

# Scrub Color Affects Perceived Professionalism of Dental Hygienists: A Cross-sectional Study

Connor Hendry<sup>1</sup>, Nouf Maayta<sup>2</sup>, Lourd Nafea<sup>3</sup>, Vania Aranda<sup>4</sup>, Udochukwu Oyoyo<sup>5</sup>, So Ran Kwon<sup>6</sup>

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## ABSTRACT

**Aim:** To assess the impact of dental hygienists' scrub colors on patient perceptions of professionalism, with a focus on knowledge, skills, and caring.

**Materials and methods:** A cross-sectional study was conducted using an anonymous survey distributed between November 2024 and January 2025, targeting patients and visitors aged 18 years and older. The study recruited 483 participants across three age-groups (18–30, 31–60, and 61 and above). The survey included 16 questions, with two assessing demographic information and 14 evaluating perceptions of dental hygienists based on scrubs color. Participants viewed images of one male and one female dental hygienists wearing scrubs in five colors: Pink, burgundy, teal, navy, and black. They were asked to select the most and least knowledgeable, skilled, and caring hygienist based on scrub color and indicate their preferred provider. Data were analyzed using Pearson's Chi-square tests, Fleiss' and Light's Kappa statistics. Statistical significance was set at  $p < 0.05$ .

**Results:** Findings revealed that scrub color significantly influenced patient perceptions. Navy scrubs were the most preferred for both male (39.7%) and female (38.1%) dental hygienists, followed by teal and black. Navy scrubs were associated with knowledge and skill, while pink was linked to caring traits but perceived as less competent. Black scrubs were rated least caring. There was no significant difference in provider preference based on gender (male clinician:  $p = 0.168$ ; female clinician:  $p = 0.544$ ). However, there was a statistically significant difference in preferred provider frequency by age category ( $p < 0.001$ ).

**Conclusion:** The color of scrubs plays a crucial role in conveying professionalism. The preference for navy blue scrubs suggests that color plays a crucial role in establishing trust and perceived competence in dental settings.

**Clinical significance:** The influence of scrub color on the professionalism of dental hygienists is a crucial factor that must be addressed to identify the most favorable color for fostering trust and perceived competence in dental settings.

**Keywords:** Caring, Color, Dental hygienist, Knowledge professionalism, Scrubs, Skill.

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## INTRODUCTION

Professionalism in health care serves as a cornerstone for building patient trust and confidence ensuring the delivery of high-quality care. In the dental hygiene profession, patient interaction is frequent, and anxiety is commonly encountered. Professionalism includes behaviors and communication styles that align with the ethical and competent standards expected of dental practitioners. Traditionally, professionalism has been closely linked to interpersonal skills of healthcare providers, emphasizing the importance of empathy, competence, and adherence to ethical standards.<sup>1</sup> However, there is growing recognition of the influence of visual appearance—particularly attire—on affecting patient perceptions of professionalism in dental care settings.

Numerous studies demonstrate that patients assess the professionalism of healthcare providers based on attire, linking specific clothing styles to perceptions of competence, trustworthiness, and approachability.<sup>2,3</sup> The dress code for dental hygienists has evolved significantly since the inception of America's first dental hygiene program in 1913. Early dental hygienists typically wore white uniforms that included dresses, caps, and aprons, to convey cleanliness and professionalism.<sup>4</sup> Over the decades, as the role of dental hygienists expanded and workplace dynamics modernized, the dress code shifted toward scrubs, which are more versatile, comfortable, and easy to clean. Advances in infection control, particularly after the 1980s HIV/AIDS crisis, introduced personal protective equipment (PPE) like gloves, masks, and eyewear.<sup>4</sup> Today, dental hygienists wear scrubs in a variety of colors, including blue, green, white, purple, and even

<sup>1–4</sup>School of Dentistry, Loma Linda University School of Dentistry, Loma Linda, California, United States of America

<sup>5</sup>Dental Education Services, Loma Linda University School of Dentistry, Loma Linda, California, United States of America

<sup>6</sup>Department of General Dentistry, Loma Linda University School of Dentistry, Loma Linda, California, United States of America

**Corresponding Author:** So Ran Kwon, Department of General Dentistry, Loma Linda University School of Dentistry, Loma Linda, California, United States of America, Phone: +1 9095585118, e-mail: sorankwon@llu.edu

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patterned designs. Each color choice can convey a different message and impact patient perception. As such, by carefully selecting scrub colors, dental hygienists can create a welcoming and reassuring environment for their patients.

Insights from color psychology reveal that colors can invoke certain emotional and psychological responses. In healthcare environments, colors like blue and green are preferred for their

calming properties, while brighter colors may appear friendlier but less professional.<sup>5,6</sup> These principles hold particular relevance in dental hygiene, where many patients experience heightened anxiety. A recent study by Hribar et al. explored the relationship between patient perceptions of surgeons and the color of their scrub attire. They assessed whether different scrub colors influence patient trust, confidence, and perceived competence of surgeons. Findings suggested that certain colors, such as blue and green, were more positively associated with professionalism and reliability, while other colors evoked less favorable impressions. The study highlighted the psychological impact of attire in medical settings and emphasized the importance of choosing scrub colors that foster positive patient perceptions.<sup>7</sup>

Existing research on scrub color primarily focuses on medical providers, particularly in pediatrics.<sup>8–11</sup> However, there is scarce information regarding how the scrub color of dental hygienists influences patients' perceptions. Therefore, the purpose of the study was to assess the impact of dental hygienists' scrub colors on patient perceptions of professionalism, with a specific focus on knowledge, skills, and caring. We hypothesized that certain scrub colors would be associated with positive and negative traits and that a specific scrub color would emerge as the most preferred choice for a dental hygiene provider.

## MATERIALS AND METHODS

### Research Compliance

This study used a cross-sectional study design through the distribution of an anonymous survey. The research study was determined to be exempt from oversight by the Institutional Review Board at Loma Linda University in Loma Linda, CA, USA (IRB # 5240492).

### Pilot Survey

The five colors were selected based on a pilot survey on the most preferred color from the dental hygiene class of 2025. A total of seven colors were mentioned and the most top five colors were chosen. To ensure the validity and reliability of the survey used in the study, a pilot survey was drafted by the authors and distributed among dental hygiene students. This preliminary testing helped refine the survey questions, ensuring they effectively measured patient perceptions of knowledge, skillfulness, and caring associated with different scrub colors. By piloting the survey with dental hygiene students, we validated the consistency of responses and improved the study's overall reliability before administering it to a broader audience.

### Sample Size Calculation

The sample size calculation was based on detecting a medium effect size (Cohen's  $w = 0.3$ ) with 80% power and a significance level of 0.05, using a Chi-square test for group differences. To assess whether preferred scrub color choices differ across three age categories (18–30, 31–60, and 61 years and above), and to predict scrub color preferences, we required a total of 324 participants. To meet the requirements, a total of 600 hard copies were distributed.

### Survey Distribution

A hard copy survey was distributed over 3 months, from November 2024 to January 2025. Inclusion criteria included patients and visitors aged 18 years and older who can read and understand English. Minors were excluded from participation. Out of the 600 surveys

distributed, any that were returned empty were excluded from the study. The survey was distributed at the Loma Linda University School of Dentistry, California as well as at local churches.

The survey was conducted manually, requiring participants to complete a hard copy and submit it into a drop-box to ensure confidentiality. It consisted of 16 multiple-choice questions, all of which were closed-ended. Two questions were on demographic items regarding gender and age category. The remaining 14 questions focused on perceptions of knowledge, skills, and caring, with participants selecting among five scrub colors—Pink, Burgundy, Teal, Navy, and Black—to indicate which they associated with the most and least knowledgeable, skilled, and caring dental hygienists. Participants were presented with two images each of male and female dental hygienists wearing scrubs in five different colors: Pink, burgundy, teal, navy, and black within the hard copy survey (Fig. 1). The survey was presented in English and was estimated to take approximately 5–10 min to complete. Anonymity was maintained, as no identifying information was collected, and responses were deposited in a secure drop-box. Instead of a numerical scoring system, responses were analyzed based on the frequency of selections for each color, allowing researchers to assess trends in patient perceptions regarding scrub color and professional competence. Surveys that had missing answers were excluded from the data analysis.

### Data Analysis

Summary statistics (frequencies and percentages) were used to characterize the distribution of responses among the full sample. Additionally, Pearson's Chi-square tests to determine associations between scrub color and participant rankings. Fleiss' and Light's Kappa statistics were used to assess interrater reliability for agreement between male and female preferred provider choices. Bootstrap confidence intervals were generated for the reliability estimates. Statistical significance was set at  $p < 0.05$ . Analyses were conducted using R and Jamovi statistical software.<sup>12</sup>

## RESULTS

### Demographic Data

Out of 600 hard copy surveys distributed a total of 484 participants' responses were collected in the study (response rate: 80.1%). There were 208 male participants (43.0%) and 273 female participants (56.4%), with a  $p$ -value of 0.003, suggesting a statistically significant deviation from an equal gender distribution. Three participants did not check their gender and left it unmarked. Regarding age distribution, the majority of participants fall within the 18–30 years category (242 participants, 50.0%), followed by those aged 31–60 years (144 participants, 29.8%), and the smallest group being those 61 years and above (98 participants, 20.2%).

### Dental Hygienists and Negative Traits

Figure 2 illustrates respondents' perceptions of negative traits associated with different scrub colors. Dental hygienists in pink scrubs were most frequently perceived as the least knowledgeable (male: 59.9%, female: 39.4%) and least skilled (male: 53.1%, female: 44.9%), regardless of model gender. Black scrubs were linked to the perception of being the least caring (male: 55.1%, female: 56.2%) for both male and female models.

### Dental Hygienists and Positive Traits

Figure 3 summarizes respondents' perceptions of positive traits based on scrub color. Blue scrubs were associated with the highest



Fig. 1: Photo of male and female dental hygienists' wearing scrubs of different colors

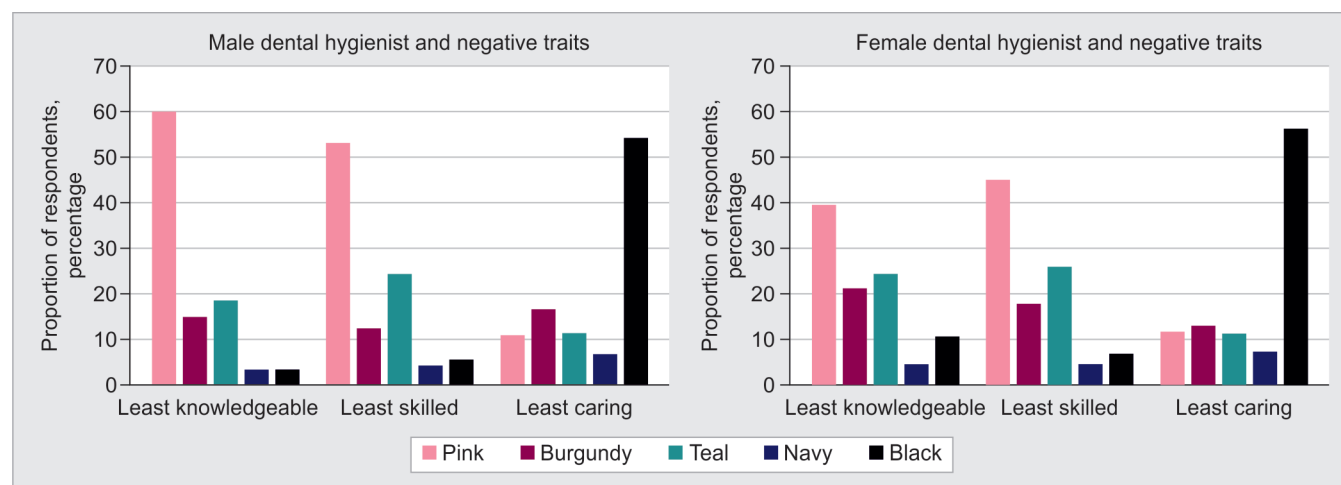


Fig. 2: Male and female dental hygienists and negative traits

ratings for knowledge (male: 42.7%, female: 41.3%) and skill (male: 42.0%, female: 40.0%) across both models. Pink scrubs were most frequently linked to a caring trait (male: 34.7%, female: 44.0%).

### Preferred Provider

Figure 4 illustrates the respondents' preference on provider based on scrubs color. For male dental hygienist, navy scrubs were the most preferred provider choice (39.7%), followed by black (24.2%) and teal (21.3%), while for female dental hygienist, navy scrubs were the most preferred provider choice (38.1%), followed by teal (20.4%) and black (19.8%). There was a strong preference for navy scrubs among both male and female providers, with statistically significant associations ( $p = 0.001$ , for both). Inter-rater reliability

between male and female preferred provider choices was assessed using Light's Kappa ( $\kappa = 0.491$ ,  $p < 0.001$ ), indicating moderate agreement. Fleiss' Kappa analysis further confirmed this agreement ( $\kappa = 0.491$ ,  $p < 0.001$ ), with bootstrap confidence intervals between 0.434 and 0.548.

There was no significant difference in provider preference based on gender (male clinician:  $p = 0.168$ ; female clinician:  $p = 0.544$ ). However, there was a statistically significant difference in preferred provider frequency by age category which is summarized in Table 1. The findings highlight navy as the most consistently preferred scrub color across all age-groups for both male and female providers. Teal emerged as a more popular choice among older individuals (61 years and above), particularly for female providers,

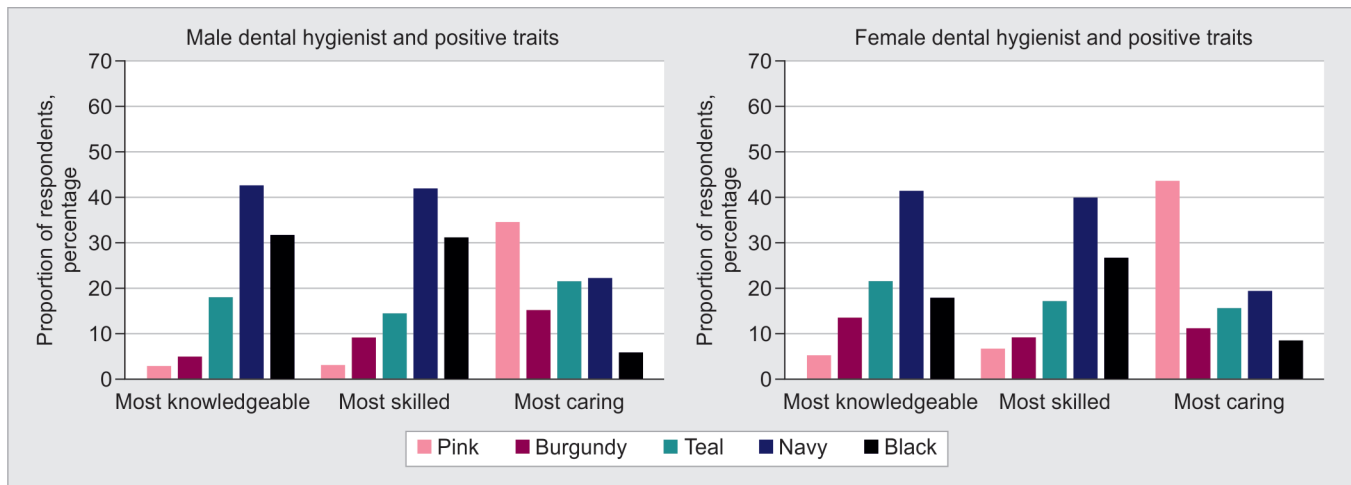


Fig. 3: Male and female dental hygienists and positive traits

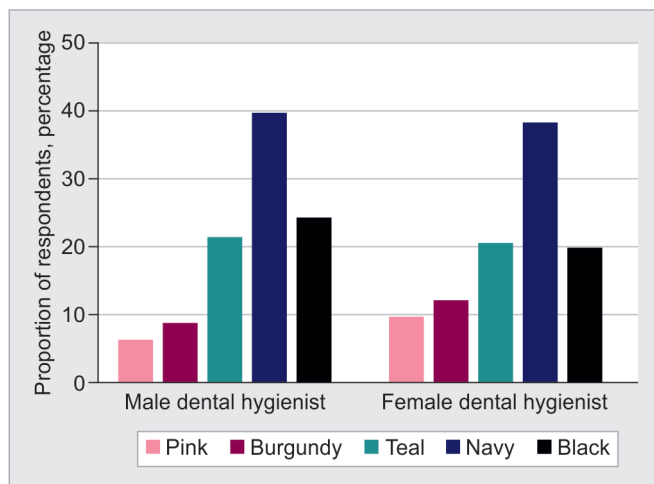


Fig. 4: Most preferred provider: Male vs female dental hygienists

indicating a potential shift in perception with age. Conversely, pink was more favored among younger respondents but showed a significant decline in preference among older age-groups.

The results highlight that scrub color significantly influences patient perceptions of dental hygienists. Pink scrubs were associated with lower knowledge and skill, while black was perceived as the least caring. In contrast, blue scrubs were rated highest for competence, and navy was the most preferred color for both male and female providers. Age differences also played a role, with teal gaining popularity among older participants.

## DISCUSSION

The US medical scrubs market has experienced a significant growth, valued at USD 8.11 billion in 2022, with a projected compound annual growth rate (CAGR) of 6.5% during the forecast period.<sup>13</sup> This growth is driven by the increasing number of healthcare professionals and a shift in preferences toward scrubs that are not only functional but also stylish and athletic. Leading brands in the market have capitalized on this trend, offering scrubs in a wide range of colors and styles. While the trend toward more personalized and stylish scrubs reflects a broader shift toward

individual expression, it also raises important questions about the balance between uniformity and self-expression in professional settings. Uniformity in healthcare attire, such as the traditional white coat or specific scrub colors, can convey a sense of professionalism and authority, helping to establish trust with patients. However, allowing healthcare providers to choose their attire may enhance their comfort and confidence, which could, in turn, positively impact patient care.<sup>14</sup>

The findings of this study align with prior research on the impact of healthcare attire on patient perceptions, yet they also offer novel insights specific to dental hygienists. Previous studies, such as Rehman et al. in the United States, assessed the effect of physicians' attire on patient trust and confidence, concluding that professional clothing influences perceived competence.<sup>2</sup> Similarly, Gherardi et al. conducted a descriptive survey in hospital settings in Australia, finding that patients associate darker and neutral clothing with professionalism and authority.<sup>3</sup> These studies, though focused on physicians, parallel the present findings that navy and darker scrubs were preferred for dental hygienists, reinforcing the broader relevance of attire across healthcare professions.

In contrast, Hemphill examined color-emotion associations among adults rather than within healthcare settings, demonstrating that blue is often linked to trust and competence—aligning with the current study's results that blue scrubs were most associated with knowledge and skill.<sup>5</sup> While this study provides psychological reasoning behind color preferences, it lacks direct application to clinical environments, making the present study more relevant to healthcare professionals.

Additionally, Hribar et al. specifically investigated surgeons' scrub color preferences in the United States, finding that darker colors like navy and black were linked to authority, while lighter shades such as pink were perceived as less professional.<sup>7</sup> The present study's methodology and findings closely align with Hribar et al.'s results, extending the understanding of scrub color perceptions beyond surgeons to dental hygienists. These findings suggest that dental hygienists aiming to maximize patient trust and perceived professionalism may benefit from selecting navy or blue scrubs in their professional attire.

Conversely, pink scrubs were frequently associated with negative perceptions of knowledge and skill, particularly for male dental hygienists. While pink was perceived as the most caring color,



**Table 1:** Cross table: Age association with male and female dental hygienists' scrub color

<i>Male:</i>					
<i>Preferred provider</i>	<i>18–30 (N = 243)</i>	<i>31–60 (n = 142)</i>	<i>61 and above (N = 98)</i>	<i>Total (N = 483)</i>	<i>p-value</i>
Black	74 (30.5%)	35 (24.6%)	8 (8.2%)	117 (24.2%)	<0.001
Burgundy	18 (7.4%)	17 (12.0%)	7 (7.1%)	42 (8.7%)	
Navy	91 (37.4%)	57 (40.1%)	43 (43.9%)	191 (39.5%)	
Pink	24 (9.9%)	5 (3.5%)	1 (1.0%)	30 (6.2%)	
Teal	36 (14.8%)	28 (19.7%)	39 (39.8%)	103 (21.3%)	
<i>Female:</i>					
<i>Preferred provider</i>	<i>18–30 (N = 243)</i>	<i>31–60 (n = 142)</i>	<i>61 and above (N = 98)</i>	<i>Total (N = 483)</i>	<i>p-value</i>
Black	54 (22.5%)	32 (22.5%)	9 (9.3%)	95 (19.8%)	<0.001
Burgundy	30 (12.5%)	18 (12.7%)	10 (10.3%)	58 (12.1%)	
Navy	90 (37.5%)	62 (43.7%)	31 (32.0%)	183 (38.2%)	
Pink	36 (15.0%)	9 (6.3%)	0 (0.0%)	45 (9.4%)	
Teal	30 (12.5%)	21 (14.8%)	47 (48.5%)	98 (20.5%)	

\*Pearson's Chi-squared test

its association with lower competence ratings suggests that while warmth and approachability are valued, patients may also prioritize perceived knowledge and skills when evaluating professionalism. These results suggest that while caring traits are important, the overall professional image of dental hygienists may be compromised when wearing lighter or more traditionally “non-professional” colors.

Interestingly, black scrubs were perceived as the least caring color for both male and female dental hygienists. While black has been associated with authority and sophistication in some studies, it has also been linked to negative emotions and intimidation in healthcare environments.<sup>8,11</sup> These findings highlight the nuanced role of color psychology in shaping patient perceptions and suggest that while black scrubs may enhance perceptions of authority, they may also detract from the warmth and approachability that patients seek in their dental hygienists.

Our study found moderate agreement between male and female dental hygienist preferences, as indicated by Light's and Fleiss' Kappa statistics. The preference for navy scrubs remained consistent across genders, underscoring the broad appeal of this color in professional healthcare settings. It is interesting to note that gender did not influence the study participants' perception of professionalism, aligning with previous research that assessed the impact of dental hygienists' professional appearance—including hairstyle, clinic attire, and ear accessories—and similarly found no significant gender association.<sup>15</sup>

This study stands out as a pioneering exploration of how scrub color influences patients' perceptions of dental hygienists, an area previously overlooked in research. Unlike prior studies that focus primarily on medical providers, particularly in pediatrics, this study specifically examines the impact of attire in a dental setting. Its strengths lie in its robust methodology, including a large sample size, statistical rigor, and a focus on multiple key traits—knowledge, skill, and caring perception. While our study offers valuable insights, certain limitations should be acknowledged. First, only five representative colors were chosen based on a preliminary survey of dental hygiene students' preferred scrubs color. This selection did not encompass all color options available in the market. Second, the study was conducted within a specific geographic region, which may limit the generalizability of the findings to broader populations.

Moreover, patient perceptions of professionalism are influenced by multiple factors beyond attire, including demeanor, communication style, and the clinical environment. Future research should consider these variables alongside scrubs color to develop a more comprehensive understanding of patient-provider interactions.

## CONCLUSION

This study underscores the importance of scrubs color in shaping patient perceptions of dental hygienists' professionalism. The preference for navy blue scrubs suggests that color plays a crucial role in establishing trust and perceived competence in dental settings. By integrating these findings into professional dress codes, dental hygienists and healthcare institutions can enhance patient confidence and improve overall patient-provider interactions, ultimately contributing to better patient satisfaction, trust, and adherence to dental care recommendations. This study offers valuable clinical translational insights by providing evidence-based guidance on attire choices that can positively impact patient perceptions, fostering a more reassuring and professional healthcare environment.

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