CURRICULUM VITAE

Alicia Briscoe, DDS
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EDUCATION

University of Maryland School of Dentistry – Baltimore, MD

- Master of Oral Biology and Certificate in Orthodontics (May 2025)

University of Maryland School of Dentistry – Baltimore, MD

- Doctor of Dental Surgery (May 2022)

University of Maryland – College Park, MD

- Bachelor of Science in General Biology (May 2018)

AWARDS

Orthodontics Clerkship, *University of Maryland School of Dentistry* (2021-2022)

Leonard Rapoport Memorial Award for Excellence in Dental Pharmacology, *University of Maryland School of Dentistry* (2021)

The Gorgas Odontological Honorary Society, *University of Maryland School of Dentistry* (2020-Present)

Gamma Pi Delta, *University of Maryland School of Dentistry* (2020-Present)

National Society of Leadership and Success – Sigma Alpha Pi, *University of Maryland, College Park* (2016-2018)

LEADERSHIP EXPERIENCE

Secretary, *Orthodontics Interest Group*, *University of Maryland School of Dentistry* (2020-2022)

Class Examination Critique Committee Representative, *University of Maryland School of Dentistry* (2018-2022)

Admissions Committee, *University of Maryland School of Dentistry* (2020-2022)

Impressions Day Chair (2020-2021)**, Impressions Day Co-Chair** (2019-2020)**,** *Student National Dental Association, University of Maryland School of Dentistry*

Missions Education Chair, *Global Health Student Association, University of Maryland School of Dentistry* (2020-2021)
D1 Physiology Tutor, *University of Maryland School of Dentistry* (2020)

General Practice #5 Representative, *Clinical Advisory Board, University of Maryland School of Dentistry* (2019-2020)

Delegate, *National Dental Association Conference, University of Maryland School of Dentistry* (2019-2020)

President's Student Leadership Institute, *Diversity and Inclusive Leadership and Integrative Health and Wellbeing Certificates, University of Maryland, Baltimore* (2018-2022)

Student Ambassador, *Ten Woman Plan/Ten Man Plan, University of Maryland, College Park* (2017)

Council Member, *Student Success and Leadership Council, University of Maryland College Park* (2016-2018)

Teaching Assistant, *College of Computer, Mathematical, and Natural Sciences Freshman Seminar, University of Maryland, College Park* (2016-2018)

RESEARCH

COVID-19 and Dentistry, *University of Maryland School of Dentistry* (2020-2022) – Mentor: Dr. Mark Macek

- Performed a systematic review of the current knowledge of the effects of COVID-19 on dentistry to fill in the gaps through national and international surveys in hopes of bestowing and adopting novel ideas and techniques to better the field of dentistry.

"Tongue muscle volumes and percentages in two glossectomy patients" (Poster found at the end of this document), *Pain and Neurology Department, University of Maryland School of Dentistry* (2019-2021) – Mentor: Dr. Maureen Stone

- Studied and analyzed two glossectomy patient tongue muscles and volumes using MRI images to determine the volumes of remaining tongue muscles after their respective glossectomy surgeries
- Analyzed the data to predict tongue muscle movement ability based on the location of the glossectomy surgery.

Effect of good deeds and selfless acts of kindness on self-perception, *Psychology Department, University of Maryland, College Park* (2016-2018) – Mentor: Dr. Scott Roberts

- Read student papers on good deed that they have performed and how performing that selfless act of kindness affected those around them and themselves.
- Determined if there was a correlation between the degree of selfless act, how students felt about themselves afterwards, and how they performed in the Psychology of Evil class

Segmentation patterns and function in Gryllus bimaculatus, *Entomology Department, University of Maryland, College Park* (2015-2016) – Mentor: Dr. Alys Jarvela

- Studied segmentation patterns and function in *Gryllus bimaculatus* (Mediterranean field cricket) through performing experiments with cricket DNA to find various genes present during segmentation.

FEATURES & PUBLICATIONS

Student Doctor Eli – "Day In The Life of an Orthodontic Resident Ft. Dr. Alicia Briscoe", *YouTube* (2023)

Ortho Match Success |DrDarwin, *YouTube* (2022)

Fall 2020 - Incisal Edge: 40 under 40 "Student to Watch", *Magazine feature* (2020)

FutureDDS University of Maryland School of Dentistry Student Interview, *YouTube* (2019)

COMMUNITY SERVICE

Project Jumpstart, *University of Maryland School of Dentistry* (2018-2022)

- Made bagged meals and delivered them to the homeless population of Baltimore
- Provided various clothing items, blankets, and pillows to this population to improve comfort

UMB Continuing Umbrella of Research Experiences (CURE) Scholars Program, *University of Maryland School of Dentistry* (2018-2020)

- Served as a mentor and role model for middle schoolers in the UMB Scholars Program in the West Baltimore area interested in the sciences and health-related careers. Exposed the students to a wide variety of STEM careers. Helped the students build interest in STEM through experiments, field trips, and tutoring

Global Dental Brigades, *University of Maryland, College Park* (2018)

- Educated Honduran children about the importance of brushing their teeth. Diagnosed patients in terms of whether they need a filling or extraction.
- Documented locations of caries.
- Practiced four-handed dentistry

Hyacinth's Place, *University of Maryland, College Park* (2016-2018)

- Planned activities with the women who live at Hyacinth's Place. Encouraged them and support them as they make strides to improve their lives, and ultimately, leave Hyacinth's place

Terps Against Hunger, *University of Maryland, College Park* (2014-2018)

- Assisted in guiding volunteers during meal making process during meal packaging events. Created packaged, nutritious meals for families of five and donate them to our distribution partners

Alternative Breaks: Spring break Human Trafficking Service Trip, *University of Maryland, College Park* (2016)

- Learned about human trafficking world-wide and locally. Educated young women in the Metropolitan area about the prevalence of human trafficking, and how they can protect themselves.

Children Choice Pediatric Dentistry on National Brush Day, *University of Maryland, College Park* (2015)

- Educated young patients about proper dental hygiene such as proper teeth brushing and encouraging young patients not to be afraid of the dentist

EXTRACURRICULAR ACTIVITIES

Member, *Orthodontics Interest Group, University of Maryland School of Dentistry* (2018-Present)

Intramural Volleyball, *University of Maryland School of Dentistry* (2018-Present)

Member*, Alpha Kappa Alpha Sorority, Incorporated, University of Maryland, College Park* (2016-Present)

Member, *Student Dental Advisory Board***,** *University of Maryland, College Park* (2015-2018)

Member, *Charles R. Drew Pre-Health Society*, *University of Maryland, College Park* (2014-2018)

Member, *Black Student Union*, *University of Maryland, College Park* (2014-2018)

ABSTRACT

Title of Thesis: Assessing the Impact of Hairstyle and Hair Color on Patient Perceptions of Professionalism in Black Female Orthodontists

Alicia Briscoe, Master of Biomedical Sciences, 2025

Thesis Directed by: Dr. Jose A. Bosio

Thesis Members: Drs. Flavio Copello, Maria Doughan, Christina Platia, and David Harmon

This study examines the impact of hairstyle and hair color on the perceived professionalism of a Black female orthodontist, investigating whether Afrocentric hairstyles and unnatural hair colors influence perceptions of hygiene, carefulness, punctuality, and knowledgeability. A total of 268 participants completed an online survey, first answering demographic questions and then evaluating digitally manipulated images of the same Black female orthodontist with different hairstyles, including a bun, straight hair, curls, afros, braids, and dreadlocks, in black, brown, and blonde colors. Each image was displayed for eight seconds, after which participants rated the orthodontist on professional attributes using a validated Likert-scale instrument (*strongly disagree to strongly agree*).

The results indicate that hairstyles aligning with Eurocentric beauty standards, such as a neatly tied bun or straight hair, received the highest ratings across all categories, particularly in natural black color. In contrast, Afrocentric hairstyles, especially afros and dreadlocks, received significantly lower professionalism ratings ($p < 0.001$) comparative to the black bun. Non-natural hair colors, particularly blonde, were also rated lower in professionalism and perceived competence ($p < 0.05$), especially when paired with Afrocentric styles.

Gender and racial differences were observed in the evaluations. Male respondents assigned lower ratings to Afrocentric hairstyles, particularly in the category of knowledgeability of the orthodontist with the blonde afro ($p = 0.044$), and White participants giving significantly lower ratings to black dreadlocks and blonde afros compared to Black participants ($p < 0.05$).

The findings highlight the persistence of implicit biases in orthodontic settings, where Eurocentric beauty standards often overshadow clinical expertise and professional credibility in shaping evaluations. Such biases may affect patient trust, treatment adherence, and career advancement opportunities for Black female orthodontists. Fostering a supportive and inclusive professional environment, where colleagues actively challenge appearance-based biases and advocate for equity, is essential for ensuring fairness within the field.

Assessing the Impact of Hairstyle and Hair Color on Patient Perceptions of Professionalism in Black Female Orthodontists

by
Alicia Briscoe

Thesis submitted to the Faculty of the Graduate School of the
University of Maryland, Baltimore in partial fulfillment
of the requirements for the degree of
Master of Science
May 2025

ACKNOWLEDGEMENTS

As I approach the conclusion of my academic career, I would like to express my deepest appreciation to the many individuals who have supported, guided, and encouraged me during my three-year orthodontic residency and the completion of my master's thesis. While countless people have played a role in this journey, I would like to extend my gratitude to a few in particular:

> To my family, thank you for your unwavering support throughout my seven-year tenure at the University of Maryland School of Dentistry. A special thank you to my mother for introducing me to dentistry and ultimately orthodontics, for your constant encouragement, and for being a listening ear during the many highs and lows of this process. Your assistance in helping me to distribute my survey played a crucial role in making this research possible.
>
> To my friends, your support has been invaluable. Thank you for always being a listening ear and shoulder to cry on, reminding me of my worth, and helping me to maintain a healthy work-life balance. Your encouragement and friendship ensured that I tackled each new week with its unique challenges recharged, especially during the development of this thesis as well as advertising my survey so that it reached as many people as possible.
>
> To my committee chair, Dr. Jose Bosio, and my committee members, Drs. Flavio Copello, Maria Doughan, Christina Platia, and David Harmon, thank you for your guidance, mentorship, and belief in my abilities. Your support in both the clinical and academic aspects of my residency have been instrumental in my growth. I am honored to be colleagues not only in the dental profession but in the field of orthodontics as well.
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> To Dr. Marina Bruder (M.B.), thank you for your dedication in creating digitally manipulated images for my survey while balancing the demands of new motherhood. Your generosity and contributions to this project, even from across the world, have not gone unnoticed and are greatly appreciated.
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> Thank you to the University of Maryland School of Dentistry for shaping my seven-year dental education and providing me the opportunity to positively contribute to the field of dentistry. I am grateful for those who believed in me, even those whose support I may not have been aware of.

I would also like to acknowledge the assistance of ChatGPT, an AI language model, which was used for the brainstorming, refining academic writing, and improving clarity. All intellectual contributions, critical analyses, and final edits were reviewed and revised independently to ensure academic integrity and originality.

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ICC: Intraclass Correlation Coefficient

IRB: Institutional Review Board

INTRODUCTION

Despite increasing diversity in professional and healthcare settings, Black professionals—particularly Black women—continue to face systemic biases that shape perceptions of their competence and professionalism. These biases extend beyond attire and verbal communication to include hair texture and styling, which are often policed through unwritten workplace norms. Hair discrimination against Black individuals has been well-documented in hiring practices, workplace evaluations, and social interactions, reinforcing Eurocentric beauty standards as the default for professionalism. In healthcare, where trust is fundamental to patient-provider relationships, appearance-based biases can have significant consequences on patient confidence, treatment adherence, and career advancement opportunities for Black female practitioners.

First impressions play a pivotal role in shaping patient perceptions of a provider's competence, credibility, and approachability. Research shows that these judgments are made within milliseconds, often before any meaningful interaction occurs.[1] While attire and demeanor contribute to these perceptions, implicit biases—unconscious negative attitudes or judgments directed toward specific social groups—related to race, gender, and attractiveness further influence the formation of first impressions. Unlike explicit bias, which is intentional and conscious, implicit bias operates automatically, often without awareness, and can influence evaluations and decisions even among well-intentioned individuals. In healthcare, this can result in unintentional disparities in trust, communication, and treatment outcomes. In orthodontics, where treatment involves long-term patient engagement, these early biases may affect patient compliance, satisfaction, and provider-patient rapport. Given that first impressions are difficult to reverse,[1] understanding the impact of these biases is critical for fostering an inclusive and fair healthcare environment.

Supporters of strict professional grooming policies argue that such standards are necessary to maintain a cohesive and polished workplace image, particularly in healthcare, where trust and credibility are essential. They claim that patients feel more comfortable with providers who present a "neat" and "professional" appearance, which some argue includes well-groomed, traditionally styled hair. However, these policies often fail to account for cultural differences in hair texture and styling practices. The expectation that hair must be straightened or kept in styles that align with Eurocentric aesthetics disproportionately impacts Black professionals, forcing them to either conform to non-inclusive standards or risk being perceived as less professional. This assumption—though framed as a neutral preference—reflects a broader issue of racialized beauty norms shaping professional expectations, particularly in fields like healthcare, where patient trust can be influenced by implicit biases.

Historically, professional grooming policies have enforced rigid standards that favor Eurocentric hairstyles, often penalizing natural Black hairstyles such as afros, dreadlocks, and braids. Subjective terms like "neat," "conservative," or "professional" in workplace dress codes have granted employers and institutions broad discretion in regulating hair, leading to numerous instances of racialized hair discrimination. The *Rogers v. American Airlines* (1981) case set a legal precedent that upheld an airline's policy banning employees from wearing braids, disproportionately impacting Black women.[2] Similarly, in *Chastity Jones v. Catastrophe Management Solutions* (2016), a Black woman was denied a job offer because she refused to cut off her dreadlocks. The Eleventh Circuit Court ruled against her, stating that banning dreadlocks did not constitute racial discrimination because hair texture is not an "immutable characteristic."[3] This legal loophole allows employers to enforce grooming policies that disproportionately impact Black employees under the excuse of neutrality. These cases demonstrate the failure of legal interpretations to protect Black individuals from hair-based discrimination, reinforcing Eurocentric grooming norms in professional settings.

Although these cases primarily involve corporate policies, their impact extends beyond the business sector. Healthcare institutions, where professionalism is closely linked to patient trust, have also upheld grooming standards that disadvantage Black professionals. A *Journal of Clinical Nursing* (2021) editorial highlights how Black nurses are frequently subjected to "hair racism," where vague workplace policies use coded language such as "extreme" or "unprofessional" to justify discrimination against natural Black hairstyles.[4] The article describes cases in which Black nurses were told to "tame" their afros or were asked to remove their braids and locs, while White colleagues with long hair were simply required to tie theirs back. These workplace biases not only reinforce structural racism but also create barriers to career progression, contributing to hostile work environments that place undue burdens on Black professionals. These cases demonstrate the failure of legal and institutional policies to protect Black individuals from hair-based discrimination, reinforcing Eurocentric grooming norms in professional settings—including healthcare.

Moreover, such policies create barriers to workplace inclusion by placing undue burdens on Black professionals to conform at the expense of their cultural identity and hair health. Appearance-based biases can create hostile work environments, affecting provider confidence, patient trust, and professional credibility. In healthcare settings, where representation and trust are crucial in fostering strong patient-provider relationships, these biases may influence patients' perceptions of a provider's competence, ultimately impacting healthcare experiences and treatment adherence.

Black natural hair holds deep cultural significance, representing identity, heritage, self-acceptance, and pride. Protective hairstyles such as braids and dreadlocks are not just expressions of personal style but also essential for maintaining hair health. However, biases against these hairstyles persist, particularly in professional environments where individuals—especially Black women—are pressured to conform to traditional Eurocentric grooming standards. This bias is particularly harmful in healthcare fields such as dentistry, where only about 4% of board-certified orthodontists in the U.S. are Black according to the Fiscal Year 2021 racial/minority demographic breakdown.[5] As a result, Black orthodontists may feel added pressure to adhere to Eurocentric beauty norms to be perceived as competent and trustworthy by their patients and future employers.

In response to widespread reports of race-based hair discrimination, the CROWN Act (*Creating a Respectful and Open World for Natural Hair*) was introduced in 2019, prohibiting discrimination based on hair texture and protective styles in employment and education.[6] While currently enacted in 27 states and several municipalities across the

United States, this legislation does not protect healthcare providers from biases held by employers or educational institutions in states where it has not been passed. More critically, it does not eliminate the implicit biases held by patients in any state, as patient preferences regarding their providers' appearances are not legally regulated. Existing studies suggest that younger generations are more accepting of diverse hairstyles, tattoos, and piercings in healthcare professionals compared to older generations.[7-9] However, there remains a critical gap in research regarding the specific impact of Black female healthcare providers' hair texture and styling on patient perceptions, particularly in dentistry.

This study aims to bridge that gap by assessing whether certain hairstyles impact perceptions of professionalism, trustworthiness, and competence in orthodontic settings. Utilizing a cross-sectional survey approach, this research builds upon the methodology established by Bittencourt et al[9] which assessed orthodontists' professional stereotypes based on visible characteristics. By analyzing patient perceptions of digitally manipulated images featuring various hairstyles, this study aims to quantify the extent to which hair bias persists and whether it significantly affects professional evaluations. The findings will contribute to the ongoing discourse on racial bias in professional settings, emphasizing the need for increased awareness, cultural competence training, and policy changes to foster inclusivity in orthodontics and beyond.

The hypothesis of this study is that natural-colored, tied-up, or straight Eurocentric hairstyles will be rated more positively in terms of professionalism, while unnatural colors or coarser-textured Afrocentric hairstyles will be perceived as less professional. It is expected that patients will favor straight hairstyles with natural colors that align with traditional Eurocentric professional norms. Furthermore, deviations from these standards—such as textured styles, protective hairstyles, or unnatural colors—may significantly influence patients' perceptions of professionalism, trust, and competence. These biases could impact patient acceptance of the orthodontist and their treatment plan, business owners' trust in the orthodontist’s ability to contribute to practice growth, and the orthodontist’s self-confidence and professional identity. Understanding these biases is critical for promoting more inclusive professional standards and ensuring that Black female orthodontists are evaluated based on their skills and expertise rather than outdated beauty norms. In healthcare, where representation and diversity are increasingly valued, it is crucial to challenge outdated norms and advocate for the inclusion of all professionals, regardless of their appearance. This research aims to promote inclusivity, dismantle harmful stereotypes, and encourage bias-free evaluations of Black female orthodontists, ensuring that competence and skill—not outdated beauty standards—define professional excellence.

MATERIALS AND METHODS

The study was approved by the Institutional Review Board (IRB) of the University of Maryland, Baltimore (HP-00108790), and data collection took place between September and December 2024. A brown-skinned Black female dental student in her mid-twenties from the University of Maryland School of Dentistry volunteered to serve as the “female orthodontist” for this study. She was selected to minimize potential biases related to skin tone and to ensure representation of an underrepresented demographic in orthodontics.

The subject was photographed from a frontal view, framed at shoulder height, with a neutral facial expression while wearing a black scrub top to simulate the professional appearance of an orthodontist. The control photograph depicted the subject with her hair styled in a bun and no visible jewelry. To minimize distractions such as facial asymmetry, the image was mirrored before further modification. Six hairstyles commonly worn by Black women were selected from a high-resolution photography database: bun, straight hair, loose curls, afro, braids, and dreadlocks. Each hairstyle was digitally applied to the subject by the study's collaborator, M.B., using Photoshop's layer masking and blending tools to ensure seamless integration with the subject's head shape, lighting, and facial contours. The hair color was then adjusted to create three variations (black, brown, and blonde) using hue/saturation and selective color correction tools, ensuring consistency in lighting and tone. This process resulted in a total of 18 manipulated images (six hairstyles across three hair colors), all standardized for lighting, positioning, and background consistency (Figure 1).

Figure 1: Digitally Altered Images of the Research Subject Featuring Different Hairstyles, Textures, and Colors

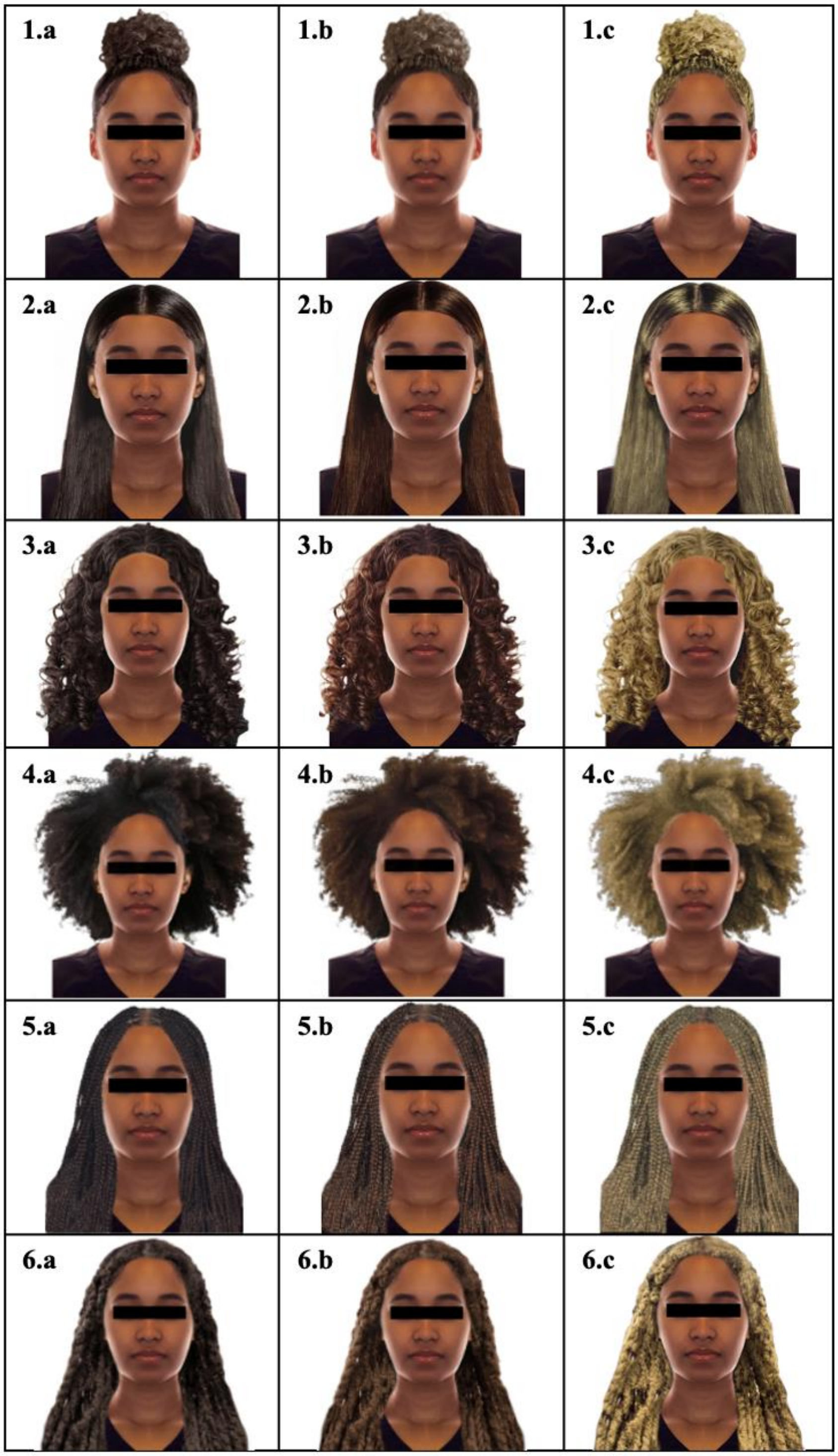

Figure 1. Digitally altered images: (1) Bun (control); (2) Straight Hair; (3) Curls; (4) Afro; (5) Braids; (6) Dreadlocks; Each hairstyle was shown in three colors: (a) Natural Black; (b) Brown; (c) Blonde

Eligible respondents were adults aged 18 years and older with proficiency in English. Participants were recruited through online survey distribution, word-of-mouth referrals, and social media platforms, including Instagram, Facebook, X (formerly Twitter), and LinkedIn. To ensure a diverse sample, participants were encouraged to share the survey with their networks, broadening reach across various geographic locations, ethnic backgrounds, and age groups.

Before participation, individuals provided informed consent via the Qualtrics survey platform, acknowledging the voluntary nature of their participation. Respondents first completed a demographic questionnaire, collecting data on gender, age, race, place of upbringing (U.S. or international), highest level of education, and current profession. Following the demographic section, an instructional preamble outlined the study procedure without revealing its specific purpose beyond the scope of the survey questions.

Each image was displayed for 8 seconds before auto-advancing, during which participants assessed their initial impressions of the orthodontist as if meeting her for the first time for potential treatment. The 8-second exposure time was selected to ensure respondents had enough time to observe the image while still capturing their immediate perceptions. The images were presented in a fixed order to maintain consistency across all participants. While randomization can help reduce order effects, a fixed sequence was chosen to ensure that all participants evaluated the images under the same conditions, minimizing variability introduced by randomized presentation. Participants were unable to return to previous images or modify their responses, ensuring that their initial impressions were accurately captured.

To assess perceptions of demeanor, competence, and reliability, participants responded to four validated questions developed by Bittencourt et al.[9] Each question used a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree): (1) The orthodontist in the image seems to have good hygiene, (2) The orthodontist in the image seems to be careful, (3) The orthodontist in the image seems to be punctual, and (4) The orthodontist in the image seems to know about orthodontics. Responses were scored from 0 to 20 points, with higher scores indicating more positive perceptions. To ensure participant attentiveness, an attention check was incorporated, consisting of a duplicate image of the blonde dreadlocks condition, randomly selected using a random number generator. Participants who provided inconsistent responses between the original and duplicate image were flagged for potential inattentiveness.

Statistical Analysis

The sample size calculation was performed based on a previous study by Bittencourt et al[9] using the PANDIS formula (Pandis, 2012). The following criteria was used: the power of the test was 80% (β=0.20), the error was 5% (α=0.05), the relevant clinical difference adopted was 1.5 points in Likert Scale and the standard deviation was 4.49 (Likert Scale). The result suggested the use of 188 complete responses. For all analyses, the level of significance was 5%. The statistical analysis was performed using the Statistical Package for Social Science Program (Version 23.0, SPSS Inc., USA). The normality of the sample was verified by the Shapiro-Wilk test (α = 0.05). The results showed significant deviation from normality, indicating that the measurements had nonparametric distribution ($p<0.05$). To analyze the responses according to the hair style comparing the control (black bun) with the other styles (curls, dreadlocks, braids, afro and straight) the Friedman`s test was performed with pairwise comparison after Bonferroni correction ($\alpha = 0.05$). The Mann-Whitney test was performed to compare male versus female and White versus African American responses ($\alpha = 0.05$). An Intraclass Correlation Coefficient (ICC) analysis was conducted to assess the reliability of responses taken by the same subject. For this purpose, a random picture was repeated in the middle of the survey and the two responses were analyzed.

RESULTS

Participant Demographics

A total of 353 individuals participated in the survey, evaluating the orthodontist based on her hairstyle and hair color. Of these, 268 individuals completed the survey in full, while 85 respondents were excluded from the final analysis due to early survey termination. Among the final 268 who responded, 158 individuals identified as women (59%), 109 as men (40.7%), and one individual (0.4%) self-described their identity (Table 1).

The majority of participants were below the age of 34, with the leading percentage falling between the ages 25-34 years old (55.6%) (Table 2). Racially, most of the participants identified as African American (44%) followed by Caucasian (36%) with the remaining respondents identifying as Asian, bi- or multi-racial, selecting "Other", or choosing not to disclose their racial identity (Table 3). Geographically, most participants grew up in Maryland (40.7%) while the remaining percentages of the participants were from various states of the United States and some from other countries (Table 4). In terms of education and professional background, 55.6% held a graduate or professional degree and 45.5% reported working in healthcare and medicine.

Table 1. Gender Distribution of Participants

Gender	Frequency (n)	Percentage (%)
Male	109	40.7
Female	158	59.0
Prefer to self-describe	1	0.4
Total	**268**	**100.0**

Table 2. Age Distribution of Participants

Age Group	Frequency (n)	Percentage (%)
18-24 years old	19	7.1
25-34 years old	149	55.6
35-44 years old	36	13.4
45-54 years old	19	7.1
55-64 years old	21	7.8
65+ years old	24	9.0
Total	**268**	**100.0**

Table 3. Racial and Ethnic Distribution of Participants.

Racial/Ethnic Group	Frequency (n)	Percentage (%)
White or Caucasian	97	36.2
Black or African American	118	44.0
Asian	27	10.1
Other	6	2.2
Prefer not to say	5	1.9
Asian, Other	1	0.4
Black or African American, American Indian/Native American or Alaska Native	1	0.4
White or Caucasian, or African American, American Indian/Native American or Alaska Native, Other	1	0.4
Black or African American, Other	2	0.7
White or Caucasian, Asian	4	1.5
White or Caucasian, Asian, Other	1	0.4
White or Caucasian, Black or African American	4	1.5
White or Caucasian, Black or African American, American Indian/Native American or Alaska Native	1	0.4
Total	**268**	**100.0**

Table 4. Geographic Distribution of Participants

Location	Frequency (n)	Percentage (%)
Maryland	109	40.7
I grew up in another country	35	13.1
Virginia	13	4.9
Pennsylvania	11	4.1
New York	10	3.7
New Jersey	8	3.0
Florida	7	2.6
Texas	7	2.6
Louisiana	6	2.2
Tennessee	6	2.2
North Carolina	6	2.2
Other States (combined)	45	16.8
Total	**268**	**100.0**

Survey Reliability

To ensure participant attentiveness and response reliability, an Intraclass Correlation Coefficient (ICC) analysis was performed. The results indicated a single measures ICC of 0.885 (95% CI: 0.871–0.897) and an average measures ICC of 0.939**,** substantiating strong reliability of the survey tool**.** These high ICC values suggest that participant responses were highly consistent**,** minimizing the likelihood of random ratings. These findings validate the strength of the methodology and support the reliability of subsequent analyses**.**

Overall Effects of Hairstyle and Hair Color on Professional Perceptions

Based on Table 5, the findings reveal a clear pattern in how hairstyle and hair color influence professional perceptions of the orthodontist. The black bun, which served as the study's control hairstyle and color, consistently received the highest ratings for all professional characteristics – hygiene, carefulness, punctuality, and knowledgeability, whereas afros, dreadlocks, and blonde hair variations received lower scores.

A series of statistical tests revealed statistically significant differences ($p < 0.001$) between the black bun and other hairstyles and color variations for all evaluated professional characteristics of the orthodontist (Table 6-11). The brown and blonde bun, though structurally identical to the control, demonstrated significant lower scores across all the professional categories ($p < 0.001$), indicating that hair color alone influenced perceptions of professionalism (Table 6). The trend of darker hair colors (black and brown) receiving higher ratings than their blonde counterparts continued across straight hair (Table 7), curls (Table 8), afros (Table 9), braids (Table 10), and dreadlocks (Table

11). The largest declines in perceived professionalism were observed in afros and dreadlocks, particularly in the blonde variations.

Table 5. Perceived Attributes Across Different Hairstyles: Hygiene, Carefulness, Punctuality, and Knowledgeability Ratings (Mean ± SD and Median ± IQR)

		Black		Brown		Blonde	
Style	**Attribute**	**Mean ± SD**	**Median ± IQR**	**Mean ± SD**	**Median ± IQR**	**Mean ± SD**	**Median ± IQR**
Bun	Hygiene	4.26 ± 0.718	4.00 ± 1.00	4.25 ± 0.765	4.00 ± 1.00	4.14 ± 0.795	4.00 ± 1.00
	Careful	3.99 ± 0.803	4.00 ± 2.00	4.00 ± 0.814	4.00 ± 2.00	3.85 ± 0.852	4.00 ± 1.00
	Punctual	3.85 ± 0.850	4.00 ± 2.00	3.85 ± 0.824	4.00 ± 2.00	3.74 ± 0.856	4.00 ± 1.00
	Knowledge	3.84 ± 0.839	4.00 ± 2.00	3.84 ± 0.823	4.00 ± 2.00	3.74 ± 0.857	4.00 ± 1.00
Straight	Hygiene	4.14 ± 0.785	4.00 ± 1.00	4.13 ± 0.783	4.00 ± 1.00	3.97 ± 0.814	4.00 ± 1.00
	Careful	3.91 ± 0.814	4.00 ± 2.00	3.88 ± 0.829	4.00 ± 2.00	3.75 ± 0.818	4.00 ± 1.00
	Punctual	3.80 ± 0.837	4.00 ± 2.00	3.79 ± 0.831	4.00 ± 1.00	3.65 ± 0.841	3.00 ± 1.00
	Knowledge	3.81 ± 0.824	4.00 ± 2.00	3.78 ± 0.822	4.00 ± 1.00	3.62 ± 0.832	3.00 ± 1.00
Curls	Hygiene	4.15 ± 0.844	4.00 ± 1.00	4.1 ± 0.788	4.00 ± 1.00	3.94 ± 0.900	4.00 ± 2.00
	Careful	3.79 ± 0.866	4.00 ± 1.00	3.85 ± 0.801	4.00 ± 1.00	3.73 ± 0.864	4.00 ± 1.00
	Punctual	3.69 ± 0.867	4.00 ± 1.00	3.75 ± 0.822	4.00 ± 1.00	3.66 ± 0.849	3.00 ± 1.00
	Knowledge	3.67 ± 0.872	3.00 ± 1.00	3.73 ± 0.814	4.00 ± 1.00	3.65 ± 0.845	3.00 ± 1.00
Afro	Hygiene	3.90 ± 0.943	4.00 ± 2.00	3.91 ± 0.969	4.00 ± 2.00	3.84 ± 0.947	4.00 ± 2.00
	Careful	3.66 ± 0.920	4.00 ± 1.00	3.68 ± 0.913	4.00 ± 1.00	3.60 ± 0.929	4.00 ± 1.00
	Punctual	3.66 ± 0.887	3.00 ± 1.00	3.63 ± 0.888	3.00 ± 1.00	3.56 ± 0.865	3.00 ± 1.00
	Knowledge	3.66 ± 0.891	3.00 ± 1.00	3.65 ± 0.890	3.00 ± 1.00	3.58 ± 0.877	3.00 ± 1.00
Braids	Hygiene	4.15 ± 0.768	4.00 ± 1.00	4.12 ± 0.753	4.00 ± 1.00	4.01 ± 0.837	4.00 ± 2.00
	Careful	3.87 ± 0.813	4.00 ± 2.00	3.90 ± 0.799	4.00 ± 2.00	3.77 ± 0.859	4.00 ± 1.00
	Punctual	3.77 ± 0.828	4.00 ± 1.00	3.78 ± 0.806	4.00 ± 1.00	3.67 ± 0.859	3.00 ± 1.00
	Knowledge	3.74 ± 0.815	4.00 ± 1.00	3.76 ± 0.798	4.00 ±1.00	3.67 ± 0.864	3.00 ± 1.00
Dreadlocks	Hygiene	3.94 ± 0.908	4.00 ± 2.00	4.00 ± 0.878	4.00 ± 1.00	3.67 ± 1.011	4.00 ± 1.00
	Careful	3.74 ± 0.870	4.00 ± 1.00	3.78 ± 0.851	4.00 ± 1.00	3.57 ± 0.923	3.00 ± 1.00
	Punctual	3.68 ± 0.836	3.00 ± 1.00	3.70 ± 0.840	3.50 ± 1.00	3.54 ± 0.909	3.00 ± 1.00
	Knowledge	3.68 ± 0.817	3.50 ± 1.00	3.70 ± 0.836	3.00 ± 1.00	3.54 ± 0.917	3.00 ± 1.00

Table 6. Comparison of Perceived Traits: Bun Controls

Style	Hygiene	Careful	Punctual	Knowledge
Black Bun (Control)	4.26 ± 0.718; 4.00 ± 1.00	3.99 ± 0.803; 4.00 ± 2.00	3.85 ± 0.850; 4.00 ± 2.00	3.84 ± 0.839; 4.00 ± 2.00
Brown Bun	4.25 ± 0.765; 4.00 ± 1.00	4.00 ± 0.814; 4.00 ± 2.00	3.85 ± 0.824; 4.00 ± 2.00	3.84 ± 0.823; 4.00 ± 2.00
Blonde Bun	4.14 ± 0.795; 4.00 ± 1.00	3.85 ± 0.852; 4.00 ± 1.00	3.74 ± 0.856; 4.00 ± 1.00	3.74 ± 0.857; 4.00 ± 1.00
P-Value	<0.001*	<0.001*	<0.001*	<0.001*

*Statistically significant difference between groups.

Table 7. Comparison of Perceived Traits: Black Bun (Control) vs. Straight Hair

Style	Hygiene	Careful	Punctual	Knowledge
Control (Black Bun)	4.26 ± 0.718; 4.00 ± 1.00^{a}	3.99 ± 0.803; 4.00 ± 2.00^{a}	3.85 ± 0.850; 4.00 ± 2.00^{a}	3.84 ± 0.839; 4.00 ± 2.00^{a}
Black Straight	4.14 ± 0.785; 4.00 ± 1.00^{a}	3.91 ± 0.814; 4.00 ± 2.00^{a}	3.80 ± 0.837; 4.00 ± 2.00^{a}	3.81 ± 0.824; 4.00 ± 2.00^{a}
Brown Straight	4.13 ± 0.783; 4.00 ± 1.00^{a}	3.88 ± 0.829; 4.00 ± 2.00^{a}	3.79 ± 0.831; 4.00 ± 1.00^{a}	3.78 ± 0.822; 4.00 ± 1.00^{a}
Blonde Straight	3.97 ± 0.814; 4.00 ± 1.00^{b}	3.75 ± 0.818; 4.00 ± 1.00^{b}	3.65 ± 0.841; 3.00 ± 1.00^{b}	3.62 ± 0.832; 3.00 ± 1.00^{b}
P-Value	<0.001*	<0.001*	<0.001*	<0.001*

Note. Superscripted letters (a-b) indicate statistical differences calculated using the Bonferroni test.
*Statistically significant difference between groups.

Table 8. Comparison of Perceived Traits: Black Bun (Control) vs. Curls

Style	Hygiene	Careful	Punctual	Knowledge
Control (Black Bun)	4.26 ± 0.718; 4.00 ± 1.00^{a}	3.99 ± 0.803; 4.00 ± 2.00^{a}	3.85 ± 0.850; 4.00 ± 2.00^{a}	3.84 ± 0.839; 4.00 ± 2.00
Black Curls	4.15 ± 0.844; 4.00 ± 1.00^{a}	3.79 ± 0.866; 4.00 ± 1.00^{b}	3.69 ± 0.867; 4.00 ± 1.00^{ab}	3.67 ± 0.872; 3.00 ± 1.00
Brown Curls	4.1 ± 0.788; 4.00 ± 1.00^{ab}	3.85 ± 0.801; 4.00 ± 1.00^{ab}	3.75 ± 0.822; 4.00 ± 1.00^{ab}	3.73 ± 0.814; 4.00 ± 1.00
Blonde Curls	3.94 ± 0.900; 4.00 ± 2.00^{b}	3.73 ± 0.864; 4.00 ± 1.00^{c}	3.66 ± 0.849; 3.00 ± 1.00^{c}	3.65 ± 0.845; 3.00 ± 1.00
P-Value	<0.001*	<0.001*	<0.001*	<0.001*

Note. Superscripted letters (a-c) indicate statistical differences calculated using the Bonferroni test.
*Statistically significant difference between groups.

Table 9. Comparison of Perceived Traits: Black Bun (Control) vs. Afro

Style	Hygiene	Careful	Punctual	Knowledge
Control (Black Bun)	4.26 ± 0.718; 4.00 ± 1.00^{a}	3.99 ± 0.803; 4.00 ± 2.00^{a}	3.85 ± 0.850; 4.00 ± 2.00^{a}	3.84 ± 0.839; 4.00 ± 2.00^{a}
Black Afro	3.90 ± 0.943; 4.00 ± 2.00^{b}	3.66 ± 0.920; 4.00 ± 1.00^{b}	3.66 ± 0.887; 3.00 ± 1.00^{ab}	3.66 ± 0.891; 3.00 ± 1.00^{ab}
Brown Afro	3.91 ± 0.969; 4.00 ± 2.00^{b}	3.68 ± 0.913; 4.00 ± 1.00^{b}	3.63 ± 0.888; 3.00 ± 1.00^{b}	3.65 ± 0.890; 3.00 ± 1.00^{ab}
Blonde Afro	3.84 ± 0.947; 4.00 ± 2.00^{b}	3.60 ± 0.929; 4.00 ± 1.00^{b}	3.56 ± 0.865; 3.00 ± 1.00^{b}	3.58 ± 0.877; 3.00 ± 1.00^{b}
P-Value	<0.001*	<0.001*	<0.001*	<0.001*

Note. Superscripted letters (a-b) indicate statistical differences calculated using the Bonferroni test.
*Statistically significant difference between groups.

Table 10. Comparison of Perceived Traits: Black Bun (Control) vs. Braids

Style	Hygiene	Careful	Punctual	Knowledge
Control (Black Bun)	4.26 ± 0.718; 4.00 ± 1.00^{a}	3.99 ± 0.803; 4.00 ± 2.00^{a}	3.85 ± 0.850; 4.00 ± 2.00	3.84 ± 0.839; 4.00 ± 2.00
Black Braids	4.15 ± 0.768; 4.00 ± 1.00^{ab}	3.87 ± 0.813; 4.00 ± 2.00^{ab}	3.77 ± 0.828; 4.00 ± 1.00	3.74 ± 0.815; 4.00 ± 1.00
Brown Braids	4.12 ± 0.753; 4.00 ± 1.00^{ab}	3.90 ± 0.799; 4.00 ± 2.00^{ab}	3.78 ± 0.806; 4.00 ± 1.00	3.76 ± 0.798; 4.00 ±1.00
Blonde Braids	4.01 ± 0.837; 4.00 ± 2.00^{b}	3.77 ± 0.859; 4.00 ± 1.00^{b}	3.67 ± 0.859; 3.00 ± 1.00	3.67 ± 0.864; 3.00 ± 1.00
P-Value	<0.001*	<0.001*	<0.001*	<0.001*

Note. Superscripted letters (a-b) indicate statistical differences calculated using the Bonferroni test.
*Statistically significant difference between groups.

Table 11. Comparison of Perceived Traits: Black Bun (Control) vs. Dreadlocks

Style	Hygiene	Careful	Punctual	Knowledge
Control (Black Bun)	$4.26 \pm 0.718; 4.00 \pm 1.00^{a}$	$3.99 \pm 0.803; 4.00 \pm 2.00^{a}$	$3.85 \pm 0.850; 4.00 \pm 2.00^{a}$	$3.84 \pm 0.839; 4.00 \pm 2.00^{a}$
Black Dreadlocks	$3.94 \pm 0.908; 4.00 \pm 2.00^{a}$	$3.74 \pm 0.870; 4.00 \pm 1.00^{ac}$	$3.68 \pm 0.836; 3.00 \pm 1.00^{ab}$	$3.68 \pm 0.817; 3.50 \pm 1.00^{ab}$
Brown Dreadlocks	$4.00 \pm 0.878; 4.00 \pm 1.00^{a}$	$3.78 \pm 0.851; 4.00 \pm 1.00^{c}$	$3.70 \pm 0.840; 3.50 \pm 1.00^{ab}$	$3.70 \pm 0.836; 3.00 \pm 1.00^{ab}$
Blonde Dreadlocks	$3.67 \pm 1.011; 4.00 \pm 1.00^{b}$	$3.57 \pm 0.923; 3.00 \pm 1.00^{b}$	$3.54 \pm 0.909; 3.00 \pm 1.00^{b}$	$3.54 \pm 0.917; 3.00 \pm 1.00^{b}$
P-Value	<0.001*	<0.001*	<0.001*	<0.001*

Note. Superscripted letters (a-c) indicate statistical differences calculated using the Bonferroni test.
*Statistically significant difference between groups.

Hygiene Ratings

Perceptions of hygiene varied significantly according to hairstyle and hair color. Bun and braided hairstyles were consistently ranked the highest for hygiene while afros and dreadlocks were ranked the lowest. The black bun (control hairstyle) had the highest hygiene rating (M = 4.26 ± 0.718) whereas blonde dreadlocks scored the lowest (M = 3.67 ± 1.011). Post hoc comparisons revealed that the black bun hairstyle differed significantly from blonde straight hair ($p < 0.001$), blonde braids ($p = 0.003$), all color variations of dreadlocks (black: $p = 0.001$; brown: $p = 0.011$; blonde: $p < 0.001$), blonde curls ($p < 0.001$), and all afro variations ($p < 0.001$) (Tables 6-11). Additionally, statistically significant differences were observed between black and blonde dreadlocks ($p = 0.006$), blonde and brown dreadlocks ($p < 0.001$), and blonde curls and black curls ($p = 0.018$). Overall, black and brown hairstyles had higher hygiene ratings than their blonde hairstyle counterparts.

Carefulness Ratings

Similarly to hygiene, bun, straight hair, and braids received the highest carefulness ratings, while afros and dreadlocks were rated the lowest. Among all hairstyles and colors, the brown bun had the highest carefulness rating (M = 4.00 ± 0.814), whereas blonde dreadlocks were rated the lowest (M = 3.57 ± 0.923). Post hoc comparisons revealed that the black bun differed significantly from blonde straight hair

($p = 0.002$), blonde braids ($p = 0.005$), all color variations of afro ($p < 0.001$), black dreadlocks ($p = 0.003$) and blonde dreadlocks ($p < 0.001$). Additionally, the black bun was rated significantly higher than black curls ($p = 0.031$) and blonde curls ($p = 0.001$). Further comparisons showed statistical difference between brown and blonde dreadlocks ($p = 0.018$). Overall, blonde variations of all the hairstyles, except the bun, had lower carefulness ratings than darker color hairstyles (Tables 5, 7-11).

Punctuality Ratings

Perceptions of punctuality followed a similar trend with buns and straight hairstyles receiving the highest ratings while dreadlocks and afros received the lowest scores. Among all the hairstyles and colors, the black bun had the highest punctuality rating (M=3.85 ± 0.850), whereas blonde dreadlocks received the lowest rating (M=3.54 ± 0.909). Post hoc comparisons revealed significant differences between the black bun and blonde straight hair ($p = 0.031$), blonde dreadlocks ($p < 0.001$), blonde curls ($p = 0.036$), brown afros ($p = 0.027$) and blonde afros ($p = 0.001$). Furthermore, blonde variations of all the hairstyles consistently received lower punctuality ratings than their brown and black counterparts (Table 5).

Knowledgeability Rating

Regarding perceptions of knowledgeability in orthodontics, a similar trend was observed, with bun and straight hairstyles being receiving the highest ratings, while dreadlocks and afros were rated the lowest. The black and brown buns had the highest knowledgeability of orthodontics rating (M=3.84 ± 0.839 and 3.84 ± 0.823, respectively), whereas blonde dreadlocks received the lowest rating (M=3.54 ± 0.917). Post hoc comparisons revealed significant differences between the black bun control and blonde straight hair (*p = 0.015*), blonde dreadlocks (*p = 0.001*), and blonde afros (*p = 0.009*). Across all hairstyles, blonde variations consistently received lower knowledgeability ratings than their black and brown counterparts (Table 5).

Gender-Based Differences in Perceptions

When comparing male and female patients' perceptions of the orthodontist, minimal significant differences were found. Although women generally rated all the hairstyles higher than men, men consistently gave lower ratings to afros and dreadlocks across all professional attributes. The only significant gender-based difference was in the perceived knowledgeability of the orthodontist with a blonde afro (*p = 0.044*). Overall, bun, straight hairstyles, and braids received the most positive evaluations from both men and women, while dreadlocks and afros were rated the lowest, primarily by men (Table 12-14).

Table 12. Comparative Analysis of the Influence of Hairstyle and Black Hair Color on Patient Perceptions of Orthodontists by Patient Gender

Characteristics	*Control*	*Straight*	*Curls*	*Afro*	*Braids*	*Dreadlocks*
Hygiene						
Males						
Mean ± SD	4.15 ± 0.780	4.07 ± 0.813	4.06 ± 0.885	3.82 ± 0.935	4.04 ± 0.871	3.89 ± 0.906
Median ± IQR	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 2.00
Females						
Mean ± SD	4.34 ± 0.666	4.19 ± 0.767	4.21 ± 0.814	3.96 ± 0.950	4.22 ± 0.683	3.97 ± 0.913
Median ± IQR	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 2.00
P value	0.052	0.239	0.167	0.140	0.132	0.417
Care						
Males						
Mean ± SD	3.92 ± 0.818	3.88 ± 0.836	3.76 ± 0.860	3.58 ± 0.895	3.81 ± 0.822	3.70 ± 0.887
Median ± IQR	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 1.00	3.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00
Females						
Mean ± SD	4.05 ± 0.788	3.94 ± 0.800	3.82 ± 0.873	3.73 ± 0.935	3.92 ± 0.806	3.77 ± 0.861
Median ± IQR	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 1.00
P value	0.212	0.575	0.602	0.188	0.375	0.509
Punctuality						
Males						
Mean ± SD	3.75 ± 0.873	3.74 ± 0.843	3.61 ± 0.870	3.59 ± 0.874	3.69 ± 0.836	3.64 ± 0.834
Median ± IQR	4.00 ± 2.00	4.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00
Females						
Mean ± SD	3.92 ± 0.829	3.84 ± 0.833	3.75 ± 0.865	3.72 ± 0.897	3.84 ± 0.821	3.71 ± 0.839
Median ± IQR	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 1.00
P value	0.145	0.330	0.160	0.226	0.186	0.501
Knowledge in orthodontics						
Males						
Mean ± SD	3.78 ± 0.821	3.77 ± 0.846	3.41 ± 0.864	3.58 ± 0.895	3.65 ± 0.821	3.65 ± 0.821
Median ± IQR	4.00 ± 1.00	4.00 ± 2.00	3.00 ± 1.00	3.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00
Females						
Mean ± SD	3.89 ± 0.852	3.84 ± 0.810	3.74 ± 0.876	3.73 ± 0.886	3.81 ± 0.807	3.70 ± 0.818
Median ± IQR	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00
P value	0.329	0.505	0.123	0.1950	0.179	0.622

*Statistically significant difference between groups.

Table 13. Comparative Analysis of the Influence of Hairstyle and Brown Hair Color on Patient Perceptions of Orthodontists by Patient Gender

Characteristics	*Control*	*Straight*	*Curls*	*Afro*	*Braids*	*Dreadlocks*
Hygiene						
Males						
Mean ± SD	4.23 ± 0.753	4.06 ± 0.831	4.06 ± 0.820	3.79 ± 1.037	4.03 ± 0.775	3.97 ± 0.918
Median ± IQR	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 2.00
Females						
Mean ± SD	4.27 ± 0.777	4.17 ± 0.750	4.14 ± 0.769	3.99 ± 0.917	4.18 ± 0.736	4.02 ± 0.856
Median ± IQR	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 1.00
P value	0.586	0.327	0.493	0.124	0.096	0.760
Care						
Males						
Mean ± SD	3.95 ± 0.798	3.86 ± 0.866	3.87 ± 0.806	3.60 ± 0.944	3.84 ± 0.807	3.76 ± 0.870
Median ± IQR	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 1.00
Females						
Mean ± SD	4.03 ± 0.825	3.91 ± 0.804	3.85 ± 0.799	3.73 ± 0.892	3.94 ± 0.792	3.80 ± 0.841
Median ± IQR	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 1.00
P value	0.422	0.752	0.834	0.321	0.313	0.754
Punctuality						
Males						
Mean ± SD	3.80 ± 0.825	3.74 ± 0.865	3.72 ± 0.829	3.54 ± 0.928	3.72 ± 0.783	3.64 ± 0.887
Median ± IQR	4.00 ± 2.00	4.00 ± 2.00	3.00 ± 1.00	3.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00
Females						
Mean ± SD	3.90 ± 0.823	3.83 ± 0.808	3.78 ± 0.819	3.69 ± 0.859	3.84 ± 0.821	3.74 ± 0.807
Median ± IQR	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 1.00	3.50 ± 1.00	4.00 ± 2.00	4.00 ± 1.00
P value	0.322	0.396	0.478	0.251	0.247	0.372
Knowledge in orthodontics						
Males						
Mean ± SD	3.79 ± 0.817	3.73 ± 0.835	3.68 ± 0.826	3.57 ± 0.917	3.72 ± 0.783	3.65 ± 0.886
Median ± IQR	4.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00
Females						
Mean ± SD	3.87 ± 0.827	3.81 ± 0.815	3.77 ± 0.807	3.70 ± 0.871	3.80 ± 0.810	3.73 ± 0.801
Median ± IQR	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00
P value	0.443	0.457	0.336	0.232	0.359	0.486

*Statistically significant difference between groups.

Table 14. Comparative Analysis of the Influence of Hairstyle and Blonde Hair Color on Patient Perceptions of Orthodontists by Patient Gender

Characteristics	*Control*	*Straight*	*Curls*	*Afro*	*Braids*	*Dreadlocks*
Hygiene						
Males						
Mean ± SD	4.09 ± 0.788	3.89 ± 0.864	3.88 ± 0.910	3.76 ± 0.990	3.92 ± 0.851	3.60 ± 1.028
Median ± IQR	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 1.00
Females						
Mean ± SD	4.18 ± 0.802	4.03 ± 0.777	3.99 ± 0.896	3.90 ± 0.918	4.08 ± 0.826	3.72 ± 1.002
Median ± IQR	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 1.00
P value	0.297	0.202	0.273	0.279	0.107	0.297
Care						
Males						
Mean ± SD	3.88 ± 0.825	3.72 ± 0.859	3.72 ± 0.862	3.52 ± 0.919	3.72 ± 0.859	3.54 ± 0.938
Median ± IQR	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00
Females						
Mean ± SD	3.84 ± 0.873	3.77 ± 0.791	3.74 ± 0.868	3.65 ± 0.937	3.81 ± 0.861	3.50 ± 0.917
Median ± IQR	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00
P value	0.808	0.785	0.717	0.318	0.369	0.671
Punctuality						
Males						
Mean ± SD	3.74 ± 0.821	3.61 ± 0.891	3.60 ± 0.851	3.44 ± 0.876	3.62 ± 0.858	3.50 ± 0.949
Median ± IQR	4.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00
Females						
Mean ± SD	3.74 ± 0.883	3.68 ± 0.808	3.70 ± 0.848	3.65 ± 0.852	3.71 ± 0.862	3.58 ± 0.883
Median ± IQR	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00
P value	0.863	0.585	0.241	0.075	0.360	0.507
Knowledge in orthodontics						
Males						
Mean ± SD	3.74 ± 0.810	3.57 ± 0.875	3.62 ± 0.837	3.44 ± 0.907	3.62 ± 0.858	3.50 ± 0.939
Median ± IQR	4.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00
Females						
Mean ± SD	3.73 ± 0.892	3.66 ± 0.803	3.68 ± 0.854	3.68 ± 0.845	3.70 ± 0.871	3.58 ± 0.905
Median ± IQR	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	3.50 ± 1.00	4.00 ± 1.00	3.00 ± 1.00
P value	0.995	0.369	0.619	0.044*	0.428	0.510

*Statistically significant difference between groups.

Racial Differences in Perception

A comparison between Black and White respondents revealed both significant and non-significant differences in professional perceptions. In terms of hygiene, both groups rated the orthodontist with a bun, regardless of hair color, as the most hygienic. However, White individuals rated blonde afros, curls, and dreadlocks slightly lower than Black individuals. The orthodontist with blonde dreadlocks received the lowest overall hygiene rating, though no statistically significant differences in perception were found between the two groups ($p > 0.05$).

For carefulness, both groups rated the black and brown bun and black straight hair the highest, while blonde afro, curls, and dreadlocks received the lowest ratings, with White respondents assigning lower scores. However, these differences were not statistically significant ($p > 0.05$).

In terms of punctuality, the black and brown bun and black straight hairstyles were rated as the most punctual by both groups, while blonde afros, blonde curls, and blonde deadlocks were rated the least punctual, with White respondents assigning them lower scores. Statistically significant differences were observed in perceived punctuality of orthodontists with black dreadlocks ($p = 0.049$) and blonde afros ($p = 0.029$) between Black and White respondents.

For knowledgeability, the same trend was observed, with black and brown bun and black straight hairstyles receiving the highest ratings, while blonde afro, blonde curls, and blonde dreadlocks were rated the lowest. Statistically significant differences were found in the perceived knowledgeability of orthodontists with black dreadlocks ($p = 0.047$) and blonde afros ($p = 0.016$), as they were rated significantly lower by White respondents compared to Black respondents. These results are detailed in Tables 15-17.

Table 15. Comparative Analysis of the Influence of Hairstyle and Black Hair Color on Patient Perceptions of Orthodontists by Patient Race

Characteristics	***Bun***	***Straight***	***Curls***	***Afro***	***Braids***	***Dreadlocks***
Hygiene						
White						
Mean ± SD	4.28 ± 0.703	4.19 ± 0.782	4.23 ± 0.757	3.85 ± 1.004	4.14 ± 0.790	3.91 ± 0.936
Median ± IQR	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 2.00
Black						
Mean ± SD	4.26 ± 0.672	4.17 ± 0.732	4.19 ± 0.826	4.05 ± 0.794	4.21 ± 0.690	4.08 ± 0786
Median ± IQR	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00
P value	0.777	0.759	0.851	0.177	0.662	0.216
Care						
White						
Mean ± SD	3.98 ± 0.803	3.95 ± 0.846	3.82 ± 0.854	3.58 ± 0.988	3.84 ± 0.825	3.66 ± 0.900
Median ± IQR	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 2.00	3.00 ± 1.00
Black						
Mean ± SD	3.98 ± 0.773	3.93 ± 0.770	3.81 ± 0.870	3.77 ± 0.831	3.92 ± 0.780	3.82 ± 0.813
Median ± IQR	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 1.00
P value	0.985	0.767	0.950	0.188	0.504	0.164
Punctuality						
White						
Mean ± SD	3.80 ± 0.825	3.76 ± 0.875	3.69 ± 0.834	3.55 ± 0.878	3.71 ± 0.816	3.55 ± 0.854
Median ± IQR	4.00 ± 2.00	4.00 ± 2.00	3.00 ± 1.00	3.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00
Black						
Mean ± SD	3.86 ± 0.836	3.81 ± 0.837	3.74 ± 0.891	3.76 ± 0.844	3.86 ± 0.819	3.76 ± 0.792
Median ± IQR	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 1.00
P value	0.600	0.690	0.428	0.085	0.202	0.049*
Knowledge in orthodontics						
White						
Mean ± SD	3.82 ± 0.854	3.77 ± 0.872	3.73 ± 0.836	3.56 ± 0.935	3.71 ± 0.829	3.57 ± 0.865
Median ± IQR	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 1.00	3.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00
Black						
Mean ± SD	3.84 ± 0.837	3.84 ± 0.795	3.69 ± 0.884	3.80 ± 0.833	3.83 ± 0.799	3.78 ± 0.775
Median ± IQR	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 1.00
P value	0.885	0.535	0.853	0.061	0.292	0.047*

*Statistically significant difference between groups.

Table 16. Comparative Analysis of the Influence of Hairstyle and Brown Hair Color on Patient Perceptions of Orthodontists by Patient Race

Characteristics	*Control*	*Straight*	*Curls*	*Afro*	*Braids*	*Dreadlocks*
Hygiene						
White						
Mean ± SD	4.24 ± 0.788	4.16 ± 0.799	4.20 ± 0.702	3.87 ± 0.986	4.16 ± 0.746	3.97 ± 0.929
Median ± IQR	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 2.00
Black						
Mean ± SD	4.27 ± 0.675	4.14 ± 0.727	4.08 ± 0.808	4.07 ± 0.782	4.13 ± 0.686	4.14 ± 0.707
Median ± IQR	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00
P value	0.985	0.639	0.382	0.177	0.655	0.284
Care						
White						
Mean ± SD	3.97 ± 0.835	3.91 ± 0.843	3.86 ± 0.816	3.59 ± 0.944	3.72 ± 0.828	3.76 ± 0.839
Median ± SD	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 2.00	3.00 ± 1.00	4.00 ± 2.00	4.00 ± 1.00
Black						
Mean ± SD	4.00 ± 0.784	3.91 ± 0.762	3.84 ± 0.795	3.81 ± 0.798	3.89 ± 0.760	3.87 ± 0.833
Median ± IQR	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 2.00
P value	0.857	0.892	0.890	0.086	0.971	0.297
Punctuality						
White						
Mean ± SD	3.79 ± 0.841	3.73 ± 0.848	3.69 ± 0.808	3.53 ± 0.891	3.73 ± 0.810	3.62 ± 0.796
Median ± IQR	4.00 ± 2.00	4.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00
Black						
Mean ± SD	3.86 ± 0.830	3.81 ± 0.826	3.69 ± 0.808	3.75 ± 0.797	3.78 ± 0.797	3.79 ± 0.836
Median ± IQR	4.00 ± 2.00	4.00 ± 2.00	3.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 2.00
P value	0.568	0.470	0.459	0.063	0.621	0.128
Knowledge in orthodontics						
White						
Mean ± SD	3.81 ± 0.858	3.72 ± 0.851	3.70 ± 0.819	3.57 ± 0.900	3.76 ± 0.814	3.66 ± 0.840
Median ± IQR	4.00 ± 2.00	4.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00
Black						
Mean ± SD	3.82 ± 0.813	3.81 ± 0.816	3.75 ± 0.805	3.78 ± 0.818	3.77 ± 0.800	3.79 ± 0.815
Median ± IQR	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00
P value	0.928	0.394	0.537	0.068	0.863	0.249

*Statistically significant difference between groups.

Table 17. Comparative Analysis of the Influence of Hairstyle and Blonde Hair Color on Patient Perceptions of Orthodontists by Patient Race

Characteristics	*Bun*	*Straight*	*Curls*	*Afro*	*Braids*	*Dreadlocks*
Hygiene						
White						
Mean ± SD	4.21 ± 0.790	4.07 ± 0.781	4.05 ± 0.795	3.84 ± 1.007	4.02 ± 0.829	3.72 ± 1.008
Median ± IQR	4.00 ± 1.00	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 2.00	4.00 ± 2.00
Black						
Mean ± SD	4.13 ± 0.757	4.01 ± 0.710	3.93 ± 0.949	3.98 ± 0.816	4.05 ± 0.804	3.76 ± 0.912
Median ± IQR	4.00 ± 1.00	4.00 ± 0.00	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00
P value	0.347	0.512	0.596	0.367	0.771	0.848
Care						
White						
Mean ± SD	3.93 ± 0.820	3.80 ± 0.825	3.79 ± 0.828	3.54 ± 0.925	3.77 ± 0.848	3.54 ± 0.936
Median ± IQR	4.00 ± 2.00	4.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00	4.00 ± 1.00	3.00 ± 0.936
Black						
Mean ± SD	3.83 ± 0.840	3.77 ± 0.756	3.72 ± 0.905	3.75 ± 0.857	3.76 ± 0.874	3.63 ± 0.875
Median ± IQR	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00
P value	0.453	0.824	0.689	0.094	0.981	0.458
Punctuality						
White						
Mean ± SD	3.75 ± 0.830	3.65 ± 0.817	3.65 ± 0.804	3.44 ± 0.866	3.60 ± 0.837	3.43 ± 0.889
Median ± IQR	4.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00
Black						
Mean ± SD	3.76 ± 0.844	3.68 ± 0.836	3.69 ± 0.884	3.70 ± 0.820	3.71 ± 0.888	3.62 ± 0.876
Median ± IQR	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00
P value	0.812	0.647	0.599	0.029*	0.270	0.121
Knowledge in orthodontics						
White						
Mean ± SD	3.76 ± 0.875	3.67 ± 0.813	3.66 ± 0.828	3.48 ± 0.914	3.64 ± 0.844	3.46 ± 0.925
Median ± IQR	4.00 ± 2.00	3.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00	3.00 ± 1.00
Black						
Mean ± SD	3.75 ± 0.839	3.69 ± 0.803	3.70 ± 0.880	3.76 ± 0.792	3.72 ± 0.876	3.64 ± 0.874
Median ± IQR	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	4.00 ± 1.00	3.00 ± 1.00
P value	0.976	0.756	0.515	0.016*	0.401	0.152

*Statistically significant difference between groups.

DISCUSSION

This study examined the effect of different hairstyles and colors on the perceived professionalism of a Black female orthodontist, specifically assessing her hygiene, carefulness, punctuality, and knowledgeability. The results unveiled deep-seated biases regarding what constitutes a "professional" appearance, especially for Black female orthodontists. These findings highlight the perpetuation of cultural and societal beauty standards rooted in Eurocentric norms, and how they continue to shape perceptions of professionalism even in clinical environments where competence, expertise, and skill should be the main elements influencing judgment.

The results revealed that hairstyles commonly associated with Eurocentric beauty standards, such as a neatly tied bun or straight hair in natural colors, were consistently rated as the most professional across all categories. This finding aligns with the study design, as the black bun was intentionally selected as the control hairstyle based on prior literature identifying tied-back, natural-colored hair as most closely aligned with traditional professional norms in healthcare. Its consistently high ratings across hygiene, carefulness, punctuality, and knowledgeability confirm its appropriateness as the control condition. Conversely, textured, Afrocentric hairstyles (such as afros and dreadlocks) and non-natural hair colors, primarily blonde, received significantly lower ratings. These findings suggest that professional appearance standards remain influenced by implicit biases deep-rooted in societal Eurocentric beauty standards, with hairstyles that deviate from these traditional norms adversely influencing perceptions of competence.[10] This topic is especially important in healthcare environments where perceptions of professionalism can directly impact the patient-provider relationship. Initial impressions about the healthcare provider's competence based on visual cues (such as attire, grooming, and hairstyle) before assessing their clinical expertise can impact a patient's trust and their overall compliance and satisfaction with care. Participants' lower ratings of afros, dreadlocks, and blonde hair, in categories such as hygiene and punctuality, suggest that unconscious biases may lead to perceptions of reduced competence or reliability.

The geographical distribution of participants in this study offers important insights into how regional cultural norms may influence perceptions of professionalism. A significant portion of participants (40.7%) were from Maryland, while others were spread across various U.S. states and international locations. Given Maryland's diverse population and proximity to major urban centers such as Washington, D.C., participants from this region might be more exposed to multicultural environments, potentially leading to more inclusive attitudes toward diverse hairstyles and hair colors; however, despite being in a diverse state, Black individuals still rated more Afrocentric hairstyles lower, likely reflected internalized appearance stigmas.[10] Furthermore, the presence of participants from international backgrounds could have subtly influenced the overall results, given that beauty and professionalism standards vary globally. For instance, participants from countries where Afrocentric hairstyles are more normalized may have rated those styles more favorably compared to participants from predominantly White Western countries, where Eurocentric beauty standards are more well-established.

An alternative interpretation of the results highlights the overarching similarity in perceptions between Black and White respondents. There were no significant differences between these groups for most hairstyles, suggesting that, in general, perceptions of professionalism were similar across racial lines. Notably, both Black and White respondents demonstrated comparable trends, consistently rating Eurocentric hairstyles, such as the tied-back bun and straight hair in natural colors, more favorably, while assigning lower professionalism scores to Afrocentric styles, including afros and dreadlocks. This convergence suggests that societal standards of professionalism, shaped by longstanding Eurocentric beauty norms, may exert a broad influence on individuals regardless of racial background. Nevertheless, significant differences were observed in specific instances. Black dreadlocks were rated significantly lower in punctuality ($p = 0.049$) and knowledge in orthodontics ($p = 0.047$), while blonde afros were associated with lower ratings in punctuality ($p = 0.029$) and knowledge in orthodontics ($p = 0.016$). One possible explanation for the overall similarity in ratings may be that participants, particularly those from Maryland, are likely more accustomed to seeing diverse hairstyles due to the state's multicultural population. Increased exposure to different expressions of identity and professionalism in diverse environments may contribute to more inclusive attitudes and minimize racial disparities in perception. However, the persistent significant differences suggest that while regional diversity may reduce bias in some areas, certain hairstyles—particularly those deviating further from Eurocentric norms—continue to elicit differential evaluations.

The age distribution of the participants also presents significant implications for the study's findings. Most respondents (55.6%) were between the ages of 25 and 34, with smaller proportions representing older generations. This bias toward younger participants could influence the generalizability of the results, as younger generations tend to be more progressive and accepting of diverse hairstyles and appearances due to increased exposure to multiculturalism through social media, global fashion trends, and inclusive marketing campaigns. However, despite the younger demographic, the study still found notable biases against Afrocentric hairstyles and non-natural hair colors, suggesting that implicit biases around professionalism remain prevalent even among younger individuals.[10] This finding may suggest the perpetuation of traditional norms around professional appearance by their parents or expectations of appearance based on social class. If the participant pool had included a larger representation of older adults—who are often more influenced by traditional norms and conservative views on professionalism—it's possible that the negative ratings for afros, dreadlocks, and blonde hairstyles could have been even more pronounced.

Generational attitudes toward professionalism could also influence perceptions. Older generations, particularly those who have worked in industries with rigid professional appearance standards, may hold stronger biases against hairstyles that deviate from traditional Eurocentric norms. Conversely, younger participants may be more influenced by evolving cultural movements, such as the natural hair movement, which has worked to normalize Afrocentric hairstyles in both social and professional settings.

However, the impact of these cultural movements may be less pronounced in the Washington, D.C, Maryland, and Virginia areas, where government and corporate jobs dominate, reinforcing traditional appearance expectations. In these predominately White corporate spaces, many Black women may prioritize professional assimilation over self-expression. Fitting in often takes precedence over standing out or fully embracing Blackness through natural hairstyles, as individuals seek to be recognized for their professional competence rather than having their identity reduced to stereotypes. The desire to be perceived as a Black woman in corporate America, rather than a Black woman with natural hair who may be viewed as a source of friction or nonconformity, can significantly shape hairstyle choices. In these regions, professional grooming norms may be unconsciously reinforced, contrasting with areas that place greater emphasis on self-expression.

There may also be an intersection between geography and age, with younger individuals from more diverse urban areas (such as Maryland) being more accepting of non-traditional hairstyles compared to older individuals from rural or less diverse regions. This intersection could provide a nuanced understanding of how cultural exposure and generational shifts contribute to perceptions of professionalism.

Gender-based and racial differences were discovered in the results. Women generally gave higher professional rankings across all hairstyles, while men rated lower Afrocentric hairstyles significantly lower, specifically in the category of knowledgeability for the blonde afro. This suggests that male patients may have stronger biases against hairstyles that deviate from traditional norms, or those they perceive as less attractive. Racially, both White and Black respondents rated the orthodontist's bun and straight hairstyles as hygienic and careful; however, significant effects on perception of punctuality and knowledgeability were revealed for black dreadlocks and blonde afros, with White participants rating these styles considerably lower than Black participants. This suggests that cultural familiarity plays a role in shaping perception, as Black participants appeared more accepting of culturally specific hairstyles.

The findings from Craig[11] help explain why Black participants rated Afrocentric hairstyles more positively than White participants. Craig discusses how Black women embracing their natural hair serves as a form of cultural resistance against Eurocentric beauty standards; however, due to the persistence of internalized biases, this may account for why Black individuals still rated these hairstyles lower in terms of professionalism compared to traditionally Eurocentric hairstyles, consistent with findings by Rudman and McLean.[10] These authors identified the role of how internalized appearance stigma can lead to racial ingroup biases, where African Americans may associate straightened hair and lighter skin with greater social acceptance.

These findings partially align with Opie and Phillips,[12] who found that Black evaluators sometimes rated Black women more harshly than White evaluators for wearing Afrocentric hairstyles, associating them with dominance and reduced professionalism. This internalized bias could explain why some Black participants in this study also rated dreadlocks and afros lower, although less severely than White participants. However, unlike Opie and Phillips's findings,[12] this study showed that Black participants generally offered higher professionalism ratings for these hairstyles, particularly in categories of carefulness and hygiene. This suggests a possible shift in attitudes, potentially mirroring increased acceptance of natural hair among younger generations of Black respondents.

The unfavorable perception of more textured Afrocentric hairstyles is supported by previous studies on hair-based discrimination and professional standards. The "Good Hair" Study conducted by the Perception Institute similarly found that Black women wearing natural hair were more likely to be perceived as less professional than those with straight styles, even by other Black respondents.[13] This internalization of Eurocentric beauty standards may explain why some Black women in this study also rated these textured hairstyles less acceptable in professional settings. Barrick et al[14] emphasized that "appropriate business attire" and having "properly combed hair" positively influences initial impressions. In this context, the concept of "properly combed" hair is likely framed within Eurocentric definitions, where a lack of cultural familiarity with natural textures, maintenance, and care of Afrocentric hairstyles (such as afros and dreadlocks) may contribute to misinterpretations of these styles as unkempt or less professional.

This bias also extends to hair color, reinforcing existing prejudices among professional appearance. Barrick et al[14] noted that deviation from traditional norms such as having an "unnatural" hair color can negatively impact initial impressions. Similarly, a study on hair color bias uncovered that blonde- or red-haired female job applicants were deemed as less capable than their brown-haired counterparts and were subsequently offered lower starting salaries.[15] These findings are consistent with the results of the present study, where blonde Afrocentric hairstyles were perceived as less professional and competent, particularly by White participants. This suggests that workplace standards of professionalism continue to be influenced by Eurocentric beauty norms, reinforcing biases against hairstyles that deviate from these expectations.[14]

Furthermore, Galliano et al[16] found that darker skin tones paired with lighter hair color, such as blonde, were deemed as less harmonious, aesthetically pleasing, and natural than combinations of darker skin tones with darker hair color. Similarly, in a study by Swami et al.,[17] they found that preferences for brunette hair were strongest when paired with darker skin tones, while blonde hair on darker skin was viewed as the least attractive combination. This aesthetic incompatibility could explain why the brown-skinned orthodontist wearing blonde hairstyles were generally rated lower in terms of professionalism than the orthodontist displaying natural hair colors such as black or brown. These aesthetic preferences strengthen race-based hair discrimination disguised under terms like "professional" and "conservative". Furthermore, consistent with these findings, the current study also demonstrates differences in acceptance of the hairstyles between Black and White participants. Black participants revealed greater acceptance of diverse hair colors while still showing preference for darker hair colors on darker skin tones; however, White participants showed stronger preference for skin tone-hair color congruence with White respondents consistently assigning blonde Afrocentric hairstyles such as afros and dreadlocks lower professional scores than Black respondents. These results can be viewed through the lens of attractiveness bias where women with non-Eurocentric hairstyles such as afros and dreadlocks are perceived as less attractive compared to more traditionally Eurocentric hairstyles such as bun and straight hair [11,13,18]. This implicit bias could support lower professionalism scores for Afrocentric hairstyles, as societal beauty standards continue to subtly intersect with development of professional evaluations.

In today's modern society, professional appearance standards are evolving, permitting greater self-expression hairstyles, clothing, tattoos, and piercings; however, biases against nontraditional appearances persist, particularly in professional setting where first impressions heavily influence credibility. Studies on patient perception of orthodontists and job applicants with loose hair, facial hair, tattoos, and piercings elucidate how deviations from traditional grooming norms negatively impact professional assessments.[9,19]

Bittencourt et al[9] found that orthodontists with visible tattoos and piercings were consistently rated lower in professionalism, hygiene, and competence compared to those without body modifications, loose hair, or facial hair. Likewise, McElroy et al[19] found that job applicants with facial piercings were perceived as less competent, careful, trustworthy, and less desirable candidates than those without facial piercings, regardless of their actual qualifications. These trends align with the present study's findings where Afrocentric hairstyles, particularly afros, dreadlocks, and blonde-colored hair, received lower professional evaluations than Eurocentric styles, which challenge the current professional norms. This emphasizes the persistence of implicit biases in professional appearance standards, which disproportionately affects individuals whose self-expression deviates from conservative and Eurocentric standards.

The "Lack of Fit" model describes how biases arise when individuals do not conform to traditional norms associated with success in a given role. Particularly, this framework has been widely viewed in gender discrimination where women are often perceived as inadequate for leadership or male-dominated fields and therefore, held to higher standards of competence to prove themselves.[20] Just as orthodontists with body modifications such as tattoos and piercings were judged as less competent despite no evidence of reduced skill, Black female orthodontists with textured or dyed hair face similar criticism. Their intersectional experience of race and gender magnifies these biases, as being both Black and a woman already places them at a disadvantage in professional settings.

The implications of this study's findings extend beyond professional perceptions among peers and employers. While the CROWN Act—currently enacted in 27 states and several cities across the United States—protects Black women from race-based hair discrimination in hiring, it does not protect Black female orthodontists from patient biases. These biases directly influence patient perceptions of healthcare providers, potentially affecting trust, patient-provider relationships, and treatment decisions. In healthcare, a professional's appearance can influence a patient's level of trust, comfort, and willingness to engage in treatment. Research has shown that patients often rely on visual cues, including hairstyle, attire, and grooming, to form quick judgments about a healthcare provider's competence, hygiene, and professionalism.[1,7,9,13,21] When Afrocentric hairstyles or non-natural hair colors (such as blonde) are perceived as less professional, these biases can shape preconceived notions about the orthodontist's competence and the quality of care she provides—before she even enters the room.

Lower ratings for afros and dreadlocks in categories such as knowledgeability and punctuality suggest that patients may subconsciously perceive orthodontists with these hairstyles as less competent in orthodontic care or less reliable in respecting appointment times. These preconceived notions may stem from cultural stereotypes, personal experiences related to the maintenance of these hairstyles, or perceptions that they appear unkempt and lack control. Such biases could lead to reduced trust and diminished patient compliance with treatment recommendations, even when the provider is equally qualified as their colleagues with Eurocentric hairstyles. The perception of punctuality is particularly critical in healthcare, as it reflects a provider's respect for patients' time and their commitment to professional responsibilities. If patients view certain hairstyles as indicative of poor time management, this could unjustly influence their confidence in the provider's reliability and professionalism.

The gender-based differences observed in this study, where male participants rated Afrocentric hairstyles more negatively, have significant implications for patient-provider interactions. Afrocentric styles like afros and dreadlocks are often perceived as assertive or nonconforming[12], while straight or loosely curled hairstyles align with Eurocentric norms of femininity and approachability, traits traditionally favored in healthcare.[20] The research by Opie and Phillips[12], which noted that Afrocentric hairstyles are perceived as more dominant, could further explain why some patients might feel intimidated or view providers with these hairstyles as less approachable. This dynamic could result in fewer patient questions during consultations, reduced patient satisfaction, or reluctance to seek follow-up care, all of which could impact treatment outcomes. While Livingston et al[23] found that Black women do not face the same backlash for dominance as White women, they remain subject to race- and gender-specific biases that shape professional evaluations.

This study also found that blonde hair in Afrocentric styles was rated lower by male participants, suggesting biases related to professionalism, dominance, and attractiveness. Research indicates that men associate Eurocentric hairstyles with competence while perceiving deviations, such as blonde afros or dreadlocks, as less authoritative.[13,16] Attractiveness biases may further influence trust and provider preference, with male patients potentially being more likely to seek treatment from providers they find conventionally attractive or non-threatening.

These biases have real-world implications, particularly in male-dominated patient populations where traditional beauty and professionalism standards may shape provider preference. Male patients may be less inclined to trust or comply with treatment recommendations from Black female orthodontists with Afrocentric hairstyles, potentially leading to lower patient satisfaction, decreased adherence to care, and professional disadvantages such as fewer referrals and reduced patient retention. Addressing these biases through cultural competence training and patient education can help ensure that provider evaluations are based on skill and expertise rather than appearance-based stereotypes.

The differing ratings from Black and White respondents suggest that cultural familiarity and racial ingroup bias shape patient perceptions. Black patients were more accepting of Afrocentric hairstyles, likely due to shared experiences, nurturing stronger patient-provider relationships and trust. In contrast, White patients' lower ratings may reflect implicit biases influenced by societal beauty norms favoring Eurocentric features.

These biases can significantly impact Black female orthodontists' careers, affecting patient trust, satisfaction, referrals, and retention. If White patients perceive providers with Afrocentric hairstyles as less professional, it may lead to reduced treatment compliance, lower patient retention, and fewer referrals, limiting professional growth and financial success. Additionally, these biases can influence patient reviews and job evaluations, further affecting career advancement. Addressing these disparities through cultural competence training and patient education is essential to ensuring providers are assessed based on their expertise rather than appearance.

Appearance-based biases significantly impact both healthcare providers and their patients. Research suggests that these biases impose ongoing challenges for Black female orthodontists, contributing to heightened stress, increased burnout, and the pressure to conform to Eurocentric beauty standards.[22,24] This pressure to alter natural hairstyles not only affects personal expression but also reinforces harmful professional norms. Patients, in turn, may subconsciously validate these biases by perceiving providers who conform to traditional grooming standards as more competent while viewing Afrocentric hairstyles as less professional.

While legislation like the CROWN Act represents progress in prohibiting race-based hair discrimination in hiring, it does not address patient-driven biases that influence provider evaluations, patient satisfaction scores, and career advancement. These biases contribute to broader issues of cultural erasure and workplace inequity, particularly when minority providers feel pressured to suppress their cultural identity to fit professional expectations. For patients, especially those from minority backgrounds, encountering providers who do not reflect diverse cultural identities may reinforce feelings of exclusion or discomfort, ultimately impacting trust and healthcare experiences.

To counteract these biases, practice owners can play a crucial role in fostering inclusivity within their offices. If patients express hesitation about receiving care from a Black female orthodontist due to her textured hair, it is essential that practice owners advocate for their colleagues by reinforcing their qualifications and expertise. This advocacy not only strengthens professional relationships among providers but also fosters a supportive practice environment, particularly when the owner or senior partner belongs to the majority demographic. Addressing biases directly and affirming the competence of all providers helps cultivate an inclusive culture, ensuring that patients receive high-quality care without superficial prejudices.

By actively implementing these solutions, the field of dentistry—particularly orthodontics—can work toward a more equitable and inclusive environment where orthodontists are evaluated based on their expertise rather than their appearance. Creating a culture of inclusivity allows Black female orthodontists to feel supported by their colleagues without the pressure to conform to Eurocentric beauty standards. When providers are empowered to present themselves authentically without fear of bias, it not only strengthens professional relationships but also fosters a more diverse, welcoming, and progressive profession—one that truly prioritizes skill, expertise, and patient care above all else.

Strengths

A key strength of this study is the use of multiple raters, which enhances the reliability and validity of the findings. Research by Eisenkraft[25] supports the approach of combining independent evaluations to produce more consistent results while reducing individual subjectivity. By incorporating 268 participants from diverse racial, gender, and professional backgrounds, this study provides a good assessment of how hairstyle and hair color influence professional perceptions. This methodological approach helps reduce personal biases, offering a more objective understanding of how Black female orthodontists are evaluated based on their hairstyle presentation.

Additionally, the use of digitally manipulated images ensured that only hairstyle and hair color varied while keeping all other variables—such as facial expression, attire, and pose—constant, thereby limiting potential confounding factors. The study also employed validated Likert-scale measures from Bittencourt et al[9] to assess hygiene, carefulness, punctuality, and knowledgeability, strengthening the methodological rigor. Furthermore, the high intraclass correlation coefficient (ICC = 0.939) demonstrated strong response consistency, ensuring that participant evaluations were reliable and not random.

Perhaps most notably, this study addresses a significant gap in the dental literature by examining perceptions of professionalism specific to Black female orthodontists. While prior research has investigated biases related to tattoos, piercings, and general grooming,[9,19] few studies have focused on racially specific hairstyles within clinical settings. This study thus contributes to the broader discourage on professional appearance standards and implicit bias in healthcare.

Limitations

Despite its strengths, this study has several limitations that warrant consideration. A significant portion of participants (40.7%) were from Maryland, which may limit generalizability due to regional differences in attitudes toward professionalism and hair bias. Additionally, all hairstyles were worn loose, except for the bun. Prior research suggests that unbound hair is viewed as less hygienic in clinical settings, particularly for orthodontists working in close proximity to patients.[7] This may have contributed to lower ratings for certain hairstyles, independent of racial or aesthetic biases. The higher ratings for braids may reflect their perceived neatness and structural control.

Another methodological limitation lies in the use of a single model for all image conditions. While this approach minimized variability, it may also have influenced participant ratings based on facial features, skin tone, or other individual characteristic unrelated to hairstyle. Additionally, the convenience sampling via online distribution could have introduced selection bias. Participants with greater awareness or sensitivity to hair-based discrimination may have been more inclined to participate, potentially affecting the neutrality of responses.

Social desirability bias is another concern, as respondents may have adjusted their ratings to align with what they perceived as socially acceptable views rather than their genuine perceptions. The age distribution of the sample, with 62.7% under age 35, also limits the study's applicability to older populations. Given that older individuals may adhere more strongly to traditional appearance norms, a more age-balanced sample might have yielded different results.

Although the study explored perceptual differences based on participant race and gender, the subgroup comparisons should be interpreted with caution. The research was not specifically powered to detect statistically significant differences between demographic groups, such as Black versus White or male versus female participants. Therefore, any observed patterns or differences should be viewed as suggestive but not conclusive. To draw more robust conclusions in future research, studies should be designed with appropriate power analyses specifically tailored to investigate these subgroup effects with statistical rigor.

Although the Intraclass Correlation Coefficient (ICC) analysis demonstrated strong response reliability, it does not account for the potential impact of survey fatigue, which may have influenced participant attentiveness over time**.** Survey fatigue occurs when respondents become disengaged due to the length or repetitive nature of a survey, potentially resulting in rushed or patterned responses that compromise data quality**.** In this study, 85 participants began but did not complete the survey, possibly reflecting disengagement related to fatigue or other external factors. Despite these incomplete responses, the final sample size exceeded the threshold required by the initial power analysis, thereby maintaining the statistical validity of the study.

To maintain data integrity, an attention check image was embedded within the survey, and incomplete surveys were excluded from the final analysis. Nevertheless, the repetitive task of rating multiple images using identical questions (72 total questions, excluding the attention check question) may still have impacted attentiveness. Future research should consider mitigating these effects by randomizing image order, reducing the number of questions per respondent, or implementing shorter survey versions to lessen cognitive fatigue.

Another limitation of this study involves the variation in devices used by participants, including smartphones, tablets, and computers. While prior research suggests minimal differences in data quality across devices, some studies indicate that open-ended responses tend to be shorter on mobile screens.[26,27] However, response rates, non-substantive answers, and straightlining behavior remain consistent across devices.[27] Additionally, device choice does not significantly impact response quality indicators, including satisficing behaviors—shortcuts respondents take that may reduce response accuracy—such as acquiescence, mid-point selection, primacy effects, and straightlining, even when self-selected.[28] While mobile users may be less likely to complete longer surveys, response accuracy remains comparable to PC users, except for more detailed open-ended responses from PC participants.[29] Since this study did not include open-ended questions, these differences were unlikely to affect the results.

Screen size and environmental distractions may have influenced image perception, particularly on smaller devices. While mobile users are more likely to be in distracting environments or multitasking,[26] research suggests these factors do not significantly impact response reliability when surveys are optimized for mobile use.[28] Additionally, mobile users took slightly longer to respond, but overall response accuracy remained unaffected.[29] Future research should consider standardizing visual presentation formats or controlling for device type to enhance internal consistency.

Building on the findings of this study, future research should incorporate multiple models to determine whether hairstyle-based biases extend across a broader population of Black female professionals. Including different facial features, skin tones, and expressions would clarify whether results are generalizable across more diverse sample of Black women. Such expansion would allow researchers to examine how different elements of identity intersect with hair-based judgements.

In addition, expanding participant demographics, particularly by age, would offer a more complete picture of how generations norms shape perceptions of professional appearance. Older adults in administrative or leadership roles often hold significant influence in hiring and evaluations, and their perceptions may differ meaningfully from those of younger cohorts. Similarly, recruiting participants from a wider geographic range could provide insight into regional variations in groom expectations. Inclusion of participants from diverse racial, religious, and cultural backgrounds is also recommended. This would help evaluate whether biases are uniquely pronounced within certain demographics or whether they are broadly held.

Another area of exploration involves conducting a parallel study specifically focused on Black male professionals and their hairstyles would address a significant gap in the literature. Given that Black men also face unique appearance-based stereotypes in professional settings, examining perceptions of locs, braids, short cuts, fades, and natural textures among Black male healthcare providers could yield important insights into how racialized grooming standards affect this underrepresented group.

Finally, further research should also examine contextual variations in presentation. For example, it would be useful to evaluate how Afrocentric styles are perceived when tied back versus left loose. Similarly, evaluating perceptions of professional when hair is covered by clinical headwear, such as scrub caps or headwraps, could provide additional insight into how visual presentations interacts with implicit bias.

By continuing to explore these issues, the field of orthodontics can move toward a more inclusive and fairer professional environment—one where providers are evaluated based on skill and expertise, rather than superficial appearance-based judgements. Ensuring that all orthodontists feel supported in their authenticity, without the pressure to conform to Eurocentric norms, will help foster a more diverse, welcoming, and progressive profession that prioritizes high-quality patient care.

CONCLUSION

This study highlights the persistent influence of Eurocentric beauty standards on perceptions of professionalism, particularly for Black female orthodontists. Findings demonstrate that Afrocentric hairstyles and non-natural hair colors are often rated lower in professionalism-related traits, reinforcing implicit biases that can affect patient trust, provider evaluations, and career advancement. These biases reflect deeply ingrained societal norms that continue to shape expectations of professionalism, even in healthcare environments where expertise should be the primary determinant of competency.

By continuing to explore these issues, the field of orthodontics can move toward a more inclusive and fairer professional environment—one where providers are evaluated based on skill and expertise rather than appearance. Ensuring that all orthodontists feel supported in their authenticity without the pressure to conform to Eurocentric standards will create a more diverse, welcoming, and progressive profession that prioritizes patient care above superficial judgments.

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