Effect of Dentists' Appearance Related with Dental Fear and Caries Status in 6-12 Years Old Children

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Objective: *The aims of this study were to determine the prevalence of dental fear, the relationship between dental fear and dental caries and the dentist appearance most likely to reduce anxiety among children. In this way, dental treatment could be made more effective by changing the dentist's appearance.* ***Study Design:*** *The "Children's Fear Survey Schedule–Dental Subscale" and a questionnaire 'designed to examine the children's preferences for their dentist's appearance', were administered to 810 patients between 6-12 years of age. Patients were examined after completing the questionnaires, and their DMFT/dmft indexes were determined. Patients were divided into three subgroups according to their CFSS-DS scores.* ***Results:*** *Among patients, anxiety scores differed significantly by age and gender (p=0.046, p=0.001). Specifically, higher anxiety scores were identified among 6- to 8-year-olds and in female patients relative to their respective counterparts. A statistically significant association between anxiety and dental caries was detected. (DMFT p=0.030/dmft p=0.015), and DMFT/dmft scores were found to be higher among patients with high levels of dental anxiety than among patients with low levels of dental anxiety. Additionally, children were highly perceptive of and exhibited strong preferences for the appearance of their dentist.* ***Conclusion:*** *Anxiety and dental caries were associated; small alterations in a dentist's appearance may reduce dental anxiety among children.*

Key words: *dental anxiety, dental fear, dental caries, dentists' appearance*

INTRODUCTION

Among children, behavior varies throughout the stages of psychological growth and development. For this reason, it has been recommended that the child-dentist relation should be defined based on the child's psychological development stage[1]. It is important to understand the normal behavioral characteristics of children of different ages to facilitate the diagnosis and treatment of pediatric patients. The chronological and physiological ages of a child are not always consistent, a factor that must also be considered during treatment planning[2]. Fear and anxiety reactions may be triggered by a variety of events that occur during life. While fear and anxiety are common emotions, they may negatively affect daily life. Despite the application of modern technological advances in the practice of dentistry, dental treatment may still be associated with fear and anxiety reactions[3]. A previous study also indicate that the existence of dental caries and pain were found as the most determinant factors associated with dental fear irrespective of socio-demographical factors and/or accessibility to the dental services for children[4].

Dental anxiety is specifically defined as all types of fear and anxiety that are associated with feelings regarding the dental treatment of individuals without external stimulus. Dental anxiety is observed across all age groups and often occurs during childhood or adolescence[5]. Studies have shown that childhood dental anxiety may persist into adulthood; therefore, it is important to identify dental anxiety early[6]. Understanding a patient's level of dental anxiety may aid in his or her treatment. The anticipation of behaviors and

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reactions and managing of a pediatric patient's anxiety may also minimize the need to implement measures that make dental treatment less problematic[3,7].

The feeling of fear in association with the threats that may arise during dental procedures is a normal emotional reaction to an offensive stimulus[8]. Peretz *et al* [9] explained that dental fear is a major problem in dental treatment because it restrains the performance of the dentist. Another study reported that school-age children were afraid of the dentist and therefore avoided dental treatment[10]. Among children, fear of the dentist may cause problems that persist for many years. Past negative dental experiences may cause some children to have more fear and anxiety than others without similar experiences, resulting in a decreased frequency of dentist visits and negative impacts on oral hygiene even later in life[11]. Data suggest that, compared to patients with no dental fear, fearful patients have more oral health problems. Therefore, dental fear has a significant impact on clinical dentistry[12,13].

Dental anxiety in children may even progress to dental phobia, a more severe type of dental anxiety, in adulthood. Avoiding or delaying dental treatment until the last moment may have a significant impact on the daily routine and social life of individuals with dental phobia[14]. The most important feature that distinguishes dental phobia from a fear of dental treatment is that dental phobic patients may never seek dental care, whereas a person who fears dental treatment may go to the dentist, albeit with some associated difficulty. The reactions among people with dental phobia are, by definition, so severe that they develop an unreasonable fear of the dentist. Truly phobic people may be unable to even discuss the topic of dentistry. In these cases, phobia has been found to lead to both poor oral health and feelings of shame and inferiority[15, 16].

One of the most commonly used psychometric measures for dental anxiety is the Children Fear Survey Schedule–Dental Subscale (CFSS-DS), which was developed by Cuthbert and Malamed[17] to measure the level of dental anxiety among pediatric dental patients; this subscale has been translated into many languages and is reported to have high validity and consistency[18].

Studies of the effects of anxiety on oral health have found that among assessed individuals, higher anxiety is associated with fewer teeth[19], more tooth decay, more missing teeth, and fewer restored teeth[20]; in addition, further dental pathology may be expected in these patients[21]. However, another study found no relationship between tooth decay and dental anxiety[22]. The level of tooth decay and its consequences are usually measured by the Decay-missing-filled-teeth (DMFT) index[23].

A child's perceptions of dental care are shaped by his or her early dental experiences. Positive or negative perceptions contribute to the manner in which a child behaves towards a dentist. A clinician's appearance is one of the factors that plays a role in non-verbal communication within the child-physician relationship[24].

The aim of this study was to determine if the small alterations of the appearance of dentists might aid to indicate decreasing dental anxiety levels by increasing their acceptance of dental treatments which could result in reduced DMFT/dmft scores inrelation with the prevalence rates of dental anxiety and fear, avoidance of dental treatment due to anxiety and fear, and tooth decay among 6- to 12-year-old children.

MATERIALS AND METHOD

The study protocol was approved by the Ethics Committee of Karadeniz Technical University (Approval number: 2014/169). Before inclusion in the study, the patients and parents were notified, and informed consent was obtained from the parents prior to their children completing the questionnaire. The study population included 810 patients (6-12 years of age) who were referred to clinics of the Department of Pediatric Dentistry, Faculty of Dentistry, Karadeniz Technical University over a period of 3 months. While in the waiting room prior to the clinic visit, the "Children's Fear Survey Schedule- Dental Subscale (CFSS-DS)" and a questionnaire designed to examine the children's preferences for their dentist's appearance were administered to the patients. Patients were examined after the questionnaires were completed, and the DMFT/dmft indexes were assessed in the clinic. The patients were then divided into three subgroups according to their CFSS-DS scores (low anxiety, medium anxiety, and severe anxiety).

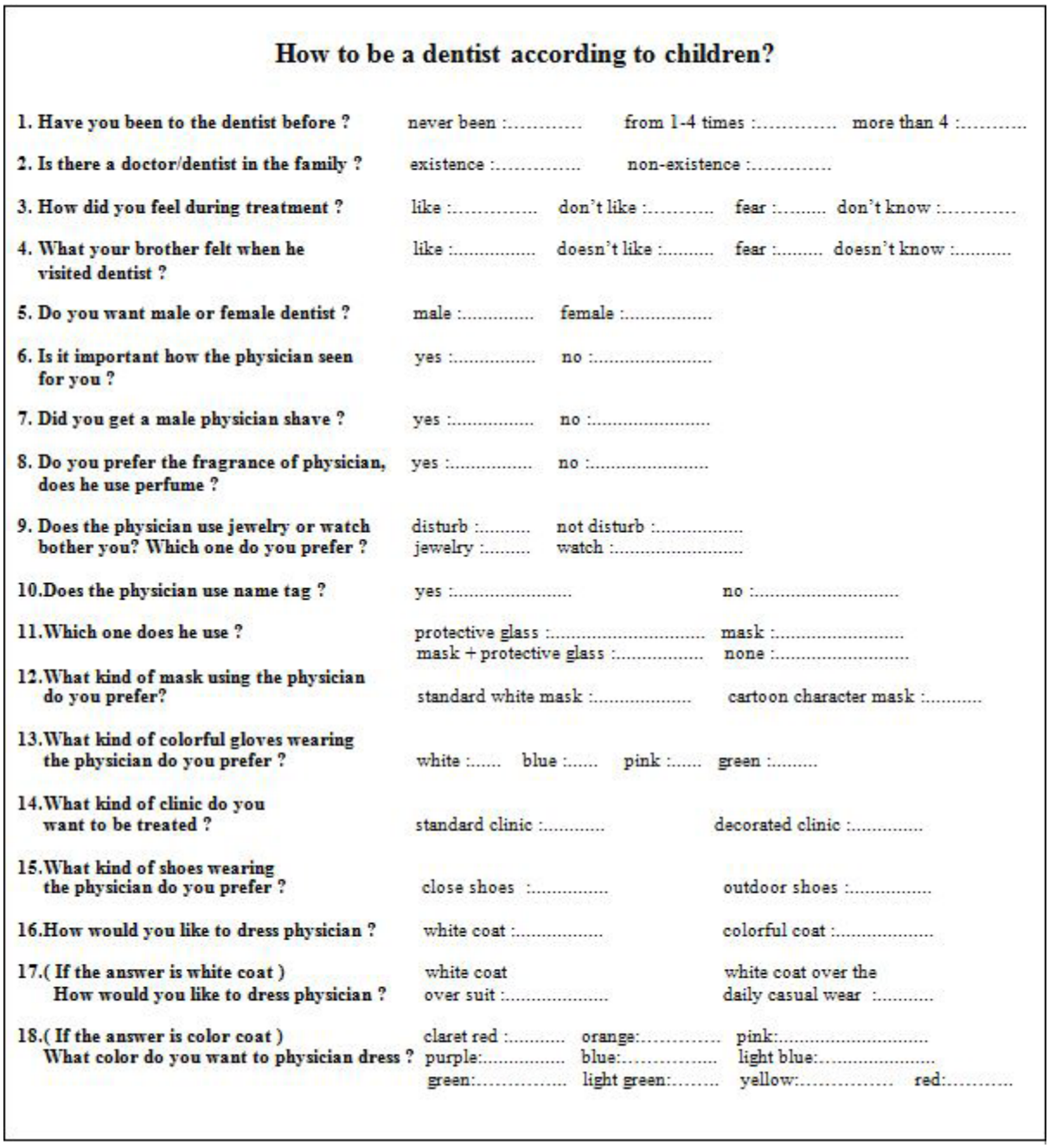
The first survey (CFSS-DS scale) consisted of 15 items with scores ranging from 15 to 75, and the responses for each item corresponded to the following five levels of fear: 1=not afraid, 2=very little afraid, 3=little afraid, 4=quite afraid, and 5=very afraid. A total of 15-31 points indicated lower levels of anxiety, while 32-38 points indicated moderate levels of anxiety; scores of 39 points and above indicated a high level of anxiety.

The second survey comprised 18 questions that assessed the children's perceptions of their dentist and his or her appearance. The children's responses to these questions were analyzed and recorded for statistical analysis (Figure 1).

The children were then assessed by a dentist, who performed a routine examination using a dental mirror and artificial light to determine the relationship between dental caries and anxiety. The status of each tooth was determined using the criteria proposed in the recommendations issued for dental caries by the World Health Organization (WHO) in 2013, and the scores for permanent teeth (DMFT scores) and primary teeth (dmft scores) were calculated (DMFT index). The dentists were not aware of the contents of of the questionnaire when completing the dental treatments. To determine the associations between anxiety and dental caries, statistical analyses were performed; the patients were divided according to anxiety status, gender, '6- to 8-year-old' and '9- to 12-year-old' age groups, and DMFT/dmft scores.

SPSS (Statistical Package for the Social Sciences, version 13, SPSS Inc., Chicago, IL, USA) was used for statistical analysis. Descriptive statistics, including the number, percentage, average and standard deviation, were generated. The normality of the distribution of continuous variables was assessed using the Kolmogorov-Smirnov test. The chi square test was used to compare categorical variables between groups. Continuous variables with normal distributions were compared using the Student-t test and one-way ANOVA, and continuous variables that were not normally distributed were compared using the Mann-Whitney U-test and the Kruskal-Wallis test. Spearman correlation analysis was used to examine the relationship between scores on the fear scale and DMFT scores. A p-value of less than 0.05 was considered statistically significant.

Figure 1. How to be a dentist according to children?



How to be a dentist according to children?

1. Have you been to the dentist before ?	never been :..... from 1-4 times :..... more than 4 :.....
2. Is there a doctor/dentist in the family ?	existence :..... non-existence :.....
3. How did you feel during treatment ?	like :..... don't like :..... fear :..... don't know :.....
4. What your brother felt when he visited dentist ?	like :..... doesn't like :..... fear :..... doesn't know :.....
5. Do you want male or female dentist ?	male :..... female :.....
6. Is it important how the physician seen for you ?	yes :..... no :.....
7. Did you get a male physician shave ?	yes :..... no :.....
8. Do you prefer the fragrance of physician, does he use perfume ?	yes :..... no :.....
9. Does the physician use jewelry or watch bother you? Which one do you prefer ?	disturb :..... not disturb :..... jewelry :..... watch :.....
10. Does the physician use name tag ?	yes :..... no :.....
11. Which one does he use ?	protective glass :..... mask :..... mask + protective glass :..... none :.....
12. What kind of mask using the physician do you prefer?	standard white mask :..... cartoon character mask :.....
13. What kind of colorful gloves wearing the physician do you prefer ?	white :..... blue :..... pink :..... green :.....
14. What kind of clinic do you want to be treated ?	standard clinic :..... decorated clinic :.....
15. What kind of shoes wearing the physician do you prefer ?	close shoes :..... outdoor shoes :.....
16. How would you like to dress physician ?	white coat :..... colorful coat :.....
17.(If the answer is white coat) How would you like to dress physician ?	white coat over suit :..... white coat over the daily casual wear :.....
18.(If the answer is color coat) What color do you want to physician dress ?	claret red :..... orange:..... pink:..... purple:..... blue:..... light blue:..... green:..... light green:..... yellow:..... red:.....

RESULTS

The 810 children included in this study were 6-12 years of age (mean age 8.81±1.84); of the included children, 402 (49.6%) were female and 408 (50.4%) were male (Table 1). The children were divided by CFSS-DS scores into low (15-31), moderate (32-38) and high (39-75) anxiety groups (Table 2). No statistically significant differences were identified in the gender and age distributions of patients in the anxiety groups (p=0.208, p=0.405). The average values of the CFSS-DS, DMFT and dmft scores were compared by level of anxiety (group), gender and age. The factors that influenced these scores are shown in Tables 3, 4, and 5. Among the patients, the average CFSS-DS scores differed significantly by age and gender (p=0.001, p=0.046). Therefore, patients who were female and 6 to 8 years old had higher mean CFSS-DS scores than did patients who were male and 9-12 years old, respectively. Additionally, average CFSS-DS score differed significantly according to patient history of visiting the dentist (p=0.001). Accordingly, a higher average CFSS-DS score was observed in patients who had not previously visited the dentist. Among patients, the average CFSS-DS score did not differ significantly according to the presence of a doctor/dentist in the family (p=0.856). However, the patients' average CFSS-DS score did differ significantly based on their perception of their own and their siblings' feelings during dental treatment (p<0.001, p<0.001). Therefore, significant differences were observed according to the sensations that had been perceived by the patients during prior dental treatment; CFSS-DS scores differed significantly

between the patients who responded that they liked the sensation and those who did not like it, were afraid of it, or responded that they did not know and patients who responded that they were afraid of the sensation and those who did not like it or responded that they did not know.

A statistically significant difference was identified in the average CFSS-DS scores based on the patients' perceptions of and preferences for their dentists (p=0.003). Thus, it was observed that patients who reported preferring female dentists had higher average CFSS-DS scores than did patients who reported preferring male dentists. However, the average CFSS-DS score did not differ significantly according to the patient's preferences for the overall external appearance of their physician (p=0.176). The patients' CFSS scores did differ significantly according to their preferences regarding protective equipment (p<0.001), and significant differences in anxiety level were identified between the patients who preferred that their dentists wear protective glasses, a mask, and both protective glass and a mask and patients preferring their dentist to wear no protective equipment.

A statistically significant difference was identified according to the patients' preferences for their dentist's attire (p<0.001). Patients who preferred their dentist to wear a decorated clinical and colorful uniform were found to have significantly greater CFSS-DS scores than those who preferred the more traditional white coat attire. No statistically significant gender difference was identified (p=0.114). However, the average DMFT score differed significantly according to the patients' age range and history of visiting a dentist (p<0.001, p<0.001). Therefore, higher average DMFT scores were observed in those aged 9-12 years and who had not previously visited the dentist than in younger patients and in patients with a history of dental visits. No statistically significantly differences in DMFT scores were identified among the patients according to the presence of a doctor/dentist in the family (p=0.518).

Table 1. Distribution of patients according to gender and age range.

Age range	Gender		Total n (%)
	Female n (%)	Male n (%)	
6 – 8	209 (%54.0)	178 (%46.0)	387 (%100)
9 – 12	193 (%45.6)	230 (%54.4)	423 (%100)
Total	402 (%49.6)	408 (%50.4)	810 (%100)

Table 2. Distribution of anxiety groups according to gender and age range.

	Anxiety Groups				
	Low n %	Medium n %	High n %	Total n %	p
Gender					
Female	344 85.6	38 9.5	20 5.0	402 100.0	0.208
Male	361 88.5	25 6.1	22 5.4	408 100.0	
Total	705 87.0	63 7.8	42 5.2	810 100.0	
Age range					
6-8	342 88.4	25 6.5	20 5.2	387 100.0	0.405
9-12	423 85.8	38 9.0	22 5.2	423 100.0	
Total	705 87.0	63 7.8	42 5.2	810 100.0	

Significantly different average DMFT scores were identified among the anxiety groups; patients reporting a high level of anxiety had higher average DMFT scores than those reporting moderate and low levels of anxiety. There was no significant difference in dmft score according to gender (p=0.573). However, the average dmft scores did differ significantly according to age (p<0.001). Therefore, the average dmft score was higher in patients aged 9-12 years than in younger patients.

No significant differences were identified in dmft scores between patients with and patients without a history of dentist visits or between patients with and patients without the presence of a doctor/dentist in the family (p=0.929, p=0.157). Additionally, the average

Table 3. Factors that may affect the CFSS-DS score.

Affecting factors	CFSS-DS Score Mean ± SS	Median	p
Gender			
Male	23.14±7.65	21	0.001*
Female	24.89±8.23	23	
Total	24.00±7.99	22	
Age			
6-8	24.57±8.14	22	0.046*
9-12	23.50±7.82	21	
Total	24.00±7.99	22	
State of the go to the dentist			
Gone	23.79±7.97	21	0.001*
Haven't gone	26.70±7.57	26	
Presence the dentist/doctor in the family	23.34±6.44	22.5	0.856
Existence	24.09±8.17	22	
Non-existence			
Feeling during the treatment			
Like	20.96±5.78	19	<0.001*
Don't like	25.34±9.08	22.5	
Fear	28.97±9.06	28	
Don't know	25.76±7.56	25	
Brother visited the dentist			
Like	21.68±7.21	20	<0.001*
Don't like	21.74±5.78	22	
Fear	25.41±8.06	24	
Don't know	24.80±8.18	23	
Preference dentist			
Female	24.66±8.17	22	0.003*
Male	22.78±7.55	21	
Makes no difference	23.45±7.56	21	
İmportance of the physician's appearance	23.87±8.56	21	0.176
Yes	24.14±7.71	22	
No	22.06±7.61	20	
Makes no difference			
Protective equipment			
Protectice glass	24.57±7.95	22	<0.001*
Mask	23.56±7.62	21	
Protective glass + mask	23.45±7.53	21	
None	29.87±10.61	27	
The feature of treatment clinic			
Standart clinic	23.29±7.95	21	<0.001*
Decorated clinic	24.96±7.95	23	
Physicians prefer the coat			
White coat	23.43±7.61	21	0.021*
Colorful coat	24.73±8.39	22.5	

Table 4. Factors that may effect the DMFT score.

Affecting factors	DMFT Score Mean ± SS	Median	p
Gender			
Male	1.65±2.00	1	0.114
Female	1.49±2.02	1	
Total	1.57±2.01	1	
Age			
6-8	0.65±1.18	0	<0.001*
9-12	2.41±2.23	2	
Total	1.57±2.01	1	
State of the go to the dentist			
Gone	1.65±2.04	1	<0.001*
Haven't gone	0.58±1.18	0	
Presence dentist/doctor in the family	1.77±2.26	1	0.518
Existence	1.54±1.97	1	
Non-existence			
Feeling during the treatment			
Like	1.60±1.97	1	<0.001*
Don't like	2.32±2.82	1	
Fear	1.58±1.78	1	
Don't know	1.06±1.75	0	
Brother visited the dentist			
Like	1.66±2.01	1	0.074
Don't like	2.51±2.74	2	
Fear	1.72±2.00	1	
Don't know	1.45±1.96	1	
Anxiety score groups			
Low	1.55±2.05	1	0.030*
Medium	1.59±2.02	1	
High	1.79±1.05	1	
Total	1.57±2.01	1	

Table 5. Factors that may affect the dmft score.

Affecting factors	dmft score Mean ± SS	Median	p
Gender			
Male	4.49±3.29	4	0.573
Female	4.80±3.88	4	
Total	4.64±3.60	4	
Age			
6-8	6.27±3.43	6	<0.001*
9-12	3.15±3.07	3	
Total	4.64±3.60	4	
State of the go to the dentist			
Gone	4.64±3.60	4	0.929
Haven't gone	4.69±3.63	4	
Presence dentist/doctor in the family	4.10±3.31	4	0.157
Existence	4.71±3.63	4.5	
Non-existence			
Feeling during the treatment			
Like	4.85±3.59	5	0.171
Don't like	4.01±3.64	3.5	
Fear	4.36±3.46	4	
Don't know	4.74±3.74	4	
Brother visited the dentist			
Like	4.68±3.75	4	0.097
Don't like	3.30±3.50	2	
Fear	4.18±3.27	4	
Don't know	4.80±3.59	5	
Anxiety score groups			
Low	4.62±3.64	4	0.015*
Medium	4.03±3.14	4	
High	5.93±3.33	6	
Total	4.64±3.60	4	

dmft score did not differ significantly according to the perceptions of the patients regarding their own or their siblings' prior dental visits (p=0.171, p=0.097). The average dmft average scores did, however, differ significantly among the different anxiety groups (p=0.015); patients with a high level of anxiety had higher average dmft scores than did those with moderate and low anxiety levels.

DISCUSSION

Dental anxiety, which has been identified as very common among patients undergoing dental treatment, is a condition that may cause problems for both physicians and patients[25]. Among children, the fear of dental treatment has been identified as a potential source of serious health problems. During dental treatment, fear and anxiety behaviors may be persistently exhibited, serving as a form of aversion therapy with the potential to severely affect oral health. To prevent future anxiety behaviors in children, it is important to identify these reactions at the earliest possible age[26]. Dental anxiety, a behavior that was investigated in the present study, has often been reported to be negatively correlated with age. Folayan *et al*. [27] and Cuthbert and Malamed[17] reported that dental anxiety levels begin to decline around the age of 6-7 years and that advancing age was associated with an increased ability to cope with dental practices among the patients included in their studies. According to Le Baron and Zeltzer[28], with increased age, children may learn to control their dental fears. These authors conducted a study in which it was determined that 30% of children aged 3-6 years and 11% of children aged 7-12 years had dental anxiety[29]. The present study was similar to those studies in that a negative correlation between dental anxiety and age was identified (p=0.046).

Another factor that has previously been reported to be associated with dental anxiety is gender. Liddell and Murray[30] reported that a gender difference began to emerge after the age of 9 years and that girls had higher levels of dental anxiety than did boys. The results of the present study accord with those of the study conducted by Liddell and Murray.

Dental fear may serve as an important indicator of and risk factor for dental caries[31]. Dental fear and dental caries may each be identified as both a cause and a consequence of the other. Kruger et al.[32] reported that caries are an important determinant of dental fear and found a significant association between dental caries and fear. Hägglin *et al* [19] and Schuller et al.[20] conducted studies examining the association between DMFT scores and anxiety and reported that individuals with high anxiety had a higher number of decayed and missing teeth and a lower number of restored teeth than did those with lower anxiety levels. In the present study, similar findings were observed; average DMFT and dmft scores were found to be significantly higher in more highly anxious patients than in those with lower levels of anxiety (p=0.030, p=0.015). An increased prevalence of dental caries was observed in patients with high anxiety, supporting the presence of a strong relationship between anxiety and caries.

Dental anxiety and fear, which may be associated with the development of physiological, cognitive and behavioral differences between patients, may also be associated with a reduced quality of life due to their negative impact on both oral and public health[6]. A previous study that evaluated the associations between dental fear, less frequent dentist visits, poor oral hygiene and severe functional disorders showed that the presence of anxiety was associated with significant differences in the number and arrangement of the visits to the dentist[19]. Schuller et al.[20] reported that a higher level of dental fear was associated with less frequent visits to the dentist and more appointment cancellations. In the present study, because patients with dental anxiety refrained from undergoing dental treatment, few patients with high-grade anxiety were interviewed, as indicated by the distribution of the participants' CFSS-DS scores.

A patient's first dental visit often plays an important role in determining the presence of anxiety, which can be viewed as a continuation of dental fear[33]. Folayan [27] performed a study among 8- to 13-year-old children visiting a dental clinic for their first time. Before treatment, children's dental anxiety level, age and gender were not statistically associated ($p>0.05$). This might have occurred because modern technology, social media, and television may provide opportunities to reach children and make them more comfortable, thus reducing the potential impact of environmental factors such as incorrect information. Physician appearance, as a component of non-verbal communication, may play a major role in the child-physician relationship[34]. Data suggest that children may create an early conclusion based on the appearance of the dentist and may scrutinize and remember all of the words, movements and gestures used by dentists during dental treatment[35]. Dunn *et al* [36] found that the doctor-patient relationship was an important factor that should be considered when choosing a family doctor and that an individual's outward appearance plays an important role in the development of this relationship. In this study, it was shown that children exhibited strong preferences for and perceptions of their pediatric dentist. The purpose of determining their preferences for their physician's outer appearance was to derive information that may inform the implementation of positive changes in the external appearances of physicians according to the preferences of the children by physicians at pediatric clinics to make their patients more comfortable and improve the quality of dental visits. In this study, patients who preferred their dentist to wear a decorated clinical and colorful uniform were found to have significantly higher CFSS-DS scores than those who preferred the more traditional white coat attire. This may probably with the distraction effect occurences in their minds during dental treatment as stated previously[4,37].

Children who are diagnosed with dental fear by dentists may have difficulties with dental treatment; however, various behavioral management and treatment options are available. Especially in pediatric dentistry, a dentist should attempt to establish rapport with a child before starting treatment. The importance of a positive doctor-patient relationship should not be disregarded as it may provide motivation in terms of compliance, visiting the dentist, and the use of preventive care at home. Thus, the effectiveness of dental treatment may increase if dentists develop a more optimistic attitude towards dental fear in children, thereby helping the children achieve better oral health. In addition, the implementation of small changes in appearance by pediatric dentists may help children feel more comfortable and reduce their level of anxiety, thereby increasing their probability of seeking dental treatment. However, these opinions should be considered within the extensive perspective of dentistry before the dental treatment.

CONCLUSION

Based on these findings, the age and gender of pediatric patients affected dental anxiety. Increased dental anxiety may be associated with an increase in the number of deteriorated and decayed teeth. **Additionally, anxious children demonstrated a preference for their physicians external appearance.** Therefore, we believe that the implementation of minor appearance changes by physicians may result in a reduction in anxiety levels among children seeking dental treatment.

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