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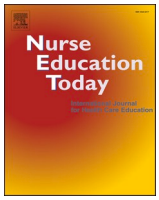

Research article

Representation of dark skin tones in foundational nursing textbooks: An image analysis

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ABSTRACT

Purpose: This study aimed to analyze and quantify the representation of dark skin tones (DST) images/graphics across fifteen foundational and clinical nursing textbooks to understand the degree of portrayed diversity in current nursing texts.

Background: The United States (U.S.) population is becoming more ethnically and racially diverse. There is a scarcity of nursing literature, studies, and educational materials on the assessment and early recognition of common skin assessment in patients with dark skin tones (DST). The underrepresentation of people with DST images in didactic material suggests that omissions of these images in educational resources may introduce bias in health care provider education and practice.

Methods: Fifteen popular foundational and clinical nursing textbooks were selected and analyzed. All the photo images and drawn graphics in these textbooks were coded according to Fitzpatrick's skin phototype (FSP) scale, which categorizes skin tone as (a) "Light" or Fitzpatrick scale I or II, (b) "Medium" or Fitzpatrick scale III or IV, and (c) "Dark" or Fitzpatrick scale V or VI. The training was provided for data collectors before analysis to ascertain good inter-rater reliability (Cohen's kappa = 0.960 for light skin tone, Cohen's kappa = 0.899 for medium skin tone, and Cohen's kappa = 0.913 for dark skin tone).

Results: Analysis of 14,192 photo images and drawn graphics depicting skin tone was completed across 15 foundational and clinical nursing textbooks. 12.3 % of photo images and 2.4 % of drawn graphics depicted dark skin tones, compared to 60.9 % of photo images and 82.8 % of drawn graphics that displayed light skin tones in these textbooks.

Conclusions: Nursing textbooks overrepresent light skin tones and underrepresent dark skin tones. While the approximate racial distribution of the U.S. population is 59.3 % non-Hispanic-White, 13.6 % Black/African American, and 26.6 % Person of Color, the images and graphics of skin tones represented 68 % light, 15 % medium, and 9.4 % dark.

Relevance to clinical practice: All healthcare providers are expected and required to deliver competent clinical care to an increasingly diverse population. For teaching-learning, more visual representations of DST and comparative images between what to expect in dark, medium, and light skin tones can help improve knowledge deficits and increase health equity.

1. Introduction

Foundational nursing textbooks are critical in preparing nursing students for the variety of roles they will assume in caring for a diverse population of clients. In addition, textbook content that includes diverse skin tone images and graphics is essential in developing the awareness that promotes a seamless transition between academic experience and clinical practice (Louie and Wilkes, 2018) and providing knowledge that minimizes disparities and enhances equity of care (Bell, 2021; Daily-Nurse®, 2021; Robert Wood Johnson Foundation, 2022). Patients with dark skin tones (DST) can present differently with subtle conditions or disease manifestations requiring distinct management and therapies. As

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part of their preparation and practice, nurses must be exposed to images of different skin tones that help normalize and validate diversity and recognize skin conditions. The United States (U.S.) and the global population are becoming more diverse. It is estimated that by 2030 over 50 % of people worldwide will be from sub-Saharan Africa and Asia, and by 2044 over 50 % in the U.S. will be from a social construct group other than non-Hispanic White (Frey, 2021; United Nations, n.d.; Vespa et al., 2020). The U.S. census reports 59.3 % non-Hispanic-White, 13.6 % Black/African American, and 26.6 % Person of Color (United States Census Bureau, 2022). Hence, nurses and healthcare providers are expected to deliver competent care to people from all varieties of skin tones.

As a result of the 2020 racial reckoning stemming from the murder of George Floyd, a renewed interest in nursing in achieving health equity (Bell, 2021; National Academies of Sciences, Engineering, and Medicine [NASEM] et al., 2021; Rudner, 2021) and the interrogation of a performative role of antiracism pervasive in nursing curricula and pedagogy have emerged (Harding, 2021; Koch, 2021). Tackling pervasive disparities in health outcomes is a priority (AACN, 2021; NASEM et al., 2021; Nardi et al., 2020). The demand for greater images and graphics diversity to meet and address learners' needs to improve learning and to recognize and effectively care for darker skin tone people has arrived. In nursing, we must intentionally reflect the demographics served and avoid fostering implicit bias by defaulting to incomplete sources of information (Narayan, 2019) that do not encompass the diverse skin tone in teaching-learning and practice.

2. Background

There is a dearth of studies on the analysis of skin tone diversity in nursing literature. However, several studies in medicine have analyzed the visual representation of skin tone in foundational textbooks and common medical literature (Bell et al., 2021; Chawla et al., 2022; Cho et al., 2021a, 2021b; Louie and Wilkes, 2018; Martin et al., 2016; Massie et al., 2019; Massie et al., 2021; Smith et al., 2022; Sobol et al., 2022; Tsai et al., 2016), which have revealed an underrepresentation of DST in medical educational and clinical materials.

One of the vital tenets of nursing is to “do no harm.” Nonetheless, the commonness of implicit and explicit bias, racism, social and health inequities, and disparities within our healthcare system injures people of color (POC), patients, families, and communities (Akbari and Nasiri, 2022; Ash et al., 2020; Coleman, 2020; Williams et al., 2019). In a study conducted by Turbes et al. (2002), where 983 cases were analyzed, the authors purported that a lack of mention or inclusion of race or ethnicity in the case reinforced the universality of Whiteness. Furthermore, in the report Unequal Treatment, the authors contend that biases, prejudice, and stereotype held by healthcare providers (HCP) can lead to differences in care (Institute of Medicine et al., 2003). Two systematic reviews revealed strong evidence that HCP displayed or have some implicit biases against POC, including dark skin tone people, and that this has implications for patient health outcomes (Maina et al., 2018; Hall et al., 2015). Additionally, two studies in medicine implied that a lack of diversity of skin tone in medical literature created in the HCP a susceptibility to implicit biases when caring for POC (Louie and Wilkes, 2018; Massie et al., 2019). Tsai et al. (2016) assert that a diverse representation in educational materials and curricula can shape HCPs' image of the patient they care for.

Furthermore, healthcare is starting to ascribe to the fact that race is a social construct that does not equate to skin tone diversity, nor is it based on biological factors, geographic ancestry, or genetics (Ioannidis et al., 2021). Therefore, race is not used as a biological category in this research. However, due to rapid demographic changes in the U.S., we must start analyzing where we stand with our educational material in nursing. While previous studies in the medical discipline and subspecialties have examined skin-tone representation in their textbooks, there is a paucity of knowledge on the skin-tone diversity of images and graphics in nursing textbooks, literature, and teaching-learning materials. Using fifteen foundational and clinical nursing textbooks, this study sought to analyze and quantify the landscape of published photos and graphics to understand the degree of skin tone representation.

3. Method and procedures

The institutional review board (IRB) exempted this study as it did not involve human subjects. All textbooks used in the analysis were purchased and are broadly available to nurses and nursing students across the U.S. and globally.

3.1. Study design

This study used a quantitative, observational design. For the analysis of photo images and drawn/computer-generated graphics, the Fitzpatrick Skin Phototypes (FSP) scale was used to categorize each image and graphics as light skin tone (FSP I and II), medium skin tone (FSP III and IV) and dark skin tone (FSP V and VI). The FSP scale is the most common and widely used tool for consistently classifying skin phototypes, and reliability and validity have been established in dermatology and skin tone representation research (Eilers et al., 2013; Fitzpatrick, 1988; Louie and Wilkes, 2018). In addition, the scale's reliability is widely accepted, even for people with dark skin tones (Fors et al., 2020; Gupta and Sharma, 2019). Consequently, in this study, skin tone diversity was defined based on the Fitzpatrick Skin Phototypes (FSP) scale, from type I (light) to V and VI (dark) (see Fig. 1). This study defines dark skin tone as FSP V and VI. All colored photo images and drawn/computer-generated graphics depicting human subjects or forms with visible skin tones of each textbook were selected for inclusion in the study. Instead of the social construct of race, skin tone was used to categorize each image. Images from video files, radiographic, or cadaveric images were not included. Photo images and drawn/computer-generated graphics where skin tone was not discernable were classified as unidentifiable. Photo images of >30 in one image were not included. The data collector visually analyzed each image and graphic once a high inter-rater agreement was established. Also, to ensure consistency and reduce potential bias, all images were analyzed following the standardized FSP scale without considering any written descriptors of the images or graphics within each textbook.

3.2. Sample selection

Fifteen published foundational and clinical nursing textbooks were selected based on the top-ranking texts used in prelicensure nursing programs in North America for inclusion. The Principal Investigator (PI) contacted each publisher to ascertain their most popular nursing texts in current electronic forms as criteria for inclusion. Their year of publication ranged from 2019 to 2024, including the most recent edition at the time of the study. The textbooks also represent three top publishing companies. The textbooks selected included Physical Assessment, Pathophysiology, Pharmacology, Medical Surgical Nursing, Fundamentals of Nursing, Pediatric Nursing, Psychiatric Nursing, and Maternal Child Nursing.

3.3. Inter-rater reliability

The PI trained the data collector to establish inter-rater reliability. Subsequently, the PI rated 30 images using the FSP scale. Next, a blinded data collector independently rated the same images and submitted them separately to the statistician for inter-rater agreement analysis. These data were then evaluated for the extent of agreement using Cohen's kappa correlation coefficient reliability. Interpretation of the kappa was based on the following: values ≤ 0 indicate no chance of agreement, 0.01–0.20 as slight agreement, 0.21–0.40 as fair agreement, 0.41–0.60 as moderate agreement, 0.61–0.80 as substantial agreement, 0.81–0.99

Fig. 1. Fitzpatrick Skin Phototype Scale – This skin scale numerically categorizes human skin tone into 6 categories based on response to UV light.
Figure reprinted from Smith, R. M., Andersen, E. S., Powell, L. E., Schuth, O. A., Mountziaris, P. M., & Feldman, M. J. (2022). It's not all white: Implicit racial bias in imagery used in plastic surgery resident education. *Journal of Surgical Education, 79*(4), 943–949, with permission from Elsevier.

as almost perfect agreement (Viera and Garrett, 2005). The inter-rater reliability results obtained were Cohen's kappa = 0.960 for light skin tone, Cohen's kappa = 0.899 for medium skin tone, and Cohen's kappa = 0.913 for DST. Therefore, inter-rater agreement was high.

4. Results

All photo and graphic images that met the criteria were analyzed based on the FSP scale. Finally, the results were tabulated in Excel.

From the 15 nursing textbooks reviewed, 14,192 photo images and drawn/computer-generated graphics met the criteria for inclusion. Of the 14,192 photos and graphics included in the data analysis, 10,105 (71.2 %) were human photo images, and 4087 (28.8 %) were graphics (see Figs. 2 and 3). From the photo images, the majority, 6156 (60.9 %), were light skin tones, 1958 (19.4 %) were medium skin tones, and 1238 (12.3 %) were DST. All photo image data are summarized in Table 1. There were over four times more light skin tones in photo images than in DST images. In addition, there were 4087 graphics, of which significantly more, 3386 (82.8 %) were classified as light skin tone, while 328 (8.0 %) were medium skin tone, and just 98 (2.4 %) were of DST. All graphic image data are summarized in Table 2. For graphic figures, they were over thirty times more light skin tone images than DST images. Two analyzed textbooks contained no human photo images depicting skin tone and were therefore not included in the final analyses (see Table 1). The textbooks with DST photos ranged from 6.0 % to 22.4 %, and light skin tone photos ranged from 31.5 % to 78.1 %. On the other hand, texts with DST graphic figures ranged from 0.4 % to 6.9 %, while texts with light skin tone graphics ranged from 18.8 % to 97.5 %.

5. Discussion

This is the first research study that examines the distribution and representation of human photographs and rendered graphic images of skin tones used in prelicensure nursing education textbooks. Hence, this research provides insight into the extent of skin tone diversity in some of the most popular prelicensure nursing textbooks.

By analyzing the diversity of skin tones represented in 15 of these foundational and clinical textbooks, this study categorized color photos and graphics into light, medium, and dark skin tones and compared their distribution to the racial/ethnic population distribution in the US, which is used as a proxy for skin tones. Therefore, these findings can inform authors and publishers and help in gauging the equitable inclusion of intentionally diverse skin tones in textbooks which can further contribute to health equity in nursing education and prepare future nurses to care for an increasingly diverse population.

While most nurses believe they are prepared and equipped to recognize common skin conditions in all patients, evidence reveals that people with DSTs experience more detrimental health outcomes (Oozageer Gunowa et al., 2018, 2021; Sommers et al., 2009, 2019). A qualitative study by Oozageer Gunowa et al. (2021) found that academic teaching-learning in nursing was presented through a white perspective. For example, the teaching of recognition of pressure injury (PI) occurs under white norms, resulting in higher stages of PI before detection in DST clients. Additionally, a study conducted by Sommers et al. (2009) examined 120 healthy Black and White women after consensual intercourse, and 56 % of White women, compared to 24 % of Black women, were found to have visible external genitalia injuries. They concluded that assault forensic examiners might not readily identify and recognize external genitalia injuries in women with DST. Hence, victims of sexual

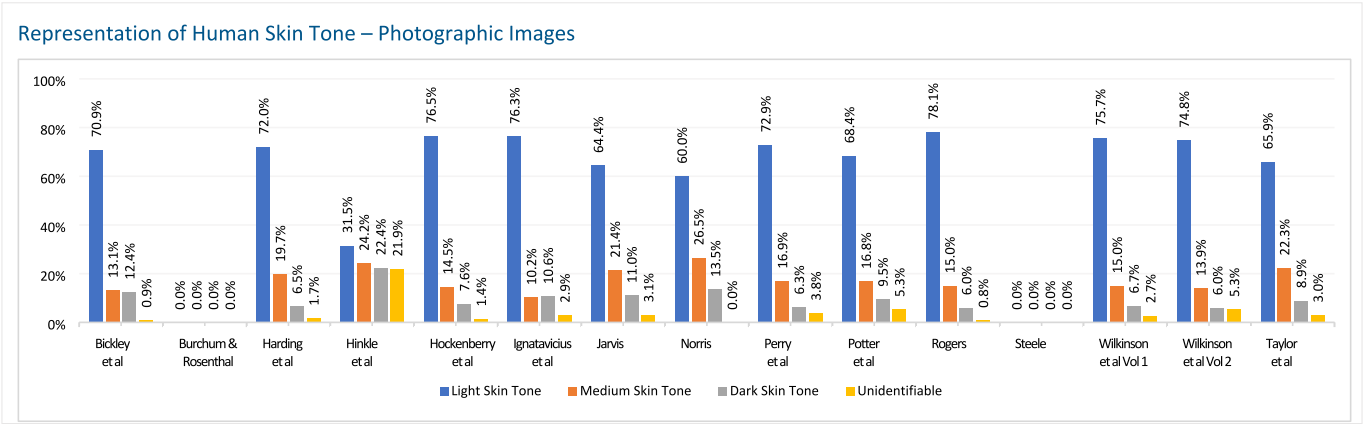

Fig. 2. Representation of human skin tone – Photographic images in textbooks.

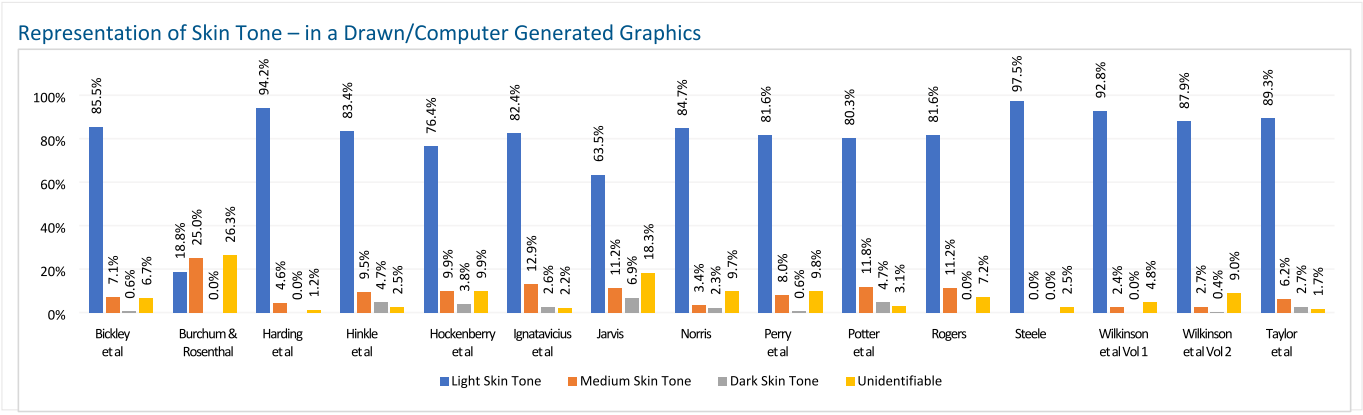

Fig. 3. Representation of skin tone – Computer-generated graphics in textbooks.

Table 1
Photographic images data.

Author	Year	Light skin tone (n, %)	Medium skin tone (n, %)	Dark skin tone (n, %)	Unidentifiable human figure (n, %)	Total (n, %) human
Bickley et al.	2021	736, 70.9 %	136, 13.1 %	129, 12.4 %	9, 0.9 %	1037, 100 %
Burchum & Rosenthal	2022	0	0	0	0	0, 100 %
Harding et al.	2023	376, 72.0 %	103, 19.7 %	34, 6.5 %	9, 1.7 %	522, 100 %
Hinkle et al.	2022	781, 31.5 %	600, 24.2 %	556, 22.4 %	544, 21.9 %	2481, 100 %
Hockenberry et al.	2022	443, 76.5 %	84, 14.5 %	44, 7.6 %	8, 1.4 %	579, 100 %
Ignatavicius et al.	2021	187, 76.3 %	25, 10.2 %	26, 10.6 %	7, 2.9 %	245, 100 %
Jarvis	2024	764, 64.4 %	254, 21.4 %	131, 11.0 %	37, 3.1 %	1186, 100 %
Norris	2019	102, 60.0 %	45, 26.5 %	23, 13.5 %	0, 0.0 %	170, 100 %
Perry et al.	2023	496, 72.9 %	115, 16.9 %	43, 6.3 %	26, 3.8 %	680, 100 %
Potter et al.	2023	208, 68.4 %	51, 16.8 %	29, 9.5 %	16, 5.3 %	304, 100 %
Rogers	2023	182, 78.1 %	35, 15.0 %	14, 6.0 %	2, 0.8 %	233, 100 %
Steele	2023	0	0	0	0	0, 100 %
Wilkinson et al. (Vol 1)	2020	227, 75.7 %	45, 15.0 %	20, 6.7 %	8, 2.7 %	300, 100 %
Wilkinson et al. (Vol 2)	2020	558, 74.8 %	104, 13.9 %	45, 6.0 %	39, 5.3 %	746, 100 %
Taylor et al.,	2023	1069, 65.9 %	361, 22.3 %	144, 8.9 %	48, 3.0 %	1622, 100 %
Total images		6156, 60.9 %	1958, 19.4 %	1238, 12.3 %	753, 7.5 %	10,105, 100 %

Table 2
Drawn/computer-generated graphics data.

Author	Year	Light skin tone (n, %)	Medium skin tone (n, %)	Dark skin tone (n, %)	Unidentifiable human figure (n, %)	Total (n, %) non-human
Bickley et al.	2021	396, 85.5 %	33, 7.1 %	3, 0.6 %	31, 6.7 %	463, 100 %
Burchum & Rosenthal	2022	3, 18.8 %	4, 25.0 %	0, 0.0 %	9, 26.3 %	16, 100 %
Harding et al.	2023	408, 94.2 %	20, 4.6 %	0, 0.0 %	5, 1.2 %	433, 100 %
Hinkle et al.	2022	538, 83.4 %	61, 9.5 %	30, 4.7 %	16, 2.5 %	645, 100 %
Hockenberry et al.	2022	139, 76.4 %	18, 9.9 %	7, 3.8 %	18, 9.9 %	182, 100 %
Ignatavicius et al.	2021	224, 82.4 %	35, 12.9 %	7, 2.6 %	6, 2.2 %	272, 100 %
Jarvis	2024	277, 63.5 %	49, 11.2 %	30, 6.9 %	80, 18.3 %	436, 100 %
Norris	2019	149, 84.7 %	6, 3.4 %	4, 2.3 %	17, 9.7 %	176, 100 %
Perry et al.	2023	284, 81.6 %	28, 8.0 %	2, 0.6 %	34, 9.8 %	348, 100 %
Potter et al.	2023	102, 80.3 %	15, 11.8 %	6, 4.7 %	4, 3.1 %	127, 100 %
Rogers	2023	226, 81.6 %	31, 11.2 %	0, 0.0 %	20, 7.2 %	277, 100 %
Steele	2023	39, 97.5 %	0, 0.0 %	0, 0.0 %	1, 2.5 %	40, 100 %
Wilkinson et al. (Vol 1)	2020	116, 92.8 %	3, 2.4 %	0, 0.0 %	6, 4.8 %	125, 100 %
Wilkinson et al. (Vol 2)	2020	225, 87.9 %	7, 2.7 %	1, 0.4 %	23, 9.0 %	256, 100 %
Taylor et al.,	2023	260, 89.3 %	18, 6,2 %	8, 2.7 %	5, 1.7 %	291, 100 %
Total graphics		3386, 82.8 %	328, 8.0 %	98, 2.4 %	275, 6.7 %	4087, 100 %
Combine total		9542, 67.2 %	2286, 16.1 %	1336, 9.4 %	1028, 7.2 %	14,192, 100 %

assault, where documented injuries may be used as evidence against an assailant, are at a deficit in the legal system. Furthermore, differentials in DST pulse oximetry measurements have been reported in multiple studies, indicating disparities in care due to delayed recognition of hypoxemia and treatment interventions contributing to a worse outcome for people of color (POC), especially DST people (Bangash et al., 2022; Fawzy et al., 2022; Feiner et al., 2007; Gottlieb et al., 2022; Wong et al., 2021). Sometimes what is not taught in nursing curricula can be just as influential as what is explicitly covered. Raso et al. (2019) addressed the impact of this hidden nursing curriculum where content is inadvertently omitted or underrepresented from nursing educational materials, which leads to specific knowledge and skills not being addressed, affecting the competencies of the students and, consequently, the skills of these clinicians after their graduation. This deficit or omission in curriculum contributes to subconscious bias reinforced in nursing education (Narayan, 2019; Ochs, 2023) due to inequities in skin tone representation. Implicit and subconscious biases can interfere with nurses' decision-making, compassion, less therapeutic relationships, and

poorer quality of client care (Hall et al., 2015; Maina et al., 2018; Narayan, 2019). The omission and deficit of adequate skin tone representation in educational materials inadvertently strengthen nurses' implicit bias that contributes to health disparities (Black et al., 2022; Martin et al., 2016; Narayan, 2019), posing a threat to the journey of achieving health equity.

This analysis revealed an underrepresentation of DST images and graphics in nursing literature (see Figs. 2 and 3). These findings showed an underrepresentation of DST photo images and graphics, and while the scope of this study did not encompass the identification of the factors that contribute to the underrepresentation of DST present in the text, studies looking at DST representation in medical educational literature suggest that an underlying implicit and unintentional bias can occur with a reduced presence of DST images and graphics (Bell et al., 2021; Louie and Wilkes, 2018). Eight of the thirteen texts with photo images had over 70 % of light skin tone images. In addition, there was an increased representation of computer-rendered graphics of light skin tones in texts. In contrast, five of the thirteen texts have DST photo image representation >10 %. At the same time, DST graphics were represented between 0 and 7 % in these texts. The representation of skin tone images and graphics in these texts do not reflect the U.S. or global population.

Nursing has set its course in pursuit of social justice and health equity to generate a culture of health and shrink the health disparity gap (NASEM et al., 2021; Rudner, 2021). Normalizing skin tone diversity in learning materials can help create a culture of social justice and equity, which impacts nursing delivery of patient care (Gona et al., 2023; Murray et al., 2023; Pusey-Reid et al., 2023).

5.1. Limitations

This study only analyzed fifteen nursing textbooks; it did not review older editions of the same textbooks to determine how many changes have been made. Though these are some of the most popular nursing texts from three well-known publishers, it is unknown how many nursing schools require these texts or these editions. Additional study is needed to determine the degree of implicit bias due to the reduced representation of diverse skin tone images on nurses and to determine how reduced exposure to diverse skin tone images for learning impacts the ability of nurses to effectively care for and assess people of DST.

6. Implication for practice

Nurses must be exposed to various skin tone images that reflect the community and population they serve. The underrepresentation of DST images underlines the complexities of educating nurses who need to normalize all skin tones visuals as they learn to care for diverse people. Therefore, educational literature must expose nursing students to a broad range of skin tones. The underrepresentation of FSP skin tones V-VI in education materials may perpetuate gaps in competence, reinforce inequities, and contribute to implicit biases.

We urge authors and editors of nursing textbooks to intentionally evaluate practices for purposefully adding DST images in their publications to ensure the inclusion of robust, diverse skin tones. We urge educators to supplement images in teaching-learning materials without such textbooks.

7. Conclusion

While most nurses believe they are prepared and equipped to recognize common skin conditions in all patients, studies suggest otherwise (Oozageer Gunowa et al., 2018; Sommers et al., 2009; Hall et al., 2015). In addition, findings from this study suggest that most texts have not included purposeful and intentional images and graphics to achieve that.

Nursing educational preparation should expose nurses to a broad spectrum of diverse skin tones that reflects the population they will serve to enhance comfort and competency in caring for patients equitably and safely. Given the rapid demographic change in the U.S. and the global population. Nursing educational material needs to reflect in their published images and graphics the people and communities we are serving, and intentional photo images also must be included to help nurses learn to recognize how common and serious skin alterations manifest in all skin tones, especially DST.

The burden of health conditions disproportionately affecting DST people is clear (Fawzy et al., 2022; Feiner et al., 2007; Oozageer Gunowa et al., 2018; Sommers et al., 2009), and they result in health disparities. These and numerous studies are evidence that health equity in the care of DST needs to be a priority and a moral obligation for nurses in practice, academia, and training. Normalizing the visual of an equitable representation of DST in teaching-learning materials may play a role in reducing the implicit bias of healthcare providers (Ricks et al., 2022), and intentionally including images that expose nurses to DST conditions will help with proficiency in prevention and early recognition of common and serious skin alterations.

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Declaration of competing interest

The authors have no conflict of interest, financial or otherwise.

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