



Gender Diversity, Equity, and Inclusivity (DEI) in Dental Higher Education: A Narrative Review on Current Evidence and Future Directions

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Abstract. The present narrative review aimed to appraise the current evidence on gender diversity, equity, and inclusivity (DEI) in dental higher education. It highlighted the existing gender disparities in dental education and leadership roles as well as the progress and challenges faced by contemporary dental schools in achieving gender DEI. Although men historically dominated the leadership roles in the dental higher education sector, evidence has shown an increase in women enrolling into dental programs and holding top-management roles in dental institutes, progressing towards a more inclusive, supportive and gender-friendly educational environment. However, gender disparities in these leadership roles, salary, and academic achievements persist, underscoring the underrepresentation of women in senior roles within dental higher education. In addition, this review further elaborated on the theoretical framework, such as the Critical Feminist Theory, Social Role Theory, and the Inclusive Excellence Framework that underpinned gender DEI. Effective strategies and future research are warranted to support dental higher education in fostering a more inclusive and equitable environment, ultimately benefiting the dental profession.

Keywords: Gender Equity, Higher Education, Leadership, Social Science, Workforce Diversity.

1. INTRODUCTION

For many years, the issue of gender diversity, equity, and inclusivity (DEI) within the global higher education sector has remained unresolved (Rosa & Clavero, 2021). It is imperative that higher education institutions play a crucial role in fostering gender DEI and empowering underrepresented groups (Rosa et al., 2020). Nonetheless, these institutions continue to exhibit gender biases, particularly in the assignment of women to low-value tasks in the workplace (Heijstra et al., 2017). Despite an increase in the number of women in higher education, men still dominate the sector, even in the presence of anti-discrimination laws and initiatives aimed at removing gender barriers (Husu, 2020). This trend is also evident in dental higher education institutions, which have historically favoured male faculty members and students, often neglecting gender DEI (Kim et al., 2024). Men continue to hold the majority of leadership and top-management positions within dental institutes (Bompolaki et al., 2022). Furthermore, significant gender gaps persist in key roles such as presidents of major dental associations, dental deans, heads of departments, and members of editorial boards of dental journals (Laloo, 2023). Promoting DEI within dental institutions and their leadership is crucial to establishing a fair, diverse, inclusive, and equitable professional environment (Koka et al., 2021).

In the early 1980s, it was observed that women constituted less than 5% of those enrolled in undergraduate dental programs (Feldman, 2015). However, his situation has significantly changed over the past few decades, with an increasing number of women pursuing careers in dentistry (Gallagher & Scambler, 2021). The number of women and non-binary individuals enrolling in and graduating from dental schools has risen substantially (Campus et al., 2024; Kim et al., 2024), leading to an equal gender distribution among graduates each year (Wanchek et al., 2017). In addition, there has been a noticeable increase in the presence of women within the dental workforce (Hernandez-Ruiz et al., 2022). Despite these encouraging trends, gender disparities persist across various dental institutions and countries. Some dental schools have proactively revised their curricula to integrate gender DEI into their core teachings (Forsyth et al., 2017). Conversely, others have lagged behind, potentially due to entrenched traditional gender beliefs and practices (Forsyth et al., 2019). For instance, a previous review highlighted the ongoing existence of gender inequalities within the dental higher education sector and research facilities globally (Tiwari et al., 2019). The study also found that although the gender gap among dental graduates in North America and Europe is narrowing, women continue to be underrepresented in dental institutions and leadership roles (Tiwari et al., 2019). To effectively address these issues and encourage more women to pursue careers in dentistry, dental schools must not only embrace gender DEI but also work towards creating an equitable future for all dental professionals.

Achieving gender DEI within the dental higher education sector presents considerable challenges. A long-standing area of research has been the rise of women in dentistry and their positions in dental academia. Though there has been a significant increase in the number of women enrolling in dental programs and entering the dental workforce, they remain underrepresented in top leadership roles within dental institutions (Hernandez-Ruiz et al., 2022; Kim et al., 2024). This disparity is largely attributed to the insufficient or limited

implementation of effective gender DEI strategies in the higher education sector (Llorens et al., 2021). Moreover, there is a dearth of literature on the progression of women and other underrepresented groups within dental higher education. A gender-diverse leadership team fosters a variety of perspectives and ideas, leading to more innovative and effective solutions, which are crucial for enhancing the performance of organisations and institutions, particularly in the dental higher education sector (Laloo, 2023). Consequently, this narrative review aims to critically evaluate the existing evidence on gender DEI in dental education and to explore strategies for addressing these challenges.

2. GENDER DISPARITIES IN DENTAL HIGHER EDUCATION AND LEADERSHIP ROLES

Women have been reported to remain significantly underrepresented in senior academic roles within dental higher education institutions. A study indicated that although the number of full-time female dental faculty members in the United States has risen over the years, men still occupy approximately 59% of the top-tier positions (Garcia et al., 2022). In addition, it was observed that male dental deans are paid on average 7% more than their female counterparts. These findings align with an exploratory study also conducted in the United States, which examined gender disparities in academic productivity and ranking among dental faculty members (Simon et al., 2019). The study showed that men were more likely to attain the rank of full professor, achieve a higher H-index, have more last-authorship publications, and receive more research citations as per the PubMed database (Simon et al., 2019). Surprisingly, time since graduation from dental school and the number of publications were the prime factors influencing the gender disparity in rank achievement. Apart from instructor roles, women continue to be underrepresented in all other academic ranks. Correspondingly, a cross-sectional study among 184 paediatric dental faculty members showed that women were significantly underrepresented at the levels of associate professor (41.3%) and professor (32.4%), respectively (Karhade et al., 2019).

A separate study investigated gender disparities within prosthodontics, a dental speciality focused on dental prostheses, by analysing the patterns of female authorship in prosthodontic journals and the involvement of women in prosthodontic organisations (Kongkiatkamon et al., 2010). The findings identified a low representation of women as first authors (16%) and last authors (8%), as well as in leadership roles within these organisations, highlighting significant gender gaps. Furthermore, the number of women serving as first and last authors showed inconsistency over the years. The study also noted that female program directors in Advanced Education in Prosthodontics (AEP) programs have consistently been under 5% in the past 13 years. In Spain, men dominated more than 70% of president and vice-president positions in dental colleges and 60% of roles in dental scientific societies, with minimal dental congress achieving equal gender participation (Hernandez-Ruiz et al., 2022). In 2020, data from a Spanish dental school showed that while 52% of full professors were women, only 36.4% of head professors were female (Hernandez-Ruiz et al., 2022). The Dean Board was predominantly male, with six men and one woman. Similar patterns were observed in Australia, where men held the majority of leadership positions in dental institutions, research organisations, the public sector, and specialist academies (Laloo, 2023). For instance, more than 60% of the leadership positions (presidents, councillors and chief executive officers) in the Australian Dental Association were held by men. Similarly, a prior survey study comprising 29 United States dental schools and 4 Canadian schools found that only 12% of the dental deans were women (Dannels et al., 2009). In the United States, the ratio of male to female deans in dental schools exceeded 5:1 (Bompolaki et al., 2022). The study also indicated that dental institutions led by female deans had a higher number of women in leadership positions within the institution.

The roles of women in dental research and authorship have been extensively documented in the literature. A longitudinal analysis spanning three years (1995, 2005, and 2015) of publications in an oral maxillofacial journal indicated that the proportion of female first and last authors ranged between 3% and 6.3%, which was significantly less than expected. Furthermore, only about 7% of female oral-maxillofacial surgeons were registered with the American Association of Oral and Maxillofacial Surgeons (AAOMS) in 2015 (Consky et al., 2020). A previous report assessing female authorship in orthodontic publications from 2018 to 2020, demonstrated that women authored merely 30% of research articles, with approximately 45% of these being first authors and 30.1% being last or senior authors (Schumacher et al., 2021). These statistics highlight the ongoing underrepresentation of women in research publications. Moreover, the leadership of the International Association for Dental Research (IADR), a preeminent global dental research organisation, was exclusively male for the first 60 years of its establishment (Shaddox & Letra, 2019). This gender disparity is also evident in dental conferences, where only 38% of speakers and participants in continuous professional development (CPD) activities in Australia were women (Silva & Teoh, 2021). Despite efforts to bridge these gaps, significant gender inequalities persist, particularly in terms of salary, leadership roles, and tenure attainment. Women frequently receive lower pay than their male counterparts and are less likely to secure academic tenure (Ioannidou et al., 2014).

3. PROGRESS AND CHALLENGES IN ACHIEVING GENDER DEI IN DENTAL HIGHER EDUCATION

In recent years, women have become increasingly prominent in dental higher education in the United States (Sinkford et al., 2011). Since 2000, there has been a significant rise in the number of female applicants and enrolments in dental programs. By 2009, women constituted approximately half of all applicants and enrolments in these programs. Furthermore, 39% of advanced dental trainees and 31.33% of full-time dental faculty members were women. A similar study found an almost equal gender distribution among dental academic faculty, with 94

men (51.1%) and 90 women (48.9%). This study also reported no significant gender differences in the number of first-author publications, total PubMed® publications, or H-index (Simon et al., 2019). Despite these gains, women remain underrepresented in top administrative roles within dental institutions compared to other fields, such as medicine. Data from nine dental journals, American Dental Association surveys, and records of female deanships and presidencies in dental speciality organisations over 22 years indicate a growing trend in female authorship and leadership roles (Yuan et al., 2010). Even though the number of female deans and tenured professors has increased over time in the United States, the overall improvements in first female authorship have not been statistically significant.

On the other hand, a study published in 2021 found that women were first authors in 40.3% of pre-prints and 64.5% of peer-reviewed publications, and last authors in 31.3% of pre-prints and 61.5% of peer-reviewed publications (Rajendran et al., 2021). These figures demonstrate significant progress in gender DEI within the dental field. A recent study conducted in 2024 highlighted a significant annual increase in the number of female authors and reviewers from 2000 to 2022, with women accounting for over 50% of first authorships since 2016 (Gottlieb et al., 2024). Multivariable analysis indicated that more recent publications had higher odds of featuring female first and senior authors compared to earlier publications (Schumacher et al., 2021). Notwithstanding these achievements, there has been minimal progress in the representation of women on editorial boards throughout the research period. Moreover, a study carried out in 2018 explored the experiences of female dental students from four different countries (the United States, Bulgaria, Brazil, and India) regarding sexual misconduct and their perceptions of gender biases (Ivanoff et al., 2018). The findings indicated a general perception of fairness in admission processes and reduced discrimination within dental schools. However, many female dental students reported feeling discriminated against by male faculty members and students, particularly in the United States.

A positive shift in workplace environments was noted, with 97% of dental school deans in the United States and Canada acknowledging improvements in gender DEI over the past decade, and 75.8% of them believed their dental schools were supportive of women's dental leadership roles (Dannels et al., 2009). Nevertheless, only 15% of dental school deans in India were female, despite women making up 50-60% of dental students in the country (Parkash et al., 2006). While men predominantly held leadership roles in dental institutions, women occupied most top positions in allied dental accreditation bodies in Australia (Laloo, 2023). For example, it has been reported that women held the positions of president and vice president of the Royal Australasian College of Dental Surgeons, as well as president and directors of allied health professional associations in Australia (Laloo, 2023), such as the Australian Dental and Oral Health Therapists Association and the Dental Hygienists Association of Australia. These findings suggested that more and more women are being offered the opportunity to enrol in dental programs and pursue leadership careers in dentistry.

Women undeniably continue to encounter significant obstacles in attaining top leadership roles on a global scale. The barriers sustaining gender disparity in dental higher education leadership are largely attributed to entrenched societal and cultural norms, pervasive gender stereotypes, family commitments, implicit and unconscious biases, and limited awareness of women's rights (Smith & Sinkford, 2022). It is apparent to some extent that women in developed countries are more likely than their Asian counterparts to hold leadership positions in the dental profession (Campus et al., 2024). The underrepresentation of women in senior leadership positions within dental institutions also limits the availability of role models and mentors for aspiring female leaders. This lack of representation can perpetuate the cycle of gender disparity in leadership (Smith & Sinkford, 2022). A previous survey conducted in India revealed that 67% of female dental leaders felt they faced more challenges in advancing their careers compared to their male counterparts (Tandon et al., 2007). The barriers identified included home environment, societal expectations, male colleagues, and personal psyche influenced by these factors. Additionally, 63.5% of these women identified family commitments as a major hindrance to their professional growth. This disproportionate burden of domestic responsibilities on women, often driven by societal expectations, is a significant factor affecting gender DEI in higher education (Ly & Jena, 2018). Such persistent gender stereotypes contribute to female dental faculty members perceiving their work environment less favourably than their male colleagues (Tiwari et al., 2019).

Furthermore, the persistent "glass ceiling" effect in dental higher education remains evident, as fewer women occupy top administrative positions compared to men (Hernandez-Ruiz et al., 2022). Nevertheless, 93.5% of women reported receiving salaries comparable to their male counterparts (Tandon et al., 2007), indicating some progress towards pay equity in dental academic settings. It has been observed that the number of academic degrees held by faculty members increases with rank, with no significant gender differences (Karhade et al., 2019). Linear regression analysis also revealed that gender was not a significant factor in academic promotion, suggesting some advancements towards gender DEI within dental higher education in recent years (Kim et al., 2024). Nonetheless, the trend of increasing female representation in dentistry is observed globally. Over the past 30 to 40 years, the number of female dentists has risen significantly in countries like the United States, Australia, Canada, and India, with women even making up 70% of dentists in Finland (Yuan et al., 2010).

4. THEORETICAL FRAMEWORK FOR GENDER DEI IN DENTAL HIGHER EDUCATION

A better understanding of the challenges and obstacles in establishing gender DEI in dental higher education can be acquired by utilising Critical Feminist Theory and Social Role Theory, together with the Inclusive Excellence Framework. These theoretical perspectives provide various insights and strategies for addressing gender DEI in dental higher education.

4.1. Critical Feminist Theory

The Critical Feminist Theory represents an amalgamation of Feminist and Critical theories. Feminist Theories advocate for gender equality, asserting that men and women are equal and should be given the same rights and opportunities in all areas of their lives - personal, social, work, and public (Baxter & Braithwaite, 2008). Meanwhile, Critical Theories examine how culture and practice influence societal life and how, in turn, societal activities and experiences shape cultural norms and practices (Kushner & Morrow, 2003). The integration of these theories into Critical Feminist Theory specifically addresses gender-based disparities, investigating how such inequalities are embedded within and perpetuated through societal structures and practices (Wood, 2008). For example, women may confront challenges such as the gender pay gap and underrepresentation in senior roles, facing more significant obstacles in their career advancement compared to their male counterparts (Tandon et al., 2007).

4.2. Social Role Theory

The Social Role Theory posits that individuals' attitudes and behaviours are influenced by the roles they are anticipated to fulfil within society. This theory was developed in the 1980s by psychologist Alice Eagly (Eagly & Kite, 1987). It elucidates how societal perceptions of gender-based expectations and stereotypes manifest across various contexts, including the workplace. For instance, men are often perceived as possessing strong leadership qualities and authority, making them more likely to occupy senior management positions such as dental deans and deputy deans (Bompolaki et al., 2022). In contrast, women are frequently viewed as less authoritative and more suited to lower-ranked roles, such as junior academics or dental assistants (Ioannidou et al., 2014).

4.3. Inclusive Excellence Framework

Inclusive Excellence is a comprehensive model or framework designed to integrate DEI into the core functioning of an organisation. It was initially developed by the Association of American Colleges of Universities in 2005 (Williams et al., 2005). By adopting this model, dental schools can infuse DEI principles into all aspects of their operations, including recruitment, hiring, training, and administrative practices. Incorporating inclusive excellence means embedding diversity into the foundation of institutional processes, ensuring that DEI efforts are not peripheral but central to achieving organisational excellence. This framework advocates for a cohesive, coherent, and collaborative integration of DEI into the pursuit of academic and institutional goals.

5. STRATEGIES FOR ENHANCING GENDER DEI IN DENTAL HIGHER EDUCATION

Dental institutions globally have begun to recognise the significance of fostering DEI in response to evolving social norms surrounding gender equality (Cain et al., 2022). Beyond providing academic knowledge and practical training, dental higher education serves as a critical platform for nurturing and promoting a gender-diverse society. To enhance gender DEI, it is imperative to raise awareness among senior management and integrate gender mainstreaming into dental school policies (Wang & Chang, 2022). This includes restructuring and enhancing existing policy-making frameworks to incorporate a gender DEI perspective at all decision-making levels. Higher education sectors should also create regulations and initiatives that support women's advancement in dental education through faculty development programmes and research career opportunities (Sinkford et al., 2011). Adopting gender-sensitive teaching methods, such as embedding gender DEI and cultural competency into the dental curriculum, alongside implementing anti-discrimination policies, is essential to fostering an inclusive academic environment (Lopez et al., 2024). Other possible strategies, such as mentorship programs, support systems and coaching sessions among faculty members and students, should be taken into consideration to promote gender DEI and reduce gender stereotypes (Husu, 2020). It is also important for dental higher education sectors to ensure that the recruitment, retention, and advancement of women in dental education align with their professional aspirations. This alignment will help create a more equitable and supportive environment for all individuals pursuing careers in dentistry, which will change the balance of power towards gender equality.

Moreover, dental institutions can host various workshops and seminars aimed at eliminating unconscious biases and establishing transparent criteria for promotions and recognition among staff members (Garcia et al., 2022). Financial inequality emerges as a potentially modifiable aspect (Schenkein & Best, 2001). To address this issue, it is essential to implement equitable pay structures within the dental higher education workforce. Regular salary audits and adjustments should be conducted to ensure fair remuneration for all employees, irrespective of gender. In addition, policies should be enacted to equitably distribute domestic and administrative responsibilities, potentially with institutional support. This approach can help alleviate the non-remunerative burdens that disproportionately affect specific groups, thereby fostering more balanced and equitable career progression for everyone. Institutional policies such as pausing the tenure clock for parental leave and implementing equal parental leave for both male and female caregivers can also address these disparities (Freund et al., 2016). These measures are particularly important as income differences between male and female academics may arise from discrepancies in taking time off. Monitoring the long-term effects of these strategies is essential, as it will improve outcomes and aid in developing organisational systems to address broader gender DEI issues.

6. IMPLICATION AND FUTURE RESEARCH

Despite significant strides towards gender DEI in dental higher education, men continue to dominate the majority of leadership positions within dental institutions (Bompolaki et al., 2022). This persistent gender

imbalance is often perpetuated by stereotypes that assign men and women to specific societal roles, which can marginalise women and undermine their professional contributions. Such gender-based biases, which diminish the value of women's roles and characteristics, must be promptly addressed to foster a more equitable academic environment (Rosa & Clavero, 2021). These biases not only affect the workplace but can also indirectly influence the educational experience of students, thereby perpetuating a cycle of inequality. Without continuous support from all stakeholders, it is impossible for dental institutes to create a harmonious environment that promotes gender DEI. Without this collective effort, achieving a harmonious and inclusive environment that truly supports gender DEI remains unattainable.

Future recommendations include the adoption of a multilevel approach to address these problems, and dental schools should ensure that their DEI strategies are inclusive, covering policies to achieve gender equity at the recruitment, retention, and promotion stages. Creating an inclusive environment can be further facilitated through the implementation of workshops, open discussions, and feedback mechanisms designed to identify and eliminate gender biases. Such initiatives can play a crucial role in transforming the culture within dental institutions, making them more supportive of gender diversity and equity. In addition, future research is warranted to compare the gender DEI outcomes across different dental schools with varying phases of DEI integration and evaluate the long-term impacts of gender DEI among faculty members and students. Future research should also seek to explain the persistent lack of an upward trend in female authorship in reputable dental journals and in leadership roles within the field. Understanding these factors will be key to developing targeted interventions that can address and rectify these disparities, thereby advancing gender DEI within the dental higher education sector.

7. CONCLUSION

Addressing gender DEI in dental higher education can improve educational quality and prepare future leaders for a diverse workforce. Despite progress, gender disparities persist, especially in leadership roles and academic achievements. There are still hurdles in the path of these initiatives to increase the number of women in leadership positions in dental institutes. Therefore, it is imperative to implement appropriate strategies and policies to improve gender DEI in the dental academic field with support from empirical evidence. Targeted interventions based on empirical evidence will be key to advancing gender DEI in dental academia.

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