

## Temperament and child dental fear

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### Abstract

**Purpose:** *The relationship between dental fear and temperament in children was investigated in 124 Swedish children aged 5–7 and 10–12 years. They represented dentally fearful (65) and not fearful (81) children, and were drawn from a larger population-based patient pod. The aims of the investigation were to study the relationships between temperament on one hand, and dental fear and dental behavior-management problems on the other hand.*

**Methods:** *Dental fear was measured by the Dental Subscale of Children's Fear Survey Schedule (CFSS-DS) and the Children's Dental Fear Picture test (CDFP), while the Emotionality, Activity, Sociability (EAS) Temperamental Survey was used to assess four aspects of temperament: negative emotionality, shyness, sociability, and activity.*

**Results:** *Using Student's  $t$  test, children with dental fear had statistically significantly higher scores on shyness compared with normative data on EAS from Sweden. When fearful children were compared with the others in the study group by the use of Student's  $t$  test, children with dental fear scored statistically significantly higher on both shyness and negative emotionality.*

**Conclusion:** *Thus, children expressing shyness and/or tendencies of negative emotionality should be considered patients at risk for developing dental fear problems. (Pediatr Dent 20:237–43, 1998)*

The etiology of dental fear and dental behavior-management problems in children has been the topic of several investigations, and important explaining factors have been identified: general emotional status,<sup>1–4</sup> parental dental fear,<sup>4–10</sup> previous dental treatment, and experiences of pain.<sup>4, 6, 11–14</sup>

Clinically, children with dental fear problems differ from those presenting dental behavior-management problems (BMP). A recent epidemiological study from Sweden has shown that not all fearful children present BMP and that only a minority of all children with BMP are dentally fearful.<sup>4</sup> Dentally fearful children can be shy and silent in their initial contact with the dentist and passive during dental treatment. Children with BMP, on the other hand, are more outgoing in their general behavior and often rebellious during dental treatment. Thus, clinical evidence suggest that there is

a temperamental difference between children with dental fear and children with BMP, but no empirical evidence exists. It is further unclear whether these groups of children have temperamental characteristics differing from children not presenting with either of these problems.

Starting with the pioneering work of child psychiatrists Thomas and Chess in the early 1960s,<sup>15</sup> temperament in children has been the interest of several investigations. With temperament we refer to an emotional quality that varies among individuals, is at least moderately stable over time and situation, is under some genetic influence, and appears early in life.<sup>16</sup>

Buss and Plomin<sup>17</sup> have classified temperament into four different groups or tendencies: emotionality, shyness, sociability, and activity. Each of the four types of temperament has been described in different dimensions: frequency, duration, intensity, direction of response, and threshold. Negative emotionality is characterized by crying, shrinking back, hiding, fear, anger, and temper tantrums. Activity is defined as tempo and vigor, i.e., the tendency to hurry or speed and force in walking and talking. Sociability concerns attempts to initiate contacts and be gregarious with people in general, i.e., a tendency to prefer the presence of others to being alone.

One important aspect of temperament is the individual's typical reaction to novelty. From an evolutionary standpoint the reaction to novelty is of special significance as, in order to develop from an incompetent infant to a competent adult, the individual must learn to master a number of skills. He does so by handling numerous novel situations, some of which are extremely dangerous. Approaching the unknown because of curiosity, or withdrawing from the unknown out of caution is an important between-species—as well as within-species—marker.<sup>18</sup>

Shyness is defined as the tendency to be slow to warm up in novel social situations. Thus, shyness occurs when meeting people who are strangers or casual acquaintances. In such situations shy children tend to be inhibited, maybe even awkward, with feelings of tension and distress and with a tendency to escape from social interaction. However, shy children need not be tense and inhibited with good friends or with mem-

bers of their family. With people whom they know well they can be as sociable, that is valuing of other persons' company, as any other child.

Studies from the US concerning very young children have suggested relationships between temperament and patient behavior during treatment under conscious sedation and initial dental examination. It was suggested that children showing the tendency of being approachable, as assessed by the Toddler Temperament Scale,<sup>19</sup> were more likely to display cooperative behavior during dental treatment under sedation compared to children showing withdrawal tendencies.<sup>20</sup> In an other study, patient behaviors in children aged 3–6 years during initial dental examination were measured with the Behavior Style Questionnaire.<sup>21</sup> Temperament constellations of easy, low, intermediate, and difficult could predict child behavior during examination. Further, approach/withdrawal and adaptability predicted quiet behavior in 3 year olds, whereas intensity and activity predicted crying behavior in 5 year olds who had no previous dental experience.<sup>22</sup>

The purpose of the present study was to investigate the relationships between temperament and dental fear and dental behavior-management problems (BMPs) in child patients.

## Methods

One-hundred and forty-six patients (74 boys, 72 girls), of whom 75 were 5–7 years old and 71 were 10–12 years old, who had been surveyed regarding dental fear in an adjacent study were eligible for the present investigation.<sup>23, 24</sup> These children represented both dentally fearful (65) and not fearful children (81) who had been drawn from a larger patient pool of 3204 children living in the City of Göteborg, Sweden. This larger group of children was identified using statistics on demographics and socioeconomic structures of the City of Göteborg, and the study population included children from areas with average socioeconomic structure as well as areas with higher and lower status. This large study population had been tested for dental and general fears using questionnaires filled out by the parents.

In the present investigation, selection procedures were based on combinations of items and questions in the previous questionnaire. Four different criteria were used to define fearful and not fearful children, and great efforts were made to minimize bias-like regression towards the mean. The procedures have been described in detail elsewhere.<sup>24</sup> Informed consent for the study was obtained from the parents.

The response rate was 85%, that is 124 of 146 children participated (64 boys and 60 girls; 64 children aged 5–7 years and 60 children aged 10–12 years). For five of the nonrespondents the mail was returned due to relocation, with no forwarding address. For the remaining 17 children the reason for not participating

is unknown. There were no statistically significant differences between respondents and nonrespondents concerning dental fear or dental BMPs.

All children were tested with the Children's Dental Fear Picture test,<sup>23</sup> which is a measure of dental fear using a projective technique. The CDFP classifies children as fearful, nonfearful, or uncertain. The CDFP testings were performed during a 60-min interview by two dentists who were trained and calibrated on the CDFP. The children were previously unknown to the dentists and no information about dental fear or previous experiences of dental treatment were available to the examiners. Further, dental fear was also assessed by a Swedish parental version of the Dental Subscale of Children's Fear Survey Schedule.<sup>25</sup> The CFSS-DS contains 15 items with a Lickert-type response format ranging from 1 (not afraid) to 5 (very afraid), so the possible score ranged from 15 to 75. The Swedish version has proved to be a reliable and valid measure of child dental fear, and scores equal to or exceeding 38 indicate clinically significant dental fear.<sup>26</sup> The CFSS-DS was collected prior to the CDFP and some of the items in CFSS-DS were used in the selection of the study population.

The dental records for the children were retrieved from the Public Dental Service. (In Sweden, all children up to the age of 19 are ensured dental treatment free of charge by law since 1974. From the age of 3, the children are offered dental examination and full dental treatment annually. This is mainly carried out within a nationwide system of Public Dental Service clinics, which employ about 50% of all Swedish dentists.) Based on these records, data regarding dental BMPs were compiled. A child was regarded as having BMPs if notes in the records clearly expressed severe disruptive behaviors resulting in delay of dental treatment, or rendering treatment impossible.

Children's temperaments were measured using the EAS temperamental survey.<sup>17</sup> The EAS has been translated to Swedish by Hagekull and Bohlin<sup>27</sup> and has been used with Swedish children aged 3–5 years of age and with 8 year olds.<sup>28</sup> It contains 20 items describing different characteristics of the child, and is constructed with a Lickert-type response format ranging from 1 (not at all like my child) to 5 (very much like my child). The EAS was sent in a questionnaire to the parents. The parents were instructed to assess the child's behavior and temperament in the different situations in an accompanying letter. Reminders were sent out twice.

Shy temperament, which was of special interest in our investigation, was identified independently by dentists and parents. The dentists rated the children as shy or not shy based on their behavior during the CDFP-testing. Parents rated children's shyness using the EAS temperamental survey as described above.

Student's *t* tests were used to compare mean val-

**TABLE 1. STUDY POPULATION SHOWN AS NUMBERS OF CHILDREN WITH AND WITHOUT DENTAL FEAR ACCORDING TO CFSS-DS\*, CDFP†, SC‡, AND BMP§ AND BY AGE GROUP**

	<i>Dental Fear</i>			<i>Not Fearful</i>			<i>N</i>
	<i>5-7 yr</i>	<i>10-12 yr</i>	<i>total</i>	<i>5-7 yr</i>	<i>10-12 yr</i>	<i>total</i>	
CFSS-DS	16	10	26	48	50	98	124
CDFP	18	14	32	46	46	92	124
SC	29	22	51	35	38	73	124

	<i>BMP</i>			<i>Non-BMP</i>			<i>N</i>
	<i>5-7 yr</i>	<i>10-12 yr</i>	<i>total</i>	<i>5-7 yr</i>	<i>10-12 yr</i>	<i>total</i>	
BMP	14	8	22	48	52	100	122

\* Children's Dental Fear Survey Schedule-Dental Subscale. † Children's Dental Fear Picture test.  
 ‡ Selection Criteria. § Dental Behavior Management Problems.

ues on CFSS-DS and EAS in fearful and not fearful children as well as to analyze differences between normative EAS data and EAS in the study population. Chi-square tests were used to analyze frequencies regarding participation between fearful and not fearful children and relationships between frequencies of shyness and negative emotionality on EAS and dental fear (CFSS-DS, CDFP, selection criteria). To compare observed shyness in CDFP and shyness in EAS, chi-square test of independence was applied. ANOVA and multiple (pairwise) comparisons procedure (Newman-Keuls procedure) were used to analyze the combined impact of shyness and negative emotionality (EAS) on CFSS-DS scores.

## Results

### Sample characteristics

Among the 124 children, 32 were found to be fearful, and 71 were identified as nonfearful, while the remaining 21 were classed as uncertain on the CDFP. A total of 26 children had scores of 38 or more on CFSS-DS indicating dental fear, while 73 had scores of 18 or lower indicating no fear at all. BMPs were found in 22 children while 100 children had no reports of BMPs. For two children, the dental records did not give enough information regarding BMPs. The patient material is shown in Table 1.

The study population had lower mean scores on negative emotionality (NEGEM) (2.90 vs. 3.15;  $P < 0.01$ ) and higher mean scores on activity (ACT) (3.90 vs. 3.66;  $P < 0.01$ ) as measured by the EAS scale compared with normative data from Sweden. No differences were found regarding sociability (SOC) or shyness (SHY). Boys had higher NEGEM scores than girls (3.18 vs. 2.60;  $P < 0.001$ ). Mean NEGEM scores

were also higher for children aged 5-7 years (3.11 vs. 2.67;  $P < 0.01$ ) compared with 10 to 12 year olds. No gender or age differences were found regarding any of the other temperaments.

### Temperament and dental fear

During the CDFP examination, 31 of the 124 children were rated shy by the examiner, while parental EAS-scores identified 23 shy children (based on normative data mean score plus one standard deviation). There was a good agreement between observations of shyness in CDFP and parental reports ( $\chi^2$  (6 df) = 20.90;  $P < 0.001$ ).

Of the 23 children who were rated as shy by their parents, seven had CFSS-DS scores of 38 or more, implying dental fear. Further, dental fear according to CDFP was found in 13 of the 23 shy patients, and 20 of the 23 were dentally fearful according to selection criteria. The relationships between SHY and the two latter (CDFP and selection criteria) proved to be statistically significant using chi-square tests (both  $P < 0.001$ ).

Chi-square tests also showed statistically significant relationships between frequencies of negative emotionality on EAS and frequencies of dental fear. Thus, EAS identified 16 children with high scores on NEGEM (normative data mean score plus one standard deviation), and seven of these scored fearful on CFSS-DS ( $P < 0.05$ ), nine were found dentally fearful on CDFP ( $P < 0.01$ ), and 12 were fearful according to selection criteria ( $P < 0.01$ ).

The EAS scores for dentally fearful children were compared with EAS scores for the other children in the study population. As shown in Table 2, children with dental fear, according to CFSS-DS, CDFP, and selection criteria, had statistically significantly higher NEGEM scores than other children. SHY scores were statistically significantly higher for children who were dentally fearful according to CDFP and selection criteria, but not CFSS-DS, compared with the others.

Compared with the normative group of children, children with dental fear according to CDFP and selection criteria had statistically significantly higher mean scores on SHY (Table 3). Children with dental fear according to CFSS-DS and selection criteria, as well as children presenting with BMPs, also had significantly higher ACT scores.

In order to evaluate the combined impact of shyness and negative emotionality on dental fear, four

groups of children were formed based on the median values on SHY (median 1.8) and NEGEM (median 2.8). The first group of children had scores on SHY and NEGEM both exceeding the median values (i.e., SHY > 1.8, NEGEM > 2.8). A second group of children had high scores only on SHY (i.e., SHY > 1.8, NEGEM ≤ 2.8). The third group had high scores only on NEGEM (SHY ≤ 1.8, NEGEM > 2.8). The last group of children had low scores on both SHY and NEGEM (SHY ≤ 1.8, NEGEM ≤ 2.8). In an ANOVA, the grouping of SHY and NEGEM explained 11% of the variance in CFSS-DS

scores ( $P < 0.001$ ). A multiple-range test (Newman-Keuls procedure) showed significant differences (5% level) between the group with low scores on SHY and NEGEM and the three others (Table 4).

#### Temperament and dental behavior management problems

Children presenting with BMPs during dental visits had statistically significantly higher activity scores compared with normative data on EAS (Table 3). No differences were found on mean scores on any of the temperaments measured by EAS between children in the study group who presented with BMP and children not presenting BMP (Table 2.). Of the 23 children who were identified as shy through parental reports five presented with BMP, and three of 16 children with high NEGEM scores had notes of BMP in their dental records.

#### Discussion

This study has shown that children with dental fear have high shyness scores compared with normative data from Sweden. Further, children with dental fear displayed higher scores on both shyness and negative emotionality compared with other children in the study population. Thus, these aspects of temperament

**TABLE 2. COMPARISONS OF EAS MEAN SCORES BETWEEN DENTALLY FEARFUL CHILDREN AND OTHERS ACCORDING TO DIFFERENT CRITERIA**

	N	Negative Emotionality		Activity		Sociability		Shyness	
		$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
CFSS-DS ≥ 38	26	3.26	0.87	4.03	0.77	3.72	0.77	2.26	0.82
		.		n.s.		n.s.		n.s.	
CFSS-DS ≤ 37	98	2.80	0.87	3.86	0.82	4.00	0.71	1.96	0.83
CDFP fearful	32	3.18	0.98	3.93	0.77	3.81	0.77	2.49	0.94
		.		n.s.		n.s.		†	
CDFP nonfearful, uncertain	92	2.80	0.84	3.89	0.82	3.99	0.71	1.87	0.74
SC fearful	51	3.22	0.90	3.96	0.72	3.82	0.64	2.45	0.91
		‡		n.s.		n.s.		‡	
SC nonfearful	73	2.67	0.81	3.85	0.87	4.02	0.78	1.73	0.64
BMP	22	3.10	0.82	4.14	0.74	3.82	0.66	2.18	0.82
		n.s.		n.s.		n.s.		n.s.	
non-BMP	100	2.83	0.89	3.83	0.82	3.96	0.74	1.99	0.85

Dental Subscale of Children's Fear Survey Schedule - CFSS-DS, Children's Dental Fear Picture test - CDFP, Selection criteria - SC, Behavior management problems - BMP). Student's *t* test;

\*  $P < 0.05$ , †  $P < 0.01$ , ‡  $P < 0.001$ , n.s. = not statistically significant.

may be of etiological importance for the development of dental fear.

The study population consisted two different age groups. It is well documented that frequencies of both dental fear and dental BMPs are higher in younger children.<sup>4,29</sup> However, our selection procedures aimed at identifying an equal number of dentally fearful and nonfearful children in both groups. Our study group thus consisted of 45% (younger) and 37% (older) dentally fearful patients in each age group. Because of our selection criteria the patient material was analyzed as one group, not taking the children's different ages into account.

As our study group was compared with a normative group, which can be assumed to include a broad range of dental fearfulness and BMPs, our results indicate that shyness is a possible risk factor for the development of dental fear in children. Identifying children at risk is important both for the individual child and from the treating dentist's points of view.

Shy temperament was identified in two ways, by dentists using the CDFP and by parents who filled out the EAS temperamental survey. The concordance between the two methods of identifying shyness indicates that dentists could identify shy children very well, de-

**TABLE 3. EAS MEAN SCORES IN CHILDREN WITH DENTAL FEAR IN THE STUDY POPULATION AS WELL AS NORMATIVE DATA FROM SWEDEN.<sup>23</sup>**

	Negative Emotionality			Activity			Sociability			Shyness		
	N	$\bar{x}$	SD	N	$\bar{x}$	SD	N	$\bar{x}$	SD	N	$\bar{x}$	SD
Normative data	197	3.15	0.77	198	3.66	0.77	197	3.87	0.72	198	2.06	0.78
Children with dental fear:												
CFSS-DS $\geq 38$	26	3.26	0.87	26	4.03	0.77*	26	3.72	0.77	26	2.26	0.82
CDFP	32	3.18	0.98	32	3.93	0.77	32	3.81	0.77	32	2.49	0.94 <sup>†</sup>
Selection criteria	51	3.22	0.90	51	3.96	0.72*	51	3.82	0.64	51	2.45	0.91 <sup>†</sup>
BMPs	22	3.10	0.82	22	4.14	0.74 <sup>†</sup>	22	3.82	0.66	22	2.18	0.82

Comparisons made between normative data and study population using Student's *t* test. \*  $P < 0.05$ , <sup>†</sup>  $P < 0.01$ .

**TABLE 4. EFFECT OF SHY AND NEGEM SCORES ON DENTAL FEAR\***

Group	N	CFSS-DS <i>x</i>
A	31	30.7 <sup>†</sup>
B	25	27.2 <sup>‡</sup>
C	30	27.0 <sup>§</sup>
D	38	18.3

\*ANOVA explained 11% of the variance in dental fear as assessed by CFSS-DS scores. Grouping based on EAS scores: Group A: SHY >1.8, NEGEM >2.8. Group B: SHY >1.8, NEGEM <2.8. Group C: SHY <1.8, NEGEM >2.8. Group D: SHY <1.8, NEGEM <2.8.

A multiple-range test (Neuman Keuls) showed statistically significant differences of 5% as follows: <sup>†</sup>Between groups A and D; <sup>‡</sup>groups B and D; and <sup>§</sup>groups C and D.

and treatment. There are, to our knowledge, no studies on the effects of differential treatment of shy children in dental or pediatric settings. Theoretically, however, some suggestions can be made. The hallmarks of the temperamentally shy child are that he/she is slow to warm up to unfamiliar persons and fearful rather than curious in novel situations. Dental or medical treatment

spite the fact that they were not previously trained in making temperamental ratings. It is therefore most likely that other dentists and dental assistants are also capable of identifying shy children. This is promising, because our investigation indicates that shy children should be considered at risk for developing dental fear. To minimize the risk of temperamentally vulnerable children developing dental fear it is important that these children are especially well cared for during dental examination

of shy children should therefore include 1) plenty of time to allow the child to get acquainted with the novel situation, 2) a proper introduction to all steps in treatment, and 3) a considerate use of agents and techniques for minimizing pain and discomfort.

In this investigation, three different methods were used to measure dental fear. Dental fear on CFSS-DS and shyness on EAS were both assessed by the parents. As shyness seems to be an important factor in the etiology of dental fear, the lack of relationship between these two parental ratings is interesting. Instead, shyness was related to the projective measure (CDFP) and selection criteria. A possible explanation to this could be the relatively low number of patients with dental fear according to CFSS-DS. Concerning the relationship between SHY and CDFP, it is important to keep in mind that CDFP takes children's behavior and conduct during the interview into account when assessing fear, which is why a clear relationship should be expected.

Negative emotionality, that is the general tendency to become upset easily and intensely, was also related to dental fear in our study. The early temperamental trait of distress, which develops in the first years of life into what is called negative emotionality, is considered a risk factor for the development of anxious attachment,<sup>30</sup> as well as psychopathology.<sup>31</sup> Shyness and behavioral inhibition in childhood has also been linked to emotional problems in childhood.<sup>32, 33</sup> The combination of a propensity for distress and behavioral inhibition (i.e., shyness in our case) has been described as the introverted pole of the extroversion/introversion dimension of early personality development.<sup>34</sup> This is particularly interesting in relation to

the development of child dental fear. Several investigations have pointed out a close relationship between dental fear and a more general emotional status in children,<sup>1-4, 29</sup> and it has been suggested that child dental fear is not a specific fear or phobia, but instead should be looked upon as a reflection of a child's more general fear level.<sup>35</sup> The additive effects of negative emotionality and shyness on dental fear reported here support such a hypothesis.

The observations regarding BMPs were made by the patients' ordinary treating dentists, each having different attitudes and experiences regarding child dental care. The validity and reliability of the registrations of BMPs are unknown. Still, for notes of BMPs to enter the dental records they must have been preceded by extensive behavior problems. Our reliance on written notes probably underestimates the occurrence of BMPs, and consequently the inclusion of "true cases" in the control (i.e., non-BMP) group. This may partly explain the general lack of temperamental differences between children with and without BMPs. However, our study does indicate a relationship between behavior management problems (BMP) and activity. This finding bears clinical relevance, as BMPs are characterized by uncooperativeness and severe overt behaviors during dental treatment. Overall, our results point towards a difference between BMP and dental fear, which has been reported by Klingberg et al.<sup>4</sup> Further studies are needed, not only on the different ways by which the children can fail to comply with dental treatment, but also as to which dental regime or technique is better suited for the different types of failed cooperation.

## Conclusions

1. Temperament, foremost shyness and possibly shyness in combination with negative emotionality, are concomitant factors in the development of dental fear in children.
2. Dental fear is probably different from dental BMPs in children. Most shy children do not present BMPs, and most children with BMPs are not shy.
3. Shyness can be identified by dental personal. This is important, because shy children should be considered patients at risk for developing dental fear.

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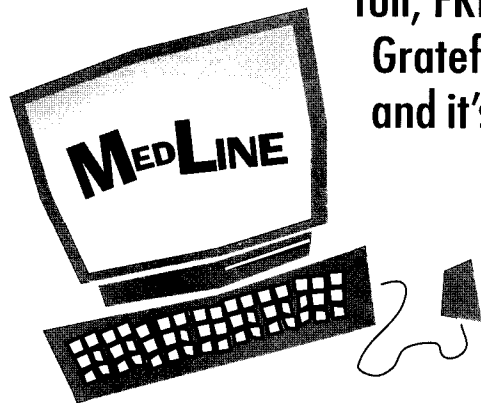
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