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Original Article

To Extract or to Restore the Tooth? Color/Race and Clinical Decision Making among Undergraduate Dental Students from Southern Brazil

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Abstract

Objective: To evaluate whether the color/race of a hypothetical patient is associated with the clinical decision to extract or restore a specific tooth, as well as with the recommendation for additional procedures for its adequate treatment. **Material and Methods:** Respondents assessed an anterior tooth with an extensive carious lesion and were asked: whether it should be extracted or restored; how much time should be spent in the first consultation; whether or not root canal retreatment was necessary; and whether complementary exams should be requested. While a Black hypothetical patient was assessed in the first stage of data collection, a White individual was subsequently shown to the study respondents. **Results:** The clinical decision on whether to extract or restore the decayed tooth was not associated with the patient's color/race (p=0.64). The mean time estimated for the first clinical consultation (p=0.28), the need for root canal retreatment (p=0.56), as well as the request for complementary exams were not associated with the patient's color/race (p=0.82). Analyses stratified by the participants' characteristics confirmed the lack of such an association. **Conclusion:** As opposed to previously published findings in Brazil, the patient's color/race was not associated with clinical decision making among undergraduate dental students.

Keywords: Social Discrimination; Health Services; Education, Professional; Oral Health.

Introduction

Discrimination is a social phenomenon that results from intentionally unfair and unequal power relations, which are linked to the wider social organization in its political, social, economic, cultural, and historical dimensions [1]. The social structures that privilege the accumulation of resources, power and stigma, as well as those based on hierarchies of material and symbolic values, interfere with the health-disease process, producing persistent health inequities of significant magnitude [2]. The effects of discrimination on health and well-being are thus widespread across societies, even though the health burden is particularly evident amongst subordinate or minority groups, in which discrimination strongly predicts adverse mental health conditions, adoption of health-damaging behaviors and restricted access to health care or the provision of low-quality care [3-7].

Discrimination is linked to negative consequences for health service users, often through the denial of rights and historical achievements in this sector. In a recent literature review [8], 18 North-American studies examined the effects of discriminatory experiences on patients' satisfaction with care, management of clinical conditions, adherence to antiretroviral therapy among people living with HIV/AIDS, use of health services, care seeking behavior, and discontinuity of care. In general, discrimination was shown to be associated with unfavorable consequences for all these outcomes, as well as a factor that potentially aggravates the health conditions of health care users.

In Brazil, discrimination in the health services has only recently gained widespread attention. The National Policy on the Integral Health of the Black Population (PNSIPN), issued in 2007 [9], seeks, among other things, to reaffirm the principles on which the Brazilian Unified Health System (SUS) is based, including those aimed at the universality and equity of access and provision of services. The PNSIPN thus emphasizes the importance of such principles as core elements in the fight against prejudice and discrimination, such that every user has his/her demands adequately met. It should be noted, however, that the PNSIPN also emphasizes the need to prioritize the reduction of racial-ethnic inequalities in health, as well as mitigate institutional racism and racial discrimination in the SUS.

In compliance with the PNSIPN, its focus on the Brazilian Black population and the federal legislation on which the SUS is based, the present study sought to address the clinical decisions adopted by a group undergraduate dental students at a university in Southern Brazil. Undergraduate dental students are a particularly interesting group for the purposes of this study, as previous research has shown that their level of *moral development* is below normative recommendations in life-related dilemmas [10,11]. Low moral development is potentially linked to unethical professional conduct that eventually exacerbates, or at least, perpetuates social injustices in the provision of care [10,11]. It has also been suggested that the training of dental students still emphasizes *technique over ethics* [10,11]. This is supported by the notion [12] that little discussion of social issues during professional training, including the topic of discrimination, may increase the likelihood of dentists basing their clinical decisions on misconceptions about non-hegemonic social groups.

One major goal of the present study is to focus on tooth extraction, a surgical procedure by which discrimination is very likely to manifest itself. This *treatment* is one of the most emblematic and mutilating procedures in the history of Brazilian Dentistry [13], with a significant impact on quality of life and performance of social functions. Brazilian dental practice has been strongly associated with a large number of tooth extractions, which selectively affects the poorest and most marginalized segments of the population [14]. In Recife (Pernambuco, northeastern Brazil), for example, dentists were more likely to recommend tooth extraction for Black patients than for White ones, even though they showed a similar clinical, socioeconomic and demographic profile [12].

The present study builds on the aforementioned publications and aims to determine whether this association is also observed among dental students from a different region of the country. In particular, this study sought to assess, among undergraduate students from a Dental School in southern Brazil, whether the color/race of a hypothetical patient is related to the clinical decision to extract or restore a carious tooth, to request additional procedures to adequately treat the patient, and to determine how much time is necessary for the first consultation.

Material and Methods

Study Design

This is a quantitative study in which undergraduate dental students were exposed to two hypothetical patients with similar characteristics, except for their racial characterization – one patient was White and the other one was Black (following the terminology used in decennial censuses of the Brazilian Institute of Geography and Statistics – IBGE). While in the first stage of data collection, a Black hypothetical patient was assessed, a White individual was subsequently shown to the study respondents. The first and the second stages of data collection were at least two months apart.

Population and Sample

The study population consisted of undergraduate dental students at a higher-education institution in the city of Florianópolis, SC, southern Brazil, in the second semester of 2014. The students included in the study: had been approved at or were attending disciplines that introduce contents related to the restoration or extraction of decayed teeth; did not have prior knowledge or had not participated in the writing of the project that originated this study; had not requested transfer to another institution or interrupted the course during the fieldwork period; and had not participated in the pilot study.

For sample size calculation, different scenarios were simulated in which the decision to extract the tooth was more frequent for the Black patient compared to the White one. With statistical power set at 80.0% and significance level at 0.05, the sample size needed to estimate a nine-percentage-point difference in the frequency of tooth extraction according to color/race ranged from 100 to 464; these sample size estimates were based on the results of a previous study [12], and

were calculated according to scenarios with distinct global frequencies of tooth extraction. Considering that, in the second semester of 2014, 262 students fulfilled the above-mentioned inclusion/exclusion criteria, all of them were invited to take part in the study.

Data Collection

Data were collected via self-administered electronic questionnaires, which addressed issues relating to socioeconomic status (according to the 2014 classification criteria of the Brazilian Association of Research Companies (ABEP)), type of school (public/private) during primary and secondary education, admission to the university through affirmative action programs (AAPs) (yes/no), sex (male/female), age, color/race ("White," "Black," "Yellow," "Brown," or "Indigenous"); engagement with student activism (yes/no); previous participation in research or academic extension projects (yes/no); and semester of the course in which he/she was at the time of participation in the study.

As mentioned before, the questionnaire also included a hypothetical clinical case, the corresponding anamnesis and five photographs of an anterior tooth with an extensive carious lesion, whose clinical treatment could be: (a) maintenance in the mouth with restorative procedures (cast post-and-core with esthetic crown, for example); or (b) extraction, with subsequent referral for implant placement and/or various prosthetic procedures. Both treatment options were considered feasible, according to previous discussions with three experienced dental specialists in periodontics, prosthesis and bucomaxillofacial surgery. The case was presented to these dental specialists and the discussion indicated that both treatment options (restoration or extraction) were viable and equally acceptable from a strictly clinical perspective. The profile of the hypothetical patient described a 31-year-old single male salesperson, with an average family income of US$460.00, non-smoker, with no signs of problem drinking, high caries activity, good general health, reporting pain in the anterior tooth. Such a profile resembled that of a typical user of the dental school clinic in which most of dental training takes place at the institution. The photographs showed the lower third of the patient's face, the upper and lower dental arches (omitting the lips), the anterior tooth to be examined and the respective periapical radiograph – an auxiliary diagnostic resource commonly used to aid the clinical decision process. The facial photographs were different between the cases, as they showed the patients' color/race. Intraoral photographs were the same for both patients, but, in one case the image was rotated horizontally, and the dental arches were digitally separated and projected on a dark background.

After presentation of the hypothetical case, other questions regarding the clinical decision were administered to the study respondents. The first one was directed to the students who decided to extract the tooth, and addressed the need for other complementary exams (yes, no). The remaining questions were administered to the students who decided to restore the tooth; participants should evaluate the need for endodontic retreatment (yes, no). Students were also asked about the

amount of time needed in the first consultation to perform anamnesis and the first clinical examination.

Prior to fieldwork, a pilot study was carried out in the second semester of 2013, with 27 individuals in their last semester of study. This step contributed to improve fieldwork procedures and allowed us to conclude that the content and structure of the questionnaire did not reveal the central hypothesis of the study: that the students' clinical decisions would vary according to color/race of the hypothetical patient. Indeed, all eligible participants were personally contacted and informed that the research purpose was to investigate factors associated with clinical decision making, without any clear reference to the patient's color/race. This procedure allowed masking of the study objectives and the central research hypothesis. The success of masking was later confirmed by informal contacts with the participants, asking about their impressions upon completing the questionnaire and evaluating the hypothetical clinical cases. The majority of participants reported that it was a survey to assess the technical ability of undergraduate dental students and there was no suspicion at all that the color/race of the patient was part of the hypothesis under investigation.

After a minimum of 2 months of the first contact, study participants were contacted again to assess the second clinical case. The hypothetical patient, whose classification was compatible with the "Black" category in the first stage was replaced with a "White" patient in the second stage. The fieldwork team had 10 members, distributed among the following activities: to get in touch with the students in the classroom and invite them to take part in the study; to refer the participating students to the computer lab; to present the informed consent form (ICF) and give instructions on how to fill in the electronic forms; and to administer the questionnaire. It should be noted that the ICF did not mention the study objectives, thus allowing us to mask the main research hypothesis.

Statistical Analysis

Statistical analyses were carried out using Stata version 13.1. Losses and/or refusals to participate in the survey were computed. Participants were then described as to their socioeconomic and demographic characteristics, as well as educational background (school and university), in both absolute and relative terms. The decisions to extract or restore the tooth, together with the need to request or recommend specific procedures were compared according to the color/race of the hypothetical patients. McNemar's test was used for categorical variables, whereas Wilcoxon's test was used for numerical variables. Both statistical tests took into account the paired nature of data, and probability values lower than 5.0% were considered statistically significant.

Ethical Aspects

The research project was approved by the Research Ethics Committee of the Federal University of Santa Catarina (Process #711.450). All students who accepted to participate in the study signed the ICF and were advised to fill out the electronic questionnaire in the computer lab between September 2014 and March 2015.

Results

A total of 262 undergraduate dental students were invited to take part in the study. In the first contact with the data collection team, 228 students volunteered to participate, but only 211 in the second one. A total of 183 students were interviewed at both occasions, which corresponds to a response rate of 69.9%. However, one student filled out the questionnaire with the same hypothetical patient (same race/color) at both data collection stages and was therefore excluded from the analyses.

The sample comprised 72.7% female students and 27.3% male students, distributed in age groups of 20 to 23 (53.9%) and 24 to 33 years of age (46.1%) (Table 1). The majority identified as White (89.6%) and belonged to economic categories B1 to E, according to the ABEP criteria. Almost half of the students (48.1%) had attended most or the entire elementary education in public schools, while 51.9% had attended most or the entire education in private schools. In contrast, 66.1% attended private high schools. A total of 25.7% of the students was admitted to the university through AAPs. Of the total interviewees, 40.4% had taken part in extracurricular activities, such as research and extension projects.

Table 1. Distribution of the undergraduate dental students according to socioeconomic and demographic characteristics, as well as educational background (school and university).

Characteristics	N	%
Sex		
Female	133	72,7
Male	50	27.3
Age[1]		
20-23	98	53.9
24-33	84	46.1
Color/race		
White	164	89.6
Brown	11	6.0
Black	7	3.8
Not stated	1	0.6
Educational Background – Primary school		
All or most part in a public school	88	48.1
All or most part in a private school	95	51.9
Educational Background – High school		
All or most part in a public school	62	33.9
All or most part in a private school	121	66.1
Economic status		
A1 and A2 (highest purchasing power)	61	33.3
B1 to E (lower purchasing power)	122	66.7
Admission to the university through affirmative action programs (AAPs)	47	25.7
Participation in research/extension projects	74	40.4
Total	183	100.0

[1]For variable "age", n=182.

Table 2 shows the frequency with which restoration or extraction was recommended, according to the patient's color/race. Students were more likely to recommend extraction over

restoration – 78.1% of all participants indicated extraction for, at least, one of the two hypothetical patients. There was no difference in the frequency of the recommended procedure according to color/race: while 19.1% indicated extraction for the Black patient and restoration for the White one, 21.9% recommended extraction for the White patient and restoration for the Black one (p=0.64).

Table 2. Frequency of restoration or extraction of a carious tooth for a Black vs. a White patient.

Clinical Decision	White Patient		Total	p value[1]
	Restore	Extract		
	N (%)	N (%)	N (%)	
Black Patient				
Restore	21.9 (40)	21.3 (39)	43.2 (79)	0.642
Extract	19.1 (35)	37.7 (69)	56.8 (104)	
Total	41.0 (75)	59.0 (108)	100.0 (183)	

Values expressed as % (*n*). [1]McNemar's test.

The analyses presented in Table 3 lend credence to the finding that the clinical decision to extract or restore the tooth was not associated with the patient's color/race: even when the analysis was stratified according to the respondents' characteristics, no association was found between the clinical decisions and the color/race of the hypothetical patient.

Table 3. Frequency of restoration or extraction of a carious tooth for a Black vs. a White patient, according to the respondents' characteristics.

Characteristics	Clinical Decision			p value[1]
	Black Patient	White Patient		
		Restore	Extract	
		N (%)	N (%)	
Age				
20-23	Restore	21.4 (21)	21.4 (21)	0.752
	Extract	19.4 (19)	37.8 (37)	
24-33	Restore	22.6 (19)	20.4 (32)	0.862
	Extract	19.0 (16)	38.1 (32)	
Sex				
Female	Restore	24.8 (33)	23.3 (31)	0.166
	Extract	15.8 (21)	39.1 (48)	
Male	Restore	14.0 (7)	16.0 (8)	0.201
	Extract	28.0 (14)	42.0 (21)	
Admission to the university through affirmative action programs (AAPs)				
No	Restore	22.8 (31)	22.8 (31)	0.166
	Extract	15.4 (21)	39.0 (53)	
Yes	Restore	19.2 (9)	17.0 (8)	0.201
	Extract	29.8 (14)	34.0 (16)	
Economic status				
A1 and A2	Restore	16.4 (10)	21.3 (13)	0.180
	Extract	11.5 (7)	50.8 (31)	
B1 to E	Restore	24.6 (30)	21.3 (26)	0.786
	Extract	23.0 (28)	31.2 (38)	
Educational Background – Primary school				
All or most part in a public school	Restore	22.7 (20)	18.1 (16)	0.262
	Extract	26.1 (23)	33.0 (29)	
All or most part in private school	Restore	21.0 (20)	24.2 (23)	0.063
	Extract	12.6 (12)	42.1 (40)	
Educational Background – High school				
All or most part in public school	Restore	19.4 (12)	21.0 (13)	0.578
	Extract	25.8 (16)	33.9 (21)	

Characteristics	Clinical Decision: Black Patient	Clinical Decision: White Patient – Restore	Clinical Decision: White Patient – Extract	p value[1]
All or most part in private school	Restore	23.1 (28)	21.5 (26)	0.297
	Extract	15.7 (19)	39.7 (48)	
Participation in research/extension projects				
No	Restore	24.8 (27)	19.3 (21)	0.631
	Extract	16.5 (18)	39.5 (43)	
Yes	Restore	17.6 (13)	24.3 (18)	0.866
	Extract	23.0 (17)	35.1 (26)	
Undergraduate semester (period)				
5th period	Restore	26.7 (8)	10.0 (3)	0.132
	Extract	26.7 (8)	36.7 (11)	
6th period	Restore	16.0 (4)	36.0 (9)	0.035
	Extract	8.0 (2)	40.0 (10)	
7th period	Restore	27.3 (9)	15.2 (5)	0.405
	Extract	24.2 (8)	33.3 (11)	
8th period	Restore	13.6 (3)	40.9 (9)	0.285
	Extract	22.7 (5)	22.7 (5)	
9th period	Restore	28.6 (10)	20.0 (7)	0.782
	Extract	17.1 (6)	34.3 (12)	
10th period	Restore	15.8 (6)	15.8 (6)	1.000
	Extract	15.8 (6)	52.3 (20)	

Values expressed as % (*n*). [1]McNemar's test.

Table 4 shows that, when the clinical decision was to extract the tooth for at least one of the patients assessed (n = 69), 13.0% of the respondents pointed out the need to request complementary exams prior to tooth extraction for the Black patient; the corresponding figure was 14.5% for the White patient. However, these differences were not statistically significant (p=0.82), even when stratified by the participants' characteristics (data not shown in the tables, but available from the authors upon request).

Table 4. Frequency of request for complementary exams when the clinical decision was to extract the tooth, according to the patient's color/race.

Need for Complementary Exams	White Patient: No N (%)	White Patient: Yes N (%)	Total	p value[1]
Black Patient				
No	59.4 (41)	14.5 (10)	73.9 (51)	0.819
Yes	13.0 (9)	13.0 (9)	26.1 (18)	
Total	72.5 (50)	27.5 (19)	100.0 (69)	

Values expressed as % (*n*). [1]McNemar's test.

Forty students decided to restore the tooth at both stages of data collection; that is, for both the Black and the White patient. Of these, 45.0% did not find root canal retreatment necessary before restoring the tooth (Table 5). As much as 12.5% of the students indicated the need for retreatment only for the Black patient, and 17.5% of the students made such a recommendation only for the White patient; however, this difference was not statistically significant (p=0.56). It was also observed that such a difference was not related to the patient's color/race, even when the analysis was stratified according to the participants' characteristics (data not shown in the tables, but available from the authors upon request).

Table 5. Frequency with which root canal retreatment was recommended when the clinical decision was to restore the tooth, according to the patient's color/race.

Need for Root Canal Retreatment	White Patient		Total	p value[1]
	No	Yes		
	N (%)	N (%)		
Black Patient				
No	45.0 (18)	17.5 (7)	62.5 (25)	0.564
Yes	12.5 (5)	25.0 (10)	37.5 (15)	
Total	57.5 (23)	42.5 (17)	100.0 (40)	

Values expressed as % (*n*). [1]McNemar's test.

According to the study participants, the estimated duration of the first consultation would be on average 56.4 min (median = 60 min) for the Black patient and 49.5 min (median = 45 min) for the White patient. There was no statistically significant difference between the estimated mean time according to the patient's color/race.

Discussion

The majority of participants in this study, when confronted with a simulated clinical situation in which they should decide between extracting and restoring a tooth with an extensive carious lesion, opted for extracting the tooth. However, the patient's color/race was not associated with this clinical decision. In addition, the estimated mean duration of the first consultation was not different for the Black and White patients. Among the students who decided to restore the tooth, color/race did not correlate with the request for endodontic retreatment. Among the students who decided to extract the tooth, the patient's color/race was also not associated with the need for complementary exams, prior to surgery.

The results of this study differ from those of a previous investigation [12], which revealed that dentists from Recife (Pernambuco) were more likely to recommend extraction for the Black than for the White patient. These contradictory results could be attributed to the profile of the population living in Recife (state of Pernambuco) and Florianópolis (state of Santa Catarina), where the present study was carried out. According to the results of the 2010 Brazilian census, the population living in the first city is mostly composed of Blacks and Browns, while the majority of residents of the second city are classified as White [15]. Income inequality between Whites and Blacks/Browns is also higher in Recife [15]. These data suggest that the greater social distance between Whites and Blacks/Browns in Recife than in Florianópolis could influence the extent to which restorations/extractions are recommended for the hypothetical patients. In this case, extractions would be more likely to be recommended for Blacks/Browns in Recife than in Florianópolis, when compared to Whites.

In the study conducted in Recife in 2005 [15], the participants were dentists and about two-thirds of them were aged 36 years and over. On the other hand, in the present study, participants were undergraduate dental students in the 20-33-year-old age group. The year in which both studies were carried out (2005 in Recife and 2014 in Florianópolis) might also have contributed to the

differences between the results. The new National Curricular Guidelines for Undergraduate Dentistry Courses [16] establish that dentists should "recognize good health and dignified conditions of life as a right;" determines that dental training "should take into account the health system existing in the country," in addition to addressing "the topics referring to the various dimensions of the individual/society relationship, contributing to an understanding of the social determinants [...] of the health-disease process." These changes in the Curricular Guidelines for Undergraduate Dentistry Courses thus emphasize that dental training should not be essentially technical, but also focused on social problems and the SUS principles.

The potential effects of the AAP available at the university should also be considered. The implementation of the AAP aimed at including the university in a contemporary agenda of diversity promotion, which may have impacted on students' training and behavior towards the hypothetical patients. In particular, quotas for Black students (here understood as the combination of individuals classified as Browns and Blacks) may have promoted an academic environment with more racial and socioeconomic diversity thus benefiting the dental students. Also, racial discrimination and its consequences received a much greater attention from 2005 on [4,17]. These changes may have also contributed to suppress discriminatory behaviors in our study sample. These and other related aspects should be further addressed in future research.

The students who decided to extract the tooth in both stages of data collection (n=40) – for both the Black and the White patient – did not recommend complementary exams apart from the periapical radiography. This result did not vary according to the patient's color/race, even when the analysis was stratified according to the respondents' characteristics. In the present study, participants were able to evaluate an extensively carious tooth by photographs and a periapical radiograph. The images showed that the extension of the carious lesion implied root canal reinfection, while the hypothetical patient complained of dental pain; these are fundamental criteria upon which endodontic retreatment should be recommended [18,19]. However, most of the students decided not to retreat the root canal and this result did not vary according to the patient's color/race.

Although the Brazilian Federal Council of Dentistry [20] does not define a minimum duration for the first consultation with the patient, the initial hypothesis of this study was that the duration of the first appointment would be shorter for the Black patient than for the White one. The results showed that the difference between the estimated duration of the first consultation for Black and White patients was not statistically significant. Although stratified analyses by study semester have revealed that some participants attributed longer consultation time for the Black patient and shorter consultation time for the White patient, such differences can be considered as resulting from multiple significance testing.

The results of this study demonstrated that the undergraduate dental students are uncertain about their clinical decisions, since many of them did not hold the same decision in both stages of data collection. As described by some authors [21], the clinical decision-making process is complex

and affected by a range of different factors. The establishment of work routine, the acquired clinical experience, and the development of the ability to critically evaluate the current scientific literature probably mitigate the uncertainties over time.

The lack of association between the patient's color/race and the clinical decisions suggests that undergraduate dental students rely on factors that were not evaluated in this study. The hypothetical patient of this study was represented by a set of photographs and not in person. In real-life situations, unconscious and implicit behaviors (such as body language), the way the person dresses, the vocabulary he or she uses, his or her accent and other personal characteristics significantly interfere with the professional-patient interaction [6]. These factors, which could not be captured in the present study, could increase the likelihood of discrimination taking place [4,6].

Conclusion

The clinical decisions of undergraduate dental students did not vary according to the patient's color/race. It is recommended, however, that other studies using different methodological approaches and focusing on other professional categories be conducted in the future.

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