

# Impact of Fake Braces on Oral Health Related Quality of Life: A Web-Based Cross-Sectional Study

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## Research article

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# Abstract

**Background** Fake braces have become popular as fashionable appliances in some parts of the world, however, there is a scarcity of information about their effects on various aspects of quality of life. Therefore, our aim was to investigate the effects of fake braces on oral health related quality of life (OHRQoL).

**Methods** A cross-sectional study was carried out with data collection from a Google form questionnaire distributed in Saudi Arabia via various forms of social media over a period of four months. OHRQoL was assessed using the validated Arabic version of the Oral Health Impact Profile-14 (OHIP-14) questionnaire. Fake braces group included respondents who had braces installed for fashion purposes only. Therapeutic braces group included subjects who were wearing braces to treat any malocclusion problems. Control group included participants who did not have any kind of braces. People who had previously completed orthodontic treatments were excluded from the study. The negative impacts were divided into seven domains and a total OHIP score was calculated. Statistical analyses and data illustration were performed with SPSS Statistics (v. 25).

**Results** A total of 1167 people voluntarily participated in the study. More than 60% of the participants were in the control group while 30% had conventional braces for therapeutic reasons and less than 5% had fashion braces under investigation. Sociodemographic distributions varied among the groups and the majority of the subjects in fake braces group had education below the university level with family income of less than average. There were no significant group differences in total OHIP scores. Physical pain was the most frequently reported complaint by all subjects and was the highest in the therapeutic braces group. People with fake or therapeutic braces reported significantly higher functional limitation and physical disability than the control. Yet, fashion braces group reported significantly lower psychological discomfort and disability compared to the therapeutic braces or control groups.

**Conclusions** The illustrated effects of fake braces on OHRQoL in this study suggests the need to study the role of social media and educate the public on the use of braces to minimize the negative effects experienced by individuals.

## Background

Optimum oral health is an essential part of the overall health of an individual. Poor oral health can significantly lower a person's quality of life by negatively affecting their functions such as eating, speaking and smiling as well as their social life<sup>1</sup>. It is therefore necessary to assess the oral health related quality of life (OHRQoL) in disease, during treatment as well as after treatment<sup>2</sup>. OHRQoL is a multidimensional construct that includes a subjective evaluation of an individual's oral health, functional wellbeing, emotional wellbeing, expectations and satisfaction<sup>3</sup>. OHRQoL is worth looking at since orthodontic treatment is seen to have both advantageous and adverse effects associated with the execution of treatment. For instance, some previous studies found that when compared with pretreatment, a patient's OHRQoL is frequently worse during orthodontic treatment with oral symptoms and functional limitations, but it is better in some aspects such as emotional wellbeing<sup>4,5</sup>.

Although orthodontic treatment is necessary and beneficial in most malocclusion cases, many patients hesitate to get the appropriate treatments because the cost of fixed orthodontic appliance is high. The high demand for braces due to increasing aesthetic concerns of the public, preferred prolonged specialty education to become orthodontists and longtime commitment necessary to correct the malocclusion are some of many factors that lead to high costs of orthodontic treatments<sup>6</sup>. Due to the high cost and the belief that orthodontic treatment is elective luxury, braces have become a sign of financial prosperity in some south Asian countries<sup>7</sup>. It has become a symbol of status, wealth and style. Cheap braces or braces like jewelry are now available at a much lower cost, which can be fitted in a dental office or even at home. These fake braces may change OHRQoL in a positive or negative way. However, there is a scarcity of knowledge in that regard as not much, if any research,

has been done. Therefore, the objective of this study was to investigate the effects of fake braces on OHRQoL in comparison with conventional therapeutic braces as well as control group without any type of orthodontic appliances.

## Methods

Ethical approval (# CODJU-18081) was reviewed and approved by the ethical committee of the scientific research unit, College of Dentistry, Jazan University before commencement of the research.

A cross-sectional study was conducted to investigate the relationship between type of braces patients wear and OHRQoL. Participants were classified into three groups – therapeutic braces, fake braces and control groups. Therapeutic braces group included subjects who were wearing braces for orthodontic treatment purposes. Fake braces group included subjects who were wearing braces for fashion only. The control group included subjects who were not wearing any kind of braces. Exclusion criteria included those subjects who reported having completed any type of orthodontic treatment.

After pre-testing, a google form questionnaire in Arabic language was distributed to residents in Saudi Arabia via social media including What's App, Twitter, Facebook, Instagram and Snapchat for four months from November 2018 to February 2019. Before answering the questions, informed consent was provided and parental consent was required for participants under the age of 18. Each participant was asked to provide sociodemographic information such as age, gender, educational level, family income, smoking status and frequency of brushing, as well as, noticing teeth color changes. Participants wearing fashion braces were asked to provide their background information, including cost of the braces, location of braces placement, classification of braces provider, opinions on the price, whether they visit their providers periodically and frequency of dental visits.

OHRQoL was assessed using the validated Arabic version of OHIP-14 questionnaire<sup>8</sup>. Participants were asked to rate the frequency they had experienced various negative impacts regarding oral health during the previous 12 months. The items included: had problem pronouncing words, felt sense of taste worsened, had painful aching in mouth, found it uncomfortable to eat food, have been self-conscious, felt tense, had an unsatisfactory diet, had to interrupt meals, found it difficult to relax, have been a bit embarrassed, have been irritable with people, had difficulty doing useful jobs, felt life in general less satisfactory, and have been unable to function. Responses were recorded on a 5-point Likert-type scale (0 – never, 1 – hardly ever, 2 – occasionally, 3 – fairly often and 4 – very often).

After the participants' responses were collected, the OHIP-14 questions were divided into seven domains – functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap. Following the OHIP protocol, each domain included two different daily activity questions from the questionnaire<sup>9</sup>. The domain score was calculated by adding up the numerical response of each question. Then, total OHIP score was obtained for each participant by adding up the scores of all seven domains. Overall, the higher the domain score, the poorer the OHRQoL.

## Statistical analysis

Statistical analysis and data illustration were performed with SPSS Statistics (v. 25; IBM, NY).

Mean and percentage distribution was calculated for subject background information. In order to compare the participants' profile according to types of braces, Chi-square analysis was performed. All variables were tested for normality using the Shapiro–Wilk test and statistically analyzed to identify any differences between the three groups. According to the normality of the data, non-parametric Mann-Whitney U test, Kruskal Wallis test with post-hoc Dunn's Bonferroni test were carried out to assess the significant differences in the seven domains among gender, educational levels, family income and type of braces. Finally, Spearman correlation was calculated to evaluate the association among the variables. The p-value was set at 0.05 for all tests.

## Results

# Sociodemographic distribution of the participants

A total of 1167 people participated in the questionnaire; 41.6% were male and 58.4% female. The mean age of all subjects was 26.6 years old with the youngest being 12 years old and the oldest being 62 years old. The majority of the participants (62.7%) were in the control group with no history of orthodontic braces, whereas 33.8% wore orthodontic braces for therapeutic purposes and 3.5% wore orthodontic braces for fashion purposes.

In terms of educational level, 73.6% of subjects had university-level, 20.5% high school-level, 5.1% intermediate-level and 0.8% elementary-level education. The majority of the subjects in the fake braces group (73.2%) had education below the university level. On the other hand, the majority of subjects in the therapeutic braces group and the control group had the university level of education (74.6% and 75.7%, respectively).

The subjects were similarly divided into three family income groups, 35.7% earning more than average, 32.2% less than average and 32.0% average. The majority of the subjects in the fake braces group had family income of less than average, while 19.5% of them had average or more than average family income. The distribution of family income in the therapeutic braces group was close to each other. The family income in the control group was 38.1% earning more than average, 29.5% less than average and 32.4% average. See Table 1 for distribution of subjects' background.

Table 1  
Distribution of subjects according to background profiles such as gender, type of braces, educational level, family income, smoking/shesha, frequency of brushing per day and noticing teeth color changes.

Background information	Distribution
Cost of braces	1068.1 ± 1488.2 SAR
Location of braces placement	3.2%
- Government clinics	96.8%
- Private clinics	0.0%
- By myself at home	
Classification of braces provider	40.6%
- Orthodontist	21.9%
- General dentist	6.3%
- Dental assistant	31.3%
- Do not know	
Subjects' opinions on the price of face braces	36.4%
- Suitable (cheap)	36.4%
- Somewhat suitable (average)	27.3%
- Unsuitable (expensive)	
Whether subjects visit their providers periodically	69.7%
- Yes	30.3%
- No	
Frequency of visits	41.9%
- Every month	16.1%
- Every two months	3.2%
- Every three months	22.6%
- Every four months	16.1%
- Not at all	

The majority of the participants (96.8%) had their fashion braces placed in private clinics. 40.6% of the fashion braces were placed by orthodontists, 21.9% by general dentists, and 6.3% by dental assistants; 31.3% of the participants with fashion braces were not aware of the specific classification of who placed the braces. 36.4% of subjects with fashion braces perceived the cost of the fashion braces as suitable and/or somewhat suitable while 27.3% perceived it as unsuitable (expensive).

The majority of the subjects in the fashion braces group (69.7%) reported visiting their providers periodically. 41.9% visited their providers every month, 16.1% every two months and 3.2% every three months. On the other hand, 22.6% reported visiting their providers every four months and 16.1% making no visits at all. Results are summarized in Table 2.

Table 2

Distribution of subjects with fashion braces according to where the braces were placed, who placed the braces, what subjects think about the cost of braces, whether subjects visit their providers periodically and how often subjects visit their providers.

OHIP Domains	Fashion braces (F) Mean (SD)	Therapeutic braces (T) Mean (SD)	Control (C) Mean (SD)	Significant Pairs
Physical pain	3.07 (2.317)	4.39 (1.694)	3.04 (1.897)	T vs. C; F vs. T
Functional limitation	1.80 (2.250)	1.42 (1.520)	1.06 (1.514)	T vs. C; F vs. C
Physical disability	2.22 (2.632)	2.34 (1.920)	1.43 (1.709)	T vs. C; F vs. C
Psychological discomfort	1.12 (1.805)	1.57 (1.818)	2.59 (2.295)	T vs. C; F vs. T
Psychological disability	1.34 (2.069)	1.68 (1.578)	2.09 (1.908)	T vs. C; F vs. C
Social disability	1.10 (1.895)	0.98 (1.397)	1.53 (1.793)	T vs. C
Handicap	0.44 (1.415)	0.78 (1.258)	1.19 (1.657)	T vs. C; F vs. C
Total OHIP	11.10 (10.754)	13.16 (7.775)	12.93 (10.054)	

## Impact of Fake Braces on OHRQoL

Overall, the total OHIP scores showed no significant differences among the three groups. However, all subscale scores of OHIP domains showed significant differences among them (Table 3).

Table 3

Mean and standard deviation of OHIP domain scores for fashion braces, therapeutic braces and control groups as well as pairs of groups that showed significant differences in the OHIP domain scores. F

	Functional limitation	Physical pain	Psychological discomfort	Physical disability	Psychological disability	Social disability	Handicap	Total OHIP
Age		-0.085 (0.004)			-0.058 (0.046)			-0.060 (0.043)
Gender		0.110 (0.000)		0.074 (0.011)				
Educational level	-0.104 (0.000)	-0.070 (0.017)						
Family income		-0.072 (0.013)		-0.093 (0.001)	-0.072 (0.014)		-0.093 (0.002)	-0.088 (0.003)
Smoking / shesha				0.060 (0.043)				
Frequency of brushing	0.098 (0.001)	0.065 (0.027)						0.061 (0.036)
Noticing teeth color changes	-0.113 (0.000)	-0.132 (0.000)	-0.189 (0.000)	-0.109 (0.000)	-0.141 (0.000)	-0.135 (0.000)	-0.106 (0.000)	-0.186 (0.000)
Noticing teeth color changes because of braces			0.164 (0.030)					

Physical pain was the most frequently reported complaints among all participants. Subjects wearing therapeutic braces reported significantly greater physical pain than those with fashion braces or those with no history of orthodontic treatment. On the other hand, subjects wearing fashion braces showed similar level of physical pain to the control group. Subjects with fake braces or therapeutic braces reported significantly higher levels of physical disability and functional limitation when compared to the subjects in the control group with no significant difference between them.

As compared with subjects with fashion braces or therapeutic braces, the control subjects had significantly higher psychological discomfort and psychological disability. Furthermore, the average scores for psychological discomfort and psychological disability in subjects with therapeutic braces was higher but not significantly different from those with fashion braces.

## Factors Influencing OHRQoL

Age, gender, educational level and family income showed significant differences and significant correlations in oral health impact as shown in Table 4. Weak negative correlation was observed between age and physical pain, psychological disability and total OHIP. Females had higher physical pain and physical disability than males. Educational level showed significant differences in functional limitation with subjects in high school level reporting higher mean functional limitation scores than those in the university level or above. Educational level showed negative correlation with functional limitation and physical pain.

Subjects with less family income group showed higher mean scores in all OHIP domains and total OHIP when compared to subjects with higher family income. Moreover, subjects with average family income reported higher average score in physical disability and handicap domains, as well as, total OHIP than subjects with high family income. Family income correlated negatively with all OHIP domains and total OHIP except functional limitation, psychological discomfort and social disability.

Significant weak correlation was also observed between OHIP domains and smoking, frequency of brushing and noticing teeth color changes as shown in Table 4. Smoking correlated positively with physical disability. Frequency of brushing showed weak positive correlation with functional limitation, physical pain and total OHIP. Noticing teeth color changes illustrated negative correlation to all domains, while noticing teeth color changes after teeth movement showed only negative correlation with psychological discomfort.

	Functional limitation	Physical pain	Psychological discomfort	Physical disability	Psychological disability	Social disability	Handicap	Total OHIP
Age		-0.085 (0.004)			-0.058 (0.046)			-0.060 (0.043)
Gender		0.110 (0.000)		0.074 (0.011)				
Educational level	-0.104 (0.000)	-0.070 (0.017)						
Family income		-0.072 (0.013)		-0.093 (0.001)	-0.072 (0.014)		-0.093 (0.002)	-0.088 (0.003)
Smoking / shesha				0.060 (0.043)				
Frequency of brushing	0.098 (0.001)	0.065 (0.027)						0.061 (0.036)
Noticing teeth color changes	-0.113 (0.000)	-0.132 (0.000)	-0.189 (0.000)	-0.109 (0.000)	-0.141 (0.000)	-0.135 (0.000)	-0.106 (0.000)	-0.186 (0.000)
Noticing teeth color changes because of braces			0.164 (0.030)					

**Table 4.** Results of Spearman Correlation tests for relationship between OHIP domains and age, gender, educational level, family income, smoking / shesha, frequency of brushing, noticing teeth color changes, noticing teeth movement after braces and noticing teeth color changes because of braces. Only statistically significant correlation coefficient and p-values are shown.

## Discussion

This study is considered the first in which the effect of fake braces on OHRQoL has been evaluated. The results have shown that changes in OHRQoL occurred with wearing braces for fashion only. Fake braces group had significantly greater negative effects on functional limitation and physical disability. Nevertheless, fake braces group reported significantly positive impacts on psychological discomfort and disability.

Along with factors such as long treatment period and discomfort of the appliances, the high cost is one of the main concerns of orthodontic devices<sup>6</sup>. Currently, braces have become symbols of wealth and fashion accessories in some parts of Southeast Asia. The problem is that as fashion braces emerged as a statement of financial status, they have been advertised and sold through social media by unqualified personnel. In addition, the quality of the orthodontic brackets is low and cases of metal toxicity from those braces have been reported<sup>10</sup>. Investigating the impact of those non-therapeutic braces on quality of life is as important as studying uncovering potential health risks because deeper understanding of the consequences of

fashion braces will enable the patients to provide informed consent, give them realistic expectations and provide a more accurate analysis of cost and benefits of the devices<sup>11</sup>. This study, therefore, was conducted to assess the impact of fashion braces on OHRQoL with the hope of filling the gap of knowledge about fake braces and educating the public about the effects of fake braces.

Overall, the total OHIP scores showed no significant differences among the three groups of subjects. Interestingly, both fashion and therapeutic braces groups showed lower levels of psychological discomfort, psychological disability, social disability and handicap than the control group. This is consistent with a previous study that showed decrease in all these criteria over time in individuals with conventional or self-ligating orthodontic devices<sup>12</sup>. Considering these OHIP domains consisted of questions regarding topics such as self-consciousness, embarrassment and dissatisfaction with life, this result suggests that wearing braces, therapeutic or fashion, could improve a person's psychological and social well-being. These results concur with other studies underscoring the positive effects of orthodontic interventions on OHRQoL as well<sup>4,13</sup>. Compared to the therapeutic braces group, the fashion braces group showed even lower levels of psychological discomfort and psychological disability, which means that fashion braces may indeed help people feel more confident and satisfied with themselves.

Despite the psychological and social benefits, both fashion and therapeutic braces groups showed greater functional limitation and physical disability than the control group, which is supported by a recent study that found a worsening trend in patients' OHRQoL during orthodontic treatments<sup>5</sup>. In particular, fashion braces group showed significantly greater deterioration in these two criteria than the control group. In other words, people with fashion braces had more problems pronouncing words, felt sense of taste worsened, had unsatisfactory diets and had to interrupt meals due to their braces. People may prioritize the psychological benefits obtained by wearing fashion braces, but it is worth thinking about what the long-term physical and functional consequences will be.

The high cost of orthodontic treatment is one of the main considerations in terms of patient treatment decisions, so it is important to investigate the relationship between family income and OHRQoL. In this study, family income showed negative correlation with all OHIP domains except for functional limitation, psychological discomfort and social disability. The low-income group showed higher OHIP domain level as well as total OHIP score when compared to high-income group. Simply put, low-income subjects suffered from more problems than high-income subjects did. Even when high-income subjects were compared to average-income subjects, negative correlations between income and physical disability, handicap and total OHIP score were observed. High-income individuals reported fewer problems eating and functioning in life while wearing braces. This was in consensus with a previous study conducted in Sweden that showed significant association between poor OHRQoL and low income as well as having no economic resources<sup>14</sup>. These results suggest that high-income subjects generally had fewer problems with their braces perhaps because they had more resources to properly address the difficulties when needed. For instance, they may have been able to visit their orthodontists more often to have therapeutic braces adjusted. Subjects with high family income may have had higher quality braces installed on their teeth from the beginning as well.

In this study, cross-sectional design was utilized as it is illegal to do a prospective study on fashion braces in Saudi Arabia and private dental centers were unwilling to cooperate. One main drawback of this study was that non-probability population sampling was used. Since the survey was distributed online as a Google form questionnaire via social media including What's App, Twitter, Facebook, Instagram and Snapchat, not all residents in Saudi Arabia had an equal chance of being selected as participants in this study. For instance, the mean age of the subjects who responded to the survey was 26.6 years old, which suggested that the younger population is more likely to use these types of social media to express their opinions. Moreover, there was not an equal representation of the three groups as more than 60% of the participants did not wear any braces while less than 5% of the subjects had braces for fashion purposes. Since this survey was conducted as a pilot study with a small sample size, it is not safe to assume that the sample fully represents the target population. The results should be accepted with the realization that the study may lack representation of the population.

Despite the limitations, there were interesting results observed in this study in terms of the distribution of the samples. More than 70% of the subjects in the fashion braces group had education below the university level whereas more than 70% of the subjects in the therapeutic braces or control group had university level education. This conforms with the conclusion that the patients' educational level had direct influence on their knowledge and behavior regarding the main oral diseases and preventive measures<sup>15</sup>. It also supports a previous study in London that found low educational level has an independent negative impact on OHRQoL in older people<sup>16</sup>. People who have university level education may be more knowledgeable about the therapeutic effects of conventional braces and detrimental effects of fake braces, so they may be more likely to avoid fashion braces. People who have university level education are also more likely to have enough resources to afford therapeutic braces instead of fashion braces.

In terms of family income, the subjects of this study were somewhat equally divided between three groups of income less than average, average and more than average. Since fashion braces are cheaper versions of braces, it is not surprising that the majority of subjects in the fashion braces group had family income less than the national average in Saudi Arabia. This agrees with a previous study in which more than half the respondents came from a low-income family and the results showed that they thought fake braces could be a cheaper and faster alternative to conventional orthodontic appliances<sup>7</sup>. Many people from low-income families are unaware of the high fees and long duration of orthodontic treatments, needless to say the potential health risks posed by fake brace. They also have a strong desire to follow the trend of wearing braces as a symbol of financial status.

## Conclusion

Based on the preliminary results of this study that showed changes in OHRQoL, it is highlighted that the need exists for further studies examining the intricate role of social media on patient treatment decisions. The fact that fake braces are easily purchased on the internet or even at shopping centers<sup>5</sup> highlight the urgency for this investigation. As patients are getting exposed to more online advertisements glamorizing the use of do-it-yourself orthodontic appliances in creating the perfect smile, it is important to properly educate the public on the use of braces.

## Declarations

Abbreviations: (OHRQoL) oral health related quality of life; (OHIP-14) Oral Health Impact Profile-14.

Ethics approval and consent to participate: Ethical approval (# CODJU-18081) was reviewed and approved by the ethical committee of the scientific research unit, College of Dentistry, Jazan University before commencement of the research. Consent to participants was provided before answering the questionnaire. Parental consent was required for participants under the age of 18.

Consent for publication: The authors confirm that the material presented in this manuscript has not been published before nor has it been submitted for publication to another scientific journal or being considered for publication elsewhere. The authors also understand that should the submitted material be accepted for publication in the journal, they will automatically transfer copyright to the publisher.

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Authors' contributions:

- ZH: conception and design of the study, acquisition of data, drafting the article and revising it critically for important intellectual content.
- CHS: analysis and interpretation of data, drafting the article.
- SM, HN, HS: acquisition of data.
- SS: conception and design of the study, final approval of the version to be published.
- NKA: analysis and interpretation of data, revising and final approval of the version to be published.

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