

Intersectionality in the Healthcare and Scientific Workforces

Intersectionality and diversity, equity, and inclusion in the healthcare and scientific workforces



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Summary

Enhancing diversity, equity, and inclusion (DEI) in the scientific and healthcare workforces* promotes research innovation and equitable access to quality healthcare. Efforts to advance DEI within the global scientific and healthcare workforces have assumed a new urgency given the strain caused by the COVID-19 pandemic, the aging of the global population, and the persistent shortages in the healthcare workforce, particularly in low- and middle-income countries. Yet, these fields continue to struggle to promote DEI. Considering the impact of intersectionality—how multiple identities interact to create unique experiences of privilege and power—within these workforces will enhance efforts to promote DEI. This series explores the impact of intersectionality on scientific and healthcare workforce DEI and how prominent institutional and structural factors (e.g., sexism and racism), as well as their interpersonal manifestations, can create barriers for workers with multiple intersecting marginalised identities. This paper, the first in a three-part series, describes how intersecting identities interact with workplace inequities and suggests ways to incorporate intersectionality into DEI efforts within the scientific and healthcare workforces.

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*We use the phrase *scientific and healthcare workforces* throughout this article to broadly encompass individuals associated with the biomedical, clinical, behavioral, and population science workforce.

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Introduction

Enhancing DEI through intersectionality

A growing body of research suggests that enhancing diversity, equity, and inclusion (DEI) within the scientific and healthcare workforces has lasting benefits, such as increasing research innovation, improving patient care, and addressing healthcare workforce shortages.¹⁻⁴ Applying an intersectional lens to efforts to promote DEI can illuminate how inequities may affect individuals' career pathways and professional experiences and enhance the benefits of DEI in the scientific and healthcare workforces.⁵

How DEI benefits the scientific and healthcare workforces

Enhancing DEI within the scientific and healthcare workforces has multiple advantages, including promoting equitable gains from scientific and healthcare innovations and addressing persistent barriers that hinder the advancement of underrepresented groups and women in science.^{1,3,6} Diverse research teams are linked with greater creativity and may facilitate communications with, and inclusion of, groups historically underrepresented in research.^{1,3} For example, researchers' publication patterns and fields of study vary based on their race, ethnicity, and gender.⁷ Scientific articles published by ethnically heterogeneous research teams are published in higher impact journals and cited more frequently than similar ethnically homogenous research teams.⁸ As such, promoting DEI in the scientific and

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healthcare workforces can increase research innovation, diversity of research topics investigated, representativeness of results, and quality of science produced.^{1,3,9}

Similarly, diversifying the healthcare workforce may benefit patients' access to care, adherence to recommendations, and subsequent health outcomes. Research links greater healthcare workforce diversity with increased innovation, improved risk assessments and communication, and better healthcare system financial performance and patient outcomes.¹⁰ Physician-patient identity concordance has been linked with greater patient satisfaction with medical care, increased patient adherence to physician guidelines, and reduced mortality.^{2,4,11}

Lastly, a lack of diverse recruitment and retention creates high rates of burnout and attrition among members of socially marginalised groups, exacerbates current and looming healthcare workforce shortages, and reduces the quality of patient care.^{12–15} Efforts to advance DEI in combination with other actions such as expanding training capacity and creating incentives for primary care specialties can help address staffing shortages.

Need for intersectionality in DEI efforts

Despite the growing recognition of the importance of fostering and sustaining diverse scientific and healthcare workforces, efforts to enhance DEI continue to fall short. Although women occupy more than 70% of the global health positions, women hold fewer than 25% of leadership positions.¹⁶ Women constitute less than one-third of the world's scientists and engineers.¹⁷ Globally and across various medical and scientific disciplines, significant underrepresentation based on gender, race, ethnicity, and socioeconomic status persists.^{18–20} The third paper in this series describes similar trends in Latin America, where immigrants, sexual and gender minorities (SGM), and individuals with race and ethnicity-based marginalized statuses experience high rates of poverty and are overrepresented in low-wage jobs.

DEI programs and initiatives often implicitly view different social identities (e.g., race, gender) as separate and mutually exclusive (e.g., the phrase “women and minorities”) and measure outcomes based on these single categories.^{21,22} This approach can lead to the “false equivalence of progress,” where the apparent advancement of an underrepresented or stigmatised group is limited to relatively privileged group members.²² Such approaches only partially consider the complex, unique experiences of individuals with more than one marginalised social identity and the underlying systems that impact their entry, persistence, and advancement within the scientific and healthcare workforces.

Enter intersectionality. First developed as a feminist critical theory, intersectionality emphasizes that individual experiences cannot be reduced to a single social

identity.^{5,23} Instead, intersectionality focuses on how aspects of identity and social status *intersect* to shape individuals' experiences and opportunities in ways that reflect broader societal systems of oppression and privilege (Box 1) (Fig. 1).²¹ For example, while Black men experience racism and White women experience sexism, Black women experience a unique combination of gender- and race-based discrimination, including assumptions regarding societal roles, temperament, and communication styles, that can manifest as disrespect and marginalisation in the workplace.²⁴ Disparities in the scientific and healthcare workforces reflect and reinforce broader socioeconomic and health inequities. Applying an intersectional lens to DEI initiatives can help ensure that interventions equitably benefit members of underrepresented groups rather than disproportionately benefit select subgroups.^{25–27} In addition, identifying and addressing the root causes of persistent inequities helps address the specific needs of population groups and subgroups, informs DEI strategies, and enables accurate assessment of ongoing DEI efforts.

This article explores the impact of intersectionality on DEI efforts within the scientific and healthcare workforces. We review the literature on the effects of intersectionality and its incorporation into DEI initiatives within these workforces and discuss themes and strategies from this review for broader consideration and application.

Literature review

To assess the impact of intersectionality on DEI efforts within the scientific and healthcare workforces and identify themes to inform future DEI interventions, we conducted a literature review of studies and commentaries using a process similar to the PRISMA Extension for Scoping Reviews (PRISMA-ScR) to report the completed review.³³

Search strategy and selection criteria

We searched articles and commentaries from PubMed and PsycInfo related to “intersectionality,” “diversity, equity, and inclusion,” and the “scientific or healthcare workforces.” Given the focus on DEI within the scientific and healthcare workforces, sources that solely discussed intersectionality in relation to healthcare services or research methods were excluded. The Supplementary Material contains a complete description of our search strategy, screening, and a results table.

Coding and synthesis

Two reviewers independently developed and coded the emergent qualitative themes across all 47 sources. Sources were also categorized by the types of social characteristics examined (e.g., race, gender, ability), geographic regions examined, study type (e.g., qualitative interviews), and relevant population characteristics

BOX 1.

Diversity, Equity, and Inclusion and Intersectionality**Diversity, Equity, and Inclusion**

The diversity, equity, and inclusion (DEI) framework, which has roots in the 1960s U.S. Civil Rights Movement, began as a policy-focused initiative to enhance the number of people from historically disadvantaged groups within the workplace.²⁸ Initial efforts focused solely on advancing diversity or quantitatively increasing demographic representation. As these efforts have evolved, the framework has expanded beyond numerical representation to encompass the concepts of equity and inclusion, critical elements in efforts to promote and sustain diverse workforces.^{28,29}

- “Diversity” refers to the representation of differing demographic and social characteristics (e.g., race, ethnicity, gender, socioeconomic status or educational attainment, people with disabilities, heritage, place of birth, SGM), perspectives, and ideas. It typically refers to increasing representation of diverse perspectives and often focuses on quantity.^{25,29}
- “Equity” refers to achieving fair and equal outcomes through intervention. Equity often involves reallocating resources and opportunities based on—and is closely tied with—justice, eliminating systemic barriers, and addressing historical and structural disadvantages to create a level playing field for everyone. Equity differs from equality, which refers to treating individuals the same, regardless of circumstance.^{25,28}
- “Inclusion” refers to the idea that simply increasing representation within an entity is not enough. It encompasses facilitating a welcoming, supportive, accepting, and respectful organizational culture for *all* individuals. Inclusion requires individual-level change but is reinforced with institutional-level changes to policies, programs, and structures (e.g., accommodations and fair-practice policies versus individually combating implicit bias).^{25,26,29}

Intersectionality

Coined as a term by scholar Kimberlé Crenshaw in 1989, intersectionality is rooted in late 1970s Black feminist thought, emerging as a critique of anti-discrimination laws and the lack of consideration of race and gender within the U.S. feminist and anti-racist movements, respectively.^{23,27} Intersectionality emphasizes the interconnectedness of various aspects of an individual’s social identity and how these intersect to shape experiences and opportunities that reflect systems of oppression and privilege (Fig. 1).⁵ While intersectionality has been understood and operationalized as a theory, research paradigm, strategic lens, analytical tool, and more,^{30–32} fundamentally, it is the understanding that multiple social identities are not siloed or independent, and their impacts are not merely additive. Instead, individuals with more than one marginalized social identity may experience unique constellations of oppression produced by power structures within their societies.^{21,27}



Fig. 1: Graphical representation of intersectionality. An individual’s (diamond) multiple social identities, such as gender, race/ethnicity, socioeconomic status, sexuality, age, and more, (colored beams of light) are not experienced or impacted independently. Instead, they combine and reflect unique experiences and challenges created by macro-level power structures. Incorporating intersectionality (white beam of light) into DEI approaches in the healthcare and scientific workforces acknowledges these multiple identities and reveals the surrounding and interacting systems and structures of power (planes of the polyhedron).

(e.g., segments of the biomedical workforce examined). Qualitative themes were identified and coded using a team-based coding, discussion, and reconciliation process described in Cole (2023).³⁴ First, two coders independently coded data across all 47 sources and then calculated IRR as percentage agreement between coders. The coders then discussed and reconciled coding definitions to achieve agreement between coders. A second round of coding was conducted based on the reconciled coding definitions, in which supportive and exemplar quotes and notes were attached to each code to further define themes. Final determinations of the prevalence of each theme were calculated based on binary (“yes”, “no”) presence of that theme within each of the 47 sources.

Results

The database searches retrieved 3942 records published between 1989 and 2023, of which 1093 were excluded as duplicates and 2849 screened out at title and abstract level. There were 103 records included for full text screening. Full texts were not available for 13 records. Of the 90 remaining reports, 34 were excluded for not discussing intersectionality in relation to the scientific or healthcare workforces, and nine were excluded for focusing solely on research methods or healthcare services. In total, 47 relevant sources, all published since 2015, were included in the review.

Intersectional challenges

Analyses of the 47 articles identified seven qualitative themes that highlight challenges for individuals with intersecting marginalised identities, described in Table 1. Here, we detail the themes in the order of prevalence in the literature.

“Minority tax”

Individuals with more than one marginalised identity are often asked or expected to assume leadership roles

in DEI programs and on committees; simultaneously, these individuals may be asked to mentor professionals from similar groups.^{19,26,35–39} Requests can stem from assumptions that these group members are better suited for such roles or emerge from a sense of obligation to alleviate inequities that members face themselves.^{19,26,37} Because many of these groups are underrepresented within workforces, individuals with more than one marginalised identity may be consistently and repeatedly asked or expected to engage in service-oriented activities at the expense of their career progression.^{35,39} Participating in these activities can create significant pressure and time commitments,^{36,38} which seldom receive compensation, protected time, or recognition during performance reviews and promotion and tenure decisions.^{35,38}

Harassment

Multiple forms of harassment are prevalent in academic and healthcare environments. Efforts to prevent harassment are currently insufficient.^{36,40,41} For example, a survey of more than 5000 researchers worldwide found that discrimination, bullying, and harassment based on age, gender, and race and ethnicity were widespread and underreported within research communities.⁴² Women of colour are more likely to report negative experiences than Black men or White women, as systems of sexism and racism intersect in academic environments to shape their careers and well-being.⁴³

Increased attrition

Attrition is often disproportionately high among workers with intersecting identities, which can result in a progressive loss of diversity throughout educational programs and along career pathways. In medical education programs, attrition among women of colour is higher than among men of colour and White women.⁴⁴ Similar patterns have been observed among healthcare and scientific professionals across multiple fields.^{45,46} Harassment, burnout, disproportionate caregiving

Theme	Description	No. of sources
Discrimination and bias	Multiple forms of discrimination, stereotyping, and bias, including microaggressions, offensive remarks, overt discrimination, doubts about professional qualifications and experience, minimization of professional achievements, and gendered expectations about caregiving.	35 (74%)
Barriers to advancement and promotion	Barriers to promotion, tenure, professional recognition, funding, and access to support services for professional advancement.	30 (64%)
Lack of mentorship	Lack of culturally competent mentorship that accounts for unique needs and experiences of individuals with intersecting marginalized identities.	26 (55%)
Caregiving burden	Increased burden (real or perceived).	18 (38%)
Increased attrition	Increased attrition among workers with intersecting marginalized identities during education and career progression.	17 (36%)
Harassment	Different forms of harassment (e.g., sexual, racial).	11 (23%)
“Minority tax”	Overrepresentation of members of underrepresented groups on DEI-related groups and task forces, leading to efforts that may not be recognized during performance reviews and promotion decisions.	9 (19%)

Table 1: Relevant coding results.

burdens, and other similar factors impact work environments and the mental, physical, and social well-being of individuals with more than one intersecting identity, contributing to the observed increased attrition.^{41,47} This further exacerbates gaps in the scientific and healthcare fields, such as the lack of adequate mentors or role models and underrepresentation of women of color and individuals with intersecting identities in leadership positions.³⁷

Caregiving burden

Members of more than one marginalised group can face heightened caregiving burdens and discrimination due to perceptions related to their perceived roles as caregivers.^{41,45,48–50} Women often shoulder most of the caregiving responsibility for children and aging or ill family members. While Western culture has moved toward a greater understanding of shared caregiving roles, the perception of this burden is heavily influenced by other sociocultural notions regarding gender roles that are specific to particular racial and ethnic contexts.^{50–53} For example, in Sub-Saharan African cultures, the expectation that men as the perceived heads of the household must be consistently available for family responsibilities can create competing pressures that negatively impact their career progression.⁴¹

Lack of mentorship

Mentorship is a critical element for career growth and success in the scientific and healthcare workforces.^{38,54} Effective mentors offer vital support for career development by providing experiential career guidance, including pathways for advancement, work-life balance, and resilience in the workforce.^{50,55} Individuals with intersecting marginalized identities are more likely to report a lack of mentorship along their career pathway, which can impact their professional growth.^{37,56,57}

Barriers to advancement and promotion

Individuals with intersecting marginalized identities face significant barriers to advancement, promotion, and tenure,^{39,58–61} including a lack of transparency around promotion and tenure decisions,^{56,62} perceived favouritism and nepotism,^{47,50,63} and stereotypes and implicit biases.^{45,47,55} The third paper in this series discusses examples of these obstacles in detail, including how SGM, Black, and Indigenous members of the clinical and scientific workforces in Latin America encounter disproportionate levels of discrimination and barriers to respect and recognition in the workplace.^{64,65} The cumulative effect of these experiences is the significant underrepresentation of individuals with multiple marginalised statuses in leadership positions. For example, in the top 130 research-intensive (R1) universities in the United States, women of color comprise only 19% of Ph.D. earners, 8% of academic deans, and 5% of university presidents.⁶⁶

Discrimination and bias

Individuals with intersecting marginalised identities experience multiple forms of discrimination and bias in the healthcare and scientific workforces, including microaggressions, stereotyping, and implicit bias.^{26,67–69} For example, in 2019, 70% of Black general surgery residents reported facing racial discrimination, with Black women reporting the highest rates of racial discrimination among all general surgery residents.⁶⁷ Additionally, individuals with intersecting marginalised identities encounter stereotyping and implicit biases, such as perceived low levels of competence and education and negative attributions for common behaviours. Women of colour in medicine frequently report that their expertise and training are dismissed or minimised due to their race or ethnicity and gender.^{56,68,70,71} Acts of discrimination and bias, whether overt or subtle, can profoundly harm victims and contribute to stress, job dissatisfaction, isolation, burnout, turnover, and attrition for people with intersecting identities.^{51,62}

As discussed in the second paper in this series, changes to organisations, policies, and systems are needed to address the structures that uphold the assumptions and practices that allow discrimination and the status quo to endure.⁷² Thus, alleviating intersectional inequities in the healthcare and scientific workforces will require large-scale and widespread changes, which we discuss in the following section.

Applying an intersectional lens to DEI efforts

The reviewed literature suggests multiple strategies and considerations for incorporating intersectionality into workforce DEI initiatives. These data suggest that strategies moving forward should include an institutional-level approach spanning norms and culture, policy and structures, and how disparities are examined.

Institutional norms and culture

The literature suggests that organisational culture affects individuals' professional and personal well-being. The norms exhibited by workplace colleagues and leadership often inform an organisation's culture. Thus, institutional leaders may need to consider how changes to organisational norms can foster more inclusive and equitable workplace environments.⁷⁰ For example, cultivating a culture of mentorship and sponsorship may help address challenges experienced by individuals with more than one marginalised identity.^{36,49,61,70} Institutions may consider exploring mentorship schema or programs that encourage widespread participation so that mentoring labour is not predominately undertaken by faculty with intersecting marginalised identities.^{39,49} Importantly, it is valuable for mentors to approach their roles with an intersectional mindset that examines their structural power and recognises their mentees' unique perspectives, identities, and backgrounds.^{58,70} Trainings that emphasise

culturally responsive mentorship, such as a Culturally Aware Mentoring (CAM) workshop can aid in this approach. CAM training encourages mentors to recognize the culturally-shaped beliefs, perceptions, and judgements they have and to be of cognizant and responsive to cultural differences and similarities between their mentees and themselves.⁵⁴

Sponsorship is an additional option for institutional leaders to consider in how best to support individual trainees' or faculty's career progression.^{36–38} While mentoring is well-recognised for providing career support and development, sponsorship offers support from colleagues with influence, which can further accelerate career advancement.^{36,38} Sponsorship is critical in situations where there is a lack of similar voices with influence and power, such as for women of colour, and requires leaders and senior colleagues to provide advocacy and support during pivotal career opportunities or transitions.^{36,39} Leaders might consider encouraging and modeling behaviour that demonstrates intentional sponsorship, such as creating a recognition structure for sponsorship and mentoring, developing open opportunities for networking and sponsorship, and outwardly engaging in sponsoring behaviours.^{36,39,70}

Fostering a culture of transparency, accountability, and open communication could help institutions and leaders create an atmosphere where questioning dominant structures and individuals is welcomed and handled without fear of reprisal.^{45,70} Transparency around decision-making and policy implementation can engender trust in organisations, allowing open communication and sharing around norms and practices.⁷⁰ For example, reporting data on promotions, harassment reports, and salaries provides a readout of cultural norms and encourages open communication around disparities.^{62,73,74} Also, institutions and leaders can strengthen transparency by simultaneously fostering a culture of accountability. Ensuring that individuals at all levels are held to the same behavioural and policy standards can help create a fair and consistent environment. When actions are taken to address observed inequities or respond to acts of discrimination, sharing the outcomes of these actions publicly, where appropriate, can help reinforce this commitment.^{37,70} Finally, although the literature demonstrates the positive impact of diversity on innovation, decision-making, and problem-solving,⁷⁵ it also shows that many benefits of diversity depend on ensuring open communication and creating environments that welcome diverse voices and perspectives.⁶² Communication, openness, and the celebration of differences are essential to reap the full benefits of diversity.⁴⁵

Institutional policies and structures

Institutional interventions may include examining career progression processes, performance reviews, and policies related to workplace discrimination and work-

life balance. Changes in career progression procedures, such as masked application processes, greater evaluator diversity, and standardised letters of recommendation, may reduce the ability of subtle forms of bias to operate.⁶² Institutions may need to consider markers of individual success and how these might contribute to career advancement challenges for individuals with more than one marginalised identity.^{52,76} For example, an in-depth analysis of clerkship performance and honours grades at the University of California, San Francisco found that small differences in clerkship performance between individuals underrepresented in medicine (UIM) and non-UIM individuals translated into substantial differences in the awarding of honours grades, with UIM individuals three times less likely to be selected for honours society membership.⁷⁷ Studies of subjective performance evaluations of medical trainees in North America found that these evaluations are frequently biased in favour of male trainees.⁷⁸

Institutions might consider adopting policies and practices for reporting and managing workforce discrimination, such as bystander training, and mitigate the impact of workforce discrimination by providing support services.⁷⁸ Designing and implementing these policies with an emphasis on transparency and accountability may help lower the risk of retaliation and offer protection for those who report concerns.^{36,52,79} Robust anti-discrimination policies can have multiple benefits, including improved psychological well-being, productivity, engagement, feelings of belonging, trust in the organisation and its leadership, and retention of individuals with marginalised social statuses. For instance, SGM-supportive policies (e.g., company policies that explicitly prohibit discrimination based on SGM status) have been found to reduce discrimination against SGM individuals and to increase their overall well-being at work.⁸⁰ Anti-discrimination policies, which also acknowledge and provide recourse for intersecting forms of discrimination, are helpful so as not to overlook harms that do not fit into single axes of discrimination.

Policies that improve work-life balance are especially beneficial to individuals with multiple intersecting marginalised identities because they tend to have less access to societal resources.⁸¹ For example, more support for flexible work hours, reduced or part-time work hours, sick leave, support for childcare, and parental leave can boost labour market participation among those with significant caregiving responsibilities.^{36,52} However, these policies may not adequately address instances of informal caregiving, which can contribute to differential pay and, further, may inadvertently reinforce inequalities in domestic and caregiving duties.^{26,38,41} Thus, to foster true equity, institutions may need to enforce collective reductions in work hours and reconsider performance metrics that hinge upon lengthy work hours.^{40,82} Overall, intersectional DEI initiatives are most

likely effective if institutions employ multiple systems-level strategies in concert.

How disparities are examined

Utilizing a variety of methodological approaches can be valuable when applying an intersectional lens to workforce DEI interventions. One approach to gathering data on experiences is to disaggregate and analyse the data along multiple intersecting identities. Although Crenshaw initially focused on the intersections of gender, race, and socioeconomic status when formulating the intersectionality theory,⁶⁹ it has expanded to encompass additional social identities. These include ethnicity, disability status, sexuality, gender identity, professional cadre, and heritage or place of birth and how these elements interact with various power structures.^{21,30} By applying an intersectional approach to workforce diversity analyses, it is possible to reveal differences between and within social groups,^{4,23,27,70} allowing for a more nuanced understanding of workforce inequities. As explored by Zajdel et al., examining the unique intersections of immigration status, sexual orientation, gender identity, and racial and ethnic background can reveal how these complex experiences affect workers in Latin America.⁸³ However, a notable challenge is that disaggregation of already limited data can lead to small sample sizes and adversely impact the privacy and confidentiality of individuals within vulnerable populations. These are important factors to consider when disaggregating data by multiple social identities.

Researchers and policymakers can also improve the granularity of data (e.g., distinguishing between sex and gender) to more fully identify potential barriers.^{39,84,85} Analyses employing an intersectional lens can demonstrate how different contexts and intersecting social categories shape individual experiences.^{40,46,67,69,86} Note that, while valuable and capable of describing inequities across intersections, quantitative methods are limited in their ability to capture the emotional and behavioural consequences of macro-level systems (e.g., sexism, racism, heterosexism, ableism).⁴⁸ Focus groups,

interviews, case studies, and other qualitative methods facilitate the interrogation of the impacts of workforce inequities by drawing out in-depth descriptions of experiences of complex social phenomena.^{41,47,87}

In summary, incorporating intersectionality into scientific and healthcare workforce DEI efforts requires a multi-level and multi-pronged approach. It may necessitate change at the individual, interpersonal, and institutional levels as well as enhancing how we query and thus understand workforce inequities. These suggested approaches are summarised in [Table 2](#).

Conclusion

Myriad advantages can accrue from effectively incorporating intersectionality into DEI efforts. Intersectionality provides a more nuanced approach to understanding how social identities shape career pathways and can help identify the root causes of inequities in the scientific and healthcare workforces. Our literature review demonstrates how the intersection of more than one marginalised social identity with systems of power can inhibit career advancement and increase attrition within science and healthcare.^{46,67,69} Analyses of the scientific and healthcare workforces that fail to consider multiple marginalised social identities can overlook their synergistic impact, risk mischaracterising the root causes of differential workforce inequities,⁸⁶ and miss inequities within seemingly similar social groups.^{82,86} Careful consideration of intersecting identities can ensure that DEI initiatives equitably reach members of underrepresented groups rather than disproportionately benefiting only the most privileged.

Effective DEI interventions are widescale, systems-level changes implemented throughout scientific and healthcare institutions.^{60,69} Enacting these changes requires institutional leaders to acknowledge their privilege and analyse how privilege influences their perspectives. Recognising the unique challenges faced by individuals with more than one marginalised identity, advocating for DEI, providing DEI training,

Changes	Challenges	Suggested approaches
Institutional Norms and Culture	<ul style="list-style-type: none"> Numerous barriers to advancement for individuals with multiple marginalized statuses. Fear of reprisal when questioning dominant structures. 	<ul style="list-style-type: none"> Openly support mentorship and sponsorship. Foster culture of open communication and diverse viewpoints.
Institutional Policies and Structures	<ul style="list-style-type: none"> Bias affects subjective reviews and evaluations. Policies do not address all forms of discrimination, especially based on intersecting identities. Individuals with marginalized identities have less access to social resources. 	<ul style="list-style-type: none"> Alter career progression policies to reduce bias. Strengthen processes for reporting and managing workplace discrimination. Implement policies to collectively improve work-life balance.
Methodological Approaches	<ul style="list-style-type: none"> Lack of granularity of social identities in data collection. Quantitative methods limited in capturing individual responses to macro-level systems. Difficulty collecting data due to privacy, safety, and cultural considerations. No standardized methods for intersectional research. 	<ul style="list-style-type: none"> Collect and disaggregate data along multiple intersecting identities. Employ qualitative or mixed methods approaches. Re-evaluate data privacy policies and procedures with input from members of marginalized groups. Develop and disseminate best practices for collecting, analyzing, and interpreting intersectional workforce data.

Table 2: Applying an intersectional lens to scientific and healthcare workforce DEI: Proposed changes, challenges, and solutions.

developing strategic plans for structural changes, and setting clear success metrics for charting progress at the individual, interpersonal, and systems levels could support these efforts.

We acknowledge several limitations of the literature review that informed our suggestions. To ensure we identified sources that directly address intersectionality within the scientific and healthcare workforces, we limited our search to PubMed and PsycNet, with relatively narrow search terms and conservative inclusion and exclusion criteria. We also restricted the search to sources written in the English language. The use of additional databases, broader search terms, and the inclusion of sources in other languages may identify additional relevant literature, particularly in other global contexts. The second and third papers in this series address this limitation to some extent by including a broad discussion of intersectionality within the Latin American scientific and healthcare workforces.

Our literature review suggests that studies on intersectionality in the scientific and healthcare workforces have largely focused on intersections of race and ethnicity with gender. This focus aligns with Crenshaw's initial concentration on the intersections of gender, race, and socioeconomic status when formulating intersectionality theory.^{23,27,30} Relatively few studies examine the experiences of individuals with multiple marginalised identities. Additional research is needed to understand the intersecting impacts of other marginalised social identities, including SGM populations, age cohort, immigration status, socioeconomic status, and people with disabilities. We acknowledge that this research poses challenges due to small sample sizes. The second and third papers in this series explore some of these intersections in Latin America, particularly how they impact health innovation and outcomes for marginalised groups. Additionally, they examine how sexual orientation, gender identity, and immigration status intersect with racial and ethnic backgrounds to impact entry and advancement in the clinical and scientific workforces.

Intersectionality offers valuable insights into the challenges individuals with multiple marginalised identities face within the scientific and healthcare workforces. Based on our literature review, addressing these challenges requires multifaceted approaches that create organisational and systematic change and challenge socially dominant norms that create and uphold systems of power and privilege. Applying an intersectional approach to enhancing DEI advances scientific discovery and helps to provide high-quality healthcare for all populations.

Contributors

TJM, RAZ, EA, JAC, SH, EPS, KS, and MAB participated in the writing of the manuscript, provided ideas for the content, and reviewed and approved the final version.

Disclaimer

This material should not be interpreted as representing the viewpoint of the U.S. Department of Health and Human Services (HHS) or the National Institutes of Health (NIH).

Declaration of interests

Dr. Clayton sits on the board of the American Association for the Advancement of Science.

Dr. Heidari is a senior researcher at the Gender Centre of the Geneva Graduate Institute and Executive Director of Gendro, through which she is providing technical support to the WHO Gender, Equity, and Human Rights Department, as well as other non-profit research organisations on gender mainstreaming in research. She also serves as a guest lecturer at various universities and is the Co-Vice President of the Geneva International Film Festival and Forum for Human Rights.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.lana.2024.100973>.

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