

Psychosocial factors correlated with children's dental anxiety

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SUMMARY

Authors developed an idea of seven blocks with different psychosocial factors that could correlate with children's dental anxiety and explain its variance. Aim of the study was to evaluate correlation between psychosocial factors and children's dental anxiety.

Totally, 240 randomly selected children (mean age $M=7.96$, $SD=2.61$, range 4 to 12) and their parents took part in the study. Parents evaluated their own (MDAS) and their children's anxiety (CFSS-DS). Psychosocial factors were evaluated by a large questionnaire, developed for this study. Dental status was fixed and child's behavior in dental setting was evaluated with Frankl's scale. Pearson's correlation of CDA with all variables and stepwise linear regression with the correlating variables within the seven psychosocial factor blocks was performed.

Dental experience and attitude factors (crying at dentist and dental treatment with difficulties) as well as Children's personality and behavior factors (general anxiety and children's behavior at dentist) gave the most effect on CDA, totally explaining 56% and 54% of variance, respectively. Children's medical experience and attitude factors (anxiety and caution towards doctors) as well as Parental/information factors (parental dental anxiety, promising prizes before treatment) explained 34% and 31% of CDA variance, respectively. Socio-economic factors (number of children and mother's age) explained 15%, but oral care habits and attitude (brushing as obligation) – 14% of CDA variance. Family distress factors had no correlation with CDA and were excluded of further analysis.

Children's dental anxiety variance is at best explained by Child's dental experience and attitude factors and Child's personality and behavior factors.

Key words: dental anxiety, dental fear, psycho-social factors, variance of dental anxiety.

INTRODUCTION

Dental anxiety is a wide-known problem, related to multiple psychosocial factors, i.e., interrelation of social factors and individual thought and behavior. Different studies estimated the prevalence of dental anxiety between 5 and 20% of the children's population (1). These authors also proposed a classification of reasons for children's dental anxiety (CDA) – internal factors (age, temperament), external family factors (family's anxiety, socioeconomic status) and external dental factors (dental and medical experience) (1). Based on this knowledge, authors developed the idea and displayed seven

blocks of different psychosocial factors that could correlate with children's dental anxiety and explain its variance.

One of the most important internal factors about children's dental anxiety (CDA) was age. Several authors indicated that dental anxiety decreases by age (2, 3), although the decrease might not be linear (4, 5).

Temperament was also one of stable congenital factors and substantially affected child's attitude towards situations and other people. Later studies of EASI temperament theory (emotionality, activity, sociability and impulsivity; shyness and emotional lability/negative emotionality were added in later studies) showed correlation with dental anxiety and behavior. Children with negative emotionality became aggressive in case of frustration, activity as a temperamental characteristic manifested in excessive energy; impulsive children missed resistance, but sociable children needed presence of other people

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(6). Shyness was correlated with dental fear and behavior management problems (7). Children's general fears/anxiety and number of different other fears as well as dental behavior management problems were also positively correlated with CDA (8). Persons' cognitive vulnerability determines whether they will perceive their dental experience as negative or not (9).

External family factors built another body of evidence for dental anxiety. The correlation of children's dental anxiety with their one of family members' dental anxiety (including mothers, fathers, siblings and others) was verified in several publications (3, 8, 10). Especially mother's ability to cope with children's anxiety has a crucial role in dental situation (11). Correlation between parental and children's dental anxiety with emotional contagion or indirect transmission of anxiety from parents to children (12), other authors, in adverse, emphasized the role of vicarious learning about dental anxiety (13). Chadwick and Hosey reminded of importance of appropriate explanations given by parents to their children before the dental appointment. These authors also advised to accompany the child by an adult who is not dentally anxious (14). Parents with higher dental anxiety had lower knowledge about oral health (15). Information about dental health and dentists' appointments could be easy found in websites but only official sites provided credible information contrary to professional and non-professional ones (16).

Socio-economic background was a disputable issue regarding CDA. Dental anxiety might be influenced by different factors, for instance, lower SES and parental divorce (7). Higher dental anxiety was correlated with part time job or unemployment as well as with relatively low income (6). Children of parents with lower education background tended to have higher dental anxiety than the ones with higher level of education (3). The oldest children and single children had higher dental anxiety in comparison with other children (17). Presence of siblings was correlated with lower dental anxiety (18). In contrary, Peretz *et al.* didn't find a correlation of CDA with socio-economic factors like parental age, education or number of children (19).

External dental and medical factors were often correlated with children's dental anxiety. Early invasive dental treatment strongly correlated to CDA (13). In some countries, e.g., Taiwan caries or pain was the reason for first dental visit for more than two thirds of the children (17). The more non-invasive dental appointments children have had before dental treatment, the lower dental anxiety they had (20). The more invasive dental treatment children have

had, the worse was their dental behavior (21). Children which have had dental treatment without local anesthesia had more behavior management problems than those with anesthesia (2). Children with dental extractions had higher dental fear than children with dental restorations or without any treatment (22). Though, children's attitude towards dental staff was often more important than their age or parental education (23). Parental perception of dental visit as an unpleasant could be translated to child and cause more negative behavior (24).

A serious physical disease, extensive investigations and demanding treatment might lead to phobic complaints, fear of hospitals, injuries and medical care in general. Patients with high dental fear much often have had medical trauma in their history (25). High hospital exposure allowed to develop medical fears and, subsequently, dental fear (20). Children with chronic diseases (e.g., otitis media or diabetes) who have met invasive procedures had higher dental fear than control group (22).

Several publications showed that dental anxiety led to dental avoidance, delayed and often painful treatment, and, subsequently, ignorance of dental health (26). Studies showed that children with higher dental anxiety had higher DMFt (8, 10). Yet, only one study that evaluated the association of oral hygiene habits with dental anxiety was found (3). Although no correlation was found, authors admitted, that tooth brushing habits might reflect the attitude towards dental treatment (3).

Although some studies revealed that parental divorce, death of a spouse or family member, or burglary might lead to emotional discomfort and, subsequently, to dental anxiety (7, 25), no statistically significant correlation of CDA with family's emotional problems or distress was found (24). Aim of the study was to evaluate correlation between children's dental anxiety (CDA) and psychosocial factors.

METHODS

Participants

In total, 240 children (mean age $M=7.96$, $SD=2.61$, range from 4 to 12; 51% girls and 49% boys) and their parents were taking part in the study.

Procedure

The study was performed by one dentist between December 2010 and September 2013. Riga Stradiņš university's Ethical committee approval and acknowledgment of concordance with Helsinki conference criteria were obtained before the study.

Children of according age who came for a routine dental visit and their parents were approached in the Pediatric department of Institute of Stomatology, Riga Stradiņš university. The participants were not recruited purposely (for instance, by inviting them by mail or phone call), though study sample was balanced by participants' age and gender. At least 200 participants and at least 12 participants in each age and gender were involved in the study. Parents fulfilled the questionnaires about their own and their children's anxiety as well as psychosocial factors related to dental anxiety after signing the informed consent before or during visit. Evaluation of the dental status as well as any necessary treatment was performed after entering the dental room. Child's behavior in the dental setting during examination and/or treatment was evaluated by an operator after the dental appointment.

Instruments

Parents evaluated their own and their children's anxiety. Parental anxiety was evaluated by the Modified Dental Anxiety Scale (MDAS) (27) Latvian version (Cronbach's $\alpha=0.85$). Children's dental anxiety was evaluated by the parental version of the Dental Subscale of Children Fear Survey Schedule (CFSS-DS) (4) in Latvian (Cronbach's $\alpha=0.91$). Psychosocial factors were evaluated by a large, newly developed questionnaire, consisting of seven blocks:

- socio-economic factors,
- children's medical experience and attitude,
- children's dental experience and attitude,
- parent's and information factors (incl. MDAS),
- children's oral care habits and attitude,
- children's personality's and behaviour factors (incl. general anxiety and child's behavior at the dentist),
- family distress.

All items that were evaluated within the blocks (except Family distress factors) are seen in Tables 1-6. Evaluation of children's dental status was performed according WHO ICDAS criteria (28). Frankl's scale was used to evaluate child's behavior in the dental setting in four categories: 1 – definitely negative, 2 – negative, 3 – positive, 4 – definitely positive (29).

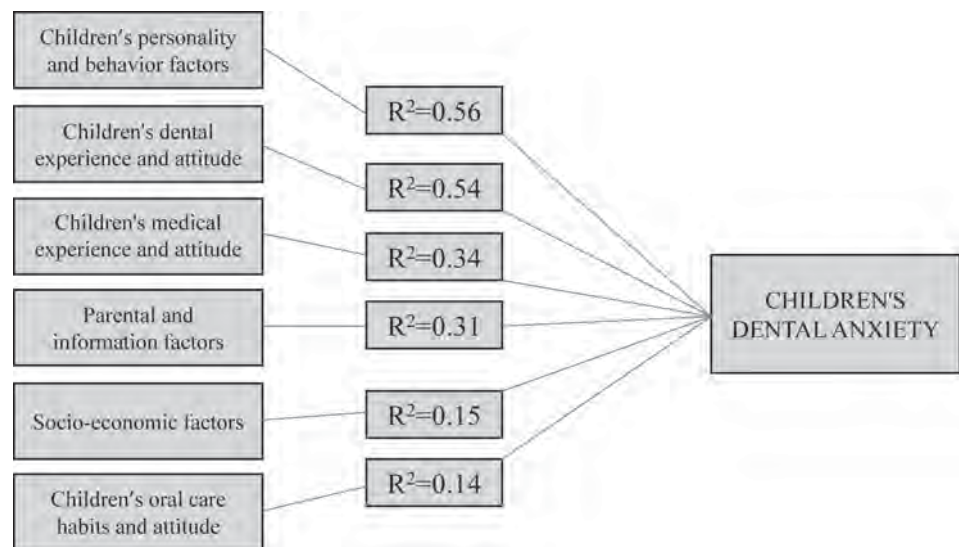


Fig. Summary of regression models of factors explaining the variance of children's dental anxiety

Statistics

Descriptive statistics of participants' age, CFSS-DS, MDAS, Frankl's scale and DMFt were calculated. Pearson's correlation analysis was performed between CFSS-DS and all the other variables within seven blocks in order to discover psychosocial factors explaining the variance of children's dental anxiety. Independent variables that correlated with dental anxiety statistically significant or close to it (at least $p<0.1$) were included in stepwise linear regression analysis within respective blocks. Variables with such level of significance could appear as relevant independent variables (factors) that explain the variance of children's dental anxiety (Figure). Stepwise linear regression was performed to see the importance of each variable (R^2), explaining dental anxiety. An independent, statistically significant variable was added in each step of linear regression until the step with amount of independent variables explaining CDA statistically significant and creating a definite model was reached. The number of the step (e.g., Step 4) characterized amount of depending variables (e.g., 4) in this particular model. Coefficient R^2 characterized the extent (percentage) in which the particular model of variables explained the variance of children's dental anxiety. The linear regression models were calculated according seven psychosocial blocks mentioned above. Children's age and dental health (DMFt) in each model were controlled. Statistical analysis was performed by SPSS 22.0.

RESULTS

Dental anxiety (CFSS-DS) of all children was $M=31.80$, $SD=10.85$, range from 15 to 70. Parental anxiety was $MDAS=9.76$, $SD=3.48$, range from 5 to 23. Correlation between children's and their parent's anxi-

Table 1. Stepwise regression analysis of Children's dental experience and attitude factors predicting the children's dental fear (Step 4)

Children's dental experience and attitude factors (Model 1)	Unstand.B	SE	Beta (β)	t	p value	R ²
Constant	26.74	3.78		7.07	0.000	0.56
Age	-0.48	0.23	-0.13	-1.64	0.105	
DMF	0.39	0.24	0.13	1.68	0.097	
Attends the dentist fearfully. crying	10.59	1.83	0.49	5.79	0.000	
Dental treatment with difficulties	2.06	0.73	0.25	2.81	0.006	

**Excluded:* First dental visit to see the office, Dentist appointments when remembered, Dentist appointments in case of changes in teeth, Doesn't attend dentist at all, Child has had dental hygiene, Child has had restoration under local anesthesia, Child has had restoration under general anesthesia (GA), Child has had extraction without anesthesia, Child has had anesthesia under GA, Attends the dentist with pleasure/interest, Attends the dentist with neutral attitude, Attends the dentist alarmed, anxiously, Attends the dentist actively protesting/resisting, Attends the dentist with panic/acting out, Negative dental experience, Coping negative experience by treating under GA, Attends dentist before noon.

***Not correlated with DFA:* First dental visit upon referral of another doctor, First dental visit because of changes in teeth, First dental visit because of toothache, Regularity of appointments, Dentist appointments annually at certain times, Dentist appointment in case of discomfort about teeth, Dentist appointment in case of lasting toothache, Child has had dental examination, Child has had restoration without local anesthesia, Child has had extraction in local anesthesia, Child has had another treatment (e.g. orthodontic), Coping negative experience by attending dental hygienist, Coping negative experience by attending the same dentist, Coping negative experience by attending another dentist/clinic, Coping negative experience by doing nothing/temporizing, Attends dentist afternoon, Attends dentist evening, Attends dentist at different times.

Table 2. Stepwise regression analysis of Children's personality's and behaviour factors predicting the children's dental fear (Step 5)

Children's personality's and behaviour factors	Unstand.B	SE	Beta (β)	t	p value	R ²
Constant	55.99	2.82		19.87	0.000	0.54
Age	0.01	0.20	0.00	0.06	0.950	
DMF	0.28	0.14	0.09	0.09	0.051	
Child's behaviour at the dentist	-7.44	0.69	-0.56	-10.67	0.000	
General anxiety	-3.35	0.68	-0.24	-4.93	0.000	
Duration of the emotional experience	1.21	0.49	0.11	2.43	0.016	

**Excluded:* Emotionality, Ability to calm down on his/her own, Fear of closed rooms, Fear of spiders/insects.

***Not correlated with DFA:* Sociability, Activity, Impulsivity, Emotional lability, Shyness, Fear of heights, Fear of being left alone, Fear unknown animals, Fear of darkness, Fear of strangers, Number of fears.

Table 3. Stepwise regression analysis of Children's medical experience and attitude factors predicting the children's dental fear (Step 4)

Children's medical experience and attitude factors	Unstand.B	SE	Beta(β)	t	p value	R ²
Constant	29.79	2.39		12.42	0.003	0.34
Age	-0.57	0.23	-0.14	-2.53	0.012	
DMF	0.53	0.17	0.17	3.15	0.002	
Anxious attitude towards doctors	16.27	2.08	0.43	7.81	0.000	
Cautious attitude towards doctors	6.94	1.27	0.29	5.47	0.000	

**Excluded:* Frequency of medical conditions, Frequency of doctor's appointments, Doctors appointments exceeding 4 times yearly, Neutral towards doctors, Friendly towards doctors, Traumatic experience with doctors (except dentists), Number of traumatic experiences, Age at the first treatment in hospital, Age at the first physical trauma.

***Not correlated with DFA:* Presence of chronic illnesses, Age at the first traumatic experience with doctors, Treatment in hospital, Number of treatments in hospital, Age at the first treatment in hospital, Treatment under GA, Number of treatments under GA, Age at the first treatment under GA, Physical traumas; Number of physical traumas, Age in the time of the first physical trauma.

ety was $r=0.278$ ($p<0.001$). Frankl's scale results were $M=2.78$, $SD=0.83$, range from 1 to 4. DMFt was $M=6.45$, $SD=3.75$, range from 0 to 20.

Stepwise linear regression analysis showed that Children's dental experience and attitude factors (crying at the dentist and dental treatment with difficulties) as well as Children's personality's and behaviour factors (children's general anxiety, behavior at the dentist and durability of the affect) gave the most effect on CDA, totally explaining 56% and 54% of variance, respectively (see Table 1 and 2). Children's medical experience and attitude factors (anxious or cautious towards doctors) as well as Parent's and information factors (parental anxiety, promising prize before treatment, etc.) explained 34% and 31% of CDA variance, respectively (see Table 3 and 4). Socio-economic factors (number of children and mother's age) explained 15%, but Children's oral care habits and attitude (brushing as an obligation) – 14% of CDA variance (see Table 5 and 6). Family distress factors had no correlation with CDA and were excluded of further analysis. Results of linear regression of different factors are seen in Tables 1-6. Independent variables correlated with CDA but excluded from linear regression models are mentioned under tables (*). Independent variables not correlated with CDA and not included in stepwise linear regression analysis are also mentioned under tables (**).

Table 4. Stepwise regression analysis of Parent's and information factors predicting the children's dental fear (Step 10)

Parent's and information factors	Unstand.B	SE	Beta (β)	t	p value	R ²
Constant	29.58	3.33		8.89	0.000	0.31
Age	-0.53	0.24	-0.13	-2.19	0.029	
DMF	0.61	0.18	0.20	3.49	0.001	
Parents' dental anxiety	0.54	0.18	0.17	3.02	0.003	
Share their own dental experience	4.34	1.39	0.18	3.13	0.002	
Information about oral care received from the dentist	-4.17	1.52	-0.16	-2.75	0.006	
Tell not to worry before an important event	3.81	1.40	0.16	-2.72	0.007	
Accompanies the person who is available	-2.63	1.29	-0.12	-2.03	0.044	
Promise a prize for good behaviour at the dentist appointment	4.21	1.61	0.15	2.62	0.009	
Information about oral care received from the dental hygienist	-2.69	1.25	-0.12	-2.16	0.032	
Accompanies the person whom child listens to	9.66	4.75	0.11	2.04	0.043	

**Excluded:* Read aloud children's books about dentists, Tells that one will do nothing and nothing will hurt, Take child along to their own dental appointments, Carry out no special preparation, Information about oral care received from general practitioner, from friends and acquaintances, from mass media, Information about child's preparation before dental visit received from friends and acquaintances, Hug when child is upset, Encourage and praise before an important event, Tell not to worry before an important event.

***Not correlated with DFA:* Accompanied by mother, Accompanied by father, Accompanied by any adult family member, Doesn't receive information about dental care, Receives child's preparatory information before dental visit from general practitioner, Receives child's preparatory information before dental visit from dentist, from dental hygienist, from mass media, Doesn't receive child's preparatory information before dental visit, Tells not to worry when worried or upset, Discuss their negative experience at child's presence, Threats child with dentist, Have postponed dental visit due an unimportant reason.

Table 5. Stepwise regression analysis of Socio-economic factors predicting the children's dental fear (Step 4)

Socio-economic factors	Unstand.B	SE	Beta (β)	t	p value	R ²
Constant	47.66	5.36		8.89	0.000	0.15
Age	-0.52	0.32	-0.12	-1.63	0.104	
DMF	0.75	0.22	0.24	3.38	0.001	
Number of children	-2.57	1.20	-0.15	-2.14	0.034	
Mother's age	-0.29	-0.14	-0.15	-2.08	0.039	

**Excluded:* Number of family members, Number of household members, Family's marital status, Father's education.

***Not correlated with DFA:* Father's age, Mother's education, Mother's or Father's employment, Family income.

Table 6. Stepwise regression analysis of Children's oral care habits and attitude predicting the children's dental fear (Step 3)

Children's oral care habits and attitude	Unstand.B	SE	Beta (β)	t	p value	R ²
Constant	32.85	2.68		12.25	0.000	0.14
Age	-0.81	0.26	-0.19	-3.15	0.002	
DMF	0.71	0.19	0.23	3.78	0.000	
Regard brushing as an obligation	3.76	1.41	0.16	2.67	0.008	

**Excluded:* Number of family members, Number of household members, Family's marital status, Father's education.

***Not correlated with DFA:* Father's age, Mother's education, Mother's or Father's employment, Family's income.

DISCUSSION

Dental fear/anxiety has many reasons and causes. Study shows that different factors explain the variance of CDA. Children's dental experience and attitude factors as well as Children's personality's and behaviour factors explain the variance of CDA at most.

The role of frightening dental and medical experience in dental anxiety is known as external dental factors (13, 20, 22). However, children's crying at the dentist and dental treatment with difficulties as well as anxious and cautious attitude towards doctors are the only variables included in dental and medical experience and attitude models of stepwise linear regression. In contrary, restorations and extractions or dental appointments because of toothaches that child have had are excluded of linear regression models or not correlated at all. It seems that child's attitude plays bigger role than the negative experience at dentists and doctors itself. This concurs with Armfield's theory of cognitive vulnerability where person's individual perception of dental treatment (how dangerous, unpredictable, uncontrollable and disgusting is the procedure) is far more important than the actual experience (9).

Children's personality's and behavior factors and, particularly, child's behavior at the dentist, general anxiety, also show big impact on the variance of CDA. Previous research showed that children's behavior

management problems are often correlated with CDA (7, 8). General anxiety has been mentioned as internal factor causing or predisposing to dental anxiety that also has been shown in other studies (1, 8). However, none of the temperament variables (except emotionality) or other fears are either correlated with CDA or included in linear regression models unlike previous studies (6, 7).

Parent's and information factors explain the importance of external family factors causing CDA (1). Parental dental anxiety strongly correlates with children's dental anxiety, like in several other studies (3, 10). Besides the parents' dental anxiety, there are three types of variables included in linear regression model: inappropriate explanations (sharing their own experience about dentist's appointments and promising prizes for good behavior), information about oral care received from the dentist or dental hygienist (negative correlation) and persons who accompany the child at the dentist's appointment (the one who is available and who child listens to). Most likely, the inappropriate explanations to children before dental appointment reflect the parental dental anxiety and their feeling of being lost in this particular situation (11, 14). Information about oral care received from the dentist or dental hygienist, in adverse, reflects that good communication with dental staff gives to parents the feeling of team support and mutual trust (14).

Family's socio-economic factors do not explain the variance of CDA very much. However, number of children in family and mother's age are the variables included in linear regression model. Although there is inconsistent evidence of correlation of socio-economic factors with children's dental anxiety, another study supports that the more children are in the family, the less they are afraid of dentist (18). In contrary to Rantavuori et al., parental education is not included in the model (3). Other socio-economic factors are not correlated with CDA, like in several previous studies (2, 19).

Regardless of the children's age, all the models of psychosocial factor blocks show that the most important thing in children's dental anxiety is the children's and parent's attitude towards dentists, doctors, oral care and information about dentistry.

No publications were found showing the effect of all abovementioned factors in etiology of CDA. However, Majstorovic *et al.* showed that children's previous medical experience explained 33-43% of variance of dental anxiety that concords well with our results (30). Lee *et al.* found that mother's fear of dentist, uncooperative behavior during first dental visit, age 4 years under, pain during first dental visit and visiting several dental clinics were factors explaining 36.2% of CDA variance (17).

This study also has several limitations. First of all, the study group was based on convenience sample. Second, all the questionnaires were filled by the parents on behalf of their children. Both factors could affect the results to some extent. On the other hand, the study circumstances for the whole sample were equal and it is confirmed by the high internal reliability of the questionnaires and balanced age and gender groups.

CONCLUSIONS

Children's dental fear/anxiety variance is at best explained by Children's dental experience and attitude factors as well as by Children's personality's and behaviour factors. Children's medical experience and attitude factors as well as Parent's and information factors were explaining the variance of CDA less, but still sufficiently. Family's socio-economic factors and Children's oral hygiene habits did not explain the CDA variance very much, but stress did not correlate with child's dental fear/anxiety at all.

STATEMENT OF CONFLICTS OF INTEREST

The authors state no conflicts of interest.

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