Dental anxiety in a students' paediatric dental clinic: children, parents and students

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Summary. *Objective.* The purpose of the present study was to investigate the dental anxieties of children, parents and student caregivers in a dental school environment. *Methods.* Eighty-eight children, parents and the dental students who treated the children were included in the study. They were asked to complete questionnaires which gathered information about demographics and dental anxiety using the Dental Anxiety Scale (DAS). Students were also asked to respond to a visual analogue scale (VAS) to assess their anxiety prior to treating children.

Results. Significant differences were observed between the mean DAS of the children compared to the students (8.8 ± 3.9 and 7.3 ± 2.7 , respectively), and between the scores of the parents and the students $(8.3 \pm 2.9 \text{ and } 7.3 \pm 2.7, \text{ respectively})$. No significance was noted between the mean DAS scores of the children and those of the parents. The number of children in family did not influence the mean DAS of the children. Parents' age, education or place of birth did not influence the mean DAS of the parents or the children. The mean DAS of children who reacted excellently in previous treatments scored significantly lower in DAS compared with children who were fearful. Female dental students demonstrated higher DAS and VAS scores than male students. Students' seniority, type of last treatment that they received, time since last treatment, parenthood or self-ranking in class did not seem to significantly influence their DAS or VAS scores. A strong correlation in DAS scores between parents and children was found (r = 0.41, P = 0.0001). No correlation between children's and students' DAS scores was found. Conclusions. Students' dental anxiety, or their anxiety prior to treating a child, may not be directly associated with the child's dental anxiety. However, a positive correlation exists between parental and children's dental anxiety.

Introduction

In children, both dental anxiety and fear of dental treatment have been recognized as a source of problems in patient management for many years [1,2]. It has been reported that as many as 16% of schoolage children are afraid of dentists and may consequently avoid dental care [3]. Avoidance of dental

treatment may be different in children and in adults: It seems plausible that, in most cases, it is a parental decision which results in a child's visit to the dentist, rather than a child's decision [1,4].

It has been found that, at the age of 2-3 years, girls appear more secure than boys and exhibit more exploratory behaviour; for example, they are curious and touch things [5]. However, in relation to dental treatment, there is no consensus: one study has indicated that it is boys and not girls for whom fear is more likely to be the factor hindering dental visiting [1]; another claimed that girls showed higher levels

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of dental anxiety than boys [6]; and yet another study found no direct effect of gender on childhood dental fear [7]. Another factor that is associated with dental anxiety in children and adults alike is the awareness of a dental problem. The importance of finding modes which enhance children's awareness of their own resources to seek mechanisms for coping has been noted [8].

Dental behaviour is largely influenced by the attitudes of the parents: positive oral health attitudes and parental support are of great importance if oral health is to be perceived as good [9]. However, overly involved parents will make the child anxious, a pattern maintained into adulthood. Mothers especially leave their mark: mothers with a high level of dental anxiety exert a negative influence on their children in the dental situation [8,10–12]. Moreover, it has been demonstrated that mothers show significantly higher levels of dental anxiety than fathers [13].

Only with children was it found that dentists change their behaviour by adopting anxiety management techniques *per se* when dealing with anxious children [14]. It has been suggested that part of the dental anxiety may originate from traumatic experiences with dental treatment, dentists' bad attitudes, personality traits or lack of exposure to dental treatment at all [15].

The dental anxieties of children, parents and caregivers have seldom been investigated simultaneously in the same clinical setting. The dental school environment may provide a convenient set-up for assessing the dental anxiety of paediatric dental patients, their parents and the caregivers (in this case students). Few reports on students' dental anxiety have been published. One longitudinal study found that anxiety scores were significantly higher among female dental students than among male dental students in the pre-clinical year. The level of anxiety decreased with seniority among the total class, significantly among females, while males' levels of anxiety remained within a close range throughout the years [16]. Futhermore, the dental anxiety scores of all students who had experienced a dental procedure in the past were higher than the scores of the students who had not.

With regard to students and patients' anxiety, it has been found that students were not accurate in their estimates of patients' anxiety during dental treatment [17].

Dental anxiety is most commonly measured using questionnaires and rating scales. Various scales have been composed to measure the many aspects of dental anxiety. A commonly applied questionnaire is the Dental Anxiety Scale (DAS) [18]. The DAS contains four multiple-choice items dealing with the patient's subjective reactions to the dental situation: (a) anticipating a visit to dental clinic; (b) waiting in the dentist's office for treatment; (c) the drilling of teeth; and (d) the scaling of teeth. Five possible answers in an ascending order from '1' to '5' are provided; thus, each question carries a possible maximum score of '5', with a total possible maximum score of '20' for the entire scale.

There is a general lack of solid empirical data on measuring the dental anxiety of children by using the same tools as for adults. Using the DAS, Neverlien *et al.* [19] found it to be a good predictor of behavioural ratings of dental anxiety in children aged 10-12 years.

Measuring children's dental anxiety with the use of the DAS enables us to compare children's or adolescents' dental anxiety with dental anxiety of adults because it is measured by the same tool. However, since the DAS is a self-report tool, patients need to be able to read and understand the items, and therefore, they need to be at least of school age.

The purpose of the present study was to investigate the dental anxiety of children, parents and student caregivers in a dental school environment.

Methods

The study population consisted of children, at least in the first grade, who could read and write, their parents and dental students who treated the children in the Hebrew University Hadassah School of Dental Medicine in Jerusalem. Dental studies in Israel last for 6 years, and children are treated by students in the fifth and sixth years. All subjects were asked to complete questionnaires prior to sitting in the dental chair during their first visit to both the fifth- and the sixth-year clinics as described below.

Children were asked to complete the DAS. When necessary, one of the authors (Y.N.) helped in explaining the items. Children were notified about the procedure that they were about to have, i.e. examination, restoration or extraction.

Parents were requested to provide socio-demographic information: the parents' age, gender, country of birth and education (12 years of formal schooling or more); the number of children in the family; the time since their last visit to the dentist (less than one year or more); the child's previous experience in the dental situation; and the DAS. Students were requested to provide the following information:

(1) Personal information, i.e. gender, year of study (fifth or sixth), having had previous dental treatment, being a parent, self-ranking in the class by grades, and having experienced parental interference in the treatment planning.

(2) The DAS.

(3) A visual analogue scale (VAS) describing the level of anxiety prior to treating a child. (The VAS scale comprises a 100-mm line from left to right, where '0' indicates 'no anxiety' and '100' indicates 'high anxiety'. The VAS scores were measured using a millimetre rule.)

(4) If children or adults provoke more anxiety prior to treatment.

All participants agreed to complete the questionnaires, and the parents agreed on behalf of their children.

The personal and demographic items for the parents and students were composed by the authors, based on previous reports.

It was decided to use the DAS for all groups because data from the DAS in children would allow a better comparison of children's dental anxiety with that of adults since it would have been measured by the same tool [6].

The questionnaires were tested in a pilot study on 15 parents and children (not included in the present study) to ensure the clarity and reliability of the questions. The socio-demographic categories were developed by the authors, and included possible variations to categorization.

Data was analysed using a JMP statistical program (Version $3 \cdot 2 \cdot 6$, SAS Institute, Cary, NC, USA). Frequency distributions for each question were constructed, and Student's *t*-test and analysis of variance were used to assess the statistical significance of the responses.

Results

The study included 88 children who were patients (45 boys and 43 girls), aged 6–14 years (mean age = 10 ± 0.3 years), their accompanying parents, and the students who treated them.

The age distribution of the children is shown in Table 1.

The parents' ages ranged between 30 and 52 years, with a mean age of 40.2 ± 5.7 years. The students' ages ranged between 23 and 30 years, with a mean age of 26 ± 0.4 years.

Table 1. Age	distribution	of the	children.
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	Age (years)								
	6	7	8	9	10	11	12	13	14
Number of children	13	3	11	12	12	8	13	8	8

 Table 2. Mean Dental Anxiety Scale (DAS) scores of the children, parents and students.

DAS	Children	Parents	Students
Question 1	2.6 ± 1.3	2.6 ± 0.9	2.3 ± 0.8
Question 2	$2 \cdot 1 \pm 1 \cdot 1$	1.8 ± 0.8	1.7 ± 0.8
Question 3	$2 \cdot 2 \pm 1 \cdot 0$	2.1 ± 0.9	1.7 ± 0.9
Question 4	1.9 ± 1.0	1.9 ± 0.8	1.6 ± 0.7
Total	$8.8 \pm 3.9*$	$8.3 \pm 2.9 **$	$7.3 \pm 2.7^{*,**}$

*children vs. students, P < 0.05 (Student's *t*-test); **parents vs. students, P < 0.05 (Student's *t*-test).

 Table 3. Mean Dental Anxiety Scale (DAS) scores of children by age.

	Age (years)				
	6-9 (<i>n</i> = 39)	10-12 (<i>n</i> = 33)	13-14 (<i>n</i> = 16)		
Mean DAS score	8.9 ± 4.3	8.7 ± 3.5	7.9 ± 3.2		

Table 2 shows the mean DAS scores of the children, the parents and the students who treated the children. Significant differences were observed between the mean DAS scores of the children compared to the students (8.8 ± 3.9 and 7.3 ± 2.7 , respectively), and between the scores of the parents and the students (8.3 ± 2.9 and 7.3 ± 2.7 , respectively). No significance was noted between the mean DAS scores of the children and those of the parents.

Table 3 shows the mean DAS scores of the children by age. Children in the youngest age group (6–9 years of age) demonstrated the highest dental anxiety (8.9 ± 4.3), while the oldest age group (13–14 years of age) demonstrated the lowest dental anxiety ($7.9 \pm$ 3.2); however, these differences were not statistically significant.

The number of children in their family did not influence the mean DAS score of the children.

The parents' age, education, place of birth and having had previous dental treatment did not influence the mean DAS score of the parents or the children.

Table 4 shows the mean DAS scores of the children by gender, type of treatment and their previous behaviour during dental treatment. Significant differences were found only regarding children's behaviour in previous treatments: the mean DAS scores of children who reacted excellently in previous

Table 4. Mean Dental Anxiety Scale (DAS) scores of the children by gender, type of treatment and their previous behaviour during dental treatment: (SD) standard deviation; (NS) not significant; and (ANOVA) analysis of variance.

			score	
Variable	Number	Mean	SD	Significance
Gender:				
male	45	8.9	4.0	
female	43	8.7	3.9	NS*
Type of treatment	nt:			
examination	47	8.3	4.0	
restoration	38	9.1	3.7	
extraction	3	8.3	3.5	NS**
Behaviour in pre	vious treatme	ent:		
excellent	49	6.6	2.8	
fear, crying	37	12.3	2.3	$P < 0{\cdot}05*$

*Student's *t*-test; **ANOVA.

treatments were significantly lower when compared with those of children who were fearful or cried $(6.6 \pm 2.8 \text{ and } 12.3 \pm 2.3, \text{ respectively}).$

With regard to the dental students, there were 45 students from fifth year and 43 from the sixth year.

Table 5 shows the mean DAS scores and mean VAS values (in centimetres) of students by gender, year of study, type of their last dental treatment, time since their last dental treatment, being a parent and self-ranking (by grades) in class. A significant difference was found only with regard to gender: female dental students demonstrated higher DAS scores than male students (7.9 ± 2.7 and 6.7 ± 2.6 , respectively) and higher VAS values than male students (4.5 ± 2.1 cm and 3.5 ± 1.9 cm, respectively).

The students' seniority at school (fifth or sixth year), type of last treatment, time since last treatment, parenthood or self-ranking in class did not seem to significantly influence their scores for either the DAS or VAS. Thirty-six students reported feeling the highest anxiety prior to treating children, 22 reported the highest anxiety prior to treating adults, 23 felt the same anxiety prior to treating both children and adults, and seven students reported no anxiety prior to treating either children or adults.

A strong correlation in DAS scores between parents and children was found (r = 0.41, P = 0.0001). No correlation between the DAS scores of the children and students was found (r = 0.08, P = 0.45).

Table 5. Mean Dental Anxiety Scale (DAS) scores and mean visual analogue scale (VAS) values (in centimetres) of students by gender, year of study, type of last dental treatment that they received, time since their last dental treatment, being a parent and self-ranking in class: (SD) standard deviation; (NS) not significant; (ANOVA) analysis of variance.

Variable Num			DAS score			VAS value	
	Number	Mean	SD	<i>P</i> -value	Mean	SD	P-value
Gender:							
male	41	6.7	2.6		3.5	1.9	
female	47	7.9	2.7	0.0043*	4.5	2.1	0.0264*
Year of study:							
fifth	45	7.1	2.7	NS*	3.8	2.0	NS*
sixth	43	7.6	2.6		4.2	2.0	
Type of last treatme	ent:						
preventive	7	5.7	2.6		3.8	2.1	
restorative	72	7.4	2.5		3.9	1.7	
extraction	8	7.9	2.5	NS**	4.6	2.3	NS**
Time since last trea	tment:						
< 1 year	61	7.0	2.3		3.8	2.3	
1-2 years	15	7.8	2.7		4.5	2.3	
> 2 years	11	7.7	2.7	NS**	4.0	2.0	NS**
Being a parent:							
yes	77	7.4	2.6		4.0	1.8	
no	11	6.5	2.7	NS*	4.0	2.0	NS*
Self-ranking in class	s:						
upper third	28	7.0	2.6		4.0	2.1	
middle third	50	7.2	2.8		3.7	2.1	
lower third	10	8.6	2.8	NS**	5.4	2.2	NS**

*Student's *t*-test; **ANOVA.

Discussion

The results of our study show that the mean DAS scores of the children were similar to the scores of their parents, and both children's and parents' scores were significantly lower than the DAS scores of the dental students. While females demonstrated higher dental anxiety among the parents and students, there was no difference in the DAS values between boys and girls among the children. This latter finding is in agreement with those of a previous study [7]. Reports on gender differences regarding dental anxiety among children are not consistent. It has been suggested that, generally, it is boys for whom anxiety is more likely to be the factor hindering dental visiting [20]. Another study showed higher dental anxiety among girls [6].

The type of dental treatment that followed the completion of the DAS did not seem to influence the children's dental anxiety. This finding is interesting since it is logical to assume, based on previous reports (on adults), that extractions and root-canal treatments were the most anxiety-provoking stimuli among patients [21]. The fact that the paediatric dental patients in the dental school environment have visited the clinic in the past may partly explain this gap in responses, or it may be that the children in our study completed the questionnaire without actually internalizing the treatment plan.

Children who reacted with fear or with crying in previous dental sessions demonstrated significantly higher dental anxiety than those who reacted excellently. This finding may suggest that memory plays an important factor in children's behaviour in the dental situation [22,23].

The dental anxiety of parents with academic education was not different than that of those with up to 12 years of formal schooling. This finding is in accordance with other reports [24,25]. Others, however, have shown that high dental anxiety is associated with education [26].

In our study, we used the VAS to assess students' anxiety prior to treating children. The pattern of the VAS scores in our study was generally consistent with pattern of the DAS scores. Female students showed higher scores than male students. No difference in VAS scores was found between fifth- and sixth-year students. This latter finding is somewhat unexpected since the senior students are expected to acquire more experience in treating children. The gap between the expected finding and the actual finding may be explained in part by the increase in the treatment requirements in the senior year compared to the fifth year, which may have raised the students' general anxiety level prior to treating children, despite the fact that they were more experienced.

Forty per cent of the students reported that treating a child is a more anxiety-provoking situation than treating an adult. This may be explained by the uncertainty as to how the child would 'allow' the treatment, and therefore, if the students would be able to fulfil the requirements. It is logical to assume that a combination of an anxious student prior to treating a child may increase the dental anxiety of the child. However, the lack of correlation between students' VAS and DAS scores, and the DAS scores of the patients, suggests that students' dental anxiety may not be associated directly with the child's dental anxiety. On the other hand, the positive correlation between parental dental anxiety and that of the children implies that parental dental anxiety is generally more influential on that of the children.

Our study has some limitations. It was carried out in a university environment and included only dental students. A larger study of the interrelation between dentists and paediatric dental patients is needed to better understand the possible associations between dentists' emotions and those of paediatric dental patients. Nevertheless, our findings give some insight into students' and paediatric dental patients' dental anxiety. Furthermore, dental educators may appreciate another role of the dental school, that of being a desensitizer of dental students' dental anxiety.

Conclusions

Students' dental anxiety, or their anxiety prior to treating a child, may not be associated directly with the child's dental anxiety. A positive correlation between parental dental anxiety and that of their children implies that parental dental anxiety has a significant influence on that of their children.

Résumé. *Objet.* L'objet de cette étude a été d'étudier l'anxiété dentaire chez des enfants, parents et des étudiants-soignants dans un environnement de faculté dentaire.

Méthodes. Quatre-vingt-huit enfants, parents et étudiants dentaires ont été inclus dans l'étude. Il leur a été demandé de remplir des questionnaires rassemblant des informations sur la démographie et l'anxiété dentaire d'après une échelle d'anxiété

dentaire – DAS. Les étudiants ont également répondu à une échelle analogue visuelle (VAS) pour évaluer leur anxiété avant de soigner les enfants.

Résultats. Des différences significatives ont été observées entre le DAS moyen des enfants et celui des étudiants $(8,8 \pm 3,9 \text{ et } 7,3 \pm 2,7 \text{ respectivement})$, et entre les scores des parents et celui des étudiants $(8,3 \pm 2,9 \text{ et } 7,3 \pm 2,7 \text{ respectivement})$. Aucune différence significative n'a été notée entre le score moyen DAS des enfants et celui des parents. Le nombre d'enfants dans la famille n'avait pas d'influence sur le DAS moyen des enfants. L'âge des parents, l'éducation ou le lieu de naissance n'avait pas d'influence sur le DAS moyen des enfants et des parents. Le DAS moyen des enfants qui avaient bien réagi lors de traitement précédents était significativement plus bas que celui d'enfants craintifs. Les étudiantes ont montré un DAS et des valeurs VAS plus élevés que ceux des étudiants. L'ancienneté des étudiants, type de dernier traitement pour eux, parenté ou rang dans la classe ne semblait pas influencer significativement les scores de DAS ou VAS. Une forte corrélation a été trouvée entre le DAS des parents et des enfants (r = 0.41; p = 0.0001). Aucune corrélation n'a été trouvée entre les DAS des enfants et des étudiants. Conclusions. L'anxiété dentaire des étudiants, ou leur anxiété avant de soigner les enfants peut ne pas être directement associée à l'anxiété dentaire de l'enfant. Cependant, il existe une corrélation positive entre l'anxiété parentale et celle des enfants.

Zusammenfassung. *Ziel.* Das Ziel der hier vorgestellten Studie war es, die Angst bei der Zahnbehandlung zu messen, und zwar bei Kindern, Eltern sowie Zahnmedizinstudenten, welche die Behandlungen durchführten.

Methoden. Je 88 Kinder, Eltern und Zahnmedizinstudenten (welche die Kinder behandelten) wurden in die Studie aufgenommen. Alle wurden gebeten, einen Fragebogen auszufüllen, in welchem demographische Angaben und Fragen zur Zahnbehandlungsangst (unter Verwendung eines dental anxiety score DAS) erhoben wurden. Die Studenten sollten darüber hinaus noch ihre Angst vor der Behandlung der Kinder anhand einer visuellen Analogskala (VAS) angeben.

Ergebnisse. Es wurden signifikante Unterschiede zwischen den mittleren DAS Werten der Kinder und der Studenten gefunden $(8.8 \pm 3.9 \text{ bzw. } 7.3 \pm 2.7)$,

außerdem zwischen den Werten der Eltern und der Studenten $(8.3 \pm 2.9 \text{ bzw. } 7.3 \pm 2.7)$. Keine signifikanten Unterschiede ergeben sich zwischen den Werten der Kinder und der Eltern. Die Zahl der Kinder in einer Familie hatte keinen erkennbaren Einfluss auf die mittleren Scorewerte. Das Alter, die Bildung oder Geburtsort beeinflussten die DAS-Werte der Eltern oder Kinder nicht. Die mittleren DAS-Werte von Kindern, welche in vorangegangenen Zahnbehandlungen sehr kooperativ waren, lagen signifikant niedriger als bei Kindern mit vorangegangener Angst. Weibliche Zahnmedizinstudenten gaben höhere DAS-Werte sowie höhere VAS-Werte an als männliche. Studienfortschritt, die Art der letzten eigenen Behandlung, der Zeitraum seit der letzten Behandlung, eigene Elternschaft oder die fachliche Selbsteinschätzung innerhalb des Semesters zeigten keine sichtbaren Einflüsse auf DAS und VAS-Werte. Eine starke Korrelation zwischen DAS von Eltern und ihren Kindern wurde festgestellt (r = 0.41, p = 0.0001).

Schlussfolgerung. Die Zahnbehandlungsangst von Zahnmedizinstudenten und ihre eigene Angst ein Kind zu behandeln hat wohl keinen direkten Einfluss auf die Angst des behandelten Kindes. Eine deutliche positive Korrelation besteht jedoch zwischen der Angst der Eltern und der Angst deren Kinder.

Resumen. *Objetivo.* El propósito de este estudio fue investigar la ansiedad dental de los niños, padres y estudiantes cuidadores en el entorno de una escuela dental.

Métodos. Se incluyeron en este estudio 88 niños, padres y estudiantes de odontología que trataban niños. Se les pidió que completasen cuestionarios que almacenaban información sobre demografía y ansiedad dental usando una escala de ansiedad dental EAD. A los estudiantes también se les pidió que respondiesen a una escala analógica visual (EAV) para valorar su ansiedad antes de tratar a los niños.

Resultados. Se observaron diferencias significativas entre la media EAD de los niños comparada con la de los estudiantes $(8,8 \pm 3,9 \text{ y } 7,3 \pm 2,7 \text{ respectiva$ $mente})$, y entre los valores de los padres y de los estudiantes $(8,3 \pm 2,9 \text{ y } 7.3 \pm 2,7 \text{ respectivamente})$.

No se apreció una diferencia significativa entre la media de EAD de los niños y la de los padres. El número de niños por familia no influyó en la media de EAD de los niños. La edad de los padres, la educación o el lugar de nacimiento no influyó en

la media de EAD de los padres o de los niños. La media EAD de los niños que reaccionaron de forma excelente en los tratamientos previos fue significativamente menor comparada con la de los niños temerosos. Las estudiantes odontólogas demostraron EAD más altas que los estudinates varones y valores más altos de EAV que los estudiantes varones. La veteranía de los estudiantes, el tipo de tratamiento últimamente recibido, el tiempo transcurrido desde el último tratamiento, la paternidad o la propia posición en la clase no parecieron influir de forma significativa en los índices de EAD y EAV de los estudiantes. Se encontró una correlación fuerte entre la EAD de los padres y los niños (r = 0.41, p = 0.0001). No se encontró una correlación entre la EAD de los niños y la de los estudiantes.

Conclusiones. La ansiedad dental de los estudiantes o su ansiedad dental antes de tratar a un niño puede no estar asociada directamente con la ansiedad dental del niño. Sin embargo, existe una correlación positiva entre la ansiedad dental de los padres y de los niños.

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