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Structural Analysis of Dental Fear in Children with and Without Dental Trauma Experience

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A B S T R A C T

The aim of the study was to evaluate dental fear in children with and without dental injuries in a randomly selected children in Croatia (59 girls and 88 boys). Children were divided into three groups depending on dental trauma experience. They were also divided into two age groups: 5–8 and 9–12 years. Only dental trauma to the permanent teeth was included in the study. The CFSS–DS, CDAS and CMFQ were used for evaluation of dental anxiety and the ISP Hollingshead Index of Social Position was calculated for evaluation of social status. The mean values of CDAS, CFSS-DS and CMFQ tests revealed that the anxiety level decreases with increasing experience of dental injury. The analysis of variance performed for CDAS showed a significant difference between children with and without dental trauma (p= 0,010). Regarding the groups, the analysis of variance for CMFQ (p=0,021) and CFSS-DS (p=0,001) showed a significant difference, as well as regarding age (CMFQ; p=0,001 and CFSS-DS; p=0,016). Cronbach's alpha coefficients revealed the highest reliability for CFSS-DS (α=0,910). Pearson's correlation coefficients revealed significant correlations between the anxiety scores, age and ISP values for children without dental trauma, and between the anxiety scores and age for children with repeated dental trauma. The results of the ISP Hollingshead Index exhibited the highest frequency in children with dental injuries who belonged to the families with poor social background (ISP=44–60). No significant difference was obtained between children with and without dental injuries depending on either gender or the ISP value.

Key words: *dental anxiety, dental trauma, age, social status*

Introduction

Traumatic dental injuries in children and adolescents represent a serious dental public health problem, which results in functional, esthetic and psychological disturbances.[1,2] Dental injuries are regarded as emergencies and are related to objective pain experience that must be treated promptly, particularly in children.[3]

It has been known from the literature that children with a painful experience perceived at an early age are expected to have a higher risk to develop dental anxiety, which is a serious reason for avoidance of dental treatment later in life.[4–8] The objective assessment of children's pain constitutes a challenge for health professionals, because it is a complex, multidimensional phenomenon associated with the feeling of being hurt. In children with dental trauma experience, dental fear and anxiety are direct consequences of a negative sensation associated with the pain caused by this traumatic injury.[9] This negative sensation represents a defensive mechanism in an objective threatening situation, which might consequently prevent the child from further injuries.[10] Depending on a child's age and a level of its cognitive abilities, variations in experiencing, understanding, reporting and remembering pain considerably differ. Children's reports of pain experience follow a sequence of psycho-physiological stages determined by their general cognitive development.[11] Young children are usually not able to verbally interpret pain, whereas older children of 12 years and over are expected to explain pain in a rather sophisticated way because they can understand why pain hurts.[8,11] The purpose of this study is to evaluate the structure of dental fear in children with and without dental trauma experience, by using different psychometric measurements which have been standardized and widely used for evaluation of dental fear in children.

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Material and Methods

The study was performed on a sample of 147 randomly selected patients (59 girls and 88 boys). All patients were treated in the dental settings of the Department of Clinical Pedodontics, Faculty of Medicine, University of Rijeka, and the Department of Paediatric Dentistry, School of Dental Medicine, University of Zagreb, Croatia. The study was reviewed and approved by the Ethical Committee of the Faculty of Medicine, University of Rijeka, Croatia. The age of the examined patients ranged from 5–8 and 9–12 years.

Participants were divided into two groups: patients without dental trauma (n=49) and with dental trauma experience (n=98). Only patients with dental trauma to the permanent teeth were included in the study. Data related to the patient's age, gender and dental status, type of injured teeth and type of dental trauma, previous trauma history, was taken from the dental records of children who referred to the clinic. For the purpose of the study classification of dental trauma injuries, proposed by the WHO was used. Psychometric measurements usually used for evaluation of dental anxiety were applied in the study. Socioeconomic status was evaluated by the Hollingshead Two Factor Index of Social Position.

The Children's Fear Survey Schedule – Dental Subscale (CFSS-DS) questionnaire, which covers different aspects of dental and medical situations, was used to measure dental anxiety. The possible response to each item was scored between 1(not afraid) and 5 (very afraid) and the total scores ranged between 15–75.[12–15] According to the CFSS_DS test, children with the scores ≥45 can be defined as dentally anxious.[12–15]

The Corah Dental Anxiety Scale was used to measure fear in children (CDAS) and their parents (PDAS). Patients were asked to rate their fear on a five-point scale in different dental situations. The results have a possible score range between 4 and 20.[13,15–18] According to the CDAS test children are considered as low anxious (CDAS = 4–8); moderately anxious (CDAS = 9–12) and highly anxious (CDAS = 13–20).[13,15–18]

Short Dental Anxiety Inventory test (S-DAI) also covering different aspects of fear provoked by dental procedures and situations, has the total score range between 9 and 45.[13,19, 20]

Hollingshead Two Factor Index of Social Position (ISP) questionnaire was applied for the purpose of evaluating socio-economic background of the family in which the child was raised up. According to this test, families with the high ISP index indicate low socio-economic status, and conversely.[13,21]

Broome's Child Medical Fear Questionnaire (CMFQ) questionnaire consisting of 12 items, refer to different aspects of medical situations and was used to measure different aspects of medical fear. The results have a possible score range between 12 and 36.[13]

Statistical analysis

Statistical analysis was performed by using and SPSS for Windows, Release 7.5. The differences in dental anxiety between boys and girls, and the groups with and without dental trauma were performed by the analysis of variance (ANOVA) and compared by using an independent *t-test*. The consistency concerning dental anxiety scores obtained by different instruments was verified by using *Pearson's correlation* coefficients. The reliability of the tests was performed by calculating *Cronbach's α coefficients*. By calculating the mean scores children were defined as low and/or moderate, and highly anxious.

Results

Figure 1. refers to the results representing the frequencies for the groups of children without dental injury, and with isolated and repeated dental injury, in relation to the results obtained for the Hollingshead Two-Factor Index of Social Position. In general, the higher the ISP values are, the lower the social status is. The highest frequencies regarding all three groups of children are obtained for quite high ISP values (ISP = 44–60). For quite high ISP values (ISP=28–43 and ISP=44–60), the frequencies of children with repeated dental injury are higher in comparison with the groups of children without or with isolated dental trauma. With increasing the ISP values, the frequencies of children with repeated dental injury also increases. The exception is represented for the lowest and the highest ISP values, where the frequencies of children with repeated dental injury show the lowest value in comparison with the other two groups

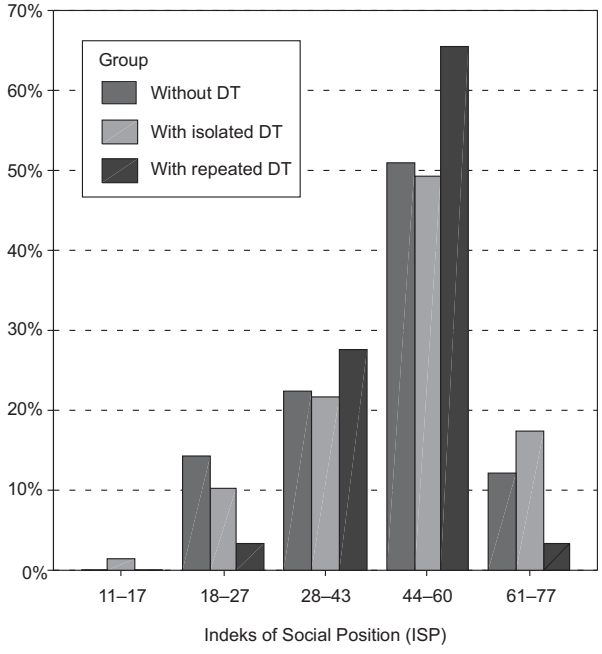

Fig. 1. Relative frequencies of children without, with isolated and repeated dental trauma injury depending on the values of the Hollingshead Two-Factor Index of Social Position (ISP) (N=147).

TABLE 1
CORAH DENTAL ANXIETY SCALE (CDAS): TOTAL MEAN VALUES, MEAN VALUES FOR CHILDREN WITHOUT DENTAL TRAUMA, WITH ISOLATED DENTAL TRAUMA AND REPEATED DENTAL TRAUMA INJURY DEPENDING ON GENDER

Groups	Gender	CDAS	
		Mean	Num. of Cases
Children without DT	Male	9.91	23
	Female	9.27	26
	Total	9.57	49
Children with isolated DT	Male	7.93	42
	Female	8.33	27
	Total	8.09	69
Children with repeated DT	Male	7.39	23
	Female	8.83	6
	Total	7.69	29
Total	Male	8.31	88
	Female	8.80	59
	Total	8.50[a]	147

[a] grand mean, DT – dental trauma injury

of children. Particularly for the lowest ISP value (ISP= 11–17), representing the highest social status of the family, there are no children with repeated dental injury (Figure 1).

The CDAS results show a significant difference in dental anxiety between the examined groups of children, i.e. children without dental trauma, with isolated dental trauma and repeated dental trauma experience (p=0.010) (Table 1 and Table 2).

The CMFQ results, representing children's medical fear, proved a significant difference in dental anxiety between the examined groups of children (p=0.021) as well. According to the same results, there is also a significant difference in dental anxiety between male and female participants (p=0.001) (Table 3 and Table 4).

The CFSS-DS results proved a significant difference in dental anxiety between children without dental trauma, with isolated and repeated dental trauma experience as well (p=0.001) (Table 3). According to these results, there is also a significant difference in dental anxiety between males and females (p=0.016) (Table 5 and Table 6).

Correlation coefficients between the anxiety scores obtained by different instruments showed a significant correlations for the group of children without dental trauma experience (Table 7). A significant correlation is obtained between children's dental anxiety and socioeconomic status of the family, as well as between children's dental anxiety and parental dental anxiety, as measured by S-DAI test (p<0.05) (Table 7). Parental dental anxiety also proved a significant correlation with socioeconomic status of the family (p<0.01) (Table 4). According to the CMFQ results, a significant correlation between children's age and fear of medical treatment proved that younger children are more afraid of the dentist (p<0.05) (Table 7).

Correlation coefficients between the anxiety scores obtained by different instruments showed a significant correlations for the group of children with repeated dental trauma injuries (Table 8). According to the CMFQ results, a significant correlation is obtained between children's age and their fear of medical treatment, proving that younger children are more feared of the dentsit (p<0.05) (Table 5). A significant correlation between the CFSS-DS results and children's age proved that younger participants are more afraid of the dentist as well (p< 0.05) (Table 8).

Discussion

It is not rare in the routine clinical practice to meet children with manifested dental anxiety who in their anamnesis approve of previous dental trauma injury. Dental trauma without any doubt represents a directly conditioned negative and uncomfortable, rather painful and fear provoking experience, which might contribute to the appearance of dental anxiety.[22,23] It can be specu-

TABLE 2
2-WAY ANOVA FOR CDAS REGARDING THE GROUPS (CHILDREN WITHOUT, WITH ISOLATED AND REPEATED DENTAL TRAUMA INJURY) AND GENDER

		SS[a]	df	MS[b]	F	*Sig.*
Covariates	Age	9.127	1	9.127	1.115	*0.293*
Main Effects	(Combined)	79.072	3	26.357	3.220	*0.025*
	Groups	77.986	2	38.993	4.764	*0.010*
	Gender	1.086	1	1.086	0.133	*0.716*
Interactions	Groups*Gender	16.626	2	8.313	1.016	*0.365*
Model		104.825	6	17.471	2.134	*0.053*
Residual		1145.923	140	8.185		
Total		1250.748	146	8.567		

[a] sum of squares, [b] mean square

TABLE 3
CHILD MEDICAL FEAR QUESTIONNAIRE (CMFQ): TOTAL MEAN VALUES, MEAN VALUES FOR CHILDREN WITHOUT DENTAL TRAUMA, WITH ISOLATED DENTAL TRAUMA AND REPEATED DENTAL TRAUMA INJURY DEPENDING ON AGE AND GENDER

Groups	Age	Gender	CMFQ	
			Mean	Num. of Cases
Children without DT	5–8 years	Male	18.55	11
		Female	17.21	19
		Total	17.70	30
	9–12 years	Male	15.42	12
		Female	15.57	7
		Total	15.47	19
	Total	Male	16.91	23
		Female	16.77	26
		Total	16.84	49
Children with isolated DT	5–8 years	Male	16.10	10
		Female	16.06	16
		Total	16.08	26
	9–12 years	Male	14.94	32
		Female	15.09	11
		Total	14.98	43
	Total	Male	15.21	42
		Female	15.67	27
		Total	15.39	69
Children with repeated DT	5–8 years	Male	16.33	6
		Female	21.00	2
		Total	17.50	8
	9–12 years	Male	14.35	17
		Female	13.25	4
		Total	14.14	21
	Total	Male	14.87	23
		Female	15.83	6
		Total	15.07	29
Total	5–8 years	Male	17.15	27
		Female	16.92	37
		Total	17.02	64
	9–12 years	Male	14.87	61
		Female	14.91	22
		Total	14.88	83
	Total	Male	15.57	88
		Female	16.17	59
		Total	15.81[a]	147

[a] grand mean, DT – dental trauma injury

TABLE 5
CHILDREN'S FEAR SURVEY SCHEDULE – DENTAL SUBSCALE (CFSS – DS): TOTAL MEAN VALUES, MEAN VALUES FOR CHILDREN WITHOUT DENTAL TRAUMA, WITH ISOLATED DENTAL TRAUMA AND REPEATED DENTAL TRAUMA INJURY DEPENDING ON AGE AND GENDER

Groups	Age	Gender	CFSS-DS	
			Mean	Num. of Cases
Children without DT	5–8 years	Male	35.55	11
		Female	29.79	19
		Total	31.90	30
	9–12 years	Male	25.83	12
		Female	31.57	7
		Total	27.95	19
	Total	Male	30.48	23
		Female	30.27	26
		Total	30.37	49
Children with isolated DT	5–8 years	Male	26.90	10
		Female	25.31	16
		Total	25.92	26
	9–12 years	Male	22.91	32
		Female	24.82	11
		Total	23.40	43
	Total	Male	23.86	42
		Female	25.11	27
		Total	24.35	69
Children with repeated DT	5–8 years	Male	25.00	6
		Female	41.50	2
		Total	29.13	8
	9–12 years	Male	20.47	17
		Female	21.25	4
		Total	20.62	21
	Total	Male	21.65	23
		Female	28.00	6
		Total	22.97	29
Total	5–8 years	Male	30.00	27
		Female	28.49	37
		Total	29.13	64
	9–12 years	Male	22.80	61
		Female	26.32	22
		Total	23.73	83
	Total	Male	25.01	88
		Female	27.68	59
		Total	26.08[a]	147

[a] grand mean, DT – dental trauma injury

lated that children with such painful experiences are expected to be more prone to developing higher dental anxiety.[6,7] But, it is still not known to which extent children's manifested anxious behavior and fears could be due to previously suffered dental injuries or rather intrinsic/extrinsic factors involved in the etiology of dental anxiety. For this reason, the present study evaluates the structure of dental anxiety in children with and without dental trauma experience.

The assumption based on the acquired results is that the group of children withouth dental trauma have a higher level of dental anxiety, as well as that younger children exhibit more anxious behaviour to a larger extent in comparison with the older ones.

The first can be explained by the »flooding theory«, whereas the latter is pretty much known from the previous literature.

TABLE 4
3-WAY ANOVA FOR CMFQ REGARDING THE GROUPS (CHILDREN WITHOUT, WITH ISOLATED AND REPEATED DENTAL TRAUMA INJURY), AGE AND GENDER

		SS[a]	df	MS[b]	F	*Sig.*
Main Effects	(Combined)	199.988	4	49.997	4.98	*0.001*
	GROUP	79.676	2	39.838	3.97	*0.021*
	AGE-K2	118.671	1	118.671	11.82	*0.001*
	GENDER	1.641	1	1.641	0.16	*0.687*
Inter-actions	(Combined)	31.524	5	6.305	0.63	*0.679*
	GROUP*AGE-K2	24.191	2	12.095	1.21	*0.303*
	GROUP*GENDER	8.671	2	4.335	0.43	*0.650*
	AGE-K2*GENDER	0.204	1	0.204	0.02	*0.887*
	GROUP*AGE-K2*GENDER	40.051	2	20.026	2.00	*0.140*
Model		271.563	11	24.688	2.46	*0.008*
Residual		1355.103	135	10.038		
Total		1626.667	146	11.142		

[a] sum of squares, [b] mean square

TABLE 6
3-WAY ANOVA FOR CFSS – DS REGARDING THE GROUPS (CHILDREN WITHOUT, WITH ISOLATED AND REPEATED DENTAL TRAUMA INJURY), AGE AND GENDER

		SS[a]	df	MS[b]	F	*Sig.*
Main Effects	(Combined)	1944.51	4	486.127	5.222	*0.001*
	GROUP	1389.02	2	694.507	7.460	*0.001*
	AGE-K2	551.72	1	551.723	5.927	*0.016*
	GENDER	3.77	1	3.772	0.041	*0.841*
Inter-actions	(Combined)	430.02	5	86.004	0.924	*0.468*
	GROUP*AGE-K2	98.51	2	49.255	0.529	*0.590*
	GROUP*GENDER	118.30	2	59.145	0.635	*0.531*
	AGE-K2*GENDER	102.64	1	102.641	1.103	*0.296*
	GROUP*AGE-K2*GENDER	551.05	2	275.524	2.960	*0.055*
Model		2925.58	11	265.961	2.857	*0.002*
Residual		12567.44	135	93.092		
Total		15493.02	146	106.117		

[a] sum of squares, [b] mean square

Being exposed to the most dreaded situation, such as dental trauma, in some children it can create an effective form of therapy. Though the first visit with the dentist upon the acute dental trauma might be rather stressful, children can learn how to cope with potentially stressful situations if they experience no harm during this first treatment. This »exposure treatment« known to represent the form of psychological therapy for the treatment of phobias, can explain less anxiety present in children with dental trauma.

The results of the CMFQ and CFSS-DS tests revealed more anxiety in younger children belonging to the 5–8 years old age group. Younger children cannot so easily cope with repeated dental injuries as the older ones, probably because they are not mature enough to suppress their fears. This statement was supported by the results obtained by correlation coefficients, which showed a significant interrelationship between age and CMFQ and CFSS – DS ($p<0,05$) respectively, in children with repeated dental trauma injuries. In children with no dental trauma experience, the interrelationship between age and CMFQ ($p<0,01$) revealed the influence of age on the level of manifested anxiety as well.

The structure of the CMFQ test represents a significant impact of not only dental, but also medical aspects which might contribute to higher dental anxiety, particu-

TABLE 7
CORRELATION COEFFICIENTS BETWEEN ANXIETY SCORES OBTAINED BY DIFFERENT INSTRUMENTS FOR CHILDREN WITHOUT DENTAL TRAUMA INJURIES (N=49)

	Age	ISP	PDAS	CDAS	CMFQ	CFSS-DS	S-DAI
Age	–	–0.044	0.014	0.035	–0.419**	–0.203	–0.110
ISP	–0.044	–	0.381**	0.217	–0.004	0.197	0.289*
PDAS	0.014	0.381**	–	0.265	0.260	0.258	0.323*
CDAS	0.035	0.217	0.265	–	0.533**	0.684**	0.856**
CMFQ	–0.419**	–0.004	0.260	0.533**	–	0.583**	0.532**
CFSS-DS	–0.203	0.197	0.258	0.684**	0.583**	–	0.758**
S-DAI	–0.110	0.289*	0.323*	0.856**	0.532**	0.758**	–

* – $p < 0.05$, ** – $p < 0.01$, ISP – Hollingshead two – factor index of social position, PDAS – Corah dental anxiety scale (parents), CDAS – Corah dental anxiety scale (children), CMFQ – Broome's child medical fear questionnaire, CFSS-DS – Children's fear survey schedule – dental subscale, S-DAI – Short dental anxiety inventory

TABLE 8
CORRELATION COEFFICIENTS BETWEEN ANXIETY SCORES OBTAINED BY DIFFERENT INSTRUMENTS FOR CHILDREN WITH REPEATED DENTAL TRAUMA INJURIES (N=29)

	Age	ISP	PDAS	CDAS	CMFQ	CFSS-DS	S-DAI
Age	–-	0.213	0.235	–0.139	–0.470*	–0.453*	–0.342
ISP	0.213	–	–0.202	0.089	0.069	–0.124	0.070
PDAS	0.235	–0.202	–	–0.138	–0.220	–0.037	0.038
CDAS	–0.139	0.089	–0.138	–	0.521**	0.502**	0.508**
CMFQ	–0.470*	0.069	–0.220	0.521**	–	0.663**	0.545**
CFSS-DS	–0.453*	–0.124	–0.037	0.502**	0.663**	–	0.662**
S-DAI	–0.342	0.070	0.038	0.508**	0.545**	0.662**	–

* – $p < 0.05$, ** – $p < 0.01$, ISP – Hollingshead two – factor index of social position, PDAS – Corah dental anxiety scale (parents), CDAS – Corah dental anxiety scale (children), CMFQ – Broome's child medical fear questionnaire, CFSS-DS – Children's fear survey schedule – dental subscale, S-DAI – Short dental anxiety inventory

larly in younger children. The situations, such as the fear of the needle and puncturing or seeing blood, can by no means be considered as the most fear provoking.

This assumption is in accordance with some previous findings considering the needle as the most responsible fear provoking factor.[24–29]

As to gender, the analysis of variance proved no statistical difference in dental anxiety.

Data from the literature varies depending on the sample and the methods used. Many studies confirm that females have higher prevalence of dental fear than males,[29–34] which is at the same time in contrast to the others who found higher anxiety levels in boys.[35] But, some authors also found the equal fear level among girls and boys.[12,36,37]

Several studies have reported that dental fear seems to decrease with increasing age, which in children is related to the development of cognitive abilities and the change in the expression of their fear. Children may learn to control the way they express their fear as they grow older.[33,38]

According to the results of the socioeconomic status, children coming from the families whose values were higher, thus representing poorer social circumstances, have the most frequencies of dental trauma injuries. It might be explained by less care and attention the parents give to potential injuries of their children. The reason might be in lack of time the parents spend with their children or a higher number of children they have to take care about and raise. It can also be because of the parents' lack of education regarding the importance of promoting oral health in their children.

The parents' age, education and the level of dental anxiety did not influence children's anxiety. And finally, the results of our study show no statistically significant difference in the mean scores of children's and parental dental anxiety, which is in accordance with some studies[38,39], but in the opposition to some others[40,41].

Conclusion

This study represents original data regarding the anxiety level in relation to dental traumas in Croatian children. It proves that dental traumatic injuries, particuraly in younger children, influences their anticipation of fear and affect future contacts with the dentists.

Nevertheless, the decrease in dental anxiety in children with isolated and repeated dental traumas can be explained due to »flooding«, known as the method introduced in the treatments of phobias. After being flooded with negative experiences, a child becomes either averse or numbed to them. If the dentist's approach to a traumatized patient isn't painful and the child anticipates no harm at a first visit following the acute trauma, the forthcoming contacts may represent a powerful therapy. In conclusion, it is important to introduce an indicated psychological approach and consider every possibility of a nonpainful treatment in paediatric dental patients, particularly those with dental trauma injuries.

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STRUKTURNA ANALIZA DENTALNOG STRAHA U DJECE SA I BEZ OZLJEDA ZUBA

SAŽETAK

Cilj istraživanja bio je evaluirati dentalni strah u djece s i bez ozljeda zuba na slučajnom uzorku djece u Hrvatskoj (59 dječaka i 88 djevojčica). Djeca su ovisno o iskustvu ozljede zuba bila podijeljena u tri skupine. Također su bila podijeljena u dvije dobne skupine: 5–8 i 9–12 godina. U istraživanje su bile uključene samo ozljede trajnih zuba. CFSS--DS, CDAS i CMFQ su se koristili za evaluaciju dentalne anksioznosti te se izračunao ISP Hollingshead-ov Indeks Socijalnog Statusa u svrhu evaluacije socijalnog statusa. Prosječne vrijednosti CDAS, CFSS-DS i CMFQ testova pokazale su da razina dentalne anksioznosti opada s iskustvom ozljeda zuba. Analiza varijance za CDAS test pokazala je značajnu razliku između skupine djece sa i bez iskustva ozljede zuba ($p=0,010$). Analiza varijance za CMFQ ($p=0,021$) i CFSS-DS ($p=0,001$) pokazala je značajnu razliku glede skupina, a također i dobi ((CMFQ; $p=0,001$ i CFSS-DS; $p=0,016$). Cronbach-ovi alfa koeficijenti pokazali su najveću pouzdanost CFSS-DS testa ($\alpha=0,910$). Pearson-ovi koeficijenti korelacija pokazali su značajne korelacije između razine anksioznosti mjerenih različitim instrumentima, te dobi i ISP statusa u djece bez ozljeda zuba, te između razine anksioznosti i dobi u djece sa ponovljenim ozljedama zuba. Rezultati ISP Hollingshead-ovog indeksa pokazali su najviše frekvencije u djece s ozljedama zuba iz familija s niskim socijalnim statusom (ISP=44–60). U djece sa i bez ozljeda zuba nije dokazana statistički značajna razlika glede spola ili ISP vrijednosti.