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Cross-Sectional Study

Investigating the Relationship Between Dental Anxiety and Children's Temperament in Children

J. B. Krikken[1*], J. M. Ten Cate[1], J. S. J. Veerkamp[1]

[1]Department of Cariology, Endodontology and Paedodontology Academic Centre for Dentistry Amsterdam (ACTA) University of Amsterdam and VU University Amsterdam, The Netherlands.

***E-mail** ✉ j.krikken@acta.nl

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ABSTRACT

Anxiety and fear of dentistry are one of the problems of children's dental treatments. One of the factors affecting dental anxiety is the child's mood. The purpose of this research was to determine the relationship between mood and anxiety in children. This research was a descriptive and analytical type that was done in a cross-sectional manner. The data collection tool included the MCDAS (Modified Child Dental Anxiety Scale) and EAS (Emotion, Activity, Sociability) questionnaire. Finally, the relationship between the score of the four dimensions of temperament and the dental anxiety score of children was evaluated by the Pearson correlation coefficient. $P < 0.05$ was considered significant. The dental anxiety score had a positive and significant correlation with the emotion dimension score ($P < 0.05$). This correlation with the dimension of shyness was also positive and significant (r $P < 0.05$), but with the dimension of physical activity, it had an inverse and significant relationship ($r = -0.175$, $P < 0.05$), and with the Sociability dimension was inverse and significant ($r = -0.161$, $P < 0.05$). A regression model was utilized to estimate the anxiety score by the different mood dimensions scores. In this model, only the mood dimension of emotions was effective in the anxiety score. Based on the findings of this study, increasing the score in the emotional dimension and being shy significantly increased the dental anxiety score, and the regression model also confirmed the impact of the emotional dimension in increasing the score of anxiety. Increasing the score in the sociability dimension and physical activity significantly decreased the dental anxiety score in children.

Keywords: Dental, Children, Anxiety, Temperament

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Introduction

Despite the progress made, the fear and anxiety of dentistry as well as the child's non-cooperation in the dental environment is still a problem for patients and the dental team, children are afraid of dental treatments [1-3]. Clients usually experience anxiety and fear because of the dental environment and the tools used. Psychological factors such as pain anxiety and mental pain are effective in dental anxiety. In addition, a large amount of pain anxiety due to pain catastrophizing and distorted perceptions of dental services can lead to dental anxiety [4, 5].

The dental office is often an environment of fear and anxiety for children. Anxiety and fear of dentistry are common in children and many factors affect it. Factors such as sex, age, history of hospitalization, child's obvious anxiety, and mother's anxiety have a significant effect on this fear and anxiety. These factors can be divided into three main groups, including individual factors (associated with the child's maturity and temperament), external factors (associated with the child's parents, siblings, and friends), and factors related to the dental group [6, 7]. Dental anxiety is described as an abnormal fear or undue apprehension of going to the dentist for dental procedures. This anxiety has a prevalence between 6 and 20% [8, 9].

One of the factors affecting dental anxiety and fear is the child's mood. Mood is an emotional characteristic that is different in different people and refers to the interaction style of people with the surrounding environment. Mood is relatively stable over time and in different conditions, but it can change under the influence of environmental factors [10, 11]. The areas involved in mood are as follows: Reactivity, which includes the intensity and reaction type such as anger, frustration, fear, embarrassment, and emotional regulation, which refers to the ability to control emotions to perform acceptable social behaviors. The different dimensions of temperament are Sociability, Shyness (tension and inhibition in facing strangers), Activity (speed and strength, preferably for physical activities), and Emotional (distress) [12-14].

Temperament can be different in two sexes and different ages. Studies have shown that boys have higher emotions than girls [15]. It has also been shown that children become more emotional, shy, and less active and that girls' negative emotions decrease more rapidly with age [16]. Temperament characteristics in early childhood can affect children's anxiety and stress characteristics [12]. However, the effect of mood on preschool children's anxiety is not clear [9]. Klingberg and Broberg showed that shyness and negative emotions affect dental fear in children over 5 years old [17]. The purpose of this research was to investigate the relationship between dental anxiety and children's mood in children.

Materials and Methods

This research was descriptive and analytical and was done in a cross-sectional manner. Based on a similar study by Jain *et al*. the sample size included 152 children aged 6 to 11 years [9]. Exclusion criteria included suffering from important medical and psychological diseases, any physical, mental, or cognitive defects, and non-cooperation required to fill out the questionnaires.

At first, the steps and aim of the study were explained to the parents and their consent was obtained to participate in the study. Then the parents and the child himself completed the predetermined questionnaire including the following items. The child completed the standard MCDAS anxiety questionnaire, whose reliability and validity have been confirmed. This questionnaire includes 8 questions that measure the level of anxiety with a 5-point Likert scale, and thus the maximum score for each person is 40 and the minimum score is 8. The demographic information of the patient was recorded and the child's parents completed the EAS temperament questionnaire containing 20 questions to determine the score in 4 dimensions of temperament including emotionality, activity, sociability, and shyness [15]. The score of each item ranged from 1 (not at all like my child, strongly disagree) to 5 (very much like my child, strongly agree). In the EAS questionnaire, 5 questions are considered for each of the 4 sub-branches (dimensions) of mood; Therefore, the minimum score for each dimension is 5 and the maximum is 25. In addition, the results of the test and retest in all cases of Spearman's correlation between the answers to the questionnaire before and after 10 days were positive and significant ($P<0.001$), which indicated the external correlation of the questions, and therefore its reliability is confirmed. After collecting, controlling, and coding, the data was entered into the SPSS 23 software environment, the required tables and indexes were prepared, and the Pearson correlation coefficient was utilized to determine the relationships. The significance limit in this research was considered 0.05.

Results and Discussion

In this study, 152 children aged 6 to 11 years with an average age of 8.03 ± 1.59 years with a range of changes from 6 to 11 years participated. 73 people (48%) of the samples were boys and the rest 79 people (52%) were girls. The average age of the father was 38.95 ± 6.4 years with a range of changes from 27 to 67 years and the average age of the mother was 34.77 ± 5.72 years with a range of changes from 24 to 57 years. The father's education of 60 children (39.7%) was below diploma, 61 children (40.4%) had a diploma and the rest 30 (19.9%) had education above diploma. In terms of mother's education, 40 people (27%) had below diploma, 67 people (45.3%) had a diploma and the rest 41 people (27.7%) had an education above diploma. **Table 1** shows the average scores of children's temperament and dental anxiety dimensions, as well as the Pearson correlation coefficients between the scores of different temperament and dental anxiety dimensions.

Table 1. The mean scores of children's temperament dimensions and their correlation coefficient with the dental anxiety score in the examined samples.

Dimensions of mood	Mean	Standard deviation	r	P-value
Emotionality	15.99	3.78	0.203	0.012

Activity	16.68	3.95	-0.175	0.031
Sociability	16.44	3.51	-0.161	0.048
Shyness	13.51	4.27	0.232	0.004
Dental Anxiety	19.01	6.46	-	-

It can be seen that there was a significant correlation between the dental anxiety score and the score of all four dimensions of children's temperament. In this way, this correlation is positive in the dimension of emotionality and shyness and negative in the dimension of physical activity and sociality. The Pearson correlation coefficient between the anxiety score and the total mood score was r = 0.077, which was positive but not significant with P = 0.347. The relationship between different dimensions of temperament was investigated by Pearson's correlation coefficient and the result was that the correlation between the score of emotionality and shyness (r = 0.169, P = 0.037) and the score of the dimension of physical activity with the two dimensions of sociability and shyness respectively It was significant with r = 0.513, r = -0.526, and P = 0.000 in both cases, as well as the score of the sociability dimension with shyness with r = -0.538, and P=0.000, but in other cases the correlations It was not meaningful (being emotional with physical activity and being social).

Table 2. Pearson Correlation coefficient between dental anxiety score and temperament dimension score according to the child's age and gender.

Variable		**Dimensions of mood**							
		Emotionality		**Activity**		**Sociability**		**Shyness**	
		r	**P-value**	**r**	**P-value**	**r**	**P-value**	**r**	**P-value**
Age of the child	6-7 years (n = 69)	0.199	0.101	-0.219	0.071	-0.217	0.074	0.354	0.003*
	8-11 years (n = 83)	0.209	0.058	-0.141	0.204	-0.137	0.216	0.115	0.300
Gender of the child	Male (n = 73)	0.147	0.214	-0.174	0.141	-0.133	0.262	0.166	0.159
	Female (n = 79)	0.261	0.020*	-0.179	0.115	-0.190	0.093	0.302	0.007*

Table 2 shows the Pearson correlation coefficient between the dental anxiety score and the score of different temperament dimensions according to the child's age and gender. It can be seen that the pattern of the relationship between personality dimensions and dental anxiety is the same as the general pattern. At the age of 6-7, there was a positive and significant correlation with the child's dental anxiety score only in the shyness dimension (P = 0.003) and no significant correlation was found in the other three mood dimensions with the dental anxiety score (P > 0.05). At the ages of 8 to 11 years, the score of any of the mood dimensions was not significant with the dental anxiety score. In addition, in boys, there was no significant relationship between different dimensions of temperament and dental anxiety score (P > 0.05). In girls, only the emotionality dimension score had a positive and significant relationship with the dental anxiety score (P = 0.020), and this relationship was not significant in the other three dimensions (P > 0.05).

Table 3. The correlation coefficient between the dental anxiety score and the score of different aspects of the child's temperament according to the mother's age and education.

Variable		**Dimensions of mood**							
		Emotionality		**Activity**		**Sociability**		**Shyness**	
		r	**P-value**	**r**	**P-value**	**r**	**P-value**	**r**	**P-value**
Mother's age	24-34 years (n = 71)	0.321	0.371	-0.039	0.747	-0.070	0.563	0.194	0.105
	35-57 years (n = 83)	0.104	0.058	-0.301	0.008*	-0.228	0.048*	0.248	0.031*
Mother's education	Under diploma (n = 40)	0.236	0.142	-0.319	0.045*	-0.365	0.021*	0.288	0.072
	Diploma (n = 67)	0.296	0.015*	-0.214	0.082	-0.119	0.338	0.271	0.027*

Higher than diploma (n = 41)	0.019	0.905	0.219	0.169	0.010	0.951	0.009	0.957

Table 3 shows the Pearson correlation coefficient between the dental anxiety score and the score of different aspects of the child's temperament according to the age and education of the child's mother. It can be seen that the Pearson correlation coefficient between the dental anxiety score and the score of different dimensions of a child's temperament in mothers under 35 years of age was not significant (P > 0.05). In mothers over 35 years of age, the correlation of physical activity, sociability, and shyness with the dental anxiety score was significant (P < 0.05), but this relationship was not significant in the other two dimensions (P > 0.05).

In children whose mother's education was below diploma, the correlation coefficient in the score of the two dimensions of physical activity and sociality with the dental anxiety score was significant (P < 0.05), but this relationship was not significant in the other two dimensions (P > 0.05). In diploma education, the correlation in the score of the two dimensions of emotionality and shyness with the dental anxiety score was significant (P < 0.05), but in the other two dimensions, this relationship was not significant (P > 0.05). In education higher than a diploma, the score of none of the personality dimensions was not significant with the dental anxiety score (P > 0.05).

Regarding the father's age and education, Pearson's correlation coefficient between the shyness dimension score and the dental anxiety score revealed a significant and positive correlation (r = 0.252, P = 0.018) for those under 40 years of age, but in the other two dimensions, this relationship was not significant (P > 0.05). For people over 40 years of age, this coefficient was obtained between the score of the physical activity dimension and the dental anxiety score, r = -0.304, which showed a significant inverse correlation with P = 0.015, but this relationship was not significant in the other two dimensions (P > 0.05).

In children whose father's education was less than a diploma, the correlation coefficient in the score of two dimensions of physical activity and sociability with the dental anxiety score was obtained, respectively, r = -0.290, r = -0.307, with P < 0.05, showed a negative and significant correlation, but in the other two dimensions, this relationship was not significant (P > 0.05). In diploma education, the correlation between the emotionality dimension score with the dental anxiety score was significant (P < 0.05), but this relationship was not significant in other dimensions (P > 0.05). In education higher than a diploma, the score of none of the personality dimensions was not significant with the dental anxiety score (P > 0.05).

A regression model was utilized to estimate the anxiety score by the different mood dimensions scores. Other independent variables included in this model are the child's age, the child's gender, the mother's age, and the mother's education. As a result, $R^2 = 0.1$ was obtained, which means that 10% of the changes in the dependent variable are explained by the regression model. Other variables are presented as described in **Table 4**.

Table 4. The regression coefficient of anxiety score estimation using dimensions of the child's temperament and related independent variables.

Variable	B	SE	Beta	t	P-value
Emotionality	0.31	0.14	0.18	2.21	0.029
Activity	-0.13	0.17	-0.08	-0.78	0.437
Sociability	-0.1	0.19	-0.05	-0.53	0.596
Shyness	0.19	0.16	0.12	1.18	0.241
Age of the child	-0.35	0.36	-0.09	-0.98	0.330
Gender of the child	-0.18	1.07	-0.01	-0.16	0.870
Mother's age	-0.01	0.1	-0.01	-0.12	0.908
Mother's education	0.73	0.73	0.08	1	0.321

It can be seen that after removing the effect of other variables, only the emotion dimension is effective in the anxiety score and other variables do not have a significant effect in the anxiety score. In addition, the overall mood score and other independent variables were included in the model, and the result was that the other variables were not significant in this model.

It is important to know the factors affecting children's anxiety to plan dental treatments. Factors affecting anxiety that have been discussed in this study are different dimensions of mood.

The results of this research showed that the score of all dimensions of children's dental mood and anxiety was about half of the maximum score, which is in line with the results of Raman and Sahithya's study [18]. In this study, they examined the relationship between parenting style and a child's temperament and anxiety and concluded that different aspects of temperament are related to parenting style and children's anxiety, in such a way that anxious children are less socially and emotionally difficult and have more physical activity.

In the present study, the correlation between the dental anxiety score with both emotions and shyness was positive and significant. These results were in line with the study of Tsoi *et al*. [19]. They showed a significant relationship between parents' prediction of their child's behavior and emotionality, shyness, and activity in EAS. The study of Jain *et al*. who examined the temperament dimensions of emotionality, shyness, and activity for children was also in line with the present study [9]. The data of this research indicated that there was a positive linear relationship between 1) the percentage of completely negative behavior and the shyness score, 2) the anxiety level and the emotionality score, and 3) the anxiety level and the shyness score. The result of the study by Stenebrand *et al*. is also in line with the present study [20]. They concluded that emotionality and activity sub-branches of temperament were significantly related to dental anxiety. Emotionality is defined as a tendency to get upset intensely and easily. A characteristic of distress and anxiety occurs in the early years of life and is introduced as a risk factor for anxiety. Behavior problems and shyness are related to emotional problems in childhood. Shyness and emotionality may have additive impacts on dental anxiety [21].

Shy children are slow-witted and slow to communicate with strangers. In new situations, these children are afraid instead of curious. Thus, shyness and emotionality, like dental anxiety, mean that the child may not be able to cope with the dental treatment which leads to negative behavior in the dental session [17].

In this research, the correlation between the score of the physical activity dimension and the score of the sociability dimension with the dental anxiety score was both negative and significant. That is, by increasing the score of the mentioned temperament dimensions, the dental anxiety score of children decreased and vice versa; This finding is consistent with Tosi *et al*.'s study [19], who state that there is a significant relationship between parents' prediction of their child's behavior and emotionality, shyness, and activity in EAS, and with Jain *et al*.'s study [9], who showed The parameters of emotionality and shyness in temperament are weakly related to dental anxiety, not aligned. As we know, a child with low physical activity and low sociability is prone to anxiety and distress, and these mood characteristics have a predictive value for controlling children's behavioral problems in dental sessions [22].

In the present study, there was a significant and positive correlation between the score of the shyness dimension and the dental anxiety score in the age group of 6-7 years. This result is in line with the study of Jain *et al*. [9]. They stated that children with higher anxiety showed more negative behavior and this negative behavior decreases with increasing age, and also with the result of Aminabadi *et al*.'s study that age and temperament are predictors for children's behavior in It is a dental appointment, it is aligned [22]. It is also consistent with the result of Fux-Noy *et al*.'s study that the negative behavior of children aged 3-6 years to receive dental services was more than the age group of 6-11 years old [23]. In general, with increasing age, dental anxiety decreases, which is probably because of the maturation of communication and adaptive skills. In this research on girls, there was a positive and significant correlation between children's dental anxiety score with the score of the emotion dimension and the shyness dimension, which is in line with the results of Fux-Noy *et al*.'s study that children's behaviors during consecutive dental treatments, compared to Gender did not have a significant difference, it does not match [23]. This difference in findings can be due to the different age ranges of the participants of the two studies, in that the age of the children in the Fux-Noy study (3-6 years) was lower than that of the present study (6-11 years). Overall, the role of gender in dental anxiety is unclear, and most studies have shown greater anxiety in females, especially after early school age. This issue can be partly due to the greater tendency of females to express their fears verbally.

In the present study, the score of children's temperament dimensions had a negative and significant correlation with the dental anxiety score for children whose education was less than a diploma. The score of temperament dimensions of physical activity and sociability at the educational level below the diploma of parents had an inverse and significant correlation with the dental anxiety score of children. In addition, by increasing the score of sociability and physical activity, the dental anxiety score of children decreased and vice versa. In parents who had a diploma education, the dimension of emotions and shyness had a positive and significant correlation with dental anxiety, which was in line with the study of Seraj *et al*.

[24]. They stated that children's temperament traits had a significant correlation with the education level of their parents. Therefore, it can be concluded that there may be a relationship between children's temperament and parents' education level. According to previous studies, parents with education levels below diploma have the lowest socioeconomic level and children who grow up in these families have many behavioral problems. In addition, parents' education level has a significant relationship with children's acceptance of treatment and social behavior [20, 25, 26].

Conclusion

Based on the findings of this research, increasing the score in the emotional dimension and being shy significantly increases the dental anxiety score, and the regression model also confirms the impact of the emotional dimension in increasing the anxiety score. While increasing the score in the dimension of physical activity and sociality significantly reduces the dental anxiety, score in children aged 6-11. Therefore, to reduce children's anxiety during dental treatment, it is necessary to reduce the child's emotional and shyness by developing appropriate behavior and increasing physical activity and sociality.

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