

Impact of Scrub Color on Patient Perceptions of Oral and Maxillofacial Surgeons: A Cross-Sectional Study

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Purpose: This study aims to evaluate how the use of five different colored scrubs by male and female surgeons in oral and maxillofacial surgery affects patients' perceptions of trust, experience, respect, cleanliness, and comfort.

Patients and Methods: A cross-sectional survey was completed by 500 adults attending a university OMS clinic. Participants viewed standardized photographs of one male and one female surgeon wearing scrubs in five colors: black, navy blue, green, red, and white. All non-attire factors were kept constant. Each image was rated on a five-point Likert scale for trustworthiness, experience, respectability, cleanliness, and comfort. Group differences were analyzed using Chi-square and Kruskal–Wallis tests, followed by Bonferroni-adjusted post-hoc comparisons.

Results: Scrub color showed significant associations with all evaluated traits ($p < 0.001$). Green, black, and navy blue received the highest ratings across most dimensions, while red consistently ranked lowest. Demographic factors produced only minor variations, and post-hoc results revealed little difference among the three best-rated colors.

Conclusion: Scrub color contributes to how patients perceive OMS surgeons, particularly in a field where anxiety is already common. Darker, traditional tones may support more reassuring impressions, while red appears less favorable. These findings may help guide attire preferences and institutional dress policies.

Keywords: color perception, healthcare uniforms, questionnaires, visual preference

Introduction

The quality of communication between the dentist and the patient is a crucial factor in both the treatment process and its success. Establishing this communication on a sound basis requires the dentist to create a positive first impression on the patient. Such an impression is usually formed during the initial encounter between the dentist and the patient, and it depends not only on the dentist's knowledge and skills but also on verbal and non-verbal communication, as well as personal characteristics such as attire, grooming, and hygiene.^{1,2} A physician's attire has always been regarded as an important means of creating a favorable first impression in any doctor–patient interaction.³ Research has shown that both the gender and the attire of the physician can influence patients' choice of healthcare provider.^{4–6}

Previous studies have consistently demonstrated that physician attire plays a significant role in shaping patient perceptions. Traditional attire, particularly the white coat, has been associated with increased trust, professionalism, and perceived competence.^{4,6–8} However, patient preferences regarding physician attire are influenced by multiple factors, including cultural context, age, and clinical setting.^{3,9–11} While the impact of general physician attire has been widely investigated, evidence specifically addressing the role of scrub color in shaping patient perceptions remains limited, particularly in oral and maxillofacial surgery.

Particularly in fields such as dentistry, where close contact with the patient is essential, physical appearance plays a significant role in fostering a sense of trust and shaping perceptions of professionalism. In this context, the dentist's appearance and demeanor during the first encounter are not only important for personal image but also decisive for the effectiveness of the treatment process. Therefore, in addition to their professional competence, dentists must also take communicative and visual aspects into account when establishing relationships with their patients.^{5,12–14}

To the best of our knowledge, no study has investigated patients' perceptions of the surgeon's scrub color in the field of oral and maxillofacial surgery. The aim of the present study was to examine the effects of the surgeon's scrub color and gender on patients' perceptions across various dimensions. The study hypothesized that the surgeon's scrub color and gender may lead to significant differences in patients' perceptions.

Materials and Methods

This study was designed as a cross-sectional and descriptive survey conducted between 2024 and 2025 at the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Ankara University. The reporting of the study was carried out in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for observational research. Ethical approval was obtained from the Ethics Committee of the Faculty of Dentistry, Ankara University (Approval No: 36290600/77; Approval Date: 20.05.2024). All participants were fully informed about the study, and written informed consent was obtained from each participant.

The study included adult patients aged 18 years and older who applied to the department and voluntarily agreed to participate. Participants were recruited using a convenience sampling method from patients attending the clinic during the study period who met the inclusion criteria and agreed to participate. Individuals under the age of 18, those who refused participation, and those with incomplete or incorrectly completed questionnaires were excluded. A total of 599 individuals were invited to participate; 86 declined, and 13 submitted incomplete or erroneous questionnaires. Missing data were excluded from the analysis, and ultimately, the data of 500 participants were evaluated. The study procedure and participant flow are summarized in [Figure 1](#).

The sample size was calculated through a power analysis based on a 95% confidence level, a 5% margin of error, and an assumed proportion of $p = 0.5$, which indicated that a minimum of 384 participants would be sufficient. Including 500 participants in the study enhanced its statistical power.

A questionnaire consisting of three sections was administered to the participants. In the first section, data were collected on gender, age, educational level, prior experience with oral and maxillofacial surgery, and the importance attributed to the physician's appearance. In the second section, five photographs of a male physician wearing scrubs in different colors were shown to the participants in random order. The selected scrub colors (black, navy blue, green, red, and white) were chosen based on their common use in clinical practice and their distinct associations in color psychology literature. In the third section, the same procedure was applied using five photographs of a female physician. The same models were used in both the male and female physician photographs, ensuring that attire was the only variable. In all photographs, facial expression, posture, hairstyle, and background were kept constant. Photographs were chosen as the most appropriate method to isolate the attire variable, independent of other factors such as attitude, behavior, and tone of voice that may influence the evaluation of live physicians ([Figure 2](#)). Participants rated each photograph on dimensions of experience, trustworthiness, comfort, respectability and cleanliness using a 5-point Likert scale ranging from "very low" to "very high". The questionnaire was developed based on relevant literature evaluating patient perceptions of physician attire and was reviewed by experts in oral and maxillofacial surgery for content validity.

To minimize bias in the study, all participants completed the questionnaire individually under the same environmental conditions, and the photographs were presented in random order to prevent the influence of visual sequence on preferences.

Statistical Analysis

The data were analyzed using IBM SPSS Statistics version 22. Descriptive statistics were presented as frequency and percentage distributions. Differences between groups were evaluated using the Chi-square test and the Kruskal–Wallis test. In cases where significant differences were found, post-hoc pairwise comparisons were performed with the Mann–

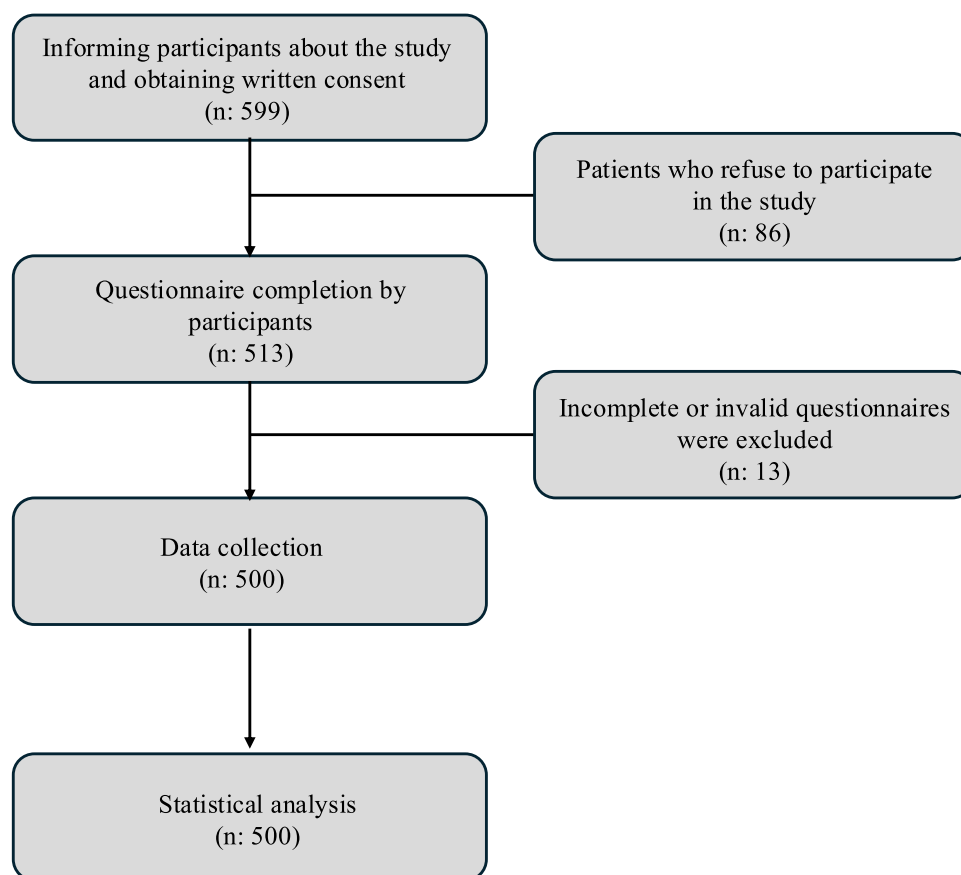


Figure 1 Flow chart illustrating the study process.

Whitney *U*-test and Bonferroni correction. In addition, Cramér's *V* coefficients were calculated to assess effect size, with $V \approx 0.1$ interpreted as small, $V \approx 0.3$ as moderate, and $V \approx 0.5$ as large effect. A significance level of $p < 0.05$ was accepted for all analyses. Non-parametric tests were preferred due to the ordinal nature of Likert scale data and the non-normal distribution of the variables.

Results

Participants' Demographic Characteristics

A total of 500 participants were included in the study, of whom 35.8% were male and 64.2% were female. Nearly half of the participants were aged 18–30 years (49.8%), followed by those aged 30–65 years (42.2%), while a smaller proportion were 65 years or older (7.8%). Most participants had an undergraduate or higher level of education (57.6%). The majority reported that physicians' appearance was important (62.4%) and had prior experience with oral and maxillofacial surgery (69.4%).

Participants' Perceptions of the Physician's Uniform Color

Participants' evaluations of physicians wearing different colored uniforms showed significant differences across all perception dimensions, including trustworthiness, experience, respectability, cleanliness, and comfort ($p < 0.001$ for all). Across all analyses, green, black, and navy blue consistently received the highest ratings, whereas red was rated lowest in all parameters. White was generally positioned at a moderate level.

Effect size analysis using Cramér's *V* further indicated predominantly moderate associations between scrub color and perception parameters. For male physicians, values ranged from 0.328 to 0.381, while for female physicians they ranged from 0.265 to 0.288.



Figure 2 Images of male and female healthcare uniforms presented in five different colors (black, navy blue, green, red, and white).

Similar patterns were observed for both male and female physicians, indicating a consistent preference for darker, traditional colors across all perception domains. Mean Likert scores for all parameters are presented in [Figure 3](#).

Age-based analyses revealed minor variations in color preferences. Younger and middle-aged participants showed similar trends, favoring black, green, and navy blue, whereas older participants demonstrated a stronger preference for navy blue. However, post-hoc analyses indicated no significant differences among these three colors, while they were consistently rated higher than red and, to a lesser extent, white.

Detailed comparisons of uniform color preferences by age groups are presented in [Table 1](#).

Perceptions by Gender

When analyzed according to participant gender, significant differences in perceptions of uniform color were observed across all parameters ($p < 0.001$). Overall, both male and female participants demonstrated similar evaluation patterns. Black, green, and navy blue uniforms were consistently rated higher, whereas red received the lowest scores across all parameters.

Although minor variations were observed between male and female participants in terms of preferred colors, these differences did not alter the overall pattern. Post-hoc analyses indicated that the observed statistical significance was primarily driven by the consistently lower ratings of red (and, to a lesser extent, white) uniforms, while no significant differences were found among black, green, and navy blue in most comparisons.

Detailed results by participant gender are presented in [Table 2](#).

Evaluations by Educational Level

When analyzed according to educational level, some variations in color preferences were observed across perception dimensions. However, the overall pattern remained consistent across all groups. Black, green, and navy blue uniforms were generally rated higher, whereas red received the lowest scores and white was positioned at a moderate level.

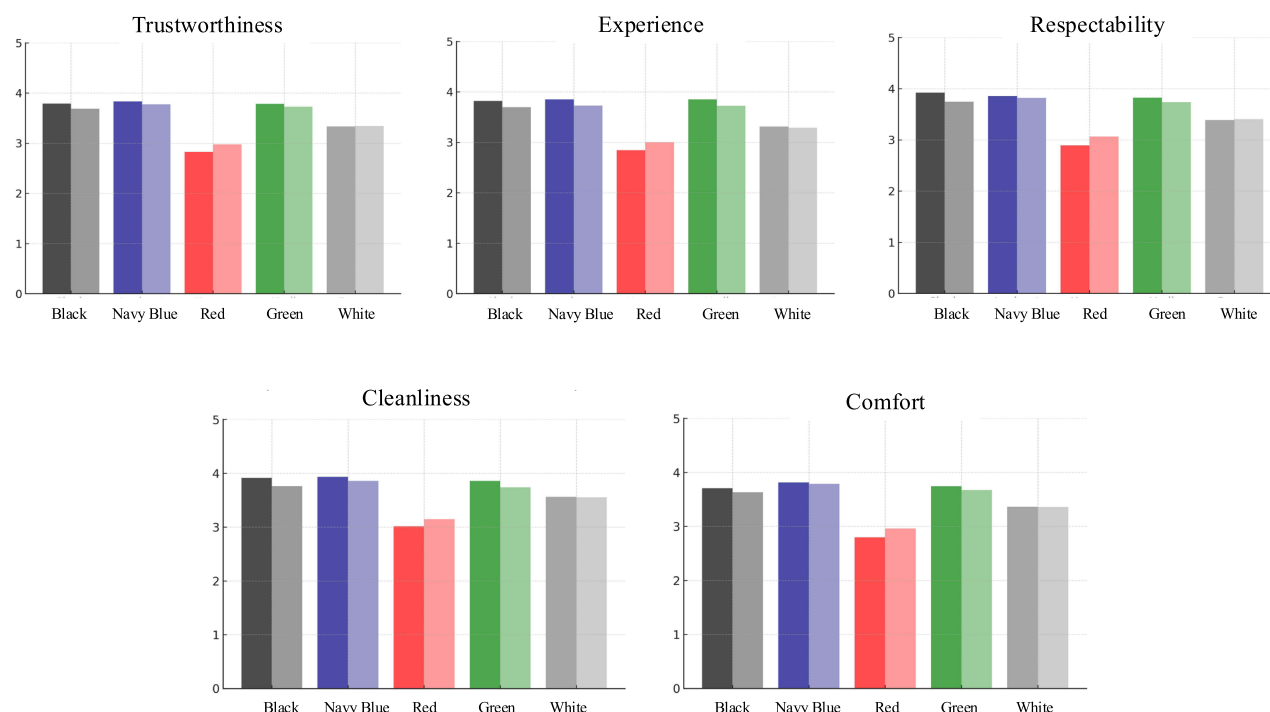


Figure 3 Mean Likert scores for five perception dimensions across different scrub colors. Perceptions by Age Groups. Dark-colored bars represent male surgeons; light-colored bars represent female surgeons.

Although minor differences were observed between education groups in terms of the most preferred color, these variations did not result in meaningful differences among black, green, and navy blue. Post-hoc analyses confirmed that the overall statistical significance was primarily driven by the consistently lower ratings of red uniforms.

Detailed comparisons by educational level are presented in [Table 3](#).

Color Perceptions by Experience Status in Oral and Maxillofacial Surgery

When analyzed according to prior clinical experience, significant differences in uniform color perceptions were observed across all parameters ($p < 0.001$). However, the overall pattern remained consistent between experienced and inexperienced participants. Black, green, and navy blue uniforms were generally rated higher, whereas red consistently received the lowest scores, with white occupying an intermediate position.

Although minor variations were observed between groups in terms of preferred colors, these differences did not result in meaningful distinctions among black, green, and navy blue. Post-hoc analyses confirmed that the overall statistical significance was primarily driven by the consistently lower ratings of red uniforms.

Detailed comparisons according to prior clinical experience are presented in [Table 4](#).

Discussion

This study examined the impact of scrub color worn by oral and maxillofacial surgeons on patient perceptions across five key dimensions: trustworthiness, experience, respectability, cleanliness, and comfort. In addition, potential differences in these perceptions were evaluated according to participants' gender, age, educational level, and prior clinical experience.

Oral and maxillofacial surgery involves more invasive procedures and complex treatment processes compared to other dental disciplines, which may be associated with increased patient anxiety.^{15–17} In this context, the physician's physical appearance may play an important role in shaping first impressions and influencing trust in the treatment process.¹⁸

Table I Perceptions of Uniform Color by Age Groups

Age	Parameter	Male Physician					p-values*	Female Physician					p-values*
		Black	Navy Blue	Green	Red	White		Black	Navy Blue	Green	Red	White	
18–30	Experience	3.92±1.10	3.90±0.97	3.90±1.19	2.81±1.38	3.19±1.41	< 0.001 B=N=G>W>R**	3.75±1.20	3.71±1.35	3.74±1.20	3.01±1.35	3.19±1.35	< 0.001 B=N=G>W>R**
	Trustworthiness	3.86±1.18	3.87±1.03	3.83±1.21	2.81±1.39	3.26±1.36	< 0.001 B=N=G>W>R**	3.71±1.22	3.80±1.10	3.78±1.20	3.01±1.37	3.28±1.35	< 0.001 B=N=G>W>R**
	Comfort	3.71±1.26	3.83±1.07	3.75±1.26	2.75±1.45	3.26±1.36	< 0.001 B=N=G>W>R**	3.66±1.22	3.81±1.10	3.70±1.24	2.94±1.38	3.27±1.37	< 0.001 B=N=G>W>R**
	Respectability	4.01±1.10	3.92±1.00	3.85±1.21	2.90±1.38	3.28±1.38	< 0.001 B=N=G>W>R**	3.82±1.17	3.83±1.06	3.76±1.20	3.08±1.39	3.31±1.37	< 0.001 B=N=G>W>R**
	Cleanliness	3.96±1.16	4.03±0.92	3.87±1.21	3.02±1.43	3.51±1.38	< 0.001 B=N=G>W>R**	3.84±1.20	3.89±1.01	3.76±1.20	3.21±1.39	3.48±1.43	< 0.001 B=N=G>W>R**
30–65	Experience	3.74±1.19	3.78±1.05	3.87±1.15	2.91±1.32	3.47±1.29	< 0.001 B=N=G>W>R**	3.67±1.19	3.72±1.05	3.74±1.14	3.08±1.35	3.48±1.27	< 0.001 B=N=G>W>R**
	Trustworthiness	3.73±1.22	3.79±1.09	3.81±1.21	2.87±1.31	3.42±1.32	< 0.001 B=N=G>W>R**	3.68±1.19	3.72±1.10	3.71±1.18	3.03±1.35	3.46±1.28	< 0.001 B=N=G>W>R**
	Comfort	3.71±1.23	3.80±1.11	3.79±1.23	2.90±1.40	3.50±1.35	< 0.001 B=N=G>W>R**	3.64±1.22	3.74±1.13	3.67±1.20	3.06±1.39	3.50±1.27	< 0.001 B=N=G>W>R**
	Respectability	3.87±1.12	3.80±1.08	3.85±1.15	2.92±1.34	3.54±1.28	< 0.001 B=N=G>W>R**	3.70±1.17	3.78±1.06	3.74±1.15	3.12±1.36	3.55±1.26	< 0.001 B=N=G>W>R**
	Cleanliness	3.92±1.18	3.83±1.09	3.92±1.17	3.07±1.35	3.65±1.35	< 0.001 B=N=G>W>R**	3.71±1.21	3.81±1.07	3.76±1.19	3.17±1.39	3.71±1.26	< 0.001 B=N=G>W>R**
65+	Experience	3.59±1.29	3.87±1.15	3.44±1.43	2.69±1.36	3.21±1.42	< 0.001 B=N=G>W>R**	3.51±1.21	3.85±1.09	3.49±1.41	2.54±1.31	2.85±1.44	< 0.001 B=N=G>W>R**
	Trustworthiness	3.67±1.22	3.87±1.15	3.31±1.52	2.64±1.37	3.28±1.43	< 0.001 B=N=G>W>R**	3.51±1.25	3.92±1.09	3.51±1.41	2.46±1.29	3.08±1.44	< 0.001 B=N=G>W>R**
	Comfort	3.62±1.21	3.79±1.20	3.44±1.48	2.56±1.48	3.23±1.39	< 0.001 B=N=G>W>R**	3.44±1.21	3.92±1.06	3.56±1.39	2.59±1.43	3.15±1.46	< 0.001 B=N=G>W>R**
	Respectability	3.64±1.22	3.74±1.23	3.49±1.47	2.69±1.38	3.23±1.37	< 0.001 B=N=G>W>R**	3.46±1.19	3.97±1.01	3.56±1.43	2.64±1.39	3.18±1.47	< 0.001 B=N=G>W>R**
	Cleanliness	3.64±1.31	3.85±1.14	3.44±1.50	2.64±1.39	3.36±1.39	< 0.001 B=N=G>W>R**	3.51±1.21	3.90±1.05	3.51±1.37	2.56±1.45	3.15±1.50	< 0.001 B=N=G>W>R**

Notes: * Kruskal–Wallis test. **Post-hoc pairwise comparisons: Mann–Whitney U-test with Bonferroni correction.

Abbreviations: B: Black; N: Navy Blue; G: Green; W: White; R: Red.

Table 2 Perceptions of Physicians' Uniform Colors by Participant Gender

Sex	Parameter	Male Physician					p-values*	Female Physician					p-values*
		Black	Navy Blue	Green	Red	White		Black	Navy Blue	Green	Red	White	
Male	Experience	3.77 ± 1.13	3.89 ± 1.02	3.05 ± 1.42	3.94 ± 1.18	3.42 ± 1.37	< 0.001 B=N=G=W=R**	3.71 ± 1.22	3.74 ± 1.14	3.28 ± 1.37	3.84 ± 1.21	3.43 ± 1.37	< 0.001 B=N=G=W=R**
	Trustworthiness	3.77 ± 1.20	3.92 ± 1.04	3.04 ± 1.39	3.91 ± 1.23	3.46 ± 1.33	< 0.001 B=N=G=W>R**	3.74 ± 1.21	3.78 ± 1.15	3.25 ± 1.38	3.92 ± 1.19	3.54 ± 1.33	< 0.001 B=N=G=W=R**
	Comfort	3.74 ± 1.19	3.87 ± 1.09	3.02 ± 1.47	3.93 ± 1.20	3.47 ± 1.33	< 0.001 B=N=G=W>R**	3.66 ± 1.25	3.80 ± 1.15	3.22 ± 1.38	3.87 ± 1.21	3.54 ± 1.34	< 0.001 B=N=G=W=R**
	Respectability	3.86 ± 1.11	3.89 ± 1.02	3.08 ± 1.40	3.96 ± 1.17	3.50 ± 1.29	< 0.001 B=N=G=W>R**	3.78 ± 1.18	3.79 ± 1.11	3.30 ± 1.36	3.83 ± 1.23	3.57 ± 1.35	< 0.001 B=N=G=W=R**
	Cleanliness	3.88 ± 1.17	4.01 ± 0.97	3.19 ± 1.41	3.98 ± 1.15	3.70 ± 1.27	< 0.001 B=N=G=W>R**	3.74 ± 1.20	3.85 ± 1.07	3.39 ± 1.39	3.87 ± 1.21	3.75 ± 1.32	< 0.001 B=N=G=W=R**
Female	Experience	3.85 ± 1.18	3.82 ± 1.02	2.73 ± 1.30	3.80 ± 1.21	3.25 ± 1.36	< 0.001 B=N=G>W>R**	3.69 ± 1.19	3.72 ± 1.05	2.85 ± 1.32	3.65 ± 1.18	3.21 ± 1.31	0.008 B=N=G>W>R**
	Trustworthiness	3.80 ± 1.20	3.79 ± 1.08	2.70 ± 1.32	3.71 ± 1.25	3.26 ± 1.36	< 0.001 B=N=G>W>R**	3.65 ± 1.21	3.77 ± 1.07	2.83 ± 1.33	3.62 ± 1.21	3.23 ± 1.32	< 0.001 B=N=G>W>R**
	Comfort	3.69 ± 1.27	3.78 ± 1.11	2.68 ± 1.39	3.64 ± 1.29	3.30 ± 1.38	< 0.001 B=N=G>W>R**	3.61 ± 1.20	3.78 ± 1.08	2.82 ± 1.38	3.56 ± 1.23	3.26 ± 1.33	< 0.001 B=N=G>W>R**
	Respectability	3.96 ± 1.13	3.83 ± 1.07	2.79 ± 1.33	3.75 ± 1.23	3.32 ± 1.37	< 0.001 B=N=G>W>R**	3.72 ± 1.17	3.83 ± 1.03	2.94 ± 1.38	3.68 ± 1.17	3.31 ± 1.32	< 0.001 B=N=G>W>R**
	Cleanliness	3.93 ± 1.18	3.89 ± 1.04	2.92 ± 1.38	3.79 ± 1.26	3.48 ± 1.42	< 0.001 B=N=G>W>R**	3.77 ± 1.21	3.86 ± 1.02	3.01 ± 1.39	3.67 ± 1.20	3.44 ± 1.39	< 0.001 B=N=G>W>R**

Notes: * Kruskal–Wallis test. **Post-hoc pairwise comparisons: Mann–Whitney U-test with Bonferroni correction.

Abbreviations: B, Black; N, Navy Blue; G, Green; W, White; R, Red.

Table 3 Uniform Color Perceptions by Educational Level

	Parameter	Male Physician					p-values*	Female Physician					p-values*
		Black	Navy Blue	Green	Red	White		Black	Navy Blue	Green	Red	White	
Primary School	Experience	3.83 ± 1.22	3.64 ± 1.12	3.93 ± 1.10	2.88 ± 1.38	3.49 ± 1.28	< 0.001 B=N=G=W>R**	3.65 ± 1.21	3.70 ± 1.20	3.64 ± 1.30	2.90 ± 1.40	3.22 ± 1.40	< 0.001 B=N=G=W=R**
	Trustworthiness	3.79 ± 1.22	3.59 ± 1.18	3.83 ± 1.17	2.84 ± 1.39	3.47 ± 1.32	< 0.001 B=N=G=W>R**	3.75 ± 1.20	3.72 ± 1.23	3.68 ± 1.29	2.83 ± 1.38	3.26 ± 1.40	< 0.001 B=N=G=W=R**
	Comfort	3.96 ± 1.13	3.65 ± 1.22	3.98 ± 1.12	2.85 ± 1.45	3.53 ± 1.32	< 0.001 B=N=G=W>R**	3.65 ± 1.26	3.75 ± 1.19	3.73 ± 1.26	2.93 ± 1.47	3.28 ± 1.36	< 0.001 B=N=G=W=R**
	Respectability	3.99 ± 1.11	3.67 ± 1.20	3.94 ± 1.09	2.93 ± 1.43	3.54 ± 1.26	< 0.001 B=N=G=W=R**	3.69 ± 1.19	3.81 ± 1.16	3.67 ± 1.31	3.01 ± 1.46	3.35 ± 1.41	0.002 B=N=G=W=R**
	Cleanliness	4.07 ± 1.18	3.73 ± 1.16	3.96 ± 1.17	3.00 ± 1.48	3.67 ± 1.27	< 0.001 B=N=G=W>R**	3.75 ± 1.23	3.88 ± 1.17	3.77 ± 1.26	3.00 ± 1.50	3.48 ± 1.40	0.001 B=N=G=W=R**
High school	Experience	3.83 ± 1.18	4.02 ± 0.99	3.82 ± 1.23	3.19 ± 1.39	3.40 ± 1.50	< 0.001 B=N=G=W=R**	3.78 ± 1.22	3.90 ± 0.96	3.73 ± 1.23	3.31 ± 1.42	3.41 ± 1.43	0.008 B=N=G=W=R**
	Trustworthiness	3.74 ± 1.26	3.99 ± 1.02	3.74 ± 1.28	3.19 ± 1.38	3.45 ± 1.47	< 0.001 B=N=G=W=R**	3.72 ± 1.28	3.95 ± 0.99	3.70 ± 1.23	3.35 ± 1.44	3.43 ± 1.46	0.017 B=N=G=W=R**
	Comfort	3.77 ± 1.28	3.93 ± 1.08	3.71 ± 1.28	3.12 ± 1.44	3.47 ± 1.47	< 0.001 B=N=G=W=R**	3.72 ± 1.27	3.96 ± 1.00	3.72 ± 1.24	3.31 ± 1.45	3.42 ± 1.47	0.007 B=N=G=W=R**
	Respectability	3.92 ± 1.15	3.97 ± 1.03	3.75 ± 1.24	3.19 ± 1.36	3.47 ± 1.48	< 0.001 B=N=G=W=R***	3.79 ± 1.23	3.94 ± 0.95	3.75 ± 1.23	3.34 ± 1.43	3.48 ± 1.45	0.015 B=N=G=W=R**
	Cleanliness	3.98 ± 1.20	4.08 ± 0.94	3.85 ± 1.25	3.29 ± 1.43	3.65 ± 1.47	< 0.001 B=N=G=W=R**	3.85 ± 1.20	3.98 ± 0.96	3.79 ± 1.23	3.47 ± 1.45	3.58 ± 1.43	0.117 B=N=G=W=R**
Undergraduate	Experience	3.81 ± 1.15	3.82 ± 1.00	3.84 ± 1.21	2.67 ± 1.28	3.20 ± 1.33	< 0.001 B=N=G>W>R**	3.64 ± 1.20	3.66 ± 1.08	3.74 ± 1.15	2.88 ± 1.30	3.24 ± 1.28	< 0.001 B=N=G>W>R**
	Trustworthiness	3.78 ± 1.19	3.84 ± 1.03	3.78 ± 1.25	2.65 ± 1.27	3.22 ± 1.32	< 0.001 B=N=G>W>R**	3.62 ± 1.18	3.71 ± 1.09	3.75 ± 1.18	2.84 ± 1.30	3.33 ± 1.26	< 0.001 B=N=G>W>R**
	Comfort	3.60 ± 1.26	3.82 ± 1.05	3.71 ± 1.27	2.60 ± 1.37	3.28 ± 1.30	< 0.001 B=N=G>W>R**	3.56 ± 1.20	3.73 ± 1.11	3.65 ± 1.22	2.80 ± 1.32	3.36 ± 1.28	< 0.001 B=N=G>W>R**
	Respectability	3.90 ± 1.12	3.86 ± 1.01	3.80 ± 1.23	2.75 ± 1.32	3.29 ± 1.32	< 0.001 B=N=G>W>R**	3.71 ± 1.16	3.75 ± 1.07	3.74 ± 1.15	2.96 ± 1.33	3.39 ± 1.27	< 0.001 B=N=G>W>R**
	Cleanliness	3.81 ± 1.18	3.92 ± 0.99	3.81 ± 1.23	2.87 ± 1.32	3.48 ± 1.37	< 0.001 B=N=G>W>R**	3.69 ± 1.21	3.80 ± 1.03	3.72 ± 1.17	3.00 ± 1.33	3.54 ± 1.35	< 0.001 B=N=G>W>R**
Postgraduate	Experience	4.00 ± 0.87	3.97 ± 0.94	3.92 ± 1.17	2.82 ± 1.47	3.37 ± 1.24	< 0.001 B=N=G=W=R**	3.97 ± 1.00	3.79 ± 1.09	3.68 ± 1.14	3.13 ± 1.23	3.29 ± 1.23	0.012 B=N=G=W=R**
	Trustworthiness	4.16 ± 0.82	3.89 ± 1.03	3.84 ± 1.24	2.79 ± 1.51	3.37 ± 1.15	< 0.001 B=N=G=W=R**	4.03 ± 1.05	3.84 ± 1.13	3.76 ± 1.22	3.08 ± 1.26	3.29 ± 1.23	0.003 B=N=G=W=R**
	Comfort	3.82 ± 1.06	3.76 ± 1.20	3.58 ± 1.39	2.97 ± 1.52	3.26 ± 1.35	0.063 B=N=G=W=R**	3.92 ± 1.00	3.79 ± 1.14	3.50 ± 1.31	3.08 ± 1.30	3.26 ± 1.27	0.021 B=N=G=W=R**
	Respectability	4.08 ± 0.82	3.89 ± 1.01	3.97 ± 1.17	2.87 ± 1.44	3.45 ± 1.11	< 0.001 B=N=G=W=R**	4.03 ± 0.94	4.00 ± 0.93	3.76 ± 1.17	3.11 ± 1.25	3.37 ± 1.22	0.002 B=N=G=W=R**
	Cleanliness	4.21 ± 0.78	4.05 ± 0.98	3.95 ± 1.18	3.18 ± 1.47	3.61 ± 1.17	0.009 B=N=G=W=R**	4.11 ± 1.01	3.95 ± 0.90	3.63 ± 1.28	3.50 ± 1.22	3.71 ± 1.29	0.215 B=N=G=W=R**

Notes: * Kruskal–Wallis test. **Post-hoc pairwise comparisons: Mann–Whitney U-test with Bonferroni correction.

Abbreviations: B, Black; N, Navy Blue; G, Green; W, White; R, Red.

Table 4 Uniform Color Preferences by Patients' Experience Status

	Parameter	Male Physician					p-values*	Female Physician					p-values*
		Black	Navy Blue	Green	Red	White		Black	Navy Blue	Green	Red	White	
Experienced Patient	Experience	3.86 ± 1.16	3.88 ± 1.02	3.85 ± 1.20	2.80 ± 1.34	3.31 ± 1.38	< 0.001 B=N=G>W>R**	3.72 ± 1.18	3.76 ± 1.10	3.71 ± 1.21	2.96 ± 1.37	3.27 ± 1.34	< 0.001 B=N=G>W>R**
	Trustworthiness	3.81 ± 1.20	3.86 ± 1.05	3.78 ± 1.26	2.78 ± 1.34	3.34 ± 1.36	< 0.001 B=N=G>W>R**	3.70 ± 1.20	3.81 ± 1.13	3.72 ± 1.22	2.92 ± 1.36	3.34 ± 1.32	< 0.001 B=N=G>W>R**
	Comfort	3.72 ± 1.23	3.86 ± 1.09	3.73 ± 1.28	2.76 ± 1.42	3.35 ± 1.36	< 0.001 B=N=G>W>R**	3.62 ± 1.23	3.79 ± 1.11	3.67 ± 1.24	2.93 ± 1.38	3.38 ± 1.33	< 0.001 B=N=G>W>R**
	Respectability	3.93 ± 1.12	3.89 ± 1.07	3.81 ± 1.22	2.83 ± 1.35	3.36 ± 1.35	< 0.001 B=N=G>W>R**	3.75 ± 1.17	3.84 ± 1.07	3.72 ± 1.21	3.01 ± 1.39	3.42 ± 1.33	< 0.001 B=N=G>W>R**
	Cleanliness	3.91 ± 1.19	3.96 ± 1.01	3.85 ± 1.23	2.98 ± 1.39	3.53 ± 1.37	< 0.001 B=N=G>W>R**	3.74 ± 1.20	3.88 ± 1.06	3.73 ± 1.21	3.09 ± 1.40	3.54 ± 1.37	< 0.001 B=N=G>W>R**
Inexperienced Patient	Experience	3.73 ± 1.16	3.78 ± 1.01	3.86 ± 1.19	2.94 ± 1.38	3.32 ± 1.33	< 0.001 B=N=G=W=R**	3.63 ± 1.23	3.66 ± 1.02	3.75 ± 1.15	3.11 ± 1.32	3.33 ± 1.33	< 0.001 B=N=G=W=R**
	Trustworthiness	3.74 ± 1.21	3.76 ± 1.10	3.80 ± 1.22	2.92 ± 1.40	3.31 ± 1.34	< 0.001 B=N=G>W=R**	3.65 ± 1.24	3.70 ± 1.04	3.74 ± 1.19	3.10 ± 1.36	3.34 ± 1.36	< 0.001 B=N=G>W=R**
	Comfort	3.68 ± 1.28	3.71 ± 1.11	3.76 ± 1.24	2.89 ± 1.46	3.38 ± 1.37	< 0.001 B=N=G>W>R**	3.66 ± 1.21	3.78 ± 1.11	3.69 ± 1.21	3.03 ± 1.41	3.31 ± 1.37	< 0.001 B=N=G>W>R**
	Respectability	3.90 ± 1.12	3.78 ± 1.03	3.85 ± 1.19	3.03 ± 1.39	3.44 ± 1.33	< 0.001 B=N=G=W=R**	3.72 ± 1.19	3.76 ± 1.02	3.76 ± 1.18	3.19 ± 1.37	3.37 ± 1.36	< 0.001 B=N=G>W>R**
	Cleanliness	3.93 ± 1.16	3.87 ± 1.03	3.86 ± 1.20	3.10 ± 1.41	3.63 ± 1.37	< 0.001 B=N=G>W>R**	3.80 ± 1.20	3.80 ± 0.99	3.76 ± 1.21	3.27 ± 1.40	3.58 ± 1.39	0.005 B=N=G>W>R**

Notes: * Kruskal–Wallis test. **Post-hoc pairwise comparisons: Mann–Whitney U-test with Bonferroni correction.

Abbreviations: B, Black; N, Navy Blue; G, Green; W, White; R: Red.

Color is one of the main elements that affect human senses, both psychologically and physiologically. In a healthcare setting, in addition to meeting patients' treatment needs, it may be necessary to focus on color psychology concepts to address their psychological needs. Each color has a symbolic meaning for people; for example, white can evoke associations with cleanliness, blue with peace, and red with seriousness.

Previous studies have shown that physician attire is an important factor influencing patient perceptions.^{11,19} Physicians wearing professional or traditional attire, particularly a white coat, have been associated with higher levels of trust and perceived empathy.^{9,20,21} In general, the literature provides consistent evidence that surgeons' attire can affect patient perceptions.^{22,23} However, research examining the combined effects of scrub color and physician gender, particularly in oral and maxillofacial surgery settings, remains limited.

Overall, the findings indicate that darker tones such as green, black, and navy blue were generally evaluated more positively, whereas red received consistently lower ratings and white was perceived at a moderate level. Green was frequently associated with higher scores in trustworthiness, experience, and comfort, while black was more often linked to respectability and cleanliness. Navy blue also emerged as a commonly preferred color, particularly among older participants. These findings may be interpreted in light of color perception theories, where green is often associated with calmness, black with authority, and navy blue with professionalism.^{24–26} Such associations may help explain the observed preferences, although these interpretations should be considered cautiously.

Systematic reviews have also demonstrated that physician attire influences patient perceptions, with formal attire combined with a white coat often reported as the preferred option.²⁷ However, these findings are strongly influenced by contextual factors such as cultural background, patient age, and clinical setting.

Previous studies have reported that older patients tend to place greater importance on physician attire and may show stronger preferences for more formal appearances.²⁸ In line with this, age-related differences observed in the present study may reflect increased sensitivity to physicians' attire among older participants.

Age may play a moderating role in uniform color preferences. Older participants (≥ 65 years) tended to favor more traditional dark tones, particularly navy blue, whereas younger and middle-aged groups showed more balanced preferences among black, navy blue, and green. This pattern may be explained by previous findings suggesting that older individuals place greater emphasis on professionalism and authority in physician appearance.^{28,29}

Gender-related differences were also observed in uniform color preferences. Female participants tended to prefer navy blue for female physicians, whereas male participants more frequently rated black and green higher for male physicians. These differences may be associated with gender-related expectations in patient–physician interactions. Previous studies have suggested that the attire of female physicians may be interpreted differently, sometimes leading to ambiguity in professional identity or misidentification.^{12,30}

Educational level was associated with some variation in uniform color preferences. Participants with higher education tended to prefer more traditional professional colors such as black, whereas those with lower education levels more frequently favored navy blue and green. These differences may reflect variations in aesthetic perception and expectations. However, previous studies have reported inconsistent findings, suggesting that education level may not always have a significant influence on attire preferences.²⁹

Differences between participants with and without prior clinical experience suggest that previous healthcare encounters may influence perceptions of physicians' appearance. While inexperienced participants tended to favor navy blue across both male and female physicians, those with prior experience showed slightly greater variation, with black, green, and navy blue being more positively evaluated. These findings may indicate that prior experience shapes expectations regarding professional appearance, although such interpretations should be made with caution.^{9,31}

In the present study, red uniforms were consistently associated with lower scores across several perception dimensions, including trustworthiness, experience, cleanliness, and comfort. This finding is in line with previous literature suggesting that the color red may be linked to alertness or caution.³² In the context of healthcare, such associations may contribute to less favorable perceptions, particularly given that red is not commonly used in clinical attire. These findings may also be interpreted in relation to the concept of “attire dissonance,” where a mismatch between clothing and clinical context may influence patient perceptions.^{11,33,34}

The findings of this study suggest that physicians' uniform color preferences may play a role in shaping patient perceptions and the overall patient experience. Physicians' visual presentation may therefore be considered an element of nonverbal communication rather than solely a matter of personal preference. Consistent with previous studies, physician attire has been shown to influence the patient–physician relationship and may contribute to patient satisfaction.^{9,27,35}

The findings of this study may offer practical insights for healthcare professionals and institutions regarding physician attire. When establishing dress codes, it may be beneficial to consider not only institutional identity but also patient perceptions and the potential psychological impact of attire. In this context, colors such as green, navy blue, and black may be associated with more favorable patient perceptions. Accordingly, physician attire may be regarded not only as an aesthetic element but also as a component of nonverbal communication.

This study has several limitations. First, its cross-sectional and single-center design may limit the generalizability of the findings across different populations and socio-cultural settings. Second, perceptions were evaluated using standardized static images rather than real clinical interactions, which may not fully reflect actual patient attitudes and behaviors. Third, the study considered only binary gender representation and did not account for the broader gender spectrum. Finally, the study focused solely on perceptual outcomes and did not assess behavioral outcomes such as patient satisfaction, treatment adherence, or clinical decision-making.

Despite these limitations, the study has several strengths. It was specifically conducted within the context of oral and maxillofacial surgery, providing field-specific insights. In addition, focusing on uniform color as a single variable allowed for a more controlled evaluation. Finally, the inclusion of multiple demographic factors, such as age, gender, educational level, and prior clinical experience, offers a comprehensive perspective on patient perceptions.

Conclusion

Uniform color may play a role in shaping patient perceptions and aspects of the patient–physician relationship, including trust, satisfaction, and communication. Establishing rapport and trust remains an important component of effective clinical care. While the present study provides insights into the role of attire in oral and maxillofacial surgery, further research is needed to explore these relationships across different professional groups, medical specialties, and cultural contexts, as well as to incorporate additional factors such as tone of voice, gestures, and facial expressions.

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