

Navigating the Intersection of Identity and Mental Health: A Literature Review of Non-White Women in Orthopedic Surgery

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Abstract Non-white women in orthopedic surgery face various challenges at the intersection of identity and mental health. Underrepresentation and systemic barriers can lead to increased rates of stress, lower sense of belonging, and lower confidence in an individual's perception of success in orthopedics. This literature review explores the impact of these factors on mental health, professional advancement, and patient care. Our analysis of the current literature identifies unique challenges that non-white women orthopedic surgeons face and highlights the further need for systematic changes. Addressing issues that negatively impact diversity, equity, and inclusion within orthopedics, particularly for non-white women, is critical for addressing interventions and policy reform measures, to ultimately improve the well-being of both orthopedic surgeons and their patients.

Keywords: women, orthopedic surgery, underrepresented minority, diversity, mental health

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1. Introduction

The intersection of identity and mental health plays an important role in shaping professional experiences. An individual's identity encompasses gender, race, ideologies, and cultural background, which play a role in navigating various environments. Although sex is rooted in biological differences, gender is classified on the social construct of cultural differences between females and males [1]. Race is often distinguished based on physical characteristics, while ethnicity focuses on cultural characteristics and customs [1]. Orthopedic surgery is a field that is known to be predominantly dominated by white males, creating challenges for those from different backgrounds and identities. Limited representation in the workplace can present unique challenges for non-white women, which can contribute to disparities in mental health outcomes.

Despite an overall increase in diversity in orthopedic surgery over the past 10 years, women in orthopedic surgery only make up about 18% of orthopedic surgery residents [2,3]. Despite this statistic of those in training,

only 5.9% of practicing orthopedic surgeons identify as women [3]. This highlights that more women are entering orthopedic surgery compared to historic levels. Minority groups remain underrepresented within orthopedic surgery trainees, with African Americans making up only 4.1% and Hispanics 2.7%- figures that are likely even lower for female minority trainees [2,3]. Data on Asian female trainees is limited, however, several studies have shown that Asian females are underrepresented as orthopedic surgeons [4].

Many of these non-white women in training face limitations in finding female mentors and female faculty at residency programs. This absence of mentorship can contribute to feelings of isolation and higher rates of burnout compared to male counterparts [5]. Female orthopedic surgeons also have a higher risk of experiencing discrimination, bullying, and sexual harassment, which can further negatively impact mental health [6]. Few studies have looked into these unique stressors that impact female orthopedic surgeons directly, especially those who identify as non-white women.

This paper aims to address this gap in the literature by exploring the mental health challenges faced by non-white

women in orthopedic surgery, focusing on both the unique stressors of their identities, and the broader systemic issues they encounter. Non-white women in this paper are defined as African American, Hispanic, Asian, and Indigenous women in orthopedics. This is the first study, to our knowledge, to comprehensively discuss how the intersection of race, gender, and profession uniquely impacts the mental health of non-white women in orthopedic surgery.

2. Methods

Seven reviewers independently assessed studies published between 2000 and 2024 using data sources through PubMed. They were searched between February 2025 and March 2025 using keywords in combination “non-white women,” “orthopedic surgery,” and “mental health.” Studies were excluded from the review based on several factors: publications prior to 2000, studies that did not directly address the core purpose of the review, and studies where the population under investigation did not align with the focus on non-white women in orthopedic surgery, including those that focused on male participants or non-surgical specialties.

3. Clinical Implications and Outcomes Within the United States

The mental health and well-being of individuals in healthcare has been shown to be negatively affected by discrimination, bullying, and sexual harassment (DBSH) [7]. Balch et al. sent surveys to 5,638 American Academy of Orthopedic Surgeon (AAOS) members to determine if DBSH exists in the orthopedic workplace. The response rate of the survey included 621 women and 305 men for a total of 927 responders. Out of the surveyed members, 612 members (66%) reported experiencing discrimination, bullying, or some form of harassment [7]. Women, ages 35 to 44, and African American surgeons were all more likely to experience DBSH [7]. Among all African American respondents, 76% reported having experienced DBSH [7]. When asked if respondents took action to address these behaviors, 61% reported that they did not [7]. There were multiple reasons for respondents not to address unprofessional or harmful behaviors, including perceived harm to their reputation, effect on their career, fear of retaliation, concern of not being believed, being blamed, loss of support, stress with filing a report, harm to a perpetrator's reputation, and monetary losses [7]. Furthermore, 58% of respondents stated that they believed that their workplace culture could appropriately address DBSH concerns and behaviors [7]. When asked about the fair treatment of underrepresented minorities, only 45% believed them to be fairly treated [7]. Discrimination, bullying, sexual harassment, and other unprofessional behaviors are linked to reduced self-esteem and mental well-being [7]. Other sequelae of unprofessional behaviors include social isolation, nervousness, sleep disturbances, and even suicidal thoughts [7]. Samora et al. hypothesized that these factors could contribute to a discouraging environment, which may help explain the low number of

women (7%), African Americans (2.2%) and Latinos (1.9%) in the AAOS [7]. To counteract DBSH and improve the mental health of individuals who are affected, education on implicit and explicit bias, and a better system for reporting DBSH can improve the culture within the orthopedic community.

The workplace environment, discrimination, and opportunity for African American orthopedic surgeons was further explored by Ode et al. [8]. A total of 274 (215 male and 58 female) African American orthopedic surgeons completed the survey [8]. Out of all responders, 89% reported encountering racial microaggressions in the workplace, with the most common by confusing respondents with being a nurse or physician assistant (89%) or janitorial or dietary services (74%) [8]. Microaggressions were reported at higher rates among African American female orthopedic surgeons (66-98%) compared to African American male orthopedic surgeons (53-87%) [8]. Regarding discrimination, 97.6% responders felt that African American orthopedic surgeons experience workplace discrimination in the United States [8]. 71.1% felt that discrimination is occurring through hiring practices [8]. However, less than 20% of respondents expressed a lack of trust that leaders of orthopedic organizations are working on putting a stop to racial discrimination in the workplace setting [8]. About 93-94% of African American orthopedic surgeons also reported inequalities in opportunities in the workplace compared to white orthopedic surgeons [8]. These results indicate a need for institutional and national tactics to improve the inequality and discrimination African American orthopedic surgeons face.

These findings are consistent with broader patterns seen in orthopedic residency programs as well. Similar to the experiences reported by practicing surgeons, seventeen orthopedic residency programs in the Collaborative Orthopaedic Educational Research Group agreed to participate in a study focusing on the well-being and mistreatment of women and minorities [9]. Race and ethnicity data was categorized into “white” and “underrepresented in orthopedics” (URiO) including residents who self-identified as Asian, African American, Hispanic or Latino, Native American, or other [9]. It was found that women residents were more likely to report emotional exhaustion (odds ratio 2.18; $p = .03$) [9]. It was also found that URiO residents were more likely than white residents to report experiencing racial discrimination (odds ratio 7.8; $p < 0.001$) [9]. Together, this data highlights the trajectory of discrimination and mental health strain non-white women face at both the resident and attending level.

These patterns of discrimination and unequal treatment among both orthopedic surgeons and trainees raise the critical question of whether similar disparities extend to patient populations. While studies by Balch et al. and Ode et al. have drawn attention to inequality and discrimination within the orthopedic surgery community, the extent of inequality experienced by patients remains less clear [7,8]. To explore this, Okike et al. investigated the presence racial disparities within the orthopedic patient population by assessing if racial inequality of the utilization of total joint arthroplasty (TJA) persisted in patients within Kaiser Permanente [10]. A total of 99,548

patients 50 years and older with hip osteoarthritis (OA) and 290,324 patients 50 years and older with knee OA were included [10]. Out of 99,548 patients that were diagnosed with hip OA, 27,114 had an elective total hip arthroplasty (THA) [10]. However, the amount of patients receiving a THA was significantly lower among all minority groups [10]. The incidence rate ratio in THA for Black patients was 0.55 (95% confidence interval (CI)), for Hispanic patients was 0.63 (95% CI), and for Asian patients was 0.64 (95% CI) in comparison with white patients [10]. Out of 290,324 patients with knee OA, 29,976 had elective total knee arthroplasty (TKA) performed [10]. However, the amount of patients receiving a TKA was also significantly lower in minority groups [10]. The incidence rate ratio for TKA for Black patients was 0.52 (95% CI), for Hispanic patients was 0.72 (95% CI), and for Asian patients was 0.60 (95% CI) in comparison with white patients [10]. These disparities among TJA among patients demonstrate the possibility of race accounting for these differences in TKA and THA utilization, especially since insurance authorization and common coverage barriers are reduced with all the patients under Kaiser Permanentes' network. Potential explanations may be due to a difference in provider recommendation of TJA to minority groups or difference in minority groups willingness to undergo TJA. Further investigation in provider-patient relationships, and other factors affecting minority groups, is needed to determine potential causes of the disparities in total joint utilization.

4. Clinical Implications and Outcomes Globally

Globally, the clinical experiences and professional outcomes of female orthopedic surgeons are shared by systemic barriers, gender bias, and cultural norms. Liew investigated perceptions by Malaysian female orthopedic surgeons and their reasons for interest, experiences, and barriers to orthopedics [11]. Female orthopedic surgeons registered with Malaysian Medical Council from 1980 to 2020 were sent a questionnaire and 82 responded with a response rate of 81.2% [11]. Out of the 82 responders, 52 (63%) were Malay, 21(26%) were Chinese, 5 (6%) were Indians and 4 (5%) were others [11]. When asked about gender discrimination, 23 (28%) reported experiencing it in their career opportunity, and 49 (60%) reported experiencing it in daily work with the majority (47% n=34) being from male orthopedic surgeons [11]. Verbal sexual harassment was experienced by 27 (33%) with most (87% n=26) being from medical colleagues, and physical sexual harassment was experienced by 9 (11%) of responders with all being from medical colleagues (n=9), but two also reported experiencing physical harassment from a patient or their family member [11]. Responders chose orthopedics as their career due to enjoyment of manual tasks (64.6%), professional satisfaction (64.6%), and enjoy working with other orthopedic surgeons (52.4%) [11]. Main barriers to orthopedic surgery for female doctors were perceived to be too much physical strength required (56%) and public gender bias (43%) [11]. Minor barriers included disliking operating theater (35.3%), negative previous exposure to orthopedics (29.3%),

work/life imbalance (29.3%), lack of exposure (26.8%), lack of strong mentorship (24.3%), disliking manual tasks (19.5%), and competitiveness (9.8%) [11]. Forty-four percent of responders also disclosed that they had help from male colleagues on manual assistance, working hours, child care emergencies and during pregnancy [11]. It was deduced that this finding might be due to Malaysian society defining a women's role as family caretaker above their careers, leading to a more accommodating work culture for female surgeons during pregnancy or child emergencies [11]. Malaysian female orthopedic surgeons also faced challenges in the workplace regarding discrimination, harassment, and other barriers that impede other females from choosing the specialty contributing to the low representation.

Like in Malaysia, female orthopedic surgeons in India face significant challenges related to systemic barriers that discourage others from entering the specialty. Paul et al. highlighted that women comprise just 1% of orthopedic surgeons in India, marking one of the lowest representation rates worldwide [12]. Paul et al. also found that the number of female Orthopedic surgeons in India is trending at only 1%, one of the lowest rates in the world. Indian women face even more challenges, such as feeling out of place and lower confidence due to both gender and racial barriers [12]. One reason for this is the lack of female mentors available [12]. Flint et al. showed that roughly 96% of orthopedic residents consider mentorship as a crucial part of their training and the lack of female Indian mentors places constraints on aspiring female orthopedic surgeons [13]. The lack of representation not only limits mentorship opportunities, but can contribute to feelings of isolation and reduce confidence in succeeding in a field such as orthopedics [13]. Cultural values and societal expectations of women in countries like India also contribute to the pressure against pursuing medical specialties like orthopedics. For instance, in a study using purposive sampling interviewing, Indian physicians from May to July of 2023 found that some male surgeons held the perception that women may not be as effective in surgical disciplines like orthopedics [14]. These societal attitudes highlight the urgent need for structural reforms in medical education along with the advancement of equality and inclusion policies on the global level [14].

Similar to trends observed in other countries, a study conducted at Harbin Medical University in China surveyed medical students about gender bias and their intentions to pursue surgical careers [15]. Among the 643 respondents, 53.2% believed that surgical specialties like orthopedics were not suitable for women [15]. This perception was attributed to various factors including cultural influences, but it was also linked to gender bias among mentors [15]. Many medical students reported that there were more male leaders in surgical departments who favored male medical students during clinical rotations [15]. These experiences of discrimination and exclusion can exacerbate mental health challenges further leading to decreased confidence in succeeding in such fields [15].

These patterns of gender bias and systemic barriers observed are echoed across other regions, such as the Arab region, where similar disparities in female orthopedic surgeons persist. In a study done analyzing surgeon differences in mental and physical well-being in the Arab

region, results vary based on country [16]. In the 23 studies collected they were able to state that men held a higher representation within participants [16]. Females make up 37.3% of orthopedic physicians and residents [16]. In Lebanon, in a study of 3970 surgeons, 1.63% were female, with one of the lowest being in orthopedic surgery [16]. Alansari et al. found that there was a gender disparity in the motivation for fellowships with males pursuing multiple as opposed to their female counterparts. In Saudi Arabia, 81.9% of medical students believed that women faced more challenges than their male counterparts in pursuing orthopedics with the reasons being due to stress, burnout, and self-doubt (skill level, physical physique, patient preference, gender discrimination) as major barriers [16].

Similarly, Canada has experienced comparable challenges. A 2023 study examined sex and racial diversity within surgical specialties, including orthopedic surgery, across 17 Canadian faculties of medicine [17]. The findings revealed that orthopedic surgery had one of the smallest proportions of BIPOC (Black, Indigenous, and People of Color) surgeons, at only 19%, with females comprising just 2% [17]. While these countries display a more homogenous patient and physician population, the trends in female orthopedic surgeon participation and mental barriers remain the same.

5. Challenges

Efforts to support the mental health of non-white women in orthopedic surgery face multiple obstacles, including a lack of comprehensive research, underreporting of mental health struggles, and the persisting stigma surrounding mental health in the surgical profession. A notable challenge is the limited research on the mental health experiences of non-white women in orthopedic surgery. While studies have examined workplace discrimination, microaggressions, and career advancement barriers, few have focused specifically on the intersectionality of race, gender, and mental health within this field, revealing a gap in literature specifically addressing the intersection. The lack of robust studies focused on mental health in orthopedic surgery trainees and attendings, especially of historically marginalized populations, makes it difficult to develop interventions and policies aimed to effectively address their unique challenges. Expanding research efforts in this area is important to gaining a deeper understanding of these issues while guiding institutional change.

Another issue is the reluctance to report mental health concerns. Many non-white women in orthopedic surgery may hesitate to share their struggles due to fears of professional repercussions, concerns about being perceived as weak, or a lack of trust in institutional support systems, as seen in studies related to residents of various specialties [18]. In a study by Amini et al., the psychological burden experienced by orthopedic residents was highlighted and showed a pooled prevalence of anxiety at 25% and depression 18.6% based on a review of 10 studies encompassing over 2,300 residents [19]. This suggests that nearly one in four orthopedic residents faced significant mental health challenges, which

strengthens the need for establishing a strong accessible mental health foundation in residency programs. However, there were inconsistencies and gaps in the study related to quality of the studies due to using different screening tools and cutoff scores to define anxiety and depression, as well as studies being cross-sectional, providing only a snapshot in time [19]. Furthermore, the analysis did not explore the experiences of residents of minority background, who often face unique stressors such as discrimination, cultural isolation, and additional stigma around mental health.

The surgical profession, including orthopedic surgery, has long emphasized resilience, endurance, and mental toughness. This culture can discourage open discussions about mental health, making it difficult for individuals to seek help or advocate for systemic change. Burnout, as defined by Ross et al., is a psychological syndrome that arises in response to chronic occupational stress characterized by emotional exhaustion, depersonalization, and a reduced sense of personal accomplishment [20]. Travers found that the burnout rate in the field of orthopedic surgery was 32.3%, which is supported by the national estimates of 40-60% in the review by Ross et al. [20,21]. Contributing factors to the rate of burnout included long work hours and extensive clinical responsibilities, resulting in poor work-life balance, and reduced professional autonomy. Travers also mentions a comparison of the different rates of burnout between orthopedic surgeons and residents, 38% and 56% respectively [21]. While both groups face significant pressures, residents may be more likely to report symptoms if they experience wellness initiatives during residency, but this has not been well studied. In comparison, attending surgeons may be reporting less due to maintaining their roles in leadership responsibilities or as a result of stigma and longstanding cultural norms they have once experienced. However, studies on these topics are limited.

Additionally, moral injury is a distinct, but related experience that contributes to psychological distress among orthopedic surgeons. Moral injury occurs when physicians are pressured to act in ways that violate their own ethical or moral beliefs, often due to systemic pressures [20]. Such compromise, whether due to prioritizing administrative metrics over patient care or feeling unable to advocate for vulnerable patients, can lead to further burnout. For non-white women, who may already face additional scrutiny or bias in the workplace, the pressure to conform or compromise against their own beliefs as in moral injury, can further exacerbate issues like burnout or moral injury. The stigma that is embedded into the systems that define the profession, such as licensing boards and insurance eligibility, creates similar systemic barriers for non-white women in orthopedic surgery, as they often receive less mentorship, face biased evaluations, and have fewer role models in leadership positions [22]. The stigma further reinforces the difficulty of openly addressing these challenges.

Recent findings by Ranson et al. demonstrated the importance of having more women faculty leads to more women residents in orthopedic programs, showing a strong association [23]. Programs with women in leadership roles, like assistant professor, division chief, or vice chair, were more likely to have higher numbers of

women residents [23]. Despite the positive correlation, women still make up only 13.1% of orthopedic faculty and less than 6% of practicing orthopedic surgeons in the United States [3,23]. This lack of representation may discourage women from choosing orthopedic surgery due to the lack of fewer mentors and role models.

6. U.S Policy and Institutional Recommendations

With a push towards embracing diversity within orthopedic surgery, more opportunities are arising to help improve diversity, equity, and inclusion initiatives. The AAOS has been actively working on a strategic plan that includes the recruitment and retention of historically marginalized minorities and women in orthopedic surgery [24]. The AAOS administers grants and scholarships towards these initiatives, as well as highlighting important pertinent issues within the workplace [24]. The National Institutes of Health (NIH) is a large supporter of orthopedic surgery funding. From 2005 to 2014, the NIH had a 24.3% (\$54,608,264) increase in orthopedic funding and a 79.7% increase from 2015 to 2021 with \$104,710,841 administered in 2021 [25,26]. The majority of these funds were towards basic science research [25]. Associations, such as AAOS, are funded in part by the NIH, and are therefore at risk by changes to federal policies. In 2024, the National Institute of Mental Health (NIMH), under the NIH, allocated \$2.5 billion for mental health research initiatives aimed at improving mental health care [27]. This award amount is subdivided between research centers, grants, and training services [27]. The field of mental health study is broad, but its significance in medical professionals providing healthcare is understudied.

Some studies have demonstrated a connection between physician burnout and poor clinical and surgical outcomes with an increase in self-reported medical errors [28,29]. Shanafelt et al., saw that for every point increase in emotional exhaustion, there was an associated 5% increase in reporting an error amongst attendings [29]. Poor wellness within residency programs can also lead to poor outcomes, as Hewitt et al. showed that within a six-month period, 6.9% of residents reported committing a harmful medical error, with residents experiencing burnout being more likely to report it [28]. Reasons for burnout range between work culture and environment, to work hours and personal work-life balance, but research has demonstrated the significant difference with women and non-white physicians compared to their male counterparts [30,31]. Women and non-white physicians are more prone to burnout due to a variety of factors including microaggressions, harassment, family planning discrepancies, and pay differences [31].

Recent government cuts to public health and research funding will likely have consequences for scientific innovation and programs that assist in eliminating barriers within medicine. It is too early to know the long-term effects of these budget cuts, but on January 20, 2025, the President of the United States issued an executive order that would end federal funding directed towards diversity, equity, and inclusion (DEI) programs [32]. Mental health

research, including that of female and non-white surgeons, falls under DEI research. How these federal initiatives will be implemented remains unknown. Global Health 50/50, a global non-profit DEI organization, has already assessed how language surrounding DEI has changed, with a reduction in statements regarding commitment and advancement to gender equality and women leadership [32]. United States federal budget cuts have included that of the NIH, which has led to hiring freezes, pauses to clinical trials, and publications being rejected, including those on disparate health outcomes [33,34]. These cuts may impact efforts to promote DEI, such as initiatives focused on mental health, particularly those supporting the recruitment and retention of diverse applicants and faculty in the field of orthopedic surgery. Programs such as the J. Robert Gladden Orthopaedic Society (JRGOS), Ruth Jackson Orthopaedic Society (RJOS), American Association of Latino Orthopaedic Surgeons (AALOS), Pride Ortho, and SpeakUpOrtho, are well-distinguished organizations that have demonstrated to be pillars of mentorship and support to underrepresented individuals in orthopedics. RJOS has encouraged hundreds of women to pursue orthopedics through scholarship and networking, as can be seen with over 1,450 members and their implementation of 100 medical student chapters, and 90 scholarships awarded to medical students and residents [35]. These women have increased potential to publish research and pursue leadership positions within orthopedic surgery [36]. JRGOS along with Nth dimensions developed a pipeline program that would increase the amount of BIPOC students interested in orthopedic surgery, by providing continued mentorship and support, and encouraging successful matching with long-term resources [37]. As successful as these programs are, they sometimes rely on federal funding, which could limit their ability to provide opportunities.

As federal directives continue to evolve, further challenges remain for orthopedic surgery leaders to address. DEI initiatives can help those in leadership understand the significance of culturally competent care and improved health outcomes [38,29]. Without these initiatives, for example, we would not have evidence regarding the benefit of adaptive lead for female surgeons to decrease breast cancer risk [40], we would not have data supporting improved health compliance when a Spanish-speaking patient has a Spanish-speaking physician [41], and would not have the platform to allow for female orthopedic surgeons to explain what it is they need to succeed in the field. While the future of these initiatives, as well as institutional recommendations under the current political environment, lie in uncertainty, there is power in community and continued research. Programs and leaders with a genuine interest in guiding their residents and faculty should continue to advocate on their behalf.

7. Future Directions

It is critical to assess the systemic barriers affecting non-white women's experience in orthopedic surgery, given the persistent underrepresentation of non-white women in this profession. Although existing literature highlights the challenges minority groups encounter in the

field, there remains a lack of understanding of the long-term career obstacles of non-white female orthopedic surgeons. Studies evaluating underrepresented groups in orthopedics frequently combine data for women without taking into consideration the racial and ethnic differences, preventing an evaluation of the specific experiences of these groups [2,42]. Therefore, future studies should consider dividing data by race and ethnicity, to provide insights on possible inequities. There are also limitations in assessing gender, sex, and sexual orientation as barriers for orthopedic surgeons. Organizations like Pride Ortho provide research and support avenues to improve our understanding. There is also a need for studies evaluating more specific outcomes, such as leadership achievement, job satisfaction, burnout levels, and career advancement in minority populations within orthopedic surgery. There is also benefit to including further studies with interviews and focus groups to help reveal subtle or unconscious barriers that quantitative studies could miss.

It is known that mentorship is crucial for career success, especially in competitive fields, such as orthopedic surgery. Yet, non-white women often experience difficulties accessing such resources. It has been demonstrated that structured mentorship programs, such as those offered by RJOS and The Perry Initiative, can increase interest and retention among women in orthopedic surgery [43,44]. There are also multiple institutions incorporating policies that promote DEI initiatives. As mentioned earlier, the AAOS strategic diversity plan emphasizes recruitment and retention efforts [24]. There remain limitations in understanding the potential benefits of these programs due to the lack of long-term outcome data of these initiatives. Negative perceptions about historically marginalized communities have been linked to increased stress, self-doubt, and withdrawal from competitive professions like orthopedic surgery, according to studies on stereotypes [45]. Analyzing the effects of stereotype threat on non-white women in orthopedics can help develop targeted interventions to promote confidence and resilience.

More research is needed to examine how career support systems may promote psychological well-being in non-white female orthopedic surgeons. There may be long-term benefits from peer support groups and mental health resources specifically designed for minority surgeons, along with institutional measures to combat discrimination. There are studies indicating an association between discrimination, workplace microaggressions, and mental health concerns [46]. Determining whether institutional policy changes, leadership development, and mentoring reduce these mental health concerns could provide important information for enhancing working conditions.

8. Limitations

This study focuses on papers published between 2000 and 2024. Due to this criterion, it may not fully capture earlier shifts in opinion, shared experiences, or motivations to research the intersectionality between mental health, race, and gender prior to 2000. This paper is also limited by the geographic scope of the studies included. The focus of this paper was on the scope of

mental health in female orthopedic surgeons within the United States, but information was taken from other countries such as Malaysia, China, India, the Middle East, and Canada to demonstrate the sentiments of females in orthopedic surgery across the world. Papers that were not published in English but examining similar issues in other countries were excluded.

Among the literature examined, studies that rely on self-reported data and surveys are subject to both recall and selection bias [46]. For example, in studies where Black orthopedic surgeons were asked to recall microaggressions from residency, one concern was the accuracy that participants remembered or described events and statements over time [46]. Additionally, those who had experienced these microaggressions may have been more likely to complete voluntary surveys [46]. Brooks et al. also examined the possibility that geography could have affected the experiences of the 243 surgeons and 67 fellows and residents surveyed [46]. Their survey had the most respondents who were trained in the southern and northeastern United States, which captured fewer experiences of those trained in other regions of the country [46]. When combining the responses from residents, fellows, and attendings, 119 were trained in the southern United States region, 106 trained in northeastern United States, 48 from the Midwest region, and 11 residents and 37 attendings trained in the Midwest region, 35 from the western United States, and 2 responses that were unspecified [46]. This distribution of results introduces the possibility that there may be regional differences in how pervasive microaggressions are in residencies for these Black Orthopedic surgeons, residents, and fellows [46].

Depending on how these questionnaires were distributed, surveys may sample only a small portion of orthopedic surgeons and trainees. When participants are recruited from groups organized by specialty or demographic, they tend to capture the opinions of those who identify with those demographics, practice in that specialty, or choose to subscribe to that organization. Ortega et al. addressed this limitation in their study [47]. This study distributed one survey to 1907 members of The Orthopedic Trauma Association of the United States and Canada and a second survey to 30 past chairs of the 2017-2019 OTA educational course and meetings [47]. They acknowledged that the distribution method, via email, may have contributed to the low response rate [47]. Specifically, while 710 emails were opened, only 207 responses were received from a pool of 1,907 members in the organization. From the survey sent to course chairs, only 14 out of 30 responses were received [47].

This literature review also highlights that current research often focuses on surgeons who are underrepresented in medicine, including people of color and female surgeons [48]. While these studies provide valuable insight into the experiences of orthopedic surgeons from these demographics, they may not examine the different challenges faced by female surgeons of various ethnicities. Poor analysis of differences amongst demographic groups such as Black/African American, Hispanic, Asian, and Indigenous female surgeons might be a result of their low presence within the field of orthopedic surgery, which are often grouped together

when studying barriers in medicine. In a study looking at residency rates from 2001 to 2020, there was a 9.2% increase in multiracial residents, with a 10.4 to 15.4% range in Asians, 2.5% to 6.42% range identifying as Black, 0.3 to 4.4% range in Hispanics, and 0.0 to 1.2% range in American Indian or Alaska Native (AIAN) [49]. Multiple studies have demonstrated how URiM groups face systemic barriers in pursuing orthopedics, but few separate the distinct groups within non-white women to highlight individual obstacles.

9. Conclusion

This literature review regarding the mental health challenges faced by non-white women in orthopedic surgery highlights the variety of challenges due to underrepresentation within the field, discrimination, and inequality. Non-white orthopedic surgeons reported more inequalities in opportunities within the workplace compared to white orthopedic surgeons. Furthermore, in a study regarding racial inequality and the utilization of a total joint arthroplasty, the utilization of the arthroplasty was lower in minority groups, despite an increase in incidence of knee osteoarthritis. Further research regarding such disparities is needed to evaluate possible associations. Discussing mental health challenges and discrimination faced by non-white women in orthopedic surgery has the potential to improve outcomes of these issues in societal, academic, and scientific settings. The American Academy of Orthopaedic Surgeons (AAOS) has been working to improve the mental health, burnout, and work-life balance through grants, scholarships, and research. However, these efforts may be at risk due to United States policy reforms. Bringing awareness to challenges faced by the women within this field allows for an opportunity of growth and potential solutions to be implemented. It is important to recognize that non-white women encompass different groups and that individual groups might require different resources to provide appropriate needed support. Challenges and limitations of this study include a narrow geographical region, with most research taking place in the United States that met our inclusion criteria. Many of the included studies were based on surveys and self-reported data, which have potential bias, and limitations in generalizability. Future research, such as large prospective studies across different regions on the global scale, can help understand the mental health needs of non-white women and create effective interventions for this population. Continuing research concerning this topic will allow for potential solutions to be applied within the societal, academic, and scientific settings.

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