

# The Relationship between Dental Anxiety and Reported Dental Treatment Experience in Children Aged 11 to 14 years

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## ABSTRACT

**Objective:** The aim of the study was to determine the influence of reported dental experience on dental anxiety in children aged 11-14 years in Liverpool, United Kingdom.

**Methods:** A total 366 children completed a two-part questionnaire. The first part invited the children to record which dental procedures they had experienced. These procedures were the same as those included in the Modified Child Dental Anxiety Scale, which formed the second part of the questionnaire. The scale consisted of eight questions, which invited the children to rate their anxiety about a variety of dental procedures, including going to the dentist in general, a dental examination, a scale and polish, local anaesthesia, dental restoration, dental extraction, dental treatment under general anaesthesia and dental treatment under inhalation sedation. The Modified Child Dental Anxiety Scale allowed the children to report on a five point Likert scale about how relaxed or worried they were for each of these scenarios. Cross-tabulation and t-tests were used to determine the relationship between dental anxiety and reported dental experience. The significance level for the study was set at  $p < 0.05$ .

**Results:** Females were found to have significantly higher ( $p < 0.05$ ) mean anxiety score (21.87) than males (18.90). Children were significantly less anxious about specific items of dental treatment if they had experienced that particular form of treatment. In the study group of 366 children, 232 (63.4%) reported that they had experienced a dental filling had a mean anxiety score of 2.23, 105 (28.7%) children reported that they had not experienced a dental filling had a mean value for the dental filling item of 2.70.

**Conclusions:** Females were found to be statistically more dentally anxious than males. Children who reported that they had experienced dental treatment and visited the dentist more frequently were significantly less anxious than those who reported infrequent visits.

**Key words:** Dental anxiety, Gender, Treatment experience

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## Introduction

Dental anxiety should concern us as professionals because it prevents many potential patients from seeking care and it causes stress to the dentists undertaking dental treatment. A major source of stress for general dental practitioners is coping with the difficult patient. Therefore the treatment of young children can be challenging for the dental

practitioner as their level of cooperation can be limited due to their anxiety.<sup>(1)</sup>

Fear and anxiety are two concepts that are closely associated and for which there are many definitions. Geer<sup>(2)</sup> stated that the difference between fear and anxiety is thus conceptualized as a difference in the specificity of the stimulus. Fear is a response to a specific stimulus while anxiety is a response to a

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more general or pervasive stimulus. Corah<sup>(3)</sup> stated that dental anxiety is more specific than general anxiety; it is the patient's response to the stress specific to the dental situation.

Early surveys indicated that 5-6% of the adult population avoided dental treatment because of extreme fear; the range may be as high as 16% among school-age children.<sup>(4,5)</sup> Bedi *et al.* investigated the prevalence of dental anxiety among 13-14 year-old children. They found that the prevalence of high dental anxiety was 7.1% with a higher level among girls and among children with lower social classes.<sup>(6)</sup> Dental anxiety, a fairly common condition in five year-old children, is closely associated with symptoms, irregular attendance pattern, history of extraction and having dentally anxious parents.<sup>(7)</sup>

Many researchers have also investigated the causes of dental anxiety in relation to gender. Ollendick *et al.* found that girls reported a greater level of fear than boys. Interestingly, boys endorsed more direct conditioning and vicarious conditioning sources than girls. Boys were more likely to report fear than girls when they had direct or vicarious conditioning experiences with the feared stimulus. On the other hand, girls reported fears that were largely due to instructional/informational sources. Effects due to nationality were minimal.<sup>(8)</sup>

Dental anxiety is most commonly measured using questionnaires and rating scales.<sup>(9)</sup> Questionnaires can only be used with teenagers and adults because of the limitation of vocabulary, understanding and emotional development of younger children.<sup>(10)</sup> The evaluation of anxiety in children is therefore largely based on observed behaviour using rating scales (behavioural ratings); an example is the widely used Frankl scale, which was developed by Frankl.<sup>(11)</sup> It consists of four ratings, which range from definitely negative to definitely positive.

The aim of the study was to determine the influence of reported dental experience on dental anxiety in children aged 11-14 years in Liverpool, United Kingdom.

## Methods

Children aged 11-14 (school groups years 7, 8 and 9), attending Broadgreen Comprehensive School in Liverpool, which had been allocated a score of 14 on the Jarman Index of social deprivation, were involved in this study.

A letter was distributed through the school to all parents asking permission for their children to take part in this study. The letter outlined the purpose of

the study and gave the opportunity to the parents to withdraw their children if they had any objections.

A two-part questionnaire was used for the purpose of this study. For the first part, a Modified Child Dental Anxiety Scale was employed to assess the child's dental anxiety. The scale consisted of eight questions, which asked the children to record which dental procedures they had experienced, including (1) going to the dentist in general; (2) dental examination; (3) scaling and polishing; (4) local anaesthesia; (5) dental restoration; (6) dental extraction; (7) dental treatment under inhalation sedation; (8) dental treatment under general anaesthesia.

The second part of the questionnaire allowed the children to report on a five point Likert scale about how relaxed or worried they were for each of these scenarios. Children were asked to choose an answer which best sums up their feelings. The answers were scored from one to five (1=relaxed and not worried at all; 2=slightly worried; 3=moderately worried; 4=fairly worried 5=extremely worried).

Teachers distributed the questionnaire to children in their class groups and each class teacher explained the purpose of the questionnaire. Children were invited to complete the questionnaire in their classes in the presence of the teacher. All the classes took place at the same time to prevent children discussing the questionnaire among each other. The teacher took the children through the questionnaire by reading all the questions and showing the children how they could mark their answers, so that any misunderstandings in the comprehension of the questionnaire were solved at the time of completion by the help of teacher or head teacher.

## Statistical Analysis

The questionnaire data was edited, coded and entered on the computer for storage. Analysis was performed using SPSS statistical package version 11. The relationships between categorical variable were analyzed using cross-tabulation, and t-tests were used to determine the relationship between dental anxiety and reported dental experience. The conventional significance level of  $p < 0.05$  was set.

## Results

Out of a target of 450 children, 366 (81.3%) completed a questionnaire. All parents allowed their children to participate. Those who did not participate were absent from their classes. The age distribution of the children revealed that 25 (6.8%)

**Table I.** Number of children for each age group

Age (years)	No. of Children	%
11	25	6.8
12	140	38.3
13	121	33.1
14	80	21.9
Total	366	100

**Table II.** The relationship between dental anxiety and gender

Gender	No. ( %)	Dental anxiety Mean $\pm$ SD
Male	204 (55.7)	18.90 $\pm$ 6.810
Female	162 (44.3)	21.87 $\pm$ 7.707
		P=0.0001

**Table III.** Mean dental anxiety and reported dental treatment experience

Dental anxiety and reported dental treatment experience	Attending to the dentist	Dental examination	Scaling & polishing	Local anaesthesia	Dental restoration	Dental extraction	Dental treatment under GA
	No. (%) Mean $\pm$ SD	No (%) Mean $\pm$ SD	No. ( %) Mean $\pm$ SD	No. ( %) Mean $\pm$ SD	No. ( %) Mean $\pm$ SD	No. ( %) Mean $\pm$ SD	No. ( %) Mean $\pm$ SD
Yes	227 (62.0) 20.17(7.132)	336(91.8) 1.73(1.147)	110(30.1) 1.96(1.24)	187(51.1) 2.77(1.381)	232(63.4) 2.23(1.314)	242(66) 3.02(1.487)	153(41.8) 2.42(1.555)
No	39 (10.7) 21.28(8.016)	13(3.6) 1.92(1.320)	175(47.8) 2.28(1.258)	131(35.8) 3.38(1.454)	105(28.7) 2.70(1.435)	102(27.9) 3.64(1.481)	178(48.6) 2.87(1.593)
P-value	0.396	0.546	0.040	0.0001	0.004	0.0001	0.011

The mean difference is significant at the 0.05 level

were 11 years old, 140 (38.3%) were 12 years old, 121 (33.1%) were 13 years old and 80 (21.9%) were 14 years old (Table I). Gender distribution showed that 204 (55.7%) of the respondents were boys and 162 (44.3%) were girls. The relationship between dental anxiety and gender is presented in (Table II), which revealed that the mean dental anxiety score for boys was 18.90 and for girls was 21.87, and the difference was statistically significant. The P value was calculated as 0.0001 using the t-test (2-tailed). Of the 366 study children, 227 (62%) reported attendance within six months and had mean anxiety score of 20.17, 39 (10.7%) reported attendance once a year or more and had a mean anxiety score of 21.28. The P value was calculated as 0.396 using t-test (2-tailed).

Table III shows a comparison of children who attended within six months with those who attended once a year or more, demonstrating no statistical significance in the relationship between those who had regular and those who had irregular attendance. However, there was a difference in the total anxiety score and children who reported attendance within six months had the lower mean score. There was a significant relationship between dental anxiety and experience of having dental check-up. It showed that of the 366 study children, 336 (91.8%) reported that they had experienced a dental examination. Their mean anxiety score for the "check-up" question was 1.73. Thirteen (3.6%) children who

reported that they had not had this experience had a mean value for the check-up item of 1.92. Table III compares children who reported dental check-up experience with those who reported no experience, demonstrating no statistically significant difference in the mean value for dental anxiety. The mean scores were lower with those who reported this experience. The relationship between dental anxiety and the experience of scale and polish, out of the 366 study children, 110 (30.1%) reported that they had experienced a scale and polish with a mean anxiety score of 1.96, 175 (47.8%) children reported that they had not experienced a scale and polish had a mean value for the scale and polish item of 2.28. Comparing children who reported a scale and polish experience with those who reported no experience, demonstrated a statistically significant difference in the mean value for dental anxiety.

The children who reported experience had the lower mean scores (Table III). Out of the 366 study children, 187 (51.1%) reported experience of local anaesthesia with a mean anxiety score for the local anaesthesia question of 2.77, 131 (35.8%) children reported that they had not had this experience and had a mean value for the local anaesthesia item of 3.38. The children who reported experience of local anaesthesia had the lower mean value as shown in Table III. In the study group of 366 children, 232 (63.4%) reported that they had experienced a dental filling had a mean anxiety score of 2.23, 105

(28.7%) children reported that they had not experienced a dental filling had a mean value for the dental filling item of 2.70. Table III compares children who reported dental filling experience with those who reported no experience, demonstrating a statistically significant difference in the mean value for dental anxiety for the question relating to use of dental filling. The mean value was lower for those children who reported restorative experience.

In the study group of 366 children, 242 (66%) reported experience of dental extraction had a mean anxiety score of 3.02, 102 (27.9%) children reported that they had not experienced a dental extraction had a mean value for the dental extraction item of 3.64 (Table III). Comparing children, who reported experience of dental extraction with those who reported no experience, demonstrated a statistically significant difference. The group who reported experience of extractions had the lower mean value for this item on the dental anxiety scale. Out of the 366 children in this study, 153 (41.8%) reported experience of dental general anaesthetic with a mean anxiety score for the general anaesthetic question of 2.42. 178 (48.6%) children reported that they had not had this experience had a mean value for the dental general anaesthetic item of 2.87. Table III compares children who reported dental general anaesthetic experience with those who reported no experience, demonstrating a statistically significant difference in the mean value for dental anxiety for the question relating to dental general anaesthesia. The group who reported experience of treatment under general anaesthesia had the lower mean value for this item on the dental anxiety scale.

All children who were not sure of having any form of treatment were omitted from this statistical analysis.

## Discussion

Dental anxiety was reported relating to attending to dentist in general, dental examination (check-up), scaling and polishing, local anaesthesia, dental filling, dental extraction and dental treatment under general anaesthesia. Dental treatment under inhalation sedation was excluded from the scale in order not to be mixed up with general anaesthesia by children. The modified child dental anxiety scale that we used in this study has been reviewed for reliability and proved its validity to be used for measuring dental anxiety.<sup>(12,13)</sup> The multivariate analysis showed that the mean dental anxiety score for boys was less than the value for girls. This reached statistical significance which indicates that

dental anxiety was higher in girls than boys within this study group. The same gender difference has been demonstrated in a number of studies.<sup>(6,14)</sup> One study had also shown that dental anxiety both before and after treatment was higher among girls than among boys.<sup>(15)</sup> A further study by Liddell suggested that these differences may indicate a tendency for girls to be more influenced by internal factors, whereas boys react to a greater extent to external stresses than girls.<sup>(16)</sup>

Regular dental attendance to dentist and dental examination have been claimed by many authors to be a factor for decreasing dental anxiety due to the repeated exposure to dental examination and treatment and the experience gained by the children from increasing access to dental care.<sup>(17)</sup> Irregular attendees to dental examination and treatment usually presents the dental office when there is an urgent oral health problem which needs invasive and traumatic procedure which reflects the level of anxiety to those groups of children. Studies have demonstrated that there is strong link between regular and irregular attendance in relation to dental anxiety.<sup>(14,17)</sup> Wigen *et al.* found that irregular attendees whose parents avoid bringing their children to scheduled dental appointments and those with child behaviour management problems in early dental visits increase the risk of having caries experience and dental anxiety. This may be interpreted as dental anxiety increasing after experience of traumatic dental procedures compared with receiving non-traumatic procedure.<sup>(18)</sup> McGrath *et al.* found that those experiencing high level of dental anxiety are among those with irregular attendance and the poorest oral health-related to quality of life in Britain.<sup>(19)</sup> It was found in this study that there was a statistically significant relationship between children's experience of scale and polish, and their specific anxiety about scale and polish. Children who had experienced scale and polish were less anxious than those who had not experienced. The reason can be explained that children who receive some minimal invasive dental treatment have become more experienced and less anxious than those who have not received any treatment.<sup>(20)</sup> Chadwick in assessing the anxious patient also found that the patient who returns to the dentist suggests that they trust the dentist and are trying to find ways of dealing with their anxieties.<sup>(21)</sup> Among children who had experienced local anaesthesia and those who had not, it was found that there was a statistically significant relationship between children's experience of local anaesthesia and their anxiety about local anaesthesia.

Surprisingly in this study the children with previous experience of local anaesthesia were less anxious about this than those who had not experienced local anaesthesia. However, Humphris *et al.* found that a strong association between a traumatic treatment intervention and dental anxiety.<sup>(22)</sup> A similar study found a strong association between dental anxiety and blood, injury, injection phobia (BIIP). The results indicate that among adolescents BIIP is relatively often connected with dental anxiety.<sup>(23)</sup> The result of this study supported by Moor *et al.* found that the majority of traumatic dental experiences could not be directly linked to pain, but rather the dentist's attitude or the atmosphere in the clinic.<sup>(24)</sup> Carlsen *et al.* also found in their study that children who were asked before and after treatment about both pain and dental anxiety, reported significantly less dental anxiety than the control group.<sup>(25)</sup> One explanation could be that the treatment approach adopted by the majority of the general dental practitioners and paediatric dentists was atraumatic or less traumatic by using for example topical anaesthetic and behaviour management approach (tell-show-do, acclimatisation *etc*). This study also compared children who had experienced restorative care with those who had not. There was a statistically significant relationship between children's experience of restorative treatment, and their specific anxiety about restorations. It was found that the group of children with previous history of experiencing restorative treatment had a lower mean anxiety score for this item of the questionnaire than those who had not experienced a restorative treatment. This reached statistical significance. This result is consistent with other finding. Milsom *et al.* stated that the restorative approach adopted by the majority of general dental practitioners is atraumatic for children and also that restorative procedures may well be less traumatic for children than the procedures required to undertake an extraction under either local anaesthesia or general anaesthesia.<sup>(7)</sup> Schriks also concluded that children treated according to the atraumatic restorative treatment (ART) approach using hand instruments alone experience less anxiety and discomfort than those treated using rotary instruments.<sup>(26)</sup> When children who had experienced a dental extraction were compared with those who had not. There was a statistically significant relationship between children's experience of dental extraction and their anxiety about dental extraction. It was found that those children who had history of extraction had a lower mean anxiety value than children who had not

experienced this form of treatment. It is generally believed that extraction is a traumatic procedure for young children. Milsom *et al.* found that children who had a history of extraction were three and a half times more likely to be anxious than children who had no experience of this form of treatment.<sup>(7)</sup> Another study concluded that invasive dental treatments were rated the most intense among dental treatment pains and girls were commonly inclined to report more frequent and more intense pain compared with boys.<sup>(27)</sup> However, this result in the study group of Liverpool children could be explained by the findings of other studies. Siddle and Remington stated that children might not acquire dental anxiety if they had a traumatic, painful experience after some relatively painless dental treatment, prior to the painful experience.<sup>(28)</sup>

Other complementary therapies such as relaxation and breathing techniques (meditation) also have been successfully used in the management of dental anxiety with patients who are fearful of receiving dental treatment.<sup>(29)</sup> When comparing children who had experienced dental treatment under general anaesthesia and those who had not, it was found that there was a statistically significant relationship between children's experience of dental treatment under general anaesthesia, and their anxiety. Children who had experienced treatment under general anaesthesia had a lower mean anxiety score for this item of the questionnaire than those who had not experienced treatment under general anaesthesia. This result could be explained by a model of latent inhibition, and it may be that because older children have had the chance of more dental visits of positive nature and this has helped to reduce this anxiety. Therefore older children tend to lose their anxiety, while younger children have not yet this opportunity.<sup>(30)</sup> It can be postulated that dental anxiety may disappear, not as a result of losing the fear-conditioned reflex, but because the unconditioned reflex evoked by the phobic situation has been reassessed. However, Arch *et al.* in the study of children choosing between general anaesthesia or inhalation sedation for dental extraction, found no increase in the mean value for dental anxiety following general anaesthesia when compared to anxiety before general anaesthesia.<sup>(31)</sup>

## Recommendation

The pattern of sporadic attendance and care can setup a vicious cycle leading to long lasting dental anxiety problems. In order to prevent anxiety, we must break this cycle by making the dental

experience easier and more pleasant for children and by providing effective public health measures to prevent dental disease.

## Conclusion

Conclusions were based on mean values for dental anxiety after children had been grouped according to their gender or reported dental anxiety. Dental anxiety is a fairly uncommon condition in 11 to 14 year old children attending Broadgreen Comprehensive School in Liverpool. Girls were found to be significantly more dentally anxious than boys ( $p < 0.05$ ). Children who reported that they had visited the dentist more frequently were significantly less anxious than those who reported infrequent visits. Children were significantly less anxious about specific items of dental treatment if they had experienced that particular form of treatment ( $p < 0.05$ ). This applied to scaling and polishing, local anaesthesia, restorative treatment, dental extraction and dental treatment under general anaesthesia.

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