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Evaluation of oral-health behavioral attitudes of dental students in Switzerland and Brazil

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Original article

Evaluation of oral-health behavioral attitudes of dental students in Switzerland and Brazil

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Abstract

Purpose: This study evaluated the effect of progressive training on the oral health behaviors of dental students from Switzerland and Brazil.
Methods: Dental students from two dental schools (in Zurich, Switzerland, and Goiania, Brazil) were recruited for this study. Dental behaviors of the students in the final 3 years of their 5-year dental curriculum were assessed with the 20-item Hiroshima University-Dental Behavior Inventory (HU-DBI). Nonparametric tests were used to assess intergroup and intragroup differences (significance level: $\alpha = 0.05$).
Results: 190 students (Zurich: $n = 121$, mean age ± SD = 25.5 ± 4.5 years; Goiania: $n = 69$, mean age ± SD = 23.5 ± 2.9 years) of a possible 277 students completed the survey (response rate = 68.6%). The overall mean HU-DBI score was 8.16 ± 1.35 (8.02 ± 1.27 in Switzerland and 8.41 ± 1.47 in Brazil). Age ($P = 0.225$) and sex ($P = 0.145$) were not associated with the scores, but the respondent's nationality seemed to play a role ($P = 0.024$). Progressive training had no effect on the scores ($P = 0.766$).
Conclusions: The present findings show that progressive training has no effect on the oral health behaviors of dental students but the nationality might be a factor.

Keywords; cross-cultural comparison, dental behavior, dental education, dental students, geriatric dentistry, HU-DBI

Introduction

Oral health has improved considerably in industrialized countries. However, the burden of oral diseases, such as dental caries and periodontal disease, persists worldwide [1]. Poor oral health has a massive impact on the quality of life, and there remains a strong need for public health promotion programs that improve dental health behavior worldwide [1]. Dental health care professionals have an important role in improving oral health, creating awareness, and patient education. Therefore, it is of utmost importance that, dental students receive proper guidance and cultivate within themselves a robust attitude pertaining to oral health [2]. Previous cross-cultural studies reported significant differences in oral health attitudes and behaviors of dental students. However, it is difficult to identify the reasons for these differences because of the effects of factors such as the structure of the health care system, language, culture, nationality, origin, age, sex, and socioeconomic status [3-6].

The 20-item Hiroshima University-Dental Behavioral Inventory (HU-DBI) enables the comparison of dental students' oral health behaviors in countries with varying educational curricula. The questionnaire uses 20 items with dichotomous responses (agree or disagree) to examine oral health attitudes and behaviors. Previous studies used the HU-DBI to analyze dental health behaviors of groups such as nurses, dental hygiene students [7], and dental students during their education [8].

To the best of the authors' knowledge, no previous study has examined dental health behaviors and the effects of educational training on the oral health habits, attitudes, and knowledge of dental students in Switzerland. In addition, no study has compared dental behaviors and attitudes of Swiss dental students with those of students from an industrializing nation. Hence, the primary aim of this research was to use the 20-item HU-DBI to assess oral health attitudes and behaviors of dental students in the final 3 years of a 5-year dental training program. The secondary aim was to identify any differences in oral health attitudes and behaviors between dental students in Switzerland and Brazil. Therefore, the primary null hypothesis was that progressive training would have no effect on oral health attitudes or behaviors of dental students in the two countries. The secondary null hypothesis was that oral health attitudes and behaviors would not differ between Swiss and Brazilian dental students.

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Materials and Methods

This study received ethics approval in Zurich (KEK-Zurich: Basec-Nr.: Req-2020-01060). All procedures involving human participants were performed in accordance with the ethical standards of the institutional or national research committee and the principles of the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Questionnaire

The 20-item HU-DBI validated questionnaire was used in this study. The questionnaire was administered, and the responses were received anonymously. No information on the identity of the respondents was collected. The 20-item questionnaire was designed to have dichotomous responses (agree/disagree). The codes of 0/1 for the agree/disagree responses, respectively, were defined according to the question's direction: the higher score (1) indicates better oral health attitudes/behavior. Therefore, the total score (maximum = 12) is derived from summing the scores for the 12 questions, which gives a quantitative estimate of individuals' responses. The present items were chosen because of the high reliability of the scale, as shown in previous studies [7,9].

Along with the questionnaire responses, demographic data such as age, sex, and educational year were collected in the same questionnaire.

Translation

The HU-DBI was translated by using the Medical Outcomes Trust criteria (http://www.outcomes-trust.org/bulletin/0797blltn.htm). The questionnaire was translated from English to German, after which it was back-translated from German to English. The questionnaire was reviewed and checked for any problems in comprehension. When such problems were identified, appropriate corrections were made by consensus among the translators. A Portuguese version of the HU-DBI, used in a study by Ferreira et al. was slightly adapted for Brazilian-Portuguese [10]; this adapted version was used in this study for the Brazilian participants.

Participants

This survey was conducted among dental students in their final 3 years of their 5-year training at the Center of Dental Medicine, University of Zurich, Switzerland, and at the School of Dentistry, Federal University of Goias, Brazil. The dental curriculum in Swiss universities comprises of 3 years of dental school training, which follows after the completion of the preliminary 2 years, in a faculty of medicine. The last 3 years of the 5-year dental curriculum in Brazil focus on clinical training and are preceded by basic and preclinical studies. The participation in this survey was completely voluntary, and the responses received were anonymous. No information related to the identity of students was requested. Participants' consent was indicated by their agreement to complete the questionnaires. In Switzer-

Table 1 Baseline demographics of respondents

	Number of respondents (%)			Age in years, mean ± SD		
	Overall	Zurich	Goiania	Overall (n = 190)	Zurich (n = 121)	Goiania (n = 69)
Total number of respondents / total number of students (%)	190/277 (68.6)	121/123 (98)	69/154 (44.8)	24.8 ± 4.1	25.5 ± 4.5	23.5 ± 2.9[a]
Women (%)	127 (67.2)	73 (60.8)	54 (78.3)[b]	25.1 ± 2.1	25.9 ± 5.5	23.7 ± 3.1
Men (%)	62 (32.8)	47 (39.2)	15 (21.7)	24.3 ± 4.8	25.0 ± 2.1	22.8 ± 1.6
Third year	63	42	21	25.0 ± 5.6	26.0 ± 6.4	23.0 ± 3.2
Fourth year	65	40	25	25.1 ± 3.7	25.9 ± 3.9	23.3 ± 3.1
Fifth year	62	39	23	24.3 ± 2.2	24.7 ± 1.9	24.1 ± 2.2

SD, standard deviation. [a]Brazilian students were significantly younger ($P < 0.001$). [b]The proportion of female students was significantly higher for Brazilian students ($P = 0.012$)

Table 2 Frequencies (%) of responses to the HU-DBI questionnaire (n = 190)

	Switzerland		Brazil		P-value
Items	Agree	Disagree	Agree	Disagree	
I don't worry about visiting the dentist	77 (64.7)	42 (35.3)	16 (23.2)	53 (76.8)	<0.001
My gums bleed when I brush my teeth (D)	4 (3.3)	117 (96.7)	3 (4.3)	66 (95.7)	0.714
I worry about the color of my teeth	38 (32.2)	80 (67.8)	66 (95.7)	3 (4.3)	<0.001
I have noticed some white sticky deposits on my teeth (A)	9 (7.4)	112 (92.6)	32 (46.4)	37 (53.6)	<0.001
I use a child-sized toothbrush	5 (4.1)	116 (95.9)	0 (0.0)	69 (100.0)	0.087
I think I cannot help having false teeth when I am old (D)	5 (4.2)	114 (95.8)	0 (0.0)	69 (100.0)	0.084
I am bothered by the color of my gums	2 (1.7)	118 (98.3)	60 (87.0)	9 (13.0)	<0.001
I think my teeth are getting worse despite my daily brushing (D)	17 (14.2)	103 (85.8)	6 (8.7)	63 (91.3)	0.268
I brush each of my teeth carefully (A)	108 (90.8)	11 (9.2)	46 (66.7)	23 (33.3)	<0.001
I have never been taught professionally how to brush (D)	8 (6.7)	112 (93.3)	6 (8.7)	63 (91.3)	0.608
I think I can clean my teeth well without using toothpaste (A)	12 (10.2)	106 (89.8)	23 (33.3)	46 (66.7)	<0.001
I often check my teeth in a mirror after brushing (A)	89 (74.2)	31 (25.8)	54 (78.3)	15 (21.7)	0.528
I worry about having bad breath	45 (37.5)	75 (62.5)	69 (100.0)	0 (0.0)	<0.001
It is impossible to prevent gum disease with toothbrushing alone (D)	29 (24.4)	90 (75.6)	32 (46.4)	37 (53.6)	0.002
I put off going to a dentist until I have a toothache (D)	9 (7.5)	111 (92.5)	5 (7.2)	64 (92.8)	0.949
I have used a dye to see how clean my teeth are (A)	63 (52.1)	58 (47.9)	18 (26.1)	51 (73.9)	<0.001
I use a toothbrush with hard bristles	15 (12.6)	104 (87.4)	0 (0.0)	69 (100.0)	0.002
I don't feel I have brushed unless I brush with strong strokes	9 (7.4)	112 (92.6)	0 (0.0)	69 (100.0)	0.020
I feel I sometimes take too much time to brush my teeth (A)	43 (35.5)	78 (64.5)	45 (65.2)	24 (34.8)	<0.001
I have had my dentist tell me that I brush very well	83 (69.7)	36 (30.3)	47 (68.1)	22 (31.9)	0.815

Data are presented as number (%). D, correct response is "disagree"; A, correct response is "agree". Total frequencies do not sum to 190 because of missing responses

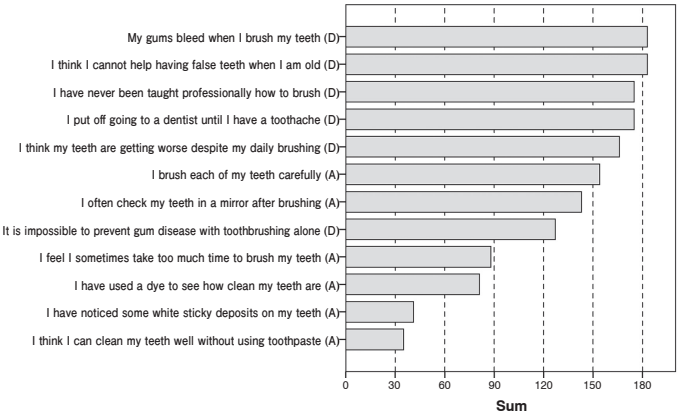

Fig. 1 Frequencies of positive responses (yes) to the 12 questions used to calculate total scores for the HU-DBI questionnaire

land, the questionnaires were handed to the students in a classroom session supervised by one of the investigators (V.W.), who addressed any questions or concerns that arose during completion of the questionnaire. In Goiania, a classroom session was not possible because of coronavirus disease 2019 (COVID-19) pandemic restrictions, and the questionnaires were circulated and returned electronically by email.

Sample size

An attempt was made to ensure maximum participation of all enrolled dental students in the current academic year from the University of Zurich, Switzerland, and the Federal University of Goias, Brazil.

Statistical analysis

Data were extracted from the completed questionnaires and scored appropriately. Mean scores were then calculated and verified for a normal distribution. Nonparametric statistical tests (Mann-Whitney and Kruskal-Wallis tests) were used to examine intergroup and intragroup differences with the level of statistical significance set to $\alpha = 0.05$. Further analyses assessed associations of the demographic variables with response scores. All statistical analyses were performed with IBM-SPSS 25.0 software.

Results

There were 190 respondents of a possible 277 students (overall response rate 68.6%): 121 (63.7%) respondents in Zurich and 69 (36.3%) in Goiania (Table 1). Two-thirds were female (67.2%), and age ranged from 19 to 44 years (mean = 24.4; SD = 4.2). Concerning the number of students per educational year, similar numbers of students completed the survey (Table 1). As compared with the Swiss students, the Brazilian students were younger ($P < 0.001$) and had a higher proportion of females ($P = 0.012$).

Table 2 summarizes the questionnaire items and actual responses (yes/no) for each of the 20 items for the respondents in Switzerland and Brazil. Overall, awareness of oral health was higher for Brazilian students than for their Swiss peers. Figure 1 summarizes the correct responses used to calculate the summative estimates of dental health behavior from the responses to the 12 items of the HU-DBI, in a descending order of the summative scores.

Respondent total scores ranged from 4 to 11 (mean ± SD = 8.16 ± 1.35). Total score did not significantly differ in relation to sex ($P = 0.145$), age ($P = 0.225$), or graduation year ($P = 0.766$), as shown in Table 3. However, a significant difference was found between respondents in Switzerland and Brazil ($P = 0.024$, Table 3). The difference between the two samples is shown in Fig. 2.

Figure 3 shows the differences between the two samples, by questionnaire item. There were differences for six questions: three that were favorable for Goiania (more positive behavior for questions #4, #11, and #19) and three that were favorable for Zurich (more positive behavior for

Table 3 Mean scores for HU-DBI questionnaire, by study group (n = 190)

	Categories	n	%	Mean (SD)	Median (IQR)	P-value
All respondents	–	190	100	8.16 (1.35)	8.0 (2.0)	–
Sex	Female	127	66.8	8.24 (1.41)	8.0 (1.25)	0.145*
	Male	63	36.3	8.00 (1.23)	8.0 (2.0)	
Age group (3 missing responses)	19-22	61	32.6	8.44 (1.18)	9.0 (1.0)	0.225**
	23-26	91	48.7	8.05 (1.38)	8.0 (2.0)	
	≥27	35	18.7	8.06 (1.53)	8.0 (2.0)	
Educational year	3rd	63	33.2	8.05 (1.33)	8.0 (2.0)	0.766**
	4th	65	34.2	8.20 (1.43)	8.0 (1.0)	
	5th	62	32.6	8.24 (1.31)	8.0 (2.0)	
Site	Zurich	121	63.7	8.02 (1.27)	8.0 (2.0)	0.024*
	Goiania	69	36.3	8.41 (1.47)	9.0 (1.5)	

*Mann-Whitney test; **Kruskal-Wallis test

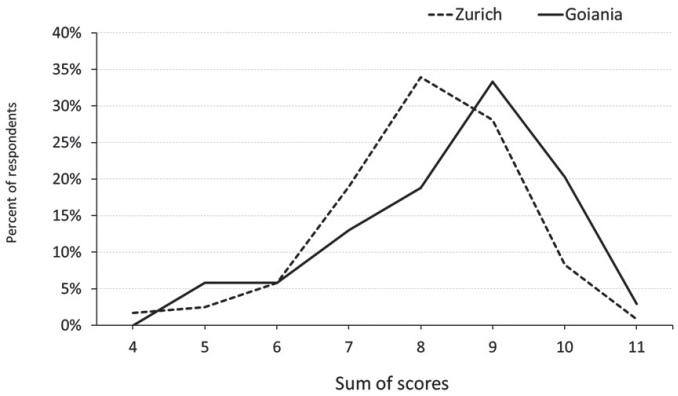

Fig. 2 Distribution of respondent total scores, by study site

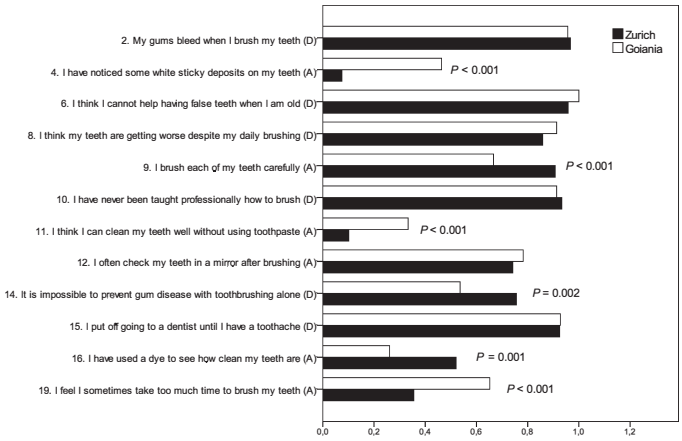

Fig. 3 Differences between the two sites (Zurich vs Goiania) in mean scores for items used to calculate total score P-values for the Mann-Whitney test (significance, $P < 0.05$)

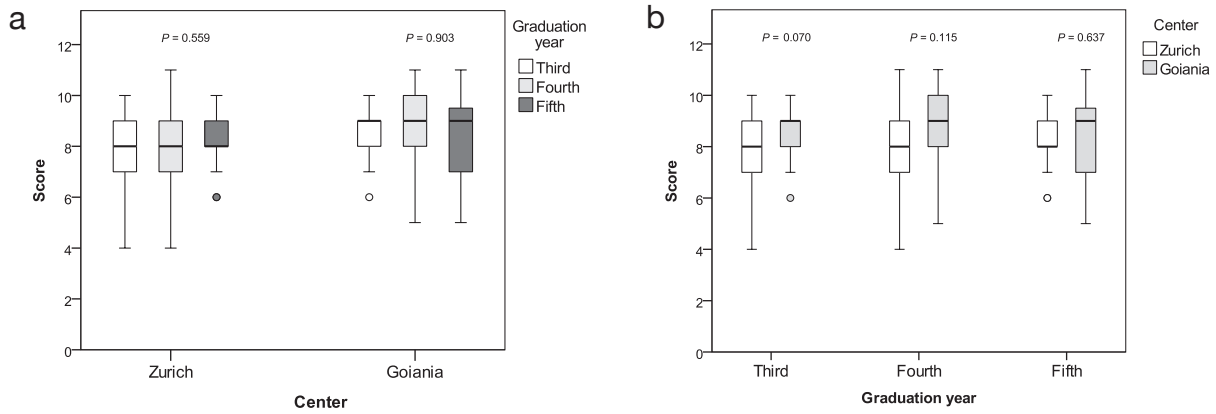

Fig. 4 a: comparison of educational years for each site (significance, $P < 0.05$); b: comparison of sites for each educational year (significance, $P < 0.05$)

questions #9, #14, and #16). No difference was observed when respondents were grouped by site (Zurich vs Goiania) or educational year (Fig. 4).

Discussion

This study revealed that dental behavior attitudes of dental students in Zurich and Goiania did not improve during their training. Hence, the primary null hypothesis is not rejected. This finding confirms the results from a previous study that noted no improvement after progressive training, i.e., dental behaviors of dental students did not improve as they progressed through the years in their dental curriculum [11]. However, several other studies reported a positive effect of progressive training on dental behaviors of dental students [3,12-16]. Most of these studies were cross-sectional, and only one study [16] compared the same medical dental students, at entry in to the university and then after 5 years. This discrepancy in the results is attributable to many factors, including participant differences in culture, language, the structure of the health care systems and socioeconomic status of the countries, and level of education [3-6].

Another possible reason why the level of education influenced the dental behaviors might have been that participants' attitudes were poor at baseline. Education and awareness might have helped to improve this, which was reflected in the study findings [15]. The students who participated in these studies were from diverse socioeconomic backgrounds and this also may have played a role in the improvement of their HU-DBI scores [17]. However, most previous studies, despite showing improvement in the attitudes of dental students through progressive learning, highlighted the need for improvement through comprehensive programs [15,18,19]. Another hypothesis is that oral behavioral attitudes would improve shortly after

admission to university or during the first years of the dental curriculum. However, this assumption is only speculative and to test this hypothesis, a future study should assess within-subject change in HU-DBI scores from the first year and to the final year. Although the total scores of the present participants improved, the differences were not statistically significant. If participants from the first year (at entry to university) had been compared with the participants from the final year, or if a group of participants had been followed from their first educational year until graduation, the findings might have been significant, as was demonstrated in a previously published study [12]. The present study included participants only from the final 3 years, hence, the true effect of progressive training may have been masked. Therefore this must be considered a limitation of the current study.

This study further evaluated whether the dental behaviors of students from two different cultural backgrounds would be similar. In fact, the dental behaviors and attitudes of the dental students in Zurich and Goiania differed. The HU-DBI scores for Brazilian students were higher than those for Swiss dental students. Therefore, the secondary study hypothesis is rejected. It was expected that the scores for the Swiss dental students would be higher, as they hail from an industrialized nation with better access to quality dental care, better affordability, and higher socioeconomic status. However, the present findings contradicted the expectations: the HU-DBI scores of Brazilian students were significantly higher. The reasons for this difference are unclear.

Many would assume that the superior healthcare and socioeconomic status of the Swiss would lead to greater student dental awareness [3]. Perhaps the Swiss students might have already possessed positive attitudes because of cultural awareness and education toward dental care, because of which they might not explicitly dedicate more care than required. This phenomenon has been observed in the dental behavior of Finnish students [3]. The absence of the above-mentioned aspects could explain why Brazilian students sought to dedicate more effort to their dental care. However, these assumption cannot be proven by the present findings, as there were significant differences in six items in the questionnaire (Fig. 3): three were favorable for Goiania and three for Zurich. These differences show an equal distribution of positive differences between the participants. Cross-cultural differences have been observed in dental behaviors of students, even when comparing industrialized nations (Japan vs. Finland) [3]. In Finland, students are taught concepts of prevention, such as the need for professional oral care, early in their training, and their main focus is improving patient oral hygiene [3]. Perhaps the curriculum lacks a more deliberate emphasis on self-care. This may help explain the Swiss students' lower scores in the present study. Brazilian and Swiss students differed in relation to age and sex, and this might have also affected HU-DBI scores. Silva et al. [20] asked a group of Brazilian undergraduate dental students to assess the aesthetics of their own smiles. Students had a positive perception of their smile, although women were less satisfied than men, and the desire for whiter teeth was greater for students in earlier years than for those in later years. The authors suggested that because students enroll in Brazilian dental schools at a young age (17-20 years) student identity is strongly influenced by the media and other external references, which have powerful effects on adolescents. Thus, the attractiveness of their smile plays a key psychosocial role [20].

Another cross-cultural study, by Komabayashi et al., revealed that Chinese students were more concerned than British students about the appearance of their teeth, gums, and halitosis [5]. Similar findings were observed in the present study: Brazilian students were more concerned than Swiss students about the appearance of their teeth. This does not mean that Swiss students are not concerned about the appearance of their teeth, only that their scores were significantly lower. The proportion of women was higher in the Brazilian sample (78.3%) than in the Swiss sample (60.8%), and it has been frequently reported that awareness of oral health care is higher in women [21].

Swiss, regardless of socioeconomic status, are granted access to health care including dental care, because of the very complex health care system in Switzerland [22]. In contrast, this type of health coverage does not exist in Brazil [23]. Persons with lower socioeconomic status have no or minimal access to dental care, and public services usually only cover emergency treatments and primary oral healthcare. However, persons with higher socioeconomic status seek dental care from private care providers [24], although there is a demand for equitable provision of care regardless of socioeconomic status [25]. This could be an important factor as to why Brazilian students were more concerned about their oral health.

In conclusion, the present findings indicate that oral health behaviors differ between dental students in Switzerland and Brazil but are not associated with age, sex, or progressive education. Moreover, although the oral health behaviors of dental students were not associated with progressive education, they were associated with nationality. The effects of societal, economic, and cultural differences between countries on student perceptions and attitudes toward oral health should be investigated in a future study.

Acknowledgments

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Conflicts of interest

The authors declare no conflicts of interests related to this study.

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