

**ORIGINAL ARTICLE** 

Business

# Public Perception of Scrub Color and Style in Plastic Surgery

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**Background:** Scrubs have become widespread office attire for plastic surgeons. The purpose of this study is to evaluate the public perception of scrub color and style for plastic surgeons.

**Methods:** A crowdsourced survey was performed via MTurk. Respondents were asked to rate images of a surgeon dressed in black, navy, blue, and green scrubs as well as traditional or fitted scrubs. Qualities including representativeness, skill, trustworthiness, knowledge, and compassion were rated on a Likert scale across all images. Analysis of variance and one-sided *t* test were used to analyze differences in means.

**Results:** In total, 562 responses were collected. For female plastic surgeons, navy and blue scrubs were perceived to be superior to those wearing black for skill, representativeness, trustworthiness, and compassion (P < 0.05). For male plastic surgeons, navy and blue scrubs were superior to black for knowledge, skill, representativeness, trustworthiness, and compassion (P < 0.05). For skill and representativeness, navy was superior to green (P < 0.05). For representativeness, blue was superior to green (P < 0.05). For trustworthiness and compassion, green was superior to black (P < 0.05). Fitted scrubs were significantly preferred (P < 0.05) across all characteristics with the exception of representativeness in the subgroup of male plastic surgeons.

**Conclusions:** Black scrubs are associated with more negative characteristics than navy or blue scrubs, which were found to be the most positively perceived. Fitted scrubs were associated with positive characteristics for both male and female surgeons. The purchase of fitted scrubs may be a worthwhile purchase to maximize the patient–physician relationship. (*Plast Reconstr Surg Glob Open 2024; 12:e5888; doi: 10.1097/GOX.000000000005888; Published online 7 June 2024.*)

## INTRODUCTION

A strong patient–physician relationship is paramount to the care of the patient, yet among interpersonal relationships, it is one of the most complex to understand.<sup>1-3</sup> A positive relationship promotes trust, enabling the exchange of vital information both from patient to physician, and vice versa. The former allows for optimal medical decision-making, whereas the latter

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Copyright © 2024 The Authors. Published by Wolters Kluwer Health, Inc. on behalf of The American Society of Plastic Surgeons. This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal. DOI: 10.1097/GOX.00000000005888 allows patients to feel understood. This relationship fosters a safe environment that encourages vulnerability and direct communication, which ultimately enhances patient care.<sup>2</sup>

Although direct verbal cues, including communication between ancillary staff and the physician, play a vital role in establishing patient rapport, only 7% of emotional communication during a medical interview is actually conveyed verbally.<sup>1-3</sup> In fact, 55% of perception of physician behavior is through visual cues such as eye contact, office ambiance, and the attire of the physician.<sup>1-3</sup> Several nonmedical studies have demonstrated the importance of attire on the perception of intelligence, expectations, and charisma.<sup>4-6</sup> Although prior studies have shown that patients tend to prefer their plastic surgeons to wear formal attire, the COVID-19 pandemic resulted in an increased acceptance of surgeons wearing scrubs.<sup>4</sup> Scrubs were first mentioned in 1894, with the colors evolving over the years from white, which was easy to wash, to green for less glare, to sky blue which was easier to see on color television.<sup>7</sup> A 2023 letter published in JAMA Surgery examined patient preferences regarding the color of scrubs physicians wore

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and found that patients most identified physicians wearing green scrubs as surgeons and those wearing blue scrubs to be the most caring, whereas those wearing black scrubs were associated mostly with negative characteristics (least knowledgeable, skilled, trustworthy, and caring).<sup>8</sup>

As scrub use in the outpatient setting increases, particularly with the boom in the popularity of fitted scrubs, this study aimed to expand on the *JAMA Surgery* letter and focus on plastic surgery. The purpose of this study was to provide a large, detailed survey evaluation of the public perception of plastic surgeons with regard to representativeness, trustworthiness, skill, compassion, and knowledge based on the choice of scrub color and scrub style (traditional versus fitted). We hypothesize that there is a difference in the public perception of scrub colors and that different colors will have different attributes in the public eye.

### **METHODS**

#### **Study Design and Setting**

A two-part survey consisting of photographs of surgeons (men and women) in various scrub colors and scrub styles was created by the authors. It was generated via Qualtrics XM Survey Software (Provo, Utah) and distributed to the online crowdsourcing platform, Amazon Mechanical Turk (MTurk). The platform respondents are voluntary members of the general public and have diverse demographic backgrounds.<sup>9,10</sup> A master's qualification was required for MTurk respondents, which is a specialized group of MTurk users, who consistently demonstrate accuracy in performing a wide range of human intelligence tasks. Human intelligence tasks are defined as a single, self-contained, virtual task that a worker can work on, submit an answer to, and collect a reward for completing.

For optimal comparison, the scrubs worn by both surgeons (both of White descent) were the same brand for traditional (nonfitted) and fitted scrubs, respectively. Using Adobe Photoshop, the colors were changed to the standardized colors of black, navy, blue, and green. To standardize comparisons, all jewelry was removed, masks were worn to control facial expressions, and backgrounds remained constant with standard photographs including full-length view from head to shoes. Survey questions were developed based on a review of questions used in previous studies and the desired focus of this study.<sup>11–14</sup>

#### **Description of Survey**

The first part of the survey presented images of a surgeon, either male or female, dressed in the same type of traditional scrubs in four different color combinations: black, navy, blue, or green (Fig. 1). Participants were asked to rank the male and female surgeons in a certain scrub color individually based on a Likert scale (1 being least and 5 being most) on the following qualities: representativeness of being a plastic surgeon, trustworthiness, skill, compassion, and knowledge. The second part of the survey presented side-by-side images of a surgeon, either male or female, dressed in traditional and fitted scrubs in

#### **Takeaways**

**Question:** How does the public perception of plastic surgeons vary depending on scrub color and scrub style?

**Findings:** A survey was distributed evaluating representativeness, skill, trustworthiness, knowledge, and compassion. Black, navy, blue, and green scrub colors and traditional versus fitted scrubs were evaluated. The public viewed navy and blue more positively and black and green less positively. Fitted scrubs were preferred over traditional scrubs. The results were consistent for both male and female surgeons.

**Meaning:** Navy and blue fitted scrubs worn by plastic surgeons are more positively perceived by the public.

the navy color (Fig. 1). Participants were then asked to rank which of the two images (traditional versus fitted) was more closely associated with the same five qualities as previously described based on the following options: no difference, little more, somewhat more, and much more.

All respondents completed color comparison, followed by fit comparison. Questions within these sections were presented in random order to prevent any bias based on order of color presentation. Summary statistics (frequencies, percentages) were used to characterize the distribution of responses among the full sample.

## **Statistical Analysis**

An ANOVA test was performed for each of the five variables (representativeness, trustworthiness, skill, compassion, and knowledge) to compare the four colors (black, navy, blue, and green). A Sidak correction was made to allow for multiple comparisons of all four scrub colors. One-sided Student t test was used to evaluate difference in means. Data were analyzed using STATA for MacOS (StataCorp LLC, College Station, Tex.). Power analysis for ANOVA was performed, with an estimated SD of 1, and an estimated delta between means of 0.4. A necessary sample size of 150 was calculated to achieve 80% power with an alpha of 0.05. This was confirmed with Monte Carlo simulation.

#### RESULTS

Responses from 562 participants were collected and included in the final analysis. Overall, black scrubs were ranked less favorably (ie, ranked lowest for a specific trait), whereas navy and blue scrubs were ranked more favorably (ie, ranked higher for a specific trait) for both male and female surgeons (Figs. 2, 3).

For female plastic surgeons, navy and blue were found to be superior to black in skill, representativeness, trust, and compassion (P < 0.05). For representativeness, navy was superior to green (P < 0.05). For knowledge and representativeness, blue was superior to green (P < 0.05). For knowledge, black was superior to green (P < 0.05). For skill, trust, and compassion, green was superior to black (P < 0.05). No other statistical differences were found between the colors (Table 1).



**Fig. 1.** Photographs used for traditional and fitted scrubs. Colors used include from left to right: black, navy, blue, and green. Bottom images show traditional and fitted styles used.

For male plastic surgeons, navy and blue scrubs were superior to black for knowledge, skill, representativeness, trust, and compassion (P < 0.05). For skill and representativeness, navy was superior to green (P < 0.05). For representativeness, blue was superior to green (P < 0.05). For trust and compassion, green was superior to black (P < 0.05). No other statistical differences were found between the colors (Table 2).

Further analysis was conducted comparing the scrub style, traditional versus fitted, and the five variables using a one-sample t test. Fitted scrubs among all surgeons

combined were found to be superior to traditional scrubs in all five variables (P < 0.0001). When further stratified by gender, the fitted scrubs for female plastic surgeons were found to be superior to traditional scrubs in all five variables (P < 0.0001). For male plastic surgeons, the fitted scrubs were found to be superior in skill, trustworthiness, compassion, and knowledge (P < 0.05; Table 3).

#### DISCUSSION

Positive patient-physician relationships are associated with improved patient satisfaction, compliance, and health outcomes.<sup>2,3</sup> Studies among various medical specialties have demonstrated that provider attire impacts patient perception. Although specific preferences vary depending on specialty and medical setting, there is a consensus that appearance impacts first impressions.<sup>15,16</sup> It is worth noting that plastic surgery is distinct as a specialty in that plastic surgeons frequently treat external appearances. To our knowledge, there is a paucity of literature regarding patient preferences for attire in plastic surgeons. Dayani et al evaluated the patient perception of plastic surgeon attire by comparing formal attire and scrubs with patients overall favoring formal attire with a white coat followed by scrubs with a white coat.<sup>17</sup> In 2020, however, physician attire changed drastically with the COVID-19 pandemic. Many transitioned away from formal attire to wearing scrubs in an effort to better incorporate personal protective equipment, with the global suit market experiencing over a 14% decrease in revenue.<sup>18,19</sup> During the pandemic, scrubs were deemed to be the most acceptable attire in the outpatient setting.<sup>18</sup> As scrub use has increased, so has the prevalence of high-end scrubs, in particular fitted scrubs. This trend is also seen in plastic surgery, with many opting to purchase fitted, more flattering, high-end scrubs as opposed to the more traditional scrub styles. However, there has yet to be a study that evaluated public perception of scrub color in plastic surgery or public perception of scrub style (fitted versus traditional) in any medical specialty.

Similarly to the study conducted by Hribar et al, our results suggest that scrub color does play a role in patient perception of plastic surgeon characteristics, which ultimately can impact the patient-physician relationship.<sup>20</sup> When ranking colors, our data suggest that patients generally feel no more positive or negative about plastic surgeons wearing navy or blue scrubs, green scrubs are less favorable than navy or blue, and black scrubs are viewed the least favorably. Despite the findings of Dayani et al that patients associated green scrubs more with surgeons likely given the historic surgeon green color, our study suggests that patients perceived navy or blue scrubs to be more representative of plastic surgeons. Interestingly, we have anecdotally seen a significant portion of plastic surgeons electing to wear black scrubs, despite black scrubs rarely being worn in television shows or movies.

Our study is the first of its kind to survey perceptions of surgeons based on scrub style. Fitted scrubs have gained popularity in the last 5–10 years with new companies, styles, and colors continuing to be introduced, implying that the market continues to dictate a growing need for

Responses for Representativeness (female)



Responses for Trustworthiness (female)



Responses for Skill (female)











**Fig. 2.** The survey responses for each of the five scrub colors are shown stratified by the questions asked for female surgeons.

Responses for Representativeness (male)



Responses for Trustworthiness (male)



Responses for Skill (male)











Fig. 3. The survey responses for each of the five scrub colors are shown stratified by the questions asked for male surgeons.

## Table 1. Comparison of Five Variables (Knowledge, Skill, Representativeness, Trustworthiness, and Compassion) among Different Scrub Colors in Female Models

	Post Hoc Testing for ANOVA for Women						
Female Color Comparison	Navy > Green	Navy > Blue	Navy > Black	Green > Blue	Green > Black	Blue > Black	
Knowledge	0.10	-0.04	-0.04	-0.14*	-0.14*	0.00	
Skill	0.12	-0.02	0.29*	-0.14	0.16*	0.30*	
Representativeness	0.21*	-0.03	0.37*	-0.25*	0.15	0.40*	
Trust	0.13	0.02	0.33*	-0.15	0.19*	0.34*	
Compassion	0.05	-0.01	0.36*	-0.06	0.31*	0.37*	

Asterisk (\*) indicates statistical significance. The data presented in the table is using a Sidak correction to compare values via ANOVA statistical analysis. Positive value signifies superiority, negative value signifies inferiority.

## Table 2. Comparison of Five Variables (Knowledge, Skill, Representativeness, Trustworthiness, and Compassion) among Different Scrub Colors in Male Models

	Post Hoc Testing for ANOVA for Men						
	Navy	Navy	Navy	Green	Green	Blue	
Male	>	>	>	>	>	>	
Color Comparison	Green	Blue	Black	Blue	Black	Black	
Knowledge	0.18	0.02	0.22*	-0.11	0.09	0.19*	
Skill	0.17*	0.02	0.19*	-0.14	0.02	0.17*	
Representativeness	0.18*	0.01	0.27*	-0.17*	0.08	0.26*	
Trust	0.11	0.02	0.30*	-0.09	0.19*	0.28*	
Compassion	0.05	-0.11	0.30*	-0.16	0.25*	0.41*	

Asterisk (\*) indicates statistical significance. The data presented in the table is using a Sidak correction to compare values via ANOVA statistical analysis. Positive value signifies superiority, negative value signifies inferiority.

## Table 3. Comparison of Five Variables (Knowledge, Skill, Representativeness, Trustworthiness, and Compassion) between Traditional and Fitted Scrubs

Traditional vs Fitted		<b>Comparison of Means for Traditional vs Fitted Scrubs</b>						
	Knowledge	Skill	Representativeness	Trust	Compassion			
Combined	4.56*	4.41*	4.37*	4.42*	4.43*			
Female	4.83*	4.65*	4.69*	4.68*	4.64*			
Male	4.30*	4.17*	4.05	4.16*	4.22*			

The groups are stratified into combined, female models, and male models groups. Asterisk (\*) indicates statistical significance. The data presented in the table is using a one-sided *t* test, with > 4 suggesting a preference for fitted scrubs. Significance signifies superiority of fitted scrubs over traditional scrubs. There was no data with statistical significance indicating inferiority of fitted to traditional scrubs.

more scrubs of this type. In our study, fitted scrubs were statistically significant in their association with higher scores in all five categories, including perception of surgeon's skill, knowledge, compassion, trustworthiness, and representation of plastic surgery.

It is not surprising to see a difference in the perception of male versus female surgeons based on attire, as this was also demonstrated in the studies within emergency medicine and orthopedic surgery literature.<sup>15,16</sup> Furthermore, Aitken et al found that men were statistically significantly more likely to be identified as a surgeon than women when wearing identical attire, which suggests subconscious biases that may alter patients' perception of surgeons.<sup>11</sup> This bias does seem to be present in our data as well, with fitted scrubs deemed to be more representative of plastic surgery in women, but not in men.

It is certainly interesting to see fitted scrubs positively associated with the characteristics of a surgeon. Surgeons are inextricably linked to the operating room, a sterile environment that birthed scrubs as a uniform that linked all who stepped in that atmosphere. While uniformity is being lost with the explosion of a variety in scrub types and cost, this trend of a wide variety of scrubs seems here to stay. Medical clothing was an 86 billion dollar industry in 2020 and is expected to grow to 140 billion dollars by 2028.<sup>21</sup> It would behoove us as plastic surgeons to understand both how we fit into this space and how to make sure the public perceives us as we intend.

The limitations of this study include all those inherent to survey studies. Amazon MTurk was the platform of choice. Although studies have shown that the majority of MTurk workers are between the age of 18 and 35 and concentrated in the United States and India, other studies have found it still to be representative of the general population and more representative of noncollege populations than those of typical internet samples.<sup>9,10,22</sup> Its diverse sample size is not limited by geographical demographics which increases validity and generalizability of its data.<sup>22</sup> However, it does require a suspension of reality and requires the participant to imagine a

hypothetical clinical encounter with the pictured plastic surgeon. Also, the platform does present possible sample bias and demographic differences compared with the general population.<sup>23</sup> Additionally, a decision was made to stay congruent with the methods of prior studies and included model plastic surgeons who were young and White.<sup>11-13</sup> This reduces confounding variables, such as gender or age, between these studies and facilitates comparisons between this study and those published previously. As a result, this decreases the generalizability of results across surgeons of different ethnicities and could have influenced survey participants' preferences for scrub color. This study also does not investigate various body types regarding fitted scrubs and traditional scrubs as attire for one may not be flattering in other body types. For example, fitted scrubs may seem more flattering for a slimmer body type. Additionally, this study investigated fitted scrubs with the jogger style, which may seem more casual. Fitted scrubs with hemmed pants are popular among providers as well and may be an area of further study. We also did not control for age and gender of survey respondents, a factor that we acknowledge could play a significant role in scrub preference; however, we hope that given our large survey size, we are able to obtain a representative sample of the general public. Finally, nursing scrub colors are not uniform nationwide, and a conflict with colors worn by nursing staff could present a possible confounding factor. Future studies examining the impact of age, gender, body type, less mainstream color choices, and hospital policies could be a valuable addition to the literature.

#### **CONCLUSIONS**

The results of this study suggest that scrub color and style does affect the public perception of plastic surgeons. Black scrubs are least favorable, navy and blue scrubs are most favorable, and fitted scrubs are more favorable than traditional scrubs. The purchase of fitted navy or blue scrubs may be a worthwhile purchase to maximize the patient–physician relationship.

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#### DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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