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.

***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.**

Keywords: Intersectionality; Diversity, equity, and inclusion; Workforce diversity; Healthcare workforce; Scientific workforce

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]

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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

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	• Numerous barriers to advancement for individuals with multiple marginalized statuses. • Fear of reprisal when questioning dominant structures.	• Openly support mentorship and sponsorship. • Foster culture of open communication and diverse viewpoints.
Institutional Policies and Structures	• 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.	• 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	• 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.	• 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.

References

1 Hattery AJ, Smith E, Magnuson S, et al. Diversity, equity, and inclusion in research teams: the good, the bad, and the ugly. *Race Justice*. 2022;12(3):505–530.
2 Nguyen AM, Siman N, Barry M, et al. Patient-physician race/ethnicity concordance improves adherence to cardiovascular disease guidelines. *Health Serv Res*. 2020;55(Suppl 1):51.
3 Nielsen MW, Alegria S, Borjeson L, et al. Opinion: gender diversity leads to better science. *Proc Natl Acad Sci U S A*. 2017;114(8):1740–1742.
4 Alsan M, Garrick O, Graziani G. Does diversity matter for health? Experimental evidence from oakland. *Am Econ Rev*. 2019;109(12):4071–4111.
5 Collins PH, Bilge S. *Intersectionality*. 2nd ed. Medford, MA, USA: Polity; 2020.
6 Valantine HA, Collins FS. National Institutes of Health addresses the science of diversity. *Proc Natl Acad Sci U S A*. 2015;112(40):12240–12242.
7 Kozlowski D, Larivière V, Sugimoto CR, Monroe-White T. Intersectional inequalities in science. *Proc Natl Acad Sci U S A*. 2022;119(2).
8 Freeman RB, Huang W. Collaborating with people like me: ethnic coauthorship within the United States. *J Labor Econ*. 2015;33(S1):S289–S318.
9 Jones PL, Sauma S, Bernard MA. Perspective: scientific workforce diversity and its impact on aging research. *J Gerontol A Biol Sci Med Sci*. 2022;77(11):2336–2340.
10 Gomez LE, Bernet P. Diversity improves performance and outcomes. *J Natl Med Assoc*. 2019;111(4):383–392.
11 Saha S, Komaromy M, Koepsell TD, Bindman AB. Patient-physician racial concordance and the perceived quality and use of health care. *Arch Intern Med*. 1999;159(9):997–1004.
12 Boniol M, Kunjumen T, Nair TS, Siyam A, Campbell J, Diallo K. The global health workforce stock and distribution in 2020 and 2030: a threat to equity and 'universal' health coverage? *BMJ Glob Health*. 2022;7(6).
13 Filip R, Gheorghita Puscaselu R, Anchidin-Norocel L, Dimian M, Savage WK. Global challenges to public health care systems during

the COVID-19 pandemic: a review of pandemic measures and problems. *J Pers Med*. 2022;12(8).
14 Rotenstein LS, Brown R, Sinsky C, Linzer M. The association of work overload with burnout and intent to leave the job across the healthcare workforce during COVID-19. *J Gen Intern Med*. 2023;38(8):1920–1927.
15 Tawfik DS, Scheid A, Profit J, et al. Evidence relating health care provider burnout and quality of care: a systematic review and meta-analysis. *Ann Intern Med*. 2019;171(8):555–567.
16 Organization WH. *Delivered by women, led by men: a gender and equity analysis of the global health and social workforce*. Geneva: World Health Organization; 2019.
17 *"Women in science" (UNESCO fact sheet No. 55, 2019)*. UNESCO Institute for Statistics: United Nations Educational, Scientific and Cultural Organization; 2019.
18 National Center for Science and Engineering Statistics (NCSES). *Diversity and STEM: women, minorities, and persons with disabilities 2023*. Alexandria, VA: National Science Foundation; 2023.
19 Kamran SC, Winkfield KM, Reede JY, Vapiwala N. Intersectional analysis of U.S. Medical faculty diversity over four decades. *N Engl J Med*. 2022;386(14):1363–1371.
20 Wang JC, Chang SW, Nwachuku I, et al. The intersection of race and sex: a new perspective into diversity trends in orthopaedic surgery. *J Am Acad Orthop Surg*. 2023;31(23):1197–1204.
21 Bowleg L. The problem with the phrase women and minorities: intersectionality-an important theoretical framework for public health. *Am J Public Health*. 2012;102(7):1267–1273.
22 Carbado DW. Colorblind intersectionality. *Signs*. 2013;38(4):811–845.
23 Crenshaw KW. *Demarginalizing the intersection of race and sex: a Black feminist critique of antidiscrimination doctrine*11989;1. Feminist Theory and Antiracist Politics. University of Chicago Legal Forum; 1989.
24 Lewis JA, Neville HA. Construction and initial validation of the gendered racial microaggressions scale for Black women. *J Couns Psychol*. 2015;62(2):289–302.
25 National Academies of Sciences E, Medicine. Advancing Anti-racism. *Diversity, equity, and inclusion in STEMM organizations: beyond broadening participation*. Washington, DC: The National Academies Press; 2023.
26 Miller KK, Mustapha T. *Challenges in diversity, equity, and inclusion. Understanding and cultivating well-being for the pediatrician: a compilation of the latest evidence in pediatrician well-being science*. Cham, Switzerland: Springer Nature Switzerland AG; 2023:173–197.
27 Crenshaw K. Mapping the margins: intersectionality, identity politics, and violence against women of color. *Stanford Law Rev*. 1991;43(6):1241–1299.
28 Kelly C, Dansereau L, Sebring J, et al. Intersectionality, health equity, and EDI: what's the difference for health researchers? *Int J Equity Health*. 2022;21(1):182.
29 Beavers D. *Diversity, equity and inclusion framework: reclaiming diversity, equity and inclusion for racial justice: the greenlining Institute*. 2018.
30 Carbado DW, Crenshaw KW, Mays VM, Tomlinson B. INTERSECTIONALITY: mapping the movements of a theory. *Du Bois Rev*. 2013;10(2):303–312.
31 Collins PH. Intersectionality's definitional dilemmas. *Annu Rev Sociol*. 2015;41(41):1–20.
32 Keuchenius AA-O, Mügge L. *Intersectionality on the go: the diffusion of Black feminist knowledge across disciplinary and geographical borders*. 2020:1468–4446 [Electronic].
33 Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. 2018;169(7):467–473.
34 Cole R. Inter-rater reliability methods in qualitative case study research. *Socio Methods Res*. 2024;53(4):1944–1975.
35 Dacus AR, Behar B, Washington K. Advocacy for diversity in hand surgery. *Hand Clin*. 2023;39(1):25–31.
36 Flexman AM, Shillcutt SK, Davies S, Lorello GR. Current status and solutions for gender equity in anaesthesia research. *Anaesthesia*. 2021;76(Suppl 4):32–38.
37 Rodriguez CI, Jagsi R, Mangurian C. Rising to the challenge: strategies to support latinas and other women of color in science and medicine. *Acad Med*. 2022;97(3):331–334.
38 Verduzco-Gutierrez M, Wescott S, Amador J, Hayes AA, Owen M, Chatterjee A. Lasting solutions for advancement of women of color. *Acad Med*. 2022;97(11):1587–1591.
39 Martin SL, Cardel MI, Carson TL, et al. Increasing diversity, equity, and inclusion in the fields of nutrition and obesity: a road map to equity in academia. *Obesity*. 2023;31(5):1240–1254.
40 Golden SH. The perils of intersectionality: racial and sexual harassment in medicine. *J Clin Invest*. 2019;129(9):3465–3467.
41 Liani ML, Nyamongo IK, Pulford J, Tolhurst R. An intersectional gender analysis of familial and socio-cultural drivers of inequitable scientific career progression of researchers in Sub-Saharan Africa. *Glob Health Res Policy*. 2021;6(1):30.
42 Dunne M, Jones C, Lucraft M, et al. *Insights into diversity, equity & inclusion in the global research community*. Springer Nature; 2023.
43 Clancy KBH, Lee KMN, Rodgers EM, Richey C. Double jeopardy in astronomy and planetary science: women of color face greater risks of gendered and racial harassment. *J Geophys Res*. 2017;122(7):1610–1623.
44 Jeffe DB, Yan Y, Andriole DA. Competing risks analysis of promotion and attrition in academic medicine: a national study of U.S. Medical school graduates. *Acad Med*. 2019;94(2):227–236.
45 Mthembu M, Baiyegunhi O, Mdleleni Y, et al. A PowerPack of SuperScientists: an innovative concept by African scientists to address gender bias and inequity in science. *Wellcome Open Res*. 2022;7:87.
46 Keshinro A, Butler P, Fayanju O, et al. Examination of intersectionality and the pipeline for Black academic surgeons. *JAMA Surg*. 2022;157(4):327–334.
47 Liani ML, Nyamongo IK, Pulford J, Tolhurst R. Institutional-level drivers of gender-inequitable scientific career progression in sub-Saharan Africa. *Health Res Policy Syst*. 2021;19(1):117.
48 Alwazzan L, Rees CE. Women in medical education: views and experiences from the Kingdom of Saudi Arabia. *Med Educ*. 2016;50(8):852–865.
49 Banks L, Randhawa VK, Colella TJF, et al. Cardiovascular physicians, scientists, and trainees balancing work and caregiving responsibilities in the COVID-19 era: sex and race-based inequities. *CJC Open*. 2021;3(5):627–630.
50 Muraya KW, Govender V, Mbachu C, Uguru NP, Molyneux S. 'Gender is not even a side issue…it's a non-issue': career trajectories and experiences from the perspective of male and female healthcare managers in Kenya. *Health Policy Plan*. 2019;34(4):249–256.
51 Keshet Y, Popper-Giveon A, Liberman I. Intersectionality and underrepresentation among health care workforce: the case of Arab physicians in Israel. *Isr J Health Policy Res*. 2015;4:18.
52 Raj A, Kumra T, Darmstadt GL, Freund KM. Achieving gender and social equality: more than gender parity is needed. *Acad Med*. 2019;94(11):1658–1664.
53 Uneke C, Uneke B. Intersectionality of gender in recruitment and retention of the health workforce in Africa: a rapid review. *East Mediterr Health J*. 2021;27(7):698–706.
54 National Academies of Sciences E, Medicine. *The science of effective mentorship in STEMM*. Washington, DC: The National Academies Press; 2019.
55 Shung-King M, Gilson L, Mbachu C, et al. Leadership experiences and practices of South African health managers: what is the influence of gender? -a qualitative, exploratory study. *Int J Equity Health*. 2018;17(1):148.
56 Mocanu V, Kuper TM, Marini W, et al. Intersectionality of gender and visible minority status among general surgery residents in Canada. *JAMA Surg*. 2020;155(10):e202828.
57 Zeinali Z, Muraya K, Molyneux S, Morgan R. The use of intersectional analysis in assessing women's leadership progress in the health workforce in LMICs: a review. *Int J Health Policy Manag*. 2021;11(8):1262–1273.
58 Aspinall C, Jacobs S, Frey R. Intersectionality and nursing leadership: an integrative review. *J Clin Nurs*. 2023;32(11-12):2466–2480.
59 Govindasamy LS, Terziovski M, Wheeler M, Rixon A, Wilson S. Gender equity in emergency medicine: five years on, where are we headed? *Emerg Med Australas*. 2022;34(2):288–290.
60 Riner AN, Herremans KM, Neal DW, et al. Diversification of academic surgery, its leadership, and the importance of intersectionality. *JAMA Surg*. 2021;156(8):748–756.
61 Zeinali Z, Muraya K, Govender V, Molyneux S, Morgan R. Intersectionality and global health leadership: parity is not enough. *Hum Resour Health*. 2019;17(1):29.
62 Johnson R, Osobamiro O, Morenz A, Mugisha N, Liu L, Albert T. Chief residency selection in internal medicine: who is left out? *J Gen Intern Med*. 2022;37(5):1261–1264.

63 Aspinall C, Jacobs S, Frey R. The impact of intersectionality on nursing leadership, empowerment and culture: a case study exploring nurses and managers' perceptions in an acute care hospital in Aotearoa, New Zealand. *J Clin Nurs*. 2021;30(13-14):1927–1941.
64 Moreno-Cubillos CL, Sepúlveda-Gallego LE. Violence and discrimination against nursing students in a Colombian public university. *Invest Educ Enfermería*. 2013;31:226–233.
65 Jiménez-Castaño J, Cardona-Acevedo M, Sánchez-Muñoz MdP. Discriminación y exclusión laboral en la comunidad LGBT: un estudio de caso en la localidad de chapinero, Bogotá Colombia. *Papeles Población*. 2017;(93):231–267. %V 23.
66 Silbert A, Punty M, Ghoniem EB. *The women's power gap at elite universities: Scaling the ivory tower*. Eos Foundation; 2022.
67 Bryant JP, Nwokoye DI, Cox MF, Mbabuike NS. The progression of diversity: Black women in neurosurgery. *Neurosurg Focus*. 2021;50(3):E9.
68 Chilakala A, Camacho-Rivera M, Frye V. Experiences of race- and gender-based discrimination among Black female physicians. *J Natl Med Assoc*. 2022;114(1):104–113.
69 Rezaiefar P, Abou-Hamde Y, Naz F, Alborhamy YS, LaDonna KA. "Walking on eggshells": experiences of underrepresented women in medical training. *Perspect Med Educ*. 2022;11(6):325–332.
70 Acosta DA, Lautenberger DM, Castillo-Page L, Skorton DJ. Achieving gender equity is our responsibility: leadership matters. *Acad Med*. 2020;95(10):1468–1471.
71 Semu LL. The intersectionality of race and trajectories of African women into the nursing career in the United States. *Behav Sci*. 2020;10(4).
72 White J, Cordova-Gomez A, Mejía R, Calyton JA. Intersectionality and interseccionalidad—the best of both worlds. *Lancet Reg Health Am*. 2025;41:100974.
73 Gouger DH, Sankaran Raval M, Hussain RS, Bastien A. Examining intersectionality in anesthesiology training, academics, and practice. *Curr Opin Anaesthesiol*. 2022;35(2):201–207.
74 Zeinali ZMK, Molyneu S, Morgan R. The use of intersectional analysis in assessing women's leadership progress in the health workforce in LMICs: a review. *Int J Health Pol Manag*. 2022;11(8):1262–1273.
75 Roberge M-É, van Dick R. Recognizing the benefits of diversity: when and how does diversity increase group performance? *Hum Resour Manag Rev*. 2010;20(4):295–308.
76 De Freitas C, Buckley R, Klimo R, Daniel JM, Mountjoy M, Vanstone M. Admissions experiences of aspiring physicians from low-income backgrounds. *Med Educ*. 2021;55(7):840–849.
77 Teherani A, Hauer KE, Fernandez A, King TE Jr, Lucey C. How small differences in assessed clinical performance amplify to large differences in grades and awards: a cascade with serious consequences for students underrepresented in medicine. *Acad Med*. 2018;93(9):1286–1292.
78 Yaman R, Hagen KM, Ghaith S, Luong H, Almader-Douglas D, Langley NR. Gender bias in medical education: a scoping review. *Clin Teach*. 2023;20(4):e13592.
79 Berry C. Discrimination toward women surgeons in the workplace through an intersectional lens: are institutions ready for diversity? *Ann Surg*. 2022;276(1):9–10.
80 Lloren A, Parini L. How LGBT-supportive workplace policies shape the experience of lesbian, gay men, and bisexual employees. *Sex Res Soc Pol*. 2017;14(3):289–299.
81 Kossek EE, Lautsch BA, Perrigino MB, Greenhaus JH, Merriweather TJ. Work-life flexibility policies: moving from traditional views toward work-life intersectionality considerations*. In: Buckley MR, Wheeler AR, Baur JE, Halbesleben JRB, eds. *Research in personnel and human resources management*. Emerald Publishing Limited; 2023:199–243.
82 Jefferies K, States C, MacLennan V, et al. Black nurses in the nursing profession in Canada: a scoping review. *Int J Equity Health*. 2022;21(1):102.
83 Zajdel RA, Rodriquez EJ, Mejía R, Pérez-Stable EJ. Perspective on the intersection of race and ethnicity, immigration status, and sexual and gender minoritized status among clinical and scientific workforces in Latin America. *Lancet Reg Health Am*. 2025;41:100975.
84 Cavanagh A, Owais S, Syed SA, Zhang A, Van Lieshout RJ. Diversity in MD-PhD programs and factors affecting admission and completion among minoritized groups: a scoping review. *Acad Med*. 2023;98(3):410–419.
85 Morrison T, Dinno A, Salmon T. The erasure of intersex, transgender, nonbinary, and agender experiences through misuse of sex and gender in health research. *Am J Epidemiol*. 2021;190(12):2712–2717.
86 Berry C. Women surgeon-scientists-applying an intersectional lens to the current status of national Institutes of health funding. *JAMA Surg*. 2022;157(12):1140–1141.
87 Delbridge R, Jovanovski N, Skues J, Belski R. Exploring the relevance of intersectionality in Australian dietetics: issues of diversity and representation. *Sociol Health Illn*. 2022;44(6):919–935.