Relationship between Child and Parental Dental Anxiety with Child's Psychological Functioning and Behavior during the Administration of Local Anesthesia

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Objectives: *The aims of this study were to determine: 1) the relationship between children's psychological functioning, dental anxiety and cooperative behavior before and during local anesthesia, 2) the relationship of parental dental anxiety with all the above child characteristics.* ***Study design:*** *There was a convenient sample of 100 children (4-12 years). Child dental anxiety and psychological functioning were measured using the "Children's Fear Survey Schedule" (CFSS-DS) and the "Strengths and Difficulties Questionnaire" (SDQ) respectively. Parental dental anxiety was measured using the "Modified Dental Anxiety Scale" (MDAS). All questionnaires were completed by parents. Before and during local anesthesia, the child behavior was scored by one experienced examiner, using the Venham scale. Non-parametric tests and correlations (Mann-Whitney, Spearman's rho) were used for the analysis.* ***Results:*** *The mean SDQ score was 10±5.6 for boys (n=60) and 8.3±4.8 for girls (n=40) (p=0.038), but there was no correlation with children's age. The mean CFSS-DS score was 33.1±11.86 and there was no correlation with age or gender. Children with higher levels in the pro-social subscale of the SDQ had significantly less anxiety and better behavior before local anesthesia. Higher mean CFSS-DS scores were significantly associated with uncooperative behavior during local anesthesia (p=0.04). There was no correlation between parents' and their children's dental anxiety, psychological functioning and behavior. 46% of the children had previous dental experience in the last 6 months. As time since the last dental treatment increased, an improvement was found in children's behavior during local anesthesia.* ***Conclusions:*** *Child psychological functioning was related to dental anxiety and behavior during dental appointment involving local anesthesia.*

Key words: *Dental anxiety, Psychological functioning, Local anesthesia*

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INTRODUCTION

Dental anxiety is one of the most commonly diagnosed anxiety disorders in children, following the generalized anxiety disorders and the separation anxiety disorders[1]. Particularly, dental anxiety may be the source of serious dental health problems and avoidance of dental treatment starting in childhood.[2-5] The prevalence of childhood dental anxiety varies considerably in the international literature ranging from 3% to 43% in different populations and age groups.[2,5-9] This variation in prevalence may be due to several parameters such as selection of patient populations and methodological and cultural variables. In addition, the instruments used in every study may vary from behavioral rating scales to several forms of fear questionnaires.[2, 3, 5-9]The age range of the children, who participate in every study, also appears to influence the fear levels found.[2, 8, 9]

The development of dental anxiety has a multifactorial and not well known etiology.[10-12] Among the causes, direct conditioning is the most common source. However, not all children with negative dental experience will develop dental anxiety. Parents play an important role in teaching their children to deal with fearful situations.[17] The effect of parental dental anxiety in their children's

dental anxiety is however a controversial issue among researchers. Sometimes a direct relation has been found [18-20], while others cannot confirm this finding.[21,22] This is because other psychological factors, such as temperament, attachment and psychological disorders seem to play an important role in the development of dental anxiety.[10,13-15] Psychological functioning is the ability of someone to achieve their goals within themselves and the external environment. It includes an individual's behavior, emotion, social skills, and overall mental health.

What makes dental anxiety a serious problem for the pediatric dentist is the fact that many times it is strongly associated with behavioral management problems (BMP).[2] The difficulty, of course, is that an operating dentist is essential be informed about a child's dental anxiety and its specific reasons before starting the actual treatment, rather than stumbling across a sudden fearful reaction of the child patient. Dental fear questionnaires are mostly designed for children 4 years old and over, because only after that age parents or patients are able to answer questions assessing dental anxiety.[23] In addition, children at younger age usually do not have dental experience and the measurement of their dental anxiety is difficult because it is based on how the child behaves in the dental office.[23] Researchers found correlations between behavior-based registrations of dental anxiety and a child's personality traits.[9,12] As a result, the development of easy and accessible tools makes their assessment easier and this results in more applicable tools in daily clinic. The use of well structured questionnaires, based on how children react on everyday stressful conditions, can help the dentist to predict how the child will cope with the dental treatment.[23] Since the relationship of children's dental anxiety, personality characteristics and behavioral management problems is not yet fully understood, there is a need to be explored.

The aims of this study were to study: 1) the relationship among children's psychological functioning, dental anxiety and behavior before and during an intrusive treatment and 2) the influence of parental dental anxiety with all the above child characteristics.

MATERIALS AND METHOD

The study population was selected from the postgraduate Pediatric Dentistry Clinic of Aristotle University of Thessaloniki. Out of a convenience sample of 107 parents who were asked to participate in the study, only 7 refused, because they could not understand Greek properly. As a result, the sample consisted of 100 children. All children were healthy and not mentally or medically compromised or previously hospitalized. Siblings were excluded. The children who were included in the study, came for a scheduled appointment, they were not in pain and should have had at least one appointment with local anesthesia. Ethical approval was obtained by the Aristotle University Ethical Committee.

The dental anxiety level of the children was assessed using the parental version of Dental Subscale of the Children's Fear Survey Schedule (CFSS-DS), which has been tested for reliability and validity in Greek.[24] The CFSS-DS consists of 15 items relating to different aspects of dental treatment; possible scores range from 1 (not afraid at all) to 5 (very afraid). Total scores range from 15 to 75 (Figure 1).

Children's psychological functioning was rated with the *Strengths and Difficulties Questionnaire (SDQ).* [25] The SDQ is an internationally validated brief screening measure used to assess behavioral problems and psychological functioning. In this study, the validated Greek translation of the parental version of the SDQ was used to measure the psychological functioning of the child. This version can be downloaded by the official site of SDQ (www.sdqinfo.com*)*. The SDQ consists of 25 psychological attributes divided into five subscales which assess conduct problems, hyperactivity, emotional symptoms, peer-related problems and pro-social behavior. The attributes are positive or negative such as 'Considerate of other people's feelings' or 'Often has temper tantrums or hot tempers' and can be answered with: 'Not true', 'Somewhat True' and 'Certainly True'.[25,26] The total scores range from 0-50. A score between 0-13 is considered normal, scores from 14-16 are considered in borderline and scores from 17-40 are considered as abnormal psychological functioning (Figure 2).

The child behavior was measured with the *Venham's (modified)* clinical rating of cooperative behavior. The scale consists of 6 points: 1) relaxed, 2) uneasy, 3) tense, 4) reluctant, 5) resistance and 6) out of contact or untreatable. The scale has an established reliability and validity.[27] The score for every child can be from 1 to 6 (Figure 3).

Parents were asked to rate their own dental fear with the Greek version of the Modified Corah Dental Anxiety Scale (MDAS), [29] which was proved to be reliable and valid [30]. It consists of 5 questions. The original DAS is a 4-item questionnaire, asking individuals to rate their anxiety as they imagine approaching four dental situations, such as sitting in the waiting room anticipating dental treatment. The Modified Dental Anxiety Scale (MDAS) was developed to improve the psychometrics and content validity of the original DAS by adding a fifth item about receiving dental injections, and grading the potential answers to each item so that they range from the least to the greatest level of anxiety.[31] Possible scores range from 5 (not afraid at all) to 25 (very afraid) (Figure 4).

One pediatric dentist (BV), trained to use the Venham scale, observed the children from the moment they entered the treatment room until the end of the local anesthesia injection (LA). She rated the anxiety behavior (average score) on the Venham scale in two parts; the first part was the period from the child's entering the treatment room until the start of the LA (before injection). The second part was about the period from the beginning until the end of the LA (during injection). The LA was performed by 4 postgraduate students in the 3rd year of their master in Pediatric Dentistry. All the students were educated to perform LA in the same way. During the whole procedure, the postgraduates used the tell-show-do technique. They started with the use of a topical gel (20% benzocaine), according to the manufacturer's instructions and they gave local anesthesia by infiltration or block anesthesia. While the children were in the treatment room, the parents (either the mother or the father) completed the questionnaires in the waiting room. Parents were not present during LA and dental treatment.

Statistical analysis

Comparisons between boys and girls were performed with Fisher's Exact test for 2×2 tables (between Good psychological functioning (scores 4-13) and Compromised psychological functioning (scores 15-40), with Independent t test for SDQ total score and CFSS-DS score and with Mann-Whitney U test for the subscales of SDQ. Comparisons between the three categories of previous experience with a dental injection (none, in the past 6 months, more than

Figure 1. The CFSS-DS questionnaire for children aged 4-12 years (Parental version) in English

The following are things your child is afraid of. Circle one of the numbers (1, 2, 3 , 4, 5) in the category that best represents how you think your child feels:

		Not afraid at all	Very little afraid	Moderate afraid	Afraid enough	Very much afraid
1	The Dentist	1	2	3	4	5
2	The Doctor	1	2	3	4	5
3	The injection	1	2	3	4	5
4	Having his/ her mouth examined	1	2	3	4	5
5	Opening his/ her mouth	1	2	3	4	5
6	Someone unknown to touch it	1	2	3	4	5
7	Someone unknown to look at it	1	2	3	4	5
8	The dentist drilling his/ her tooth	1	2	3	4	5
9	Seeing the dentist drilling teeth	1	2	3	4	5
10	The sound of the drilling	1	2	3	4	5
11	Putting tools in his/ her mouth	1	2	3	4	5
12	Feeling that he/ she will chock	1	2	3	4	5
13	Going to the hospital	1	2	3	4	5
14	People in white coats	1	2	3	4	5
15	The nurse cleaning his/ her teeth	1	2	3	4	5

6 months) were done with One-Way Anova for the SDQ total score and the CFSS-DS score and with the Kruskal Wallis test for the Venham scores. All correlations were calculated with the Spearman rank order correlation coefficient. Statistical analysis was performed with IBM Statistics SPSS 20 and statistical significance was defined for $p<0.05$.

RESULTS

The sample consisted of 100 children between 4 and 12 yrs, 60 boys and 40 girls (mean age 7.7±4.2 years old). Previous experience with LA injections had 61% (61/100) of the children. Of these 61 children, 46 had dental experience in the past 6 months, while the other 15 had this experience more than 6 months before.

Dental anxiety

The mean score in child behavior (Venham Scale) before LA was 1.41±0.84 and during LA was 1.87±1.03. A significant positive correlation was found between children's behavior during LA and the time since the last dental treatment (Spearman's rho=0.256, p=0.046). As time since the last LA increased, the child was significantly more cooperative. The behavior of the children before and during LA had statistically no significant correlations with age and gender.

The mean score of CFSS-DS was 33.1±11.86 (Table 1). Children with higher dental anxiety, had significantly more behavioral problems during LA (Spearman's rho=0.206, p=0.040). There were no significant differences between boys and girls. No correlation was found between dental anxiety and age as well.

The influence of previous experience with a dental injection on the child's behavior before and during LA in association to CFSS and SDQ was investigated and descriptive statistics are presented in Table 2. No statistically significant differences were found for behavior between the three groups (None, In the past 6 months, More than 6 months) before LA, during LA, the total CFSS-DS score and the total SDQ Score.

Psychological profile

The mean score of SDQ was 9.3 ±5.3. Most of the children, 78% (n=78), were considered to have a good level of psychological functioning (normal), 14% (n=14) had a borderline score and 8% (n=8) had a score in the abnormal range of the total score of the SDQ. Boys (mean age 7.7±2.3, mean SDQ 10±5.6) and girls (mean age 7.9±2.2, mean SDQ 8.3±4.8) did not differ in mean total SDQ scores.

Compromised psychological functioning was found in 28.3% (17/60) of the boys and 12.5% (5/40) of the girls, without any statistically significant differences between them. Regarding total psychological functioning, no statistically significant differences were found between boys and girls. However, boys did show statistically significantly greater mean value (mean 4.1±2.3) than girls (mean 2.9±2.3) on hyperactivity/inattention scale (Mann-Whitney U=875, p=0.021). Additionally no statistically significant differences were found between boys and girls on the other subscales.

Psychological functioning (SDQ), dental anxiety (CFSS-DS) and behavior (Venham scale) were examined for correlations. The only statistically significant finding was that children with higher levels (normal) in the pro-social scale of the SDQ were found to have less anxiety (Spearman's rho=-0.221, p=0.027) and more cooperative behavior (Spearman's rho=-0.213, p=0.033) before LA (Table 3). Younger children with good psychological functioning (SDQ scores 4-13) had more difficulties with LA than older ones (Spearman's rho=-0.244, p=0.031).

Figure 2. The SDQ questionnaire for the assessment of the child's psychological functioning in English

For each item, please mark the box for Not True, Somewhat True or Certainly True. It would help us if you answered all items as best you can even if you are not absolutely certain or the item seems daft! Please give your answers on the basis of the child's behavior over the last six months or this school year.

Child's Name Male/Female Date of Birth

	Not True	Somewhat True	Certainly True
Considerate of other people's feelings	☐	☐	☐
Restless, overactive, cannot stay still for long	☐	☐	☐
Often complains of headaches, stomach-aches or sickness	☐	☐	☐
Shares readily with other children (treats, toys, pencils etc.)	☐	☐	☐
Often has temper tantrums or hot tempers	☐	☐	☐
Rather solitary, tends to play alone	☐	☐	☐
Generally obedient, usually does what adults request	☐	☐	☐
Many worries, often seems worried	☐	☐	☐
Helpful if someone is hurt, upset or feeling ill	☐	☐	☐
Constantly fidgeting or squirming	☐	☐	☐
Has at least one good friend	☐	☐	☐
Often fights with other children or bullies them	☐	☐	☐
Often unhappy, down-hearted or tearful	☐	☐	☐
Generally liked by other children	☐	☐	☐
Easily distracted, concentration wanders	☐	☐	☐
Nervous or clingy in new situations, easily loses confidence	☐	☐	☐
Kind to younger children	☐	☐	☐
Often lies or cheats	☐	☐	☐
Picked on or bullied by other children	☐	☐	☐
Often volunteers to help others (parents, teachers, other children)	☐	☐	☐
Thinks things out before acting	☐	☐	☐
Steals from home, school or elsewhere	☐	☐	☐
Gets on better with adults than with other children	☐	☐	☐
Many fears, easily scared	☐	☐	☐
Sees tasks through to the end, good attention span	☐	☐	☐

Figure 3. The Venham scale in English for assessing the child's behavior

0= Relaxed. Smiling, willing, able to converse, displays behavior desired by the dentist

1= Uneasy. Concerned, may protest briefly to indicate discomfort, hands remain down or partially raised. Tense facial expression. Capable of co-operation.

2= Tense. Tone of voice, questions and answers reflect anxiety. During stessful procedure, verbal protest, crying, hands tense and raised, but not interfering very much. Child still complies with request to co-operate.

3= Reluctant. Pronounced verbal protest, crying. Using hands to stop treatment. Treatment proceeds with difficulty.

4=Intreference. General crying, body movements sometimes needing physical restraint. Protest disrupts procedure.

5= Out of contact. Hard loud swearing, screaming unable to listen, trying to escape. Physical restraint required.

Figure 4. The MDAS in English for assessing the parental dental anxiety

Can you describe how anxious are you, if you are, with a visit to the dentist? Please circle ONLY one number for each question.

•		No anxious at all	Slightly anxious	Moderate anxious	Very anxious	Extremely anxious
1	If you were to visit the dentist for treatment tomorrow, how would you feel?	1	2	3	4	5
2	If you were sitting in the waiting room (waiting for dental treatment) how would you feel?	1	2	3	4	5
3	If you had to drill your teeth, how would you feel?	1	2	3	4	5
4	If you had to clean and polish your teeth, how would you feel?	1	2	3	4	5
5	If you had to make a local anesthesia injection in the gums, over an upper tooth back, how would you feel?	1	2	3	4	5

Table 1: CFSS-DS scores in the total sample of the child population

Gender	N	Minimum	Maximum	Median	Mean	SD
Boys	60	15	64	31	32.53	12.01
Girls	40	15	60	33	33.95	11.74
Total	100	15	64	32.5	33.1	11.86

Table 2. Mean and standard deviation scores of child behavior, anxiety and psychological functioning in relation to time elapsed since their last local anesthesia experience

Previous experience with a dental injection	Venham before LA	Venham during LA	CFSS-DS	SDQ
No experience (N=39)	1.2±0.5	1.7±0.7	32.7±13.8	9.4±4.6
In the past 6 months (N=46)	1.6±1.1	2.1±1.2	33.1±11.3	9.8±5.4
More than 6 months (N=15)	1.3±0.5	1.6±0.9	34.1±7.8	7.5±6.8

Table 3. Spearman's rho correlations between SDQ subscales, CFSS-DS, age and behavior (Venham scale) before and during local anesthesia administration

N = 100	CFSS-DS	Age (years)	behavior before LA	behavior during LA
Emotional symptoms	0.142	-0.042	0.025	0.101
Conduct problems	0.099	0.074	0.01	0.025
Hyperactivity/ inattention	0.052	0.078	0.075	0.055
Peer relationship problems	0.074	0.11	-0.089	-0.048
Prosocial	-.221*	-0.002	-.213*	-0.098
Sum of SDQ Score	0.032	0.097	-0.058	0.002
Sum of CFSS-DS	-	-0.123	0.174	0.206*

*p<0.05

Parental dental fear

As for the parental dental fear, the mean score of MDAS was 12.51±5.65. No statistically significant correlation was found between parental and their children's dental fear. Additionally, no statistically significant correlations were found between parental dental fear and the children's behavior and psychological functioning.

DISCUSSION

This study indicates that there is a relationship between dental anxiety and psychological functioning of the children, in accordance with previous studies.[12,32] The finding that children with higher levels of dental anxiety have lower levels of psychological functioning and a pro-social disorder is in line with two previous Dutch studies.[12,32]. In our study group the higher scores in SDQ were found in the pro-social scale, followed by the hyperactivity/ inattention scale. The only difference between boys and girls was found in the hyperactivity/ inattention scale, where boys were found to have significantly more hyperactivity problems. This difference between boys and girls was also indicated in previous studies.[12,33] In these previous studies there was also difference in conduct and peer problems between boys and girls, something which was not found in this study.

Normal pro-social behavior for an individual is considered one that is compatible with thinking about the rights and well being of others, to feel empathy and worry about others and to behave in a manner that benefits others. Children, with pro-social disorders have general problems in externalizing their fears and develop some special personal characteristics in their attempt to deal with aversive situation.[34] This may explain the fact that these children have difficulties in externalizing their fear for the dentist and as a result they have behavioral management problems. Children with adequate pro-social behavior seem to behave better during a stressful situation (LA) in dentistry. Further findings are needed to explore the underlying mechanism.

The results of this study indicate also a positive relationship between children's dental anxiety and uncooperative behavior during LA. This finding is in agreement with many previous studies, which showed that the high levels of dental anxiety can lead to less or more serious behavioral management problems.[4, 32] During LA the children may feel a small amount of pain and this fact can raise their dental anxiety and result in uncooperative behavior.

What was found in this study was that as time from the last dental treatment increased, the child's behavior during LA improved and this finding is in agreement with the results of Versloot *et al*. A possible explanation is that a child who did not have a pleasant experience of LA in the past and as time from this memory increases the experience is forgotten. This extinction theory is in favor of postponing a treatment to reduce existing anxiety. Another important factor, which was found to be important for the behavior of the child, is the time elapsed since the last LA. This is in accordance with previous studies which have found that previous dental experience plays an important role in the development of dental anxiety.[10,12,20] A possible explanation is that highly anxious children, in comparison with low anxious children, tend to overestimate pain felt during previous treatment and as a result they report more pain and show behavioral problems during subsequent treatment.[35]

Parental dental anxiety was measured and compared with the child's dental anxiety. Parents were found to have a mean level of dental anxiety, similar to two previous Greek studies.[36,37] When these results were compared with the children's dental anxiety levels, there was no statistically significant relationship between them. According to these results, parental dental anxiety cannot be used as a predictor for the child's dental anxiety. There is not an agreement in the international data about this finding. Some recent studies show a relationship between parental and child dental anxieties, while others do not.[9,38,39] No correlation was found between parental dental fear and the psychological functioning or the behavior of the children during dental treatment. There is not international data to confirm or not this finding.

There are some limitations in our study which can be taken into consideration for the design of future studies. Firstly, the study group consisted of children from a University Postgraduate Clinic of Pediatric Dentistry and, therefore, may not be strictly representative of the general child population. Secondly, all questionnaires were completed by the parents. Older children could complete the questionnaires themselves, but this could not be done, in order to keep the uniformity of the study.

CONCLUSION

This study indicates that behavioral problems possibly arising during local anesthesia administration may be related to:

- The child's level of dental anxiety
- The child's psychological functioning and
- The time elapsed since the last local anesthesia administration

These findings may be helpful for dentists when planning treatment for children and stress the need for more extensive background psychological information during an intake procedure prior to treatment.

REFERENCES

1. Costello E.J, Angold A. Anxiety disorders in children and adolescents. In. J.S. March 1995, Epidemiology. New York: Guilford: 109-124.
2. Klingberg G, Berggren U, Noren JG. Dental fear in an urban Swedish population: prevalence and concomitant factors. Community Dent Health; 11: 208–14. 1994.
3. Wogelius P, Poulsen S, Sørensen HT. Prevalence of dental anxiety and behavior management problems among six to eight years old Danish children. Acta Odontol Scand 2003; 61: 178-83.Alvesalo I, Murtomaa H, Milgrom P, Honkanen A, Karjalainen M, Tay KM. The Dental Fear Survey Schedule: a study with Finnish children. Int J Paediatr Dent; 3: 193–9. 1993.
4. Klingberg G, Broberg AG. Dental fear/anxiety and dental behavior management problems in children and adolescents : a review of prevalence and concomitant psychological factors. Int J Paediatr Dent; 17: 391-406. 2007.
5. Lee CY, Chang YY, Huang ST. Prevalence of dental anxiety among 5-to 8-year-old Taiwanese children. J Public Health Dent; 67: 36-41. 2007.
6. Bedi R, Sutcliffe P, Donnan PT, McConnachie J. The prevalence of dental anxiety in a group of 13- and 14- year old Scottish children. Int J Paediatr Dent; 2:17–24. 1992.
7. Alvesalo I, Murtomaa H, Milgrom P, Honkanen A, Karjalainen M, Tay KM. The Dental Fear Survey Schedule: a study with Finnish children. Int J Paediatr Dent. Dec; 3(4): 193-8. 1993.
8. Milgrom P, Jie Z, Yang Z, Tay K-M. Cross-cultural validity of a parent's version of the Dental Fear Survey Schedule for Children in Chinese. Behav Res Ther; 32: 131–135. 1994.
9. ten Berge M, Veerkamp, JS, Hoogstraten, J. The etiology of childhood dental fear: the role of dental and conditioning experiences. J Anxiety Disord; 16(3): 321-329. 2002a.
10. Locker, D, Poulton, R, Thomson, WM. Psychological disorders and dental anxiety in a young adult population. Community Dent Oral Epidemiol; 29: 456-63. 2001a.
11. Thomson, WM, Locker, D, Poulton, R. Incidence of dental anxiety in young adults in relation to dental treatment experience. Community Dent Oral Epidemiol; 28: 289-294. 2000.
12. Versloot J, Veerkamp J, Hoogstraten J. Dental anxiety and psychological functioning in children: its relationship with behavior during treatment. Eur Arch Paediatr Dent. Feb; 9 Suppl 1: 36-40. 2008.
13. Hägglin, C, Hakeberg, M, Hällstöm, T, et al. Dental anxiety in relation to mental health and personality factors. A longitudinal study of middle-aged and elderly women. Eur J Oral Sci; 109: 27-33. 2001.
14. Bergdahl, M, Bergdahl, J. Temperament and character personality dimensions in patients with dental anxiety. Eur J Oral Sci; 111: 93-98. 2003.
15. Eli, I, Uziel, N, Blumensohn, R, Baht, R. Modulation of dental anxiety – the role of past experiences, psychopathologic traits and individual attachment patterns. Brit Dent J; 194: 689-694. 2004.
16. Davey GC. Dental phobias and anxieties: evidence for conditioning processes in the acquisition and modulation of a learned fear. Behav Res Ther.; 27(1): 51-58. 1989.
17. Hardy, DF, Power, TG, Jaedicke, S. Examining the relation of parenting to children's coping with everyday stress. Child Dev 1993; 64(6): 1829-1841.
18. Goettems ML, Ardenghi TM, Romano AR, Demarco FF, Torriani DD. Influence of maternal dental anxiety on the child's dental caries experience. Caries Res.; 46(1): 3-8. 2012.
19. Leal AM, Serra KG, Queiroz RC, Araújo MA, Maia Filho EM. Fear and/or anxiety of children and parents associated with the dental environment. Eur J Paediatr Dent. Dec; 14(4): 269-72. 2013.
20. Tong HJ, Khong J, Ong C, Ng A, Lin Y, Ng JJ, Hong CH. Children's and parents' attitudes towards dentists' appearance, child dental experience and their relationship with dental anxiety. Eur Arch Paediatr Dent. May 20. 215-2014.
21. ten Berge M, Veerkamp JS, Hoogstraten J, Prins PJ. Childhood dental fear in relation to parental child-rearing attitudes. Psychol Rep. Feb; 92(1): 43-50. 2003.
22. Cox IC, Krikken JB, Veerkamp JS. Influence of parental presence on the child's perception of, and behavior, during dental treatment. Eur Arch Paediatr Dent. Aug; 12(4): 200-4. 2011.
23. Klaassen MA, Veerkamp JS, Aartman IH, Hoogstraten J. Stressful situations for toddlers: indications for dental anxiety? ASDC J Dent Child.; 69(3): 306-9. 2002.
24. Arapostathis KN, Coolidge T, Emmanouil D, Kotsanos N. Reliability and validity of the Greek version of the Children's Fear Survey Schedule-Dental Subscale. Int J Paediatr Dent. Sep; 18(5): 374-379. 2008.
25. Goodman R. The Strengths and Difficulties Questionnaire: a research note. J Child Psychol Psychiatry. Jul; 38(5): 581-586. 1997.
26. Muris P, Meesters C, van den Berg F. The Strengths and Difficulties Questionnaire (SDQ)--further evidence for its reliability and validity in a community sample of Dutch children and adolescents. Eur Child Adolesc Psychiatry. Jan; 12(1): 1-8. 2003.
27. Venham LL, Gaulin-Kremer E, Munster E, Bengston-Audia D, Cohan J. Interval rating scales for children's dental anxiety and uncooperative behavior. Pediatr Dent. Sep; 2(3): 195-202. 1980.
28. Veerkamp JS, Gruythuysen RJ, van Amerongen WE, Hoogstraten J, Weerheijm KL. Dentist's ratings of child dental-patients' anxiety. Community Dent Oral Epidemiol. Dec; 23(6): 356-9. 1995.
29. Berggren U, Carlsson SG. Community Psychometric measures of dental fear. Dent Oral Epidemiol. Oct; 12(5): 319-324. 1984.
30. Coolidge T, Arapostathis KN, Emmanouil D, Dabarakis N, Patrikiou A, Economides N, Kotsanos N. Psychometric properties of Greek versions of the Modified Corah Dental Anxiety Scale (MDAS) and the Dental Fear Survey (DFS). BMC Oral Health. Sep 30; 8:29. 2008.
31. Humphris GM, Morrison T, Lindsay SJ. The Modified Dental Anxiety Scale: validation and United Kingdom norms. Community Dent Health. Sep; 12(3): 143-150. 1995.
32. ten Berge M, Veerkamp, JS, Hoogstraten, J, Prins, PJ. Behavioral and emotional problems in children referred to a centre for special dental care. Community Dent Oral Epidemiol; 27: 181-186. 1999.
33. Woerner, W, Becker, A, Rothenberger, A. Normative data and scale properties of the German parent SDQ. Eur Child and Adolesc Psychiatry; 13 (subl 2): 3-10. 2004.
34. Arnrup, K, Broberg, AG, Berggren, U, Bodin, L. Temperamental reactivity and negative emotionality in uncooperative children referred to specialized pediatric dentistry compared to children in ordinary dental care. Int J Pediat Dent; 17(6): 419-429. 2007.
35. Chen, E, Zeltzer, LK, Craske, MG, Katz, ER. Children's memories for painful cancer treatment pro c e d u res: implications for distress. Child Development; 71: 933-947. 2000.
36. Boka V, Arapostathis K, Vretos N, Kotsanos N. Parental acceptance of behavior-management techniques used in pediatric dentistry and its relation to parental dental anxiety and experience. Eur Arch Paediatr Dent. Oct; 15(5): 333-9. 2014.
37. Coolidge T, Arapostathis KN, Emmanouil D, Dabarakis N, Patrikiou A, Economides N, Kotsanos N. Psychometric properties of Greek versions of the Modified Corah Dental Anxiety Scale (MDAS) and the Dental Fear Survey (DFS). BMC Oral Health. Sep 30; 8:29. 2008.
38. Nuttall NM, Gilbert A, Morris J. Children's dental anxiety in the United Kingdom in 2003. J Dent. Nov; 36(11): 857-860. 2008.
39. Coric A, Banozic A, Klaric M, Vukojevic K, Puljak L. Dental fear and anxiety in older children: an association with parental dental anxiety and effective pain coping strategies. J Pain Res. 2014 Aug 20; 7: 515-521.