

## Physicians' Attire Influences Patients' Perceptions in the Urban Outpatient Orthopaedic Surgery Setting

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### Abstract

**Background** Previous work has established that physician attire influences patients' perceptions of their physicians. However, research from different specialties has disagreed regarding what kinds of physician attire might result in increased trust and confidence on the part of patients.

**Questions/Purposes** The purpose of this study was to investigate how surgeon attire affects patients' perceptions of trust and confidence in an urban orthopaedic outpatient setting.

**Methods** Eighty-five of 100 patients solicited completed a three-part questionnaire in the outpatient orthopaedic clinic at an urban teaching hospital. In the first section, participants viewed eight images, four of a male surgeon and four of a female surgeon wearing a white coat over

formal attire, scrubs, business attire, and casual attire, and rated each image on a five-level Likert scale. Participants were asked how confident, trustworthy, safe, caring, and smart the surgeon appeared, how well the surgery would go, and how willing they would be to discuss personal information with the pictured surgeon. The participant ranked all images from most to least confident in the second part and the last section obtained demographic information from the patients. Surveys were scored using a five-level Likert scale and a Friedman test was used to detect statistical significance when comparing all attires. For multiple pairwise comparisons, a Bonferroni correction was applied.

**Results** The white coat on the male surgeon elicited modestly higher ratings in confidence (mean difference [MD],  $0.367 \pm 0.737$ ; 95% CI, 0.202–0.532;  $p < 0.001$ ), intelligence (MD,  $0.216 \pm 0.603$ ; 95% CI, 0.077–0.356;  $p = 0.027$ ), surgical skill (MD,  $0.325 \pm 0.658$ ; 95% CI, 0.175–0.474;  $p < 0.001$ ), trust (MD,  $0.312 \pm 0.613$ ; 95% CI, 0.173–0.451;  $p < 0.001$ ), ability to discuss confidential information (MD,  $0.253 \pm 0.742$ ; 95% CI, 0.087–0.419;  $p = 0.023$ ), caring (MD,  $0.279 \pm 0.655$ ; 95% CI, 0.124–0.432;  $p = 0.006$ ), and safety (MD,  $0.260 \pm 0.594$ ; 95% CI, 0.125–0.395;  $p = 0.002$ ) compared with business attire. Similarly, the white coat was preferred to casual attire in all categories (confidence: MD,  $0.810 \pm 0.921$ ; smart: MD,  $0.493 \pm 0.801$ ; surgical skill: MD,  $0.640 \pm 0.880$ ; ability to discuss: MD,  $0.564 \pm 0.988$ ; trust: MD,  $0.545 \pm 0.836$ ; safety: MD,  $0.581 \pm 0.860$ ; caring: MD,  $0.479 \pm 0.852$ ;  $p < 0.001$  for all comparisons). For the female surgeon, white coat and scrubs were not different, however the white coat was preferred to business attire in four of seven categories. Casual clothing was widely disliked in all categories for surgeons (men and women). When attire was compared for confidence on a scale, the white coat ranked

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Each author certifies that his or her institution approved or waived approval for the human protocol for this investigation and that all investigations were conducted in conformity with ethical principles of research.

This study was performed at Temple University Hospital, Philadelphia, PA, USA.

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higher than business (MD,  $0.439 \pm 1.491$ ;  $p = 0.006$ ) and casual attire (MD,  $1.043 \pm 2.054$ ;  $p < 0.001$ ), but not scrubs (MD,  $0.169 \pm 1.230$ ;  $p = 1.000$ ).

**Conclusions** In this urban outpatient orthopaedic practice, patients' preferences varied based on the sex of the pictured surgeon in the survey. Overall, however, modest preferences were observed for the white coat in terms of confidence, intelligence, trust, and safety. Furthermore patients are more willing to discuss personal information and believe that their surgery will go better if the surgeon wears a white coat or scrubs. These results are consistent with those of several studies in other settings and therefore may be generalizable in other locations and specialties. Given the increasing awareness and concern for physician-spread hospital infection, this study lends support to scrub attire over business or casual attire if physicians do not wear a white coat.

**Level of Evidence** Level II, therapeutic study.

## Introduction

The influence of physicians' attire on patients' perceptions has been analyzed since Hippocrates, who believed that doctors should be "clean in person, [and] well-dressed" [3, 19, 23]. For professional and hygienic reasons, the debate has persisted regarding the most appropriate clothing and how this may affect the patient-physician relationship. Numerous studies have confirmed the strong influence of physician attire on communication, patient education, confidence, trust, respect, adherence to medical treatments, and ultimately the quality of care patients receive [6, 7, 15, 22, 23]. Although concepts such as trust and confidence are complex and likely involve many other factors such as respect and good communication, previous studies in settings outside orthopaedics have confirmed attire influences these variables [2, 12, 16, 23]. Furthermore, attire is one of the few changeable factors proven to have an influence on the patient's first impression [6, 18]. The white coat has been standard physician attire since the late 19th century and historically has been preferred over scrubs, formal, and casual dress in various outpatient settings [10, 15, 16, 18, 23]. The United Kingdom's Department of Health banned any garment or accessory below the elbow in a clinical care setting [4, 21]. This mandate was predicated on a series of studies which implicated clothing, particularly the white coat, as a vector which may promote the spread of nosocomial infections [3, 4, 16, 21]. Furthermore, these changes served to inform the public of the potential dangers associated with garments and accessories that might contact consecutive patients. Thus, their perception of physician professionalism now is balanced against the threat of attire as a potential fomite such as neckties, watches, and long

sleeves. Patients' preferences for physician attire is further influenced by patient age and cultural and societal standards in that particular region [4, 12, 15, 22]. In the pediatric and psychiatric settings, for example, patients view the white coat as a symbol of authority, which in turn acts as a barrier in developing a strong patient-physician relationship [5, 8]. Age also may influence preference, with older patients tending to prefer a more formally dressed doctor [4, 12, 22].

Previous studies across various institutions have claimed virtually every conceivable attire as being preferred [1–3, 5, 12, 13, 15–19, 21–23], which taken cumulatively serves to explicate the overarching principle that each specialty and patient setting needs individual consideration. Recommendations for attire have ranged from casual in the pediatrics and psychiatry settings to formal with a white coat in internal medicine [5, 8]. However, there is scant research regarding the influence of physicians' attire in an orthopaedic outpatient setting, particularly regarding urban United States populations [1]. Although recommendations from prior studies are conflicting, some authors acknowledge the strong influence of location and specialty on patient perceptions [1, 15, 16, 23]. While conducting a separate study in every subspecialty is neither feasible nor warranted, the purpose of our study was to reconcile previously contradicting recommendations and to understand how a surgeon's attire affects patients' perceptions in an urban orthopaedic outpatient setting.

We hypothesized that these patients preferred physicians in a white coat or scrubs over formal or casual attire, and we performed a survey study to investigate how surgeons' attire affects patients' perceptions of trust and confidence in an urban orthopaedic outpatient setting.

## Methods

### Study Design and Setting

In this prospective, cross-sectional study, a three-part computer-based questionnaire was completed by consecutive patients at an urban teaching hospital in the northeast United States waiting to be evaluated in the orthopaedics clinic.

### Participants

Patients were included if they were 18 years or older and agreed to be surveyed. Patients who were younger than 18 years, who answered the survey with values outside the possible range (for example, 13 on a 10-point scale), or who did not respond to more than 1/2 of the questions were

excluded. Responses were collected from a total of 85 patients in the orthopaedic surgery outpatient setting at an urban university hospital, while 15 patients declined to participate. The majority of patients included were 35 to 54 years old, female, black, had private insurance, and identified themselves as being unemployed owing to their disability (Table 1).

#### Description of the Survey Instrument

The first survey component randomly presented images of a surgeon (of one or the other sex), each dressed in four outfits; a white coat over business attire, scrubs, business attire, and casual attire (Fig. 1). Randomization was determined by computer software so that respondents viewed each type of attire in a unique order. Depicted attire for the surgeons of both sexes was chosen as similar as possible to clothing depicted in the majority of prior studies on the topic [1, 12, 15, 16], to maintain comparability. Similarly, the choice of white surgeons is in keeping with nearly all previous studies on this topic and serves to further isolate our intended study variable [1, 12, 15, 16]. All jewelry and watches, facial expression, and background remained constant. For each image, the participant was asked to rate, on a five-point Likert scale, qualities of the surgeon including confidence, intelligence, trustworthiness, safety, and compassion. A scale from 1 to 5 was chosen, as previous research has not shown superiority with more expansive scales [9]. Survey questions were developed based on a review of questions used in previous studies and the desired focus of this study [1, 12, 15, 16]. Given that question responses were to be assessed individually and that no cumulative or summary score was planned, survey questions were not piloted nor otherwise quantitatively tested. The following questions were asked: How confident are you in this surgeon? How smart is this surgeon? How well do you think the surgery will go if this was your surgeon? How willing are you to discuss confidential information with this surgeon? How trustworthy is this surgeon? How safe is this surgeon? How caring is this surgeon? The second part showed all four images of the male and female surgeons lined up next to each other on a single page and asked the participant to rank the images from highest to lowest level of confidence in the surgeon's abilities. The final section procured demographic information of the patient such as age, sex, race, education level, employment status, and whether they had private insurance, no insurance, or Medicare.

**Table 1.** Demographic data

Variable	Number of patients	Percentage of total
Age range (years)		
18 to 34	31	37
35 to 54	37	44
55 or older	14	16
Missing	3	3
Sex		
Female	44	52
Male	38	45
Prefer not to respond	1	1
Missing	2	2
Ethnicity		
American Indian, Alaskan Native, Asian, or Pacific Islander	4	4
Black or African American	34	40
Hispanic or Latino	20	24
White/Caucasian	22	26
Missing	5	6
Education		
Less than high school degree	4	5
High school degree or equivalent (eg, GED)	31	37
Some college but no degree	22	26
Associate degree	8	9
Bachelor degree	8	9
Graduate degree	6	7
Prefer not to respond	4	5
Missing	2	2
Employment status		
Employed, working full-time	26	31
Employed, working part-time	7	8
Not employed, looking for work	15	18
Disabled, not able to work	23	27
Retired	5	6
Prefer not to respond	7	8
Missing	2	2
Insurance		
Medicaid	8	9
Medicare	19	22
Private insurance	32	38
Private insurance and Medicare	4	5
I do not have insurance	6	7
Prefer not to respond	14	17
Missing	2	2

GED = General Education Diploma.



**Fig. 1A–B** The photographs show the (A) male and (B) female surgeons wearing a white coat, scrubs, business attire, and casual attire.

#### Variables, Outcome Measures, Data Sources, and Bias

Survey responses for the five-point Likert scale, as collected, were aggregated to a derived three-level response based on the decision to analyze the data as categorical, rather than continuous and allow for ease of interpretation. Furthermore, this maximized the power associated with these categorical analyses given the number of samples collected and more accurately analyzed these results, given the various assumptions imposed regarding the distribution of sample data for continuous analysis. Continuous analysis was used for summary statistics such as mean differences to further characterize the data. The original responses “not very” and “not at all” were combined and reclassified as “negative”, the original responses “very” and “somewhat” were combined and reclassified as “positive”, and “neutral” responses remained as such. Regarding outcome measures, a difference of 0.75 was

categorized as substantial, 0.5 as moderate, and 0.25 as small.

#### Statistical Analysis, Study Size

All four attires were compared using a Friedman test for statistical significance. Pairwise comparisons then were conducted with a Bonferroni correction for multiple comparisons and adjusted p values were reported. The Wilcoxon rank-sum test was used to determine any difference in ranking attributed to respondent sex and the Kruskal–Wallis test was used to evaluate responses according to age range and ethnicity. The second component of the survey, in which all four attire options for each sex were displayed simultaneously, consisted of comparative rankings for which the Friedman test was used. All reported p values are two-sided. Data were analyzed using

**Table 2.** Male and female comparisons

Sex	Attire	Confidence P (mean ± SD) [95% CI]	Smart P (mean ± SD) [95% CI]	Surgery P (mean ± SD) [95% CI]	Discuss P (mean ± SD) [95% CI]	Trust P (mean ± SD) [95% CI]	Safe P (mean ± SD) [95% CI]	Caring P (mean ± SD) [95% CI]
Male	White coat versus scrubs	p = 0.297 (0.138 ± 0.568) [0.011–0.264]	p = 0.028 (0.192 ± 0.544) [0.065–0.319]	p = 0.004 (0.218 ± 0.526) [0.099–0.337]	p = 0.086 (0.177 ± 0.656) [0.030–0.324]	p < 0.001 (0.250 ± 0.520) [0.131–0.369]	p = 0.028 (0.182 ± 0.531) [0.061–0.302]	p = 0.045 (0.178 ± 0.536) [0.053–0.303]
	White coat versus business	p < 0.001 (0.367 ± 0.737) [0.202–0.532]	p = 0.027 (0.216 ± 0.603) [0.077–0.356]	p < 0.001 (0.325 ± 0.658) [0.175–0.474]	p = 0.023 (0.253 ± 0.742) [0.087–0.419]	p < 0.001 (0.312 ± 0.613) [0.173–0.451]	p = 0.002 (0.260 ± 0.594) [0.125–0.395]	p = 0.006 (0.278 ± 0.655) [0.124–0.432]
	White coat versus casual	p < 0.001 (0.810 ± 0.921) [0.604–1.016]	p < 0.001 (0.493 ± 0.801) [0.306–0.680]	p < 0.001 (0.640 ± 0.880) [0.438–0.842]	p < 0.001 (0.564 ± 0.988) [0.341–0.787]	p < 0.001 (0.545 ± 0.836) [0.356–0.735]	p < 0.001 (0.581 ± 0.860) [0.382–0.780]	p < 0.001 (0.479 ± 0.852) [0.281–0.678]
Male	Scrubs versus business	p = 0.063 (0.222 ± 0.671) [0.074–0.371]	p = 1 (0.054 ± 0.594) [–0.084 to 0.192]	p = 0.441 (0.114 ± 0.531) [–0.005 to 0.233]	p = 1 (0.099 ± 0.682) [–0.052 to 0.250]	p = 1 (0.078 ± 0.623) [–0.064 to 0.219]	p = 0.802 (0.076 ± 0.594) [–0.057 to 0.209]	p = 1 (0.096 ± 0.690) [–0.065 to 0.257]
	Scrubs versus casual	p < 0.001 (0.695 ± 0.812) [0.517–0.873]	p = 0.001 (0.329 ± 0.688) [0.168–0.489]	p < 0.001 (0.462 ± 0.751) [0.292–0.631]	p < 0.001 (0.413 ± 0.774) [0.240–0.585]	p = 0.028 (0.299 ± 0.779) [0.122–0.476]	p < 0.001 (0.382 ± 0.765) [0.207–0.556]	p < 0.001 (0.311 ± 0.757) [0.135–0.486]
Male	Business versus casual	p < 0.001 (0.450 ± 0.840) [0.263–0.637]	p < 0.001 (0.311 ± 0.701) [0.148–0.473]	p < 0.001 (0.329 ± 0.700) [0.169–0.489]	p = 0.002 (0.313 ± 0.739) [0.148–0.477]	p = 0.049 (0.244 ± 0.759) [0.072–0.415]	p < 0.001 (0.316 ± 0.677) [0.161–0.471]	p = 0.006 (0.233 ± 0.698) [0.070–0.396]
	White coat versus scrubs	p = 1 (0.037 ± 0.580) [–0.091–0.165]	p = 0.993 (0.070 ± 0.425) [–0.030 to 0.171]	p = 1 (0.066 ± 0.442) [–0.035 to 0.167]	p = 0.209 (0.101 ± 0.411) [0.009–0.193]	p = 0.5 (0.092 ± 0.437) [–0.008 to 0.192]	p = 0.075 (0.132 ± 0.442) [0.030–0.233]	p = 0.5 (0.100 ± 0.455) [–0.009 to 0.209]
Female	White Coat versus business	p = 0.028 (0.309 ± 0.801) [0.132–0.486]	p = 0.297 (0.192 ± 0.680) [0.033–0.350]	p = 0.056 (0.273 ± 0.755) [0.101–0.444]	p = 0.01 (0.300 ± 0.736) [0.136–0.464]	p = 0.044 (0.221 ± 0.641) [0.075–0.366]	p = 0.01 (0.237 ± 0.608) [0.098–0.376]	p = 0.126 (0.178 ± 0.586) [0.041–0.315]
	White coat versus casual	p < 0.001 (0.861 ± 0.916) [0.656–1.066]	p < 0.001 (0.696 ± 0.828) [0.497–0.895]	p < 0.001 (0.689 ± 0.920) [0.476–0.902]	p < 0.001 (0.835 ± 0.912) [0.631–1.040]	p < 0.001 (0.716 ± 0.884) [0.511–0.921]	p < 0.001 (0.736 ± 0.919) [0.520–0.952]	p < 0.001 (0.592 ± 0.950) [0.367–0.816]
Female	Scrubs versus business	p = 0.042 (0.272 ± 0.758) [0.104–0.439]	p = 0.969 (0.141 ± 0.682) [–0.021 to 0.302]	p = 0.098 (0.213 ± 0.664) [0.061–0.366]	p = 0.363 (0.190 ± 0.699) [0.033–0.347]	p = 1 (0.115 ± 0.603) [–0.020 to 0.251]	p = 1 (0.091 ± 0.542) [–0.032 to 0.214]	p = 1 (0.085 ± 0.579) [–0.053 to 0.222]
	Scrubs versus casual	p < 0.001 (0.813 ± 0.887) [0.615–1.010]	p < 0.001 (0.586 ± 0.825) [0.389–0.782]	p < 0.001 (0.608 ± 0.808) [0.421–0.795]	p < 0.001 (0.709 ± 0.834) [0.522–0.896]	p < 0.001 (0.579 ± 0.821) [0.391–0.767]	p < 0.001 (0.589 ± 0.831) [0.395–0.783]	p < 0.001 (0.465 ± 0.859) [0.261–0.668]



**Table 2.** continued

Sex	Attire	Confidence P (mean ± SD) [95% CI]	Smart P (mean ± SD) [95% CI]	Surgery P (mean ± SD) [95% CI]	Discuss P (mean ± SD) [95% CI]	Trust P (mean ± SD) [95% CI]	Safe P (mean ± SD) [95% CI]	Caring P (mean ± SD) [95% CI]
Female	Business versus casual	p < 0.001 (0.557 ± 0.813) [0.375–0.739]	p < 0.001 (0.464 ± 0.698) [0.296–0.632]	p < 0.001 (0.425 ± 0.780) [0.243–0.607]	p < 0.001 (0.532 ± 0.765) [0.360–0.703]	p < 0.001 (0.474 ± 0.702) [0.313–0.634]	p < 0.001 (0.500 ± 0.805) [0.311–0.689]	p < 0.001 (0.431 ± 0.802) [0.242–0.619]

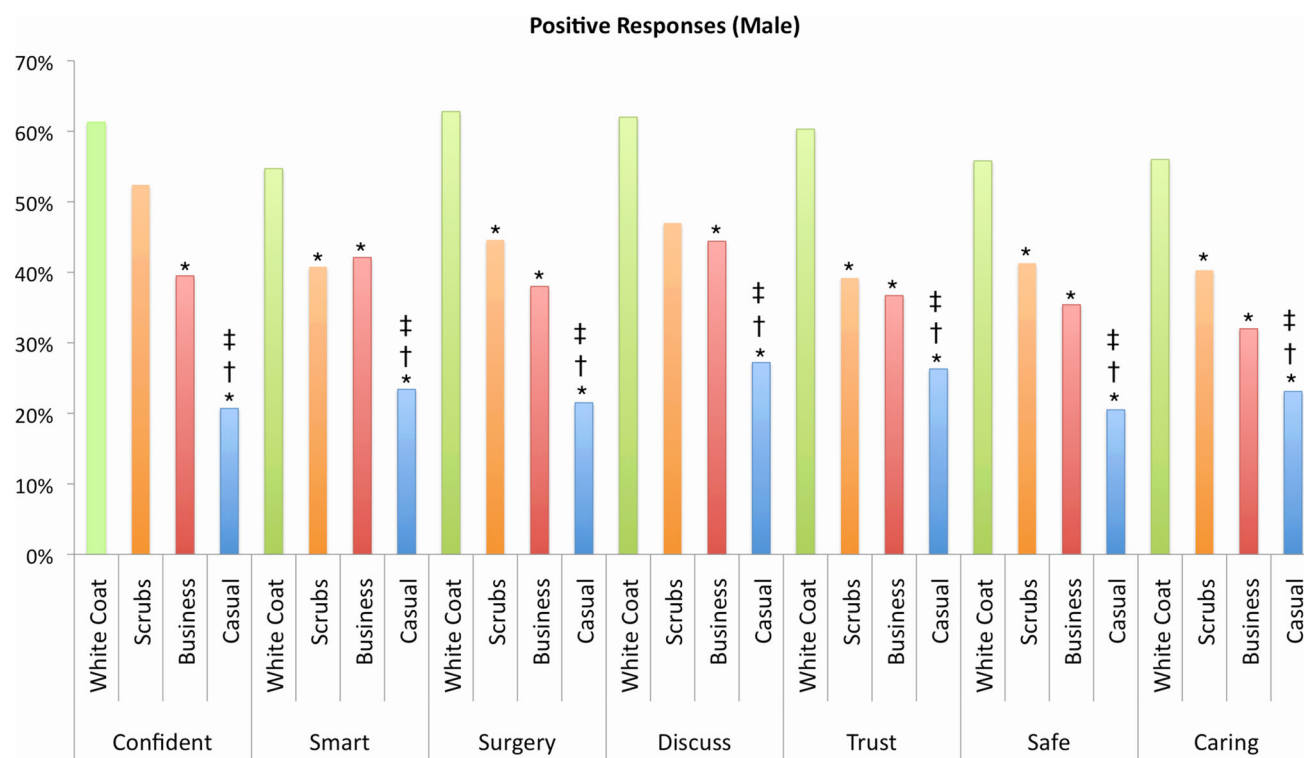
p value, mean ± SD, and 95% CI are reported for each sex, pairwise comparison of attire, and question; for the three-level Likert style rating for a given attire, positive responses were assigned a value of 1, neutral responses were assigned a value of 0, and negative responses were assigned a value of -1. Difference calculations are based on the rating of first listed attire (a three-level Likert style rating of positive, neutral, or negative) minus the rating of the second listed attire; in the context of the three-level Likert style rating, a mean difference of 1.0 reflects a higher (ie, better) rating of one rating step (eg, positive as opposed to neutral) for the first listed attire compared with the second listed attire.

SAS<sup>®</sup> 9.3 for Windows (SAS Institute Inc, Cary, NC, USA). The study was adequately powered to detect a significant difference with 95% confidence.

**Results**

For male surgeons, a white coat was preferred across all categories compared with business (confidence: mean difference [MD], 0.367 ± 0.737; 95% CI, 0.202–0.532; p < 0.001; intelligence: MD, 0.216 ± 0.603; 95% CI, 0.077–0.356; p = 0.027; surgical skill: MD, 0.325 ± 0.658; 95% CI, 0.175–0.474; p < 0.001; trust: MD, 0.312 ± 0.613; 95% CI, 0.173–0.451; p < 0.001; ability to discuss confidential information: MD, 0.253 ± 0.742; 95% CI, 0.087–0.419; p = 0.023; caring: MD, 0.279 ± 0.655; 95% CI, 0.124–0.432; p = 0.006; and safety: MD, 0.260 ± 0.594; 95% CI, 0.125–0.395; p = 0.002) and casual attire (confidence: MD, 0.810 ± 0.921; 95% CI, 0.604–1.016; intelligence: MD, 0.493 ± 0.801; 95% CI, 0.306–0.680; surgical skill: MD, 0.640 ± 0.880; 95% CI, 0.438–0.842; trust: MD, 0.545 ± 0.836; 95% CI, 0.356–0.735; ability to discuss confidential information: MD, 0.564 ± 0.988; 95% CI, 0.341–0.787; caring: MD, 0.479 ± 0.852; 95% CI, 0.281–0.678; and safety: MD, 0.581 ± 0.860; 95% CI, 0.382–0.780; p < 0.001 for all categories) (Table 2). No difference was found between white coat and scrubs with respect to patient confidence in the surgeon (MD, 0.138 ± 0.568; p = 0.297) and the ability to discuss important issues (MD, 0.177 ± 0.656; p = 0.086). For scrubs versus business attire, no difference was identified in any category, and all other outfits were preferred to casual dress (Fig. 2). For female surgeons, a white coat was not preferred to scrubs in any category, although it was rated higher than business attire in four of seven categories (confident: MD, 0.309 ± 0.801; 95% CI, 0.132–0.486; p = 0.028; discuss: MD, 0.300 ± 0.736; 95% CI, 0.136–0.464; p = 0.010; trust: MD, 0.221 ± 0.641; 95% CI, 0.075–0.366; p = 0.044; safe: MD, 0.237 ± 0.608; 95% CI, 0.098–0.376; p = 0.010) (Table 2). Although scrubs evoked greater confidence compared with business attire (MD, 0.272 ± 0.758; 95% CI, 0.104–0.439; p = 0.042), no other differences were observed. Finally, as with male surgeons, casual attire was not preferred in any aspect of patient care (Table 2; Fig. 3). The aforementioned responses were further compared with respect to baseline demographic information including age, sex, and ethnicity and no associations were observed, nor were any trends identified.

For male surgeons, respondents ranked the white coat higher than business (MD, -0.439 ± 1.491; 95% CI, -0.851 to -0.134; p = 0.006) and casual attire (MD, -1.043 ± 2.054; 95% CI -1.537 to 0.550; p < 0.001) when all attires were viewed simultaneously, however no



**Fig. 2** The positive responses are shown from patients stratified by the question asked for male surgeons: how confident are you in this surgeon (confident), how smart do you think the surgeon is (smart), how well do you think the surgery will go (surgery), how willing would you be to discuss important information with this surgeon

(discuss), how trustworthy do you find the surgeon (trust), how safe do you feel with this surgeon (safe) and finally, how caring do you find this surgeon (caring). \* $p < 0.05$  for comparisons with white coat; † $p < 0.05$  for comparisons with scrubs; ‡ $p < 0.05$  for comparisons with business attire.

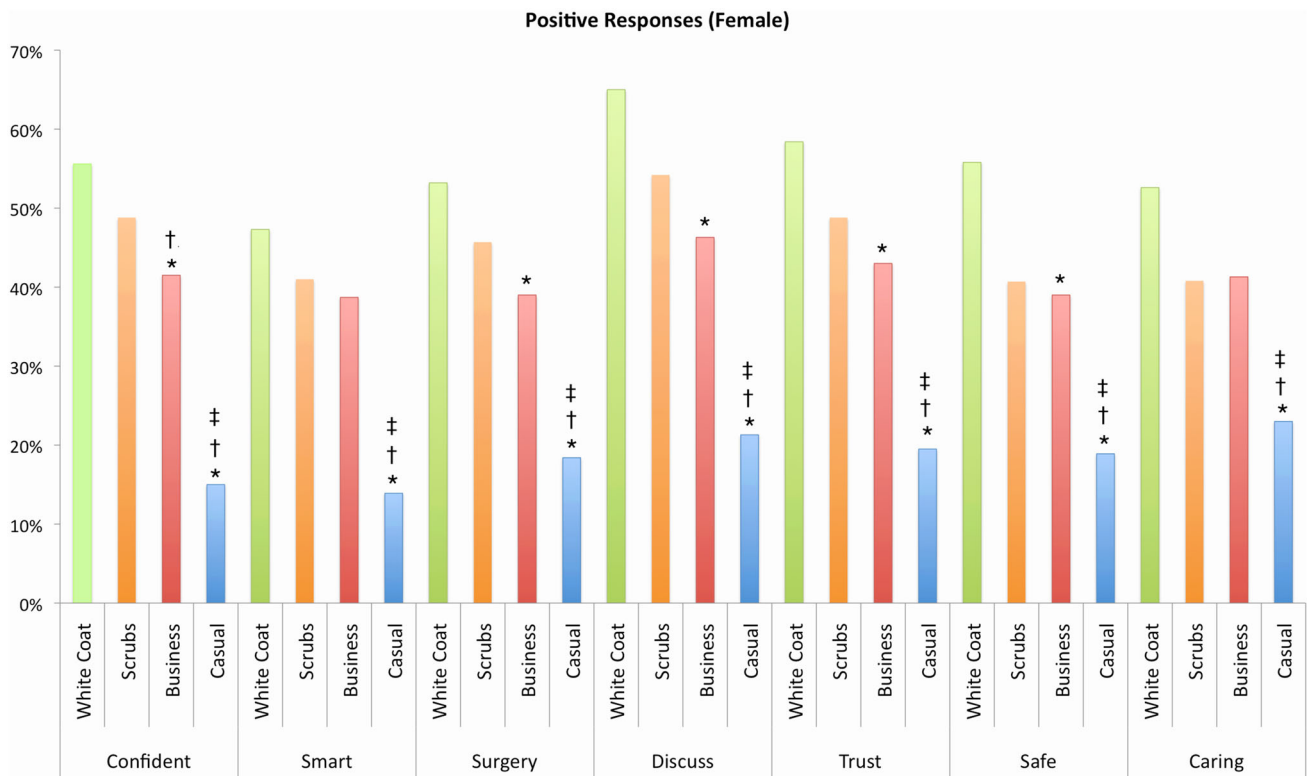
difference was found when compared with scrubs (Table 3). Furthermore, scrubs were preferred to casual (MD,  $-0.855 \pm 1.760$ ; 95% CI,  $-1.278$  to  $0.432$ ;  $p = 0.004$ ) but not business attire, which also was preferred to casual attire (MD,  $-0.515 \pm 1.440$ ; 95% CI,  $-0.863$  to  $-0.166$ ;  $p = 0.003$ ) in direct comparison (Fig. 4). The same observations (Fig. 5), were observed when female surgeons were ranked (white coat versus business: MD,  $-0.456 \pm 1.429$ ; 95% CI,  $-0.802$  to  $-0.110$ ;  $p = 0.028$ ; white coat versus casual: MD,  $-0.986 \pm 2.083$ ; 95% CI,  $-1.46$  to  $-0.485$ ;  $p = 0.001$ ; scrubs versus casual: MD,  $-0.800 \pm 1.766$ ; 95% CI,  $-1.221$  to  $-0.379$ ;  $p = 0.002$ ; business versus casual: MD,  $-0.515 \pm 1.321$ ; 95% CI,  $-0.835$  to  $-0.195$ ;  $p = 0.016$ ) (Table 4).

## Discussion

Regulations adopted in the United Kingdom have effectively prohibited white coats along with watches, ties, or long sleeves owing to the potential, yet unproven risk of infection transmission [3, 4, 11, 21]. Studies have shown that patient awareness of the “bare below the elbows” policy might influence their preferences for physicians’

attire [3, 4, 7, 24]. The topic of physicians’ attire has increased in popularity with increasing regulations to prevent infection, with a concomitant increased value placed on patients’ reviews of their experience in the hospital or clinic. Study results in various other settings diverge in their recommendations, therefore increasing the difficulty in adapting meaningful changes to daily practice [1–3, 5, 12, 13, 15–19, 21–23], and to our knowledge, no previous studies have examined the influence of physicians’ attire in the urban orthopaedic surgery setting in the United States. For this reason we sought to determine what influence, if any, our attire has on patients’ perceptions and which outfit was preferred in this population.

This study has several limitations. The study was conducted at one institution in an urban setting with relatively young patients, which is a potentially important limitation as previous studies have established the influence of location, culture, and age on patients’ preferences [16, 22]. For several reasons, location may have an effect on respondents’ preferences. In the United Kingdom, for example, the “bare below the elbows” policy might substantially alter patients’ perceptions of their physician’s attire [1, 3]. Geographic location also might influence patients’ preferences owing to various cultural or even climate-related



**Fig. 3** Patients' preferences for female surgeons' attire, stratified by each of the seven questions, are shown. \* $p < 0.05$  for comparisons with white coat; † $0.05$  for comparisons with scrubs; ‡ $p < 0.05$  for comparisons with business attire.

**Table 3.** Summary of p values for photograph ratings for male surgeon attire

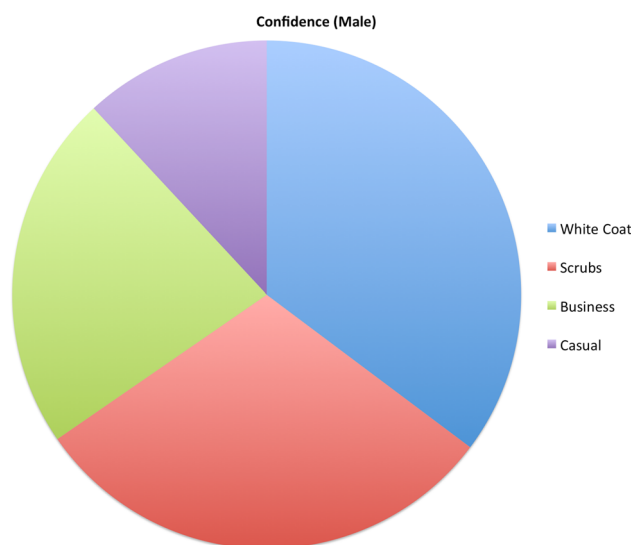
Comparison	p value	Mean difference ± SD	95% CI
White coat versus scrubs	1.000	-0.169 ± 1.230	-0.460 to 0.122
White coat versus business	0.006	-0.439 ± 1.491	-0.851 to -0.134
White coat versus casual	< 0.001	-1.043 ± 2.054	-1.537 to -0.550
Scrubs versus business	0.461	-0.304 ± 1.332	-0.624 to -0.016
Scrubs versus casual	0.004	-0.855 ± 1.760	-1.278 to -0.432
Business versus casual	0.003	-0.515 ± 1.440	-0.863 to -0.166

Photo ratings were based on ranking of the photos from 1 to 4, where 1 is the best possible ranking and 4 is the worst possible ranking; negative values represent decreased numerical ranking, and thus higher preference; the larger the magnitude of the value (regardless of the sign), the greater the difference in the rankings.

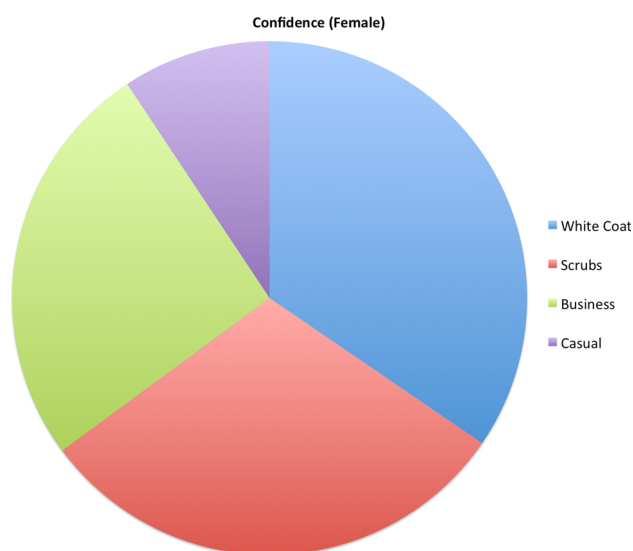
reasons. Our study was conducted in the northeast United States and therefore may not be generalizable to the global population. With young patients, previous work has established their preference for more casual attire compared with older patients who prefer a more formal dress code [4, 12, 15]. In this cohort, adult patients in the orthopaedic clinic were examined and their reported results may be influenced by setting, healthcare system, and specialty. The pictured physicians in this study were young and white, which could have influenced respondents' preferences for their attire. The choice to use white physicians was predicated on the methods of prior studies,

the majority of which showed only white physicians pictured in various attire [1, 12, 15, 16]. This not only eliminated confounding variables, but facilitated comparisons between this study and those in other settings. Furthermore, four outfits were chosen based on historical studies on this topic, however, there were numerous combinations of clothing (such as white coat over scrubs), which were not included and might have performed better than the tested attire. Finally, the use of a Likert scale has inherent limitations as an ordinal scale that subsequently is represented as numeric comparisons. The five-level scale was compressed to three levels as this enabled statistical





**Fig. 4** The results for male surgeons' attire in terms of confidence are shown. The respondents' preferences were largely in favor of white coat and scrubs.



**Fig. 5** The results for female surgeons' attire in terms of confidence are shown. The respondents' preferences were mostly in favor of white coat and scrubs.

analysis as categorical variables, the results of which are more relatable and logical (like, neutral, dislike as opposed to numerical “levels”). As discussed previously, we believe p values actually would have been even better with continuous analysis given the various assumptions imposed on this type of test. The survey was designed for this study and therefore was not previously validated, however these questions are similar to those used in previous research on physician attire and we believe are meaningful and comparable to these precedent studies [1, 12, 15, 16, 23]. For this study an effect size of substantial was set at a difference of 0.75, moderate at 0.5, and small at 0.25. Future research is needed to investigate the preferences of patients in a suburban or rural orthopaedic setting to elucidate the generalizability of our results regarding patients in an orthopaedic setting. Moreover, the influence of “bare below the elbow” guidelines enforced in the United Kingdom on patients in the United States has not been established and may further influence patients' perceptions and preferences.

We found that patients at an urban outpatient setting showed a moderate preference for male surgeons with a white coat and female surgeons with either a white coat or scrubs. In terms of patients' confidence in their physician, no difference was observed between scrubs and white coat over business attire. Respondents' predilections for the white coat are consistent with published results, which denote the coat as symbolic for a clean, competent, and professional surgeon [12, 16, 23]. Although pediatric and psychiatric patients may accept, or even prefer casual dress, it was disliked in the orthopaedic surgery setting [5, 8]. Previous studies have established a “white coat effect” where patients experience reflexive hypertension and anxiety when examined by a doctor wearing a white coat [14, 20, 25, 26]. The results of our study showing a preference for a white coat and scrubs, taken in light of prior research on physician attire, are likely explained by the white coat's associated authority, professionalism, and ability to identify the physician. In a surgical field, however, scrubs likely convey the same attributes with a potentially added benefit

**Table 4.** Summary of p values for photograph ratings for female surgeon attire

Comparison	p value	Mean difference ± SD	95% CI
White coat versus scrubs	1.000	−0.157 ± 1.112	−0.422 to 0.108
White coat versus business	0.028	−0.456 ± 1.429	−0.802 to −0.110
White coat versus casual	0.001	−0.986 ± 2.083	−1.486 to −0.485
Scrubs versus business	0.842	−0.290 ± 1.296	−0.601 to −0.021
Scrubs versus casual	0.002	−0.800 ± 1.766	−1.221 to −0.379
Business versus casual	0.016	−0.515 ± 1.321	−0.835 to −0.195

Photo ratings were based on a ranking of the photos from 1 to 4, where 1 is the best possible ranking and 4 is the worst possible ranking; negative values represent decreased numerical ranking, and thus higher preference; the larger the magnitude of the value (regardless of the sign), the greater the difference in the rankings.

of improved hygiene and avoidance of the “white coat effect”.

Two investigations indicate a growing preference for scrubs and “smart casual” attire, which are not only perceived as hygienic in conforming with the bare below the elbows regulations, but further serve to identify the treating physician [1, 13]. Some authors [2, 3] have postulated that while variations may exist from specialty to specialty, the unifying factor in clothing preferences is simply a uniform or outfit that conforms to patients' preconceived image of a doctor. Therefore, it is not surprising that the white coat and scrubs were nearly equally well received in our study, as both outfits are seen in hospitals, television shows, and movies as attire which identifies the treating physician. Finally, patient age has been implicated as an important factor in determining preference for physicians' attire. Younger respondents accept more casual attire and scrubs compared with older patients who favor more formal dress [4, 12, 15]. Authors point to a subconscious notion of how physicians should appear as the driving factor in determining preference, and that preconceived image of a physician varies with the age of the patient and evolves with time [1, 2, 15]. The majority of our study population was between 35 to 54 years old, however 80% of the patients surveyed were younger than 55 years. Owing to the relatively young cohort of respondents, it is not surprising that scrubs performed nearly equally as well as the white coat given the aforementioned evidence that younger patients are likely to favor scrubs and less formal attire.

Many factors of the doctor-patient interaction influence the first impression and cannot be replicated without a face-to-face encounter. Regardless of the physician's appearance, attributes such as demeanor, empathy, tone of voice, hygiene, and even smiling, will shape a patient's perception of his or her doctor [1, 3, 6, 17, 23]. One of the proven and changeable factors that contribute to the first impression and overall patient trust and confidence is the attire of the physician. In the urban orthopaedic outpatient setting, we observed modest preferences for the white coat and scrubs, which inspire patient confidence and are favored compared with formal or casual attire. Importantly, attire does influence how our patients perceive their physicians' character and abilities, therefore future endeavors might examine broader influences on the patient-physician relationship such as race, sex, and professionalism.

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