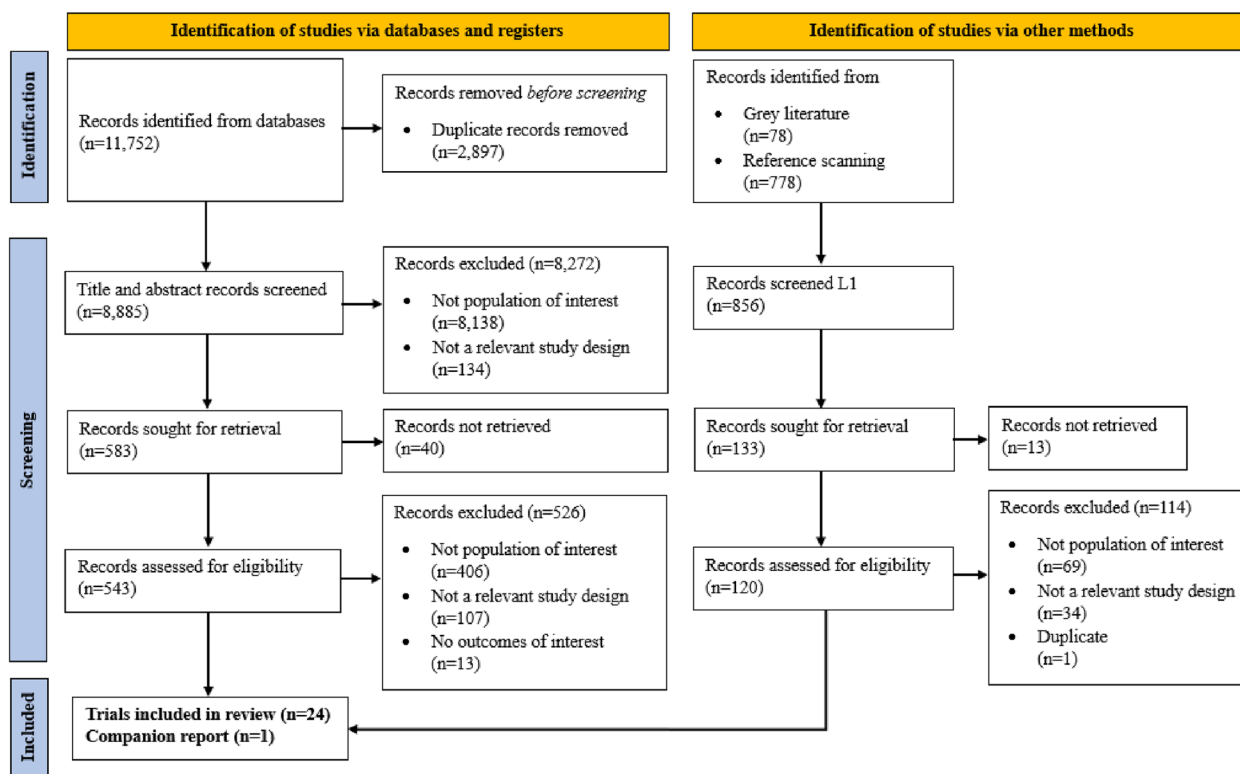
After screening 8855 citations from the electronic database searches, 803 extracts from grey literature searches, as well as 663 full-text articles, 24 unique trials [23–45]

(including 3 from the grey literature and 3 from included study reference scanning), and 1 companion report [34] (i.e., publications that provided supplementary material to the main trial publication) fulfilled inclusion eligibility criteria (Fig. 1). Brady 2015 included data on two studies which were considered as unique trials [42]. One trial within Huis 2019 was classified as a companion report as it was unclear if the sample was independent from another trial within the same article [34]. All included studies were published in English. A list of studies that were closely related to the inclusion criteria but ultimately excluded is provided in Additional file 1: Appendix 10.

**Study characteristics**

Most trials were RCTs randomized at the participant level ( $n=18$ ) [24–39, 41, 42, 45] and four were randomized at the cluster level [23, 40, 43, 44], while the remaining two were quasi-randomized RCTs [26, 36]. The trials were published between 1979 and 2022, with over 50.0% published since 2017. Trials were predominantly conducted in the USA ( $n=13$ ). Seventeen of the included trials were conducted in high-income countries (HICs) [23, 24, 26–28, 30–33, 35, 37–39, 41, 42, 45], 2 in middle-income countries (MICs) [25, 43],

4 in lower-middle income countries (LMICs) [29, 34, 40, 44], and one in a combination of LMICs and MICs [36]. Trials were set in workplaces spanning various sectors, including eight in the academic or educational sectors [23, 26–28, 30, 39, 41, 42], five in microfinance [33–35, 43, 44], one in healthcare [45], five in corporate [24, 31, 32, 37, 42], three where the workplace setting was either not clearly described or fictitious [25, 29, 40], one in a military workplace setting [38], and one in a forestry workplace setting [36]. Trials conducted in MICs and LMICs were primarily microfinance initiatives where the focus was on increasing the involvement of women in household finance decisions or expanding their small businesses with their husbands. The setting was multi-site in 12 trials [23, 25, 28, 29, 31, 35, 36, 38, 40, 43–45], single site in 10 trials [24, 26, 27, 30, 33, 34, 37, 39, 42], and 2 trials did not report sufficient information to determine the site setting [32, 41]. Nineteen were directed at the individual level [24–27, 29–31, 33–44], 3 at the organizational level [23, 42, 45], and 2 at both the individual and organizational levels [28, 32]. Further details on the included trials as well as the companion report are available in Additional file 1: Appendix 11.



**Fig. 1** PRISMA flow diagram

**Table 1** Summary of study and participant characteristics

Characteristics	Number (%)
Study characteristics (n = 24 trials)	
Year of publication	
1979	1 (4.2%)
2007	1 (4.2%)
2012	1 (4.2%)
2015	5 (20.8%)
2017	4 (16.7%)
2018	2 (8.3%)
2019	6 (25.0%)
2020	1 (4.2%)
2021	1 (4.2%)
2022	2 (8.3%)
Geographical region	
Burkina Faso	1 (4.2%)
Japan	1 (4.2%)
Kenya	1 (4.2%)
Norway	1 (4.2%)
Republic of Ireland	1 (4.2%)
Multi-country	1 (4.2%)
Norway	1 (4.2%)
Sri Lanka	1 (4.2%)
Uganda	1 (4.2%)
UK	1 (4.2%)
USA	13 (54.2%)
Vietnam	1 (4.2%)
Study design	
Cluster RCT	4 (16.7%)
Quasi RCT	2 (8.3%)
RCT	18 (75.0%)
Setting	
Multi-site	12 (50.0%)
Single site	10 (41.7%)
NR	2 (8.3%)
Participants characteristics	
Total # participants	14,798
Median number of participants (range)	247 (23.0–4356.0)
Mean % Female- participants(range)	69.1 (13.2–100.0)
Age (mean/median)	
≤ 40 years	6 (25.0%)
> 40 years	5 (20.8%)
Not reported	13 (54.2%)
Studies reporting on PROGRESS items <sup>a</sup>	
Place of residence	5
Race/ethnicity	9
Occupation	18
Gender/sex	20
Religion	3
Education	10
Socioeconomic status	6
Social capital	0

RCT randomized control trial, NR not reported

<sup>a</sup> Multiple categories reported per study

### Participant characteristics

The total number of participants was 14,798 across all RCTs (Table 1). The median number of participants was 247 across the RCTs, ranging from 23 to 4356 participants (Additional file 1: Appendix 12). The average proportion of participants reported as being females or women was 69.1%. At least one element of the PROGRESS-Plus criteria was reported in 96% of the RCTs (23/24 or 95.8%; Table 1, Additional file 1: Appendix 13). Most RCTs reported the gender/sex (20/24 or 83.3%) and occupation (18/24 or 75.0%) of the included participants. Nine (37.5%) trials reported race/ethnicity, ten (41.7%) reported on education, five on place of residence (20.8%), six on socioeconomic status (25.0%), and three (13.0%) on religion. No RCTs (0%) reported other elements of PROGRESS-Plus, namely, culture, language, social capital, disability, age, features of relationships (e.g., whether or not an individual had children or aging parents under their care), and time-dependent relationships (e.g., new hires, people coming back from a leave of absence, people with time-limited contracts.)

Most RCTs did not explicitly report a definition of sex or gender (20/24, 83.3%) (Additional file 1: Appendix 14). Most RCTs also used gender terms (i.e., man/woman) interchangeably with sex terms (i.e., male/female, 22/24, 91.7%). Four trials (4/24, 16.7%) provided a definition of sex or gender [33, 35, 39, 40]; of those, one trial provided a definition for both terms. One trial (4.2%) did not conflate sex and gender terminology [35]. Four (16.7%) RCTs reported gender as a variable defined as man/woman [27, 32, 37, 38], and in these cases, it was unclear how this was determined. Five (20.8%) RCTs reported that gender was determined through self-identification via questionnaire [24, 28, 33, 35, 45]. Nine (37.5%) RCTs focused on interventions targeting females or women [23, 25, 34, 41–45]. Two RCTs specifically identified non-binary gender beyond [28] man/woman with categories including “transgender”, “queer/non-binary”, and “other” [35]. All RCTs failed to report proportions of their participants according to their gender identities or roles.

One RCT (4.2%) explored the intersection of gender and race in their analysis reporting—reflected as white men and white women compared to “minority men” and “minority women” [28]. None of the other RCTs reported on intersectionality or the intersection of gender with other variables.

### Intervention characteristics

A pre-existing framework was used to categorize the interventions (Table 2; Additional file 1: Appendices

**Table 2** Summary of intervention outcomes and results

Author, year	(Level of intervention focus) Intervention category	Outcome categories addressed	Abstract conclusion
Bapna, 2021 [37]	(Individual)	(vii) Networking measures	Positive
Bates, 2019 [33]	(Individual) (ii) Behavioural or systemic changes	(ii) Addressing bias or changes in biases outcome measures (iii) Workplace culture outcome measures	Positive
Brady, 2015 [42] (Two studies are reported in this article)	Study 1: (Organizational); Study 2: (Individual) (ii) Behavioural or systemic changes	(iii) Workplace culture outcome measures	Negative
Bulte, 2017 [25]	(Individual) (iv) Increased visibility, recognition, and representation interventions (v) Creating opportunities for development, mentorship, and sponsorship interventions (vi) Financial support interventions	(i) Microfinance outcome measures	Positive
Chinen, 2017 [40]	(Individual) (ii) Behavioural or systemic changes	(ii) Addressing bias or changes in biases outcome measures (vi) Education outcome measures	Neutral
Cook, 2019 [36]	(Individual) (ii) Behavioural or systemic changes	(iv) Gender equity outcome measures	Positive
Dahl, 2018 [38]	(Individual) (ii) Behavioural or systemic changes	(iv) Gender equity outcome measures	Positive
Ginter, 2020 [41]	(Individual) (iv) Increased visibility, recognition, and representation interventions	(v) Academic workforce outcome measures (viii) Academic output outcome measures	Positive
Grisso, 2015 [23]	(Organizational) (iii) Career flexibility interventions (iv) Increased visibility, recognition, and representation interventions	(iii) Workplace culture outcome measures (viii) Academic output outcome measures	Positive
Huis, 2019 [34]	(Individual) (iv) Increased visibility, recognition, and representation interventions (v) Creating opportunities for development, mentorship, and sponsorship interventions (vi) Financial support interventions	(i) Microfinance outcome measures	Positive
Huis, 2019 [43]	(Individual) (iv) Increased visibility, recognition, and representation interventions (v) Creating opportunities for development, mentorship and sponsorship interventions (vi) Financial support interventions	(i) Microfinance outcome measures	Positive
Ismayilova, 2017 [44]	(Individual) (ii) Behavioural or systemic changes (iv) Increased visibility, recognition, and representation interventions (vi) Financial support interventions	(i) Microfinance outcome measures	Positive
Matsutaka, 2022 [24]	(Individual) (ii) Behavioural or systemic changes	(ii) Addressing bias or changes in biases outcome measures (vi) Education outcome measures	Positive
O'Meara, 2018 [28]	(Individual/organizational) (i) Quantifying gender impacts (ii) Behavioural or systemic changes (iv) Increased visibility, recognition, and representation interventions	(iii) Workplace culture outcome measures	Positive
Paek, 2022 [32]	(Individual/organizational) (iii) Career flexibility interventions	(iii) Workplace culture outcome measures	Positive
Peterson, 2019 [27]	(Individual) (ii) Behavioural or systemic changes	(v) Academic workforce outcome measures	Positive
Rivera, 2019 [26]	(Individual) (ii) Behavioural or systemic changes	(ii) Addressing bias or changes in biases outcome measures	Positive

**Table 2** (continued)

Author, year	(Level of intervention focus) <i>Intervention category</i>	Outcome categories addressed	Abstract conclusion
Shankar, 2015 [29]	(Individual) (iv) <i>Increased visibility, recognition, and representation interventions</i> (vi) <i>Financial support interventions</i>	(i) <i>Microfinance outcome measures</i>	Positive
Smith, 2015 [30]	(Individual) (ii) <i>Behavioural or systemic changes</i>	(iv) <i>Gender equity outcome measures</i>	Positive
Warren, 2017 [35]	(Individual) (ii) <i>Behavioural or systemic changes</i>	(ii) <i>Addressing bias or changes in biases outcome measures</i> (vi) <i>Education outcome measures</i>	Positive
Webb, 2012 [31]	(Individual)	(iv) <i>Gender equity outcome measures</i>	Positive
Wiseman, 1979 [39]	(Individual)	(iv) <i>Gender equity outcome measures</i>	Positive
Woolnough, 2007 [45]	(Organizational) (iv) <i>Increased visibility, recognition, and representation interventions</i> (v) <i>Creating opportunities for development, mentorship, and sponsorship interventions</i>	(iii) <i>Workplace culture outcome measures</i>	Positive

15–16) into six groupings [46]. The same trial could be categorized into multiple intervention categories. One trial focused on (i) *quantifying gender impacts* by making data (reported by gender) publicly available on work activity in an academic department [28]. Fifteen trials [24, 26–28, 30, 31, 33, 35–40, 42, 44] focused on (ii) *behavioural or systemic changes*, such as recognizing the need for gender equity solutions at the organizational level [27, 28, 36], use of gender-neutral language in recruitment and requests for proposals [30, 42], and use of quotas in terms of number of women and providing training on gender bias [36, 38]. Two trials examined (iii) *career flexibility interventions* [23, 32] such as one trial addressing work–family conflict and another trial examining development of flexible scheduling. Nine trials examined (iv) *increased visibility, recognition and representation interventions*, whereby six studies [23, 25, 34, 41, 43, 44] helped foster careers through interventions to promote manuscript writing in academia and targeted business training in the private sector. In addition, three trials examined leadership programs [28, 29, 45], and one examined role models [41]. Regarding (v) *creating opportunities for development, mentorship and sponsorship interventions*, three trials examined career advising plans [25, 34, 43], and one examined a peer mentoring program [45]. Finally, concerning (vi) *financial support interventions*, four of the included trials focused on microfinance [25, 29, 34, 43, 44]. Of these, three trials focused specifically on females/women [25, 34, 43]. Microfinance studies were included and reported separately as they reported on gender equality and aim to increase gender equality and reduce gender discrimination.

### Outcome frequencies

Across the 24 included trials, there were 254 outcomes reported (Additional file 1: Appendix 17) that we organized into eight categories: (i) *microfinance outcome measures* were reported 69 times in five (20.8%) trials [25, 29, 34, 43, 44] and typically included measures such as business knowledge, sales and profits totals, goal setting, and self-esteem regarding microfinance interventions. Regarding (ii) *addressing bias or changes in biases outcome measures*, these included use of various scales such as the Neo-sexism scale [33], as well as self-reporting of reductions in implicit homophobia or transphobia [24] biases. Addressing bias or changes in biases outcomes were reported 53 times in five (20.8%) trials [24, 26, 33, 35, 40]. Next, (iii) *workplace culture outcome measures* included changes in work self-efficacy, hours worked per week, and perception of workplace fairness. Workplace culture outcomes were reported 52 times in six (20.8%) trials [23, 28, 32, 42, 45]. Concerning (iv) *gender equity outcome measures*, these included number of women short-listed or interviewed for positions, gender attitudes, and female leadership attitudes. Gender equity outcomes were reported 30 times in 20.8% (5/24) of studies [30, 31, 36, 38, 39]. Outcome category (v) *academic workforce outcome measures* included metrics such as tenure stream jobs, tenured positions, and overall teaching evaluations. Academic workforce outcomes were reported 16 times in 8.3% (2/24) studies [27, 41]. Category (vi) *education outcome measures* included measures pertaining to knowledge and comprehension of the subject matter, as well as increased knowledge of terminology



and concepts. Education outcomes were reported 12 times in three (12.5%) trials [24, 35, 40]. Outcome category (vii) *networking measures* included new contacts established and number of LinkedIn connections created after a conference or event. Networking classed outcomes were reported 12 times in 4.2% (1/24) studies [37]. Finally, (viii) *academic output outcome measures* included accruing data about individuals in terms of publications, funding, and other productivity measures. Academic output outcomes were reported 10 times in two (8.3%) of trials [23, 41].

#### Conclusion statements (from included studies)

Overall, most conclusion statements according to the abstract “bottom line” were categorized as being positive (21/24, 87.5%), meaning that there was an effect of the intervention. One conclusion statement was categorized as neutral (4.2%) [40] and two as negative (8.3%) [42]. No conclusion statements were presented as being indeterminate.

#### Discussion

Our comprehensive scoping review on gender equity interventions in the workplace found that although there may be widespread awareness of issues related to gender (in)equity, that while research interest is building over time, very few intervention studies are examining the gender gap through randomized trials [7], the most methodologically rigorous experimental design. Many of the studies involved a single specific place [38], such as a specific university [23, 30], or a specific conference [37], or questionnaire [27]; and almost all were exclusively held in a specific country. As such, the global reach and scope of gender equity issues has been largely neglected.

In this scoping review, most of the studies come from the USA, yet there is a need for understanding of these issues globally, as workplace culture is not universal across countries. An intervention that is effective in one place may not show the same effectiveness elsewhere. Studies on gender equity in the workplace were conducted sporadically in a handful of other HICs and LMICs. The interventions examined in LMICs focused mostly on getting women more involved in household finance decisions or expanding their small businesses with their husbands. In contrast, the interventions from high-income countries did not focus on the family unit.

A major finding of our scoping review is the lack of standardized methods, outcomes, and definitions in this area and indicate that future research is warranted to standardize this research area. To foster common reporting in this field of gender equity research, we suggest adoption of at least minimal reporting standards around

data pertaining to patient characteristics, interventions, and outcomes. We consider definitions of sex and gender to be particularly important, as well as explicit reporting of how sex and gender as variables are determined (i.e., medical reporting, self-reporting), if the variables are only considered as binary characteristics, etc. In terms of minimal reporting standards where equity is concerned, we suggest abiding by the PROGRESS-Plus criteria. Where that is not possible, reporting of education, occupation, race/ethnicity, and economic class, are suggested as bare minimums. Regarding reporting of interventions and outcomes—organization into classes or categories based on previous frameworks is encouraged. Despite the development of tools such as SAGER [18], to support and guide equity reporting, RCTs on gender equity interventions have largely failed to meet these reporting standards. We did not find any improvement over time in reporting.

An additional finding was the lack of rigor associated with sex- or gender-related reporting. Gender, a social variable such as man or woman, was often used interchangeably with the biological variable of sex in the literature we examined. Although definitions were provided in some cases, gender and sex terms were still conflated. Furthermore, just one trial [28] reported on intersectionality in describing their study population by examining gender with race/ethnicity. Other equity variables such as religion, age, or socioeconomic status were variably reported, and not in an intersectional way.

A major strength of this scoping review was the involvement of a public partner on the project who had lived experience with the topic area. By involving this individual, the team contextualized the results using their expertise and experience. According to the GRIPP-2 checklist, facilitators to the engagement need to be discussed. In our review, a facilitator to engagement by the patient partner was the virtual environment in which this research was conducted. A one-page lay summary written by the patient partner can be found in Additional file 1: Appendix 18. According to the GRIPP-2 checklist, amendments to patient partner definitions need to be suggested. Regarding the definition of patient partner that the team used from the Canadian Institutes of Health Research (CIHR), no amendments are suggested, as it is very broad and inclusive. There were no harms mentioned by the patient partner and the experience was positive overall for everyone involved.

#### Limitations

We did not appraise the quality or risk of bias in the included studies, which is consistent with the JBI guide for scoping reviews [13]. Although the literature search was broad and not limited to English, we may have

missed trials, especially for studies written in languages other than English, which are often not well indexed from specific disciplines (although several discipline-focused databases were searched). We identified few trials from LMIC settings, suggesting the results were more applicable to high income economy contexts. In most trials, only gender identity was considered. There was a lack of consideration for the impacts of gender roles, parental status, or caregiver status. By limiting outcomes to gender identity and not taking other gender (and other intersectional) factors into account, we are unlikely to achieve equity in the future. Protocol deviations include not conducting a living scoping review (i.e., routinely updating the literature search) due to a lack of funding and broadening the focus from academic settings to any workplace setting due to the dearth of literature available.

Most interventions took place in an academic or educational setting, this highlights that the education sector has even further to go to reach gender equity. Due to the heterogeneity of intervention settings, it is important to note that interventions that may work (or not) in one workplace setting may have different outcomes in another workplace setting. This highlights the need to test interventions across multiple workplace and societal settings.

Although many of the conclusion statements were positive, this does not imply that the gender equity interventions work. A future systematic review and meta-analysis would need to confirm these preliminary results. The conclusion statements need to be interpreted with caution, as there is the opportunity to “spin” them in a more favorable way [50] in the abstracts of trials.

While the focus of this review is on formal workplace settings, we would be remiss to not acknowledge that gender inequities are much higher in the informal sector where implementing interventions is difficult [51]. Nearly 60.0% of informal workers are women [52]. We suggest this as an area of focus for future research.

## Conclusions

There is a paucity of scientific literature on interventions to promote workplace gender equity. Few PROGRESS-Plus items were reported. Non-binary gender identities and issues related to intersectionality were not adequately considered. Future research should provide consistent and contemporary definitions of gender and sex, be explicit in how sex or gender is ascertained, and apply sex and gender correctly and appropriately in their correct context. More trials are required examining gender equity interventions in the workplace and future systematic reviews can examine their related effectiveness.

## Abbreviations

CADTH	Canadian Agency for Drugs and Technologies in Health
CINAHL	Cumulated Index to Nursing and Allied Health Literature
ERIC	Education Resources Information Center Index
GRIPP	Guidance for Reporting Involvement of Patients and the Public
HICs	High-income countries
LMICs	Lower-middle income countries
MICs	Middle-income countries
PAIS Index	Public Affairs Information Service Index
PRESS	Peer Review of Electronic Search Strategies
PROGRESS-Plus equity variables	Place of residence, Race/ethnicity/culture/language, Occupation, Gender/sex, Religion, Education, Socioeconomic status, Social capital
RCTs	Randomized controlled trials
SAGER	Sex and Gender Equity in Research
SIITHIA	Strengthening the Integration of Intersectionality Theory in Health Inequality Analysis

## Supplementary Information

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**Additional file 1: Appendix 1.** PRISMA ScR Checklist. **Appendix 2.** SAGER Guidelines. **Appendix 3.** SIITHIA Checklist. **Appendix 4.** GRIPP2 Reporting Checklist. **Appendix 5.** Database Search Strategies. **Appendix 6.** Grey Literature Sources. **Appendix 7.** L1 Screening Form for Titles and Abstracts. **Appendix 8.** L2 Screening Form for Full-Text Articles. **Appendix 9.** Data Abstraction Form. **Appendix 10.** Closely Related but Ultimately Excluded Studies. **Appendix 11.** Participants Characteristics. **Appendix 12.** Participants Characteristics. **Appendix 13.** PROGRESS Plus Table. **Appendix 14.** Definitions of Gender and Sex. **Appendix 15.** Intervention Characteristics. **Appendix 16.** Details of Intervention Outcomes and Results. **Appendix 17.** Outcomes Examined in Included Studies. **Appendix 18.** Patient Partner Lay Summary.

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## Authors' contributions

ACT and SES conceived the study and refined the scope. ACT defined the study design, selection of measures, wrote the protocol, interpreted data, and wrote the manuscript. SES revised the protocol, interpreted data, and revised the manuscript. EZ, NB, KEAB, DC, JPC, IDG, GH, FL, JW, HOW, JC, ILB, JPL, SBA, KL, AA, EVL, CM, SS, BS, RP, NL, JL, ELA, WE, SO, LR, RN were given the opportunity to revise the protocol, revise the screening and charting forms, and revise the manuscript. AP, VN, PAK, HM, RW, RR, and OC screened titles and abstracts as well as full texts and then abstracted data. EZ provided a 1-page written lay summary of the manuscript findings. AP contributed to portions of the draft manuscript. PAK also contributed to revising portions of the manuscript. All authors have read, revised, and approved the final article.

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### Availability of data and materials

All of the data are available in Additional file 1.

### Declarations

#### Ethics approval and consent to participate

As this was a scoping review of primary research, ethical approval was not required.

#### Consent for publication

Not applicable.

#### Competing interests

All authors have completed the ICMJE uniform disclosure form at <http://www.icmje.org/disclosure-of-interest/> and declare: no support from any organization for the submitted work; no financial relationships with any organizations that might have an interest in the submitted work in the previous 3 years; no other relationships or activities that could appear to have influenced the submitted work.

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