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Predictors of Dental Fear and Anxiety in 9-12-year-old Children in Bosnia and Herzegovina

Prediktori dentalnoga straha i anksioznosti kod djece u dobi od 9 do 12 godina u Bosni i Hercegovini

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Abstract

Objectives: Oral health in children is additionally burdened with the presence of dental fear and anxiety (DFA). These clinical psychologic entities in their progressive stages inevitably lead to avoidance of dental appointments, which makes prevention and therapy of oral diseases more difficult. Upon the onset of DFA in general, as one of the emotional outcomes of stress in a dental office, most children patients could define the specific stressors that were most intense for them, which could predict the presence of DFA. **Aim:** To examine the predictors of DFA presence in 9-12-year-old children, and investigate how they could explain the DFA occurrence in study participants. **Material and Methods:** The sample consisted of 200 children aged from 9 to 12 years. The DFA presence was determined by the modified version of the CFSS-DS scale. The child's behavior in the dental office during the treatment was evaluated by the trained observer using Venham anxiety and behavior rating scales. Socioeconomic status, characteristics of dental office visits, and previous caries experience were also analyzed. **Results:** The main DFA predictors were related to invasive dental treatments, where the behavior during dental treatment was the most accurate expression of the DFA appearance. **Conclusions:** Invasive dental procedures are the main stressful factor for DFA occurrence. Predisposing factors could strengthen the DFA occurrence.

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Introduction

Dental fear and anxiety (DFA) are commonly seen in the general population, especially among children and adolescents. These clinical psychological entities inevitably lead to the avoidance of dental appointments. The presence of DFA is reported in 23.9% of children and adolescents (1-3). The aforementioned cannot be neglected in the context of prevention and therapy of oral diseases. This problem is becoming more complex in children's age questioning the possibilities of modern dentistry to meet its goals. A significant number of child patients are avoiding dental appointments due to DFA until it is too late for preventive treatments, and oral health is consequently impaired (2, 4).

In the beginning of DFA in general, as one of the emotional outcomes of stress in a dental office, most child patients could define the specific stressors that were most in-

Uvod

Dentalni strah i anksioznost (DSA) česti su u općoj populaciji, posebno među djecom i adolescentima. Ti klinički psihološki entiteti neizbježno završavaju izbjegavanjem stomatoloških pregleda. Prisutnost DSA-e zabilježena je kod 23,9 % djece i adolescenata (1 – 3). To se ne može zanemariti u kontekstu prevencije i terapije oralnih bolesti. Propitujući mogućnosti moderne stomatologije da ispuni svoje ciljeve, taj problem u dječjoj dobi postaje sve složeniji. Znan broj dječjih pacijenata izbjegava preglede kod stomatologa zbog DSA-e sve dok ne bude prekasno za preventivne tretmane te se tako posljedično narušava oralno zdravlje (2, 4).

U nastanku DSA-e općenito, kao jednoga od emocionalnih ishoda stresa u stomatološkoj ordinaciji, većina dječjih pacijenata mogla je definirati za njih najintenzivnije specifične stresore. Tako postoje dvije skupine čimbenika za pojavu

tense for them. There were thus two groups of factors for the DFA emergence depending on whether they had a direct or indirect contribution to its onset and development (2, 4). The first ones are the direct factors, related to the situations, content, and course of dental treatment, the dental team, and the dental office itself. The strength of these factors was directly dependent on their invasiveness. The second group is composed of indirect, predisposing (dispositional) factors, that were unrelated to the dentist, dental team, or the office, and with great certainty, it was assumed that they could indirectly contribute to the onset, development, and even deepening of DFA presence (4-8).

There is more than one way to measure the presence of DFA in child patients. The scales of self-reported DFA were most commonly used, due to their simplicity (2, 9). Recently, a modified version of the CFSS-DS scale (CFSS-DS-mod scale) for children aged 9-12 has been introduced to clinical practice. This psychometric instrument showed significant normative values in this age group within the population of child patients (10).

Study objective

This study aimed to determine the predictors of the DFA presence in 9-12-year-old children and how they could explain the DFA occurrence in study participants. Accordingly, the hypothesis of the study was that direct factors have the strongest contribution to the DFA appearance in our study participants.

Materials and methods

Ethical considerations and sample collection

The study was approved by the Ethics Committee of the Faculty of Dentistry with Clinics of the University of Sarajevo and following the Declaration of Helsinki (11). The survey was conducted in a form of prospective, cross-sectional study research.

Study participants were randomly selected patients aged from 9 to 12 years, who visited the Clinic / Department of Pediatric and Preventive Dentistry of the Faculty of Dentistry with Clinics of the University of Sarajevo due to a previously defined dental treatment plan. This specific age of children was selected due to their cognitive, emotional, and psychosocial development, and coping skills (2, 4).

All study participants had prior knowledge and awareness of why they had visited the dental office in the first place, and that all previously established treatment plan actions and interventions related to this study were performed in the same spatial conditions. Exclusion criteria were dental emergencies (odontalgia, oro-mucosal and orofacial swellings of dental and/or other origins, oro-mucosal and orofacial bleedings, dentoalveolar and/or orofacial traumas), and psychological, and/or psychiatric conditions as well. A confirmation of the existence of these conditions as exclusion criteria should be given by trained psychology and psychiatry specialists if needed, according to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (12). Nevertheless, there was not any situation during the study re-

DSA-e, bez obzira na to jesu li imali izravan ili neizravan doprinos njezinu nastanku i razvoju (2, 4). Prvi su izravni neposredni čimbenici vezani za situacije, sadržaj i tijek stomatološkoga tretmana, stomatološki tim i samu ordinaciju. Snaga tih čimbenika izravno je ovisila o njihovoj invazivnosti. Drugu skupinu čine neizravni, predisponirajući (dispozicijski) čimbenici koji nisu bili vezani uz stomatologa, stomatološki tim ili ordinaciju, a s velikom se sigurnošću pretpostavljalo da posredno mogu pridonijeti nastanku, razvoju pa i produbljivanju DSA-e (4 – 8).

DSA se kod dječjih pacijenata može izmjeriti na nekoliko načina. Zbog jednostavnosti najčešće se primjenjuju ljestvice samoprocjene (2, 9). Nedavno je za djecu od 9 do 12 godina u kliničku praksu uvedena modificirana verzija ljestvice CFSS-DS (ljestvica CFSS-DS-mod). Taj psihometrijski instrument pokazao je značajnu normativnu vrijednost u toj dobnoj skupini pacijenata (10).

Cilj studije

Ovom istraživanju bila je svrha utvrditi prediktore prisutnosti DSA-e kod djece od 9 do 12 godina i na temelju njih objasniti pojavu DSA-e kod sudionika u studiji. U skladu s tim postavljena je hipoteza da izravni čimbenici najviše pridonose pojavi DSA-e kod sudionika u našoj studiji.

Materijal i metode

Etička razmatranja i prikupljanje uzorka

Studiju je odobrilo Etičko povjerenstvo Stomatološkog fakulteta s klinikama Univerziteta u Sarajevu u skladu s načelima Helsinške deklaracije (11). Istraživanje je provedeno u obliku prospektivne, presječne studije.

Sudionici su bili nasumično odabrani pacijenti u dobi od 9 do 12 godina koji su dolazili na Kliniku / Katedru za dječju i preventivnu stomatologiju Stomatološkog fakulteta s klinikama Univerziteta u Sarajevu zbog već definiranog plana stomatološke terapije. Ta specifična dob djece odabrana je zbog njihova kognitivnog, emocionalnog i psihosocijalnog razvoja te vještina suočavanja (2, 4).

Svi sudionici imali su predznanje i svijest o tome zašto su uopće posjetili stomatološku ordinaciju, te su svi utvrđeni postupci u planu tretmana i same intervencije vezane za ovo istraživanje obavljani u istim prostornim uvjetima. Kriteriji za isključenje bili su hitni dentalni slučajevi (odontalgija, oromukozna i orofacijalna otekline zubnoga i/ili drugoga podrijetla, oromukozna i orofacijalna krvarenja, dentoalveolarne i/ili orofacijalne traume) te psihološka i/ili psihijatrijska stanja. Postojanje tih stanja kao kriterija za isključenje, u slučaju potrebe, trebali su potvrditi stručnjaci iz psihologije i psihijatrije prema petom izdanju Dijagnostičkoga i statističkoga priručnika za mentalne poremećaje (DSM-5) (12). No tijekom istraživanja nije bilo situacije u kojoj bi se trebali primijeniti ti kriteriji za isključenje.

search period where these DSM-5 exclusion criteria should have been implemented.

Prior to survey commencement, the study purpose and content were explained in detail to the child participants and their parents. Parents were asked to fill out and sign informed consent for the participation on behalf of themselves and their minor children as well. Also, children were additionally required to give their consent to participate in the study.

To meet the research objectives, the sample consisted of a group of 200 children of both sexes, according to the sample size calculation, with a 95% interval of confidence. Sample size calculation was accomplished according to the study of Pourhoseingholi et al for cross-sectional studies, observing the phenomena of DFA in children and adolescents (estimated prevalence of 23.9%; 95% CI 20.4 to 27.3), with an effect size of 0.84 (13-15).

Study design – direct factors for DFA appearance

The study group was composed of child patients who visited the dental office primarily due to the need for some further dental interventions: regular dental check-ups, preventive dental treatment (dental fluoridation and/or fissure sealing), treatment of a carious dentine lesion of medium depth on a permanent tooth, and/or permanent tooth extractions.

The selection and division of dental procedures, based on their invasiveness, were made because invasive dental procedures were considered the most provoking factors of DFA. Therefore, the procedures were further divided into non-invasive (examination, fluoridation, or sealing) and invasive (drilling or extraction) ones.

The child patients independently answered the questions from the CFSS-DS-mod scale before the scheduled treatment started (10). This psychometric instrument has 17 questions with answers rated on a Likert scale from 1 to 5. The total scale score ranged from 17 to 85, with a cut-off score of 37, which included also a population of latent DFA presence. The scale showed good normative values in an examined population, and this validated version was used in this study research (10).

The evaluation of children's behavior during dental treatment, as the potential expression of DFA presence, was performed by the Venham anxiety and behavior rating scales (Venham scale) (16). This instrument was used in such a way to notify the most negative behaviors during dental treatment. The total score on the Venham scale was 10, and the cut-off score which defined positive versus negative behaviors was 5. Higher scores indicated more negative behaviors in the dental office (16).

Study design – dispositional factors for DFA appearance

During the survey, parents of child participants provided information about the socioeconomic status (SES) of their family, the average number, frequency, and reasons for previous dental visits, as well as about the total number of different dentists previously visited by their children (17, 18). Previous dental caries experience of the child participants was

Dječjim sudionicima i njihovim roditeljima prije anke-te potanko su objašnjeni svrha i sadržaj istraživanja. Roditelji su zamoljeni da u svoje ime i u ime svoje maloljetne djece, ispune i potpišu informirani pristanak za sudjelovanje. Djeca su također dodatno trebala pristati na sudjelovanje u istraživanju.

Kako bi se ispunili ciljevi istraživanja, uzorak se sastojao od 200 djece obaju spolova prema proračunu o veličini uzorka s 95-postotnim intervalom pouzdanosti. Izračun veličine uzorka obavljen je prema studiji Pourhoseingholija i suradnika za presječne studije, promatrajući fenomen DSA-e kod djece i adolescenata (procijenjena prevalencija od 23.9 %; 95 % CI 20,4 do 27,3), s veličinom učinka od 0,84 (13 – 15).

Dizajn studije – izravni čimbenici za pojavu DSA-e

Ispitivanu skupinu činili su pacijenti koji su dolazili u stomatološku ordinaciju uglavnom zbog daljnjih potrebnih stomatoloških intervencija – redovitih stomatoloških pregleda, preventivnih stomatoloških tretmana (fluoridacija zuba i/ili pečaćenje fisura), tretmana karijesne lezije dentina srednje dubine na trajnom zubu i/ili vađenja trajnoga zuba.

Izbor i podjela stomatoloških zahvata učinjeni su na temelju njihove invazivnosti jer se takvi postupci smatraju najprovokativnijim čimbenicima za nastanak DSA-e. Tako su zahvati dalje podijeljeni na neinvazivne (stomatološki pregled, topikalna fluoridacija ili pečaćenje fisura) i invazivne (preparacija kaviteta ili ekstrakcija).

Prije početka planiranog liječenja pacijenti su samostalno odgovarali na pitanja iz ljestvice CFSS-DS-mod (10). Taj psihometrijski instrument sadržava 17 pitanja s odgovorima rangiranim na Likertovoj ljestvici od 1 do 5. Ukupni rezultat na ljestvici bio je od 17 do 85, s graničnom vrijednošću od 37 koja uključuje i populaciju s latentnom prisutnošću DSA-e. Ljestvica je pokazala dobre normative vrijednosti u ispitivanoj populaciji te je ta validirana verzija korištena u ovome studijskom istraživanju (10).

Procjena ponašanja djece tijekom stomatološkog tretmana, kao potencijalnog pokazatelja prisutnosti DSA-e, provedena je Venhamovim ljestvicama za ocjenjivanje anksioznosti i ponašanja (Venhamova ljestvica) (16). Taj je instrument korišten tako da su zabilježena negativna ponašanja tijekom stomatološkog tretmana. Ukupan rezultat na Venhamovoj ljestvici bio je 10, a onaj granični koji je definirao pozitivno prema negativnom ponašanju iznosio je 5. Viši rezultati pokazivali su negativnija ponašanja u stomatološkoj ordinaciji (16).

Dizajn studije – dispozicijski čimbenici za pojavu DSA-e

Tijekom istraživanja roditelji su dali informacije o socijalno-ekonomskom statusu (SES) svoje obitelji, prosječnom broju, učestalosti i razlozima prethodnih posjeta stomatologu te o ukupnom broju različitih stomatologa kojima su njihova djeca odlazila (17, 18). Iskustvo dječjih sudionika s karijesom određeno je njihovim KEP indeksom prije početka stomatološkog tretmana. KEP indeks dobro je poznat kao pokazatelj

determined by their DMFT index prior to commencement of dental treatment. DMFT index is well known as an indicator of hard dental tissue health status, where the existence of filled and/or missing teeth could be indirectly related to negative experiences in the dental office which could lead to the appearance of DFA in children (19).

Statistical analysis of study results

The data collected in this survey were statistically analyzed and presented as follows:

- the total number and number of participants within groups were shown descriptively in the tables corresponding to children's age, average age, and sex;
- the distribution of obtained results was determined using the Kolmogorov-Smirnov test;
- the results obtained for the socioeconomic status and dental attendance characteristics were presented in percentages;
- the existence of statistically significant differences was determined using the nonparametric Kruskal-Wallis test, Mann-Whitney test, and/or Wilcoxon signed-rank test, depending on whether the samples were independent or related ones;
- the existence of statistically significant correlations between the characteristics of the visit to the dental office was determined by Spearman's correlation coefficient;
- Identification of the determinants of DFA presence was performed by binary logistic regression analysis.

A significance level of $p \leq 0.05$ was set for most statistical analyses, except for logistic regression analysis, where the level was $p \leq 0.25$ (20). The analyses were conducted with the SPSS IBM Statistics v. 23 software for the Windows operating system.

Results

Descriptive values of the study sample

The age and the sex distribution of child patients are shown in Table 1.

Direct factors for DFA appearance

The descriptive values of the average DFA scores by CFSS-DS-mod scale are shown in Table 2. Invasive treatment subgroup obtained statistically significantly higher scale scores compared to non-invasive ones in general (Mann-Whitney test, $U = 2972.0$, $p < 0.0005$), and also within 10-year-olds (Wilcoxon signed rank test, $Z = -2.307$, $p = 0.021$), 11-year-olds ($Z = -4.289$, $p < 0.0005$), boys ($Z = -3.506$, $p < 0.0005$) and girls ($Z = -3.818$, $p < 0.0005$). Further analysis showed statistically significant age differences within non-invasive treatment subgroup (Kruskal-Wallis test, $\chi^2 = 12.318$, $p = 0.006$), between 12-year-olds (higher scores) and 9-year-olds ($U = 157.00$, $p = 0.008$), and between 12-year-olds (higher scores) and 11-year-olds ($U = 176.50$, $p = 0.001$).

Scores for the behavior of child patients, determined with the Venham scale, are shown in Table 3.

Statistical analyses (Wilcoxon signed-rank test) showed significant differences between invasive and non-invasive dental procedures according to age and sex of child partic-

ipatnika i njihov broj po skupinama prikazani su opisno u tablicama prema dobi, prosječnoj dobi i spolu djece; raspodjela dobivenih rezultata određena je Kolmogorov-Smirnovljevim testom; dobiveni rezultati za socijalno-ekonomski status i obilježja posjeta stomatologu prikazani su u postotcima; statistički značajne razlike ustanovljene su neparametrijskim Kruskal-Wallisovim testom, Mann-Whitneyjevim testom i/ili Wilcoxonovim testom označenih rangova, ovisno o tomu jesu li uzorci bili nezavisni ili povezani; statistički značajne korelacije između obilježja posjeta stomatološkoj ordinaciji ustanovljene su Spearmanovim koeficijentom korelacije; identifikacija determinanti prisutnosti DSA-e provedena je binarnom logističkom regresijskom analizom.

Statistička analiza rezultata studije

Podatci prikupljeni u ovom istraživanju statistički su obrađeni i prezentirani na sljedeći način: ukupan broj ispitanika i njihov broj po skupinama prikazani su opisno u tablicama prema dobi, prosječnoj dobi i spolu djece; raspodjela dobivenih rezultata određena je Kolmogorov-Smirnovljevim testom; dobiveni rezultati za socijalno-ekonomski status i obilježja posjeta stomatologu prikazani su u postotcima; statistički značajne razlike ustanovljene su neparametrijskim Kruskal-Wallisovim testom, Mann-Whitneyjevim testom i/ili Wilcoxonovim testom označenih rangova, ovisno o tomu jesu li uzorci bili nezavisni ili povezani; statistički značajne korelacije između obilježja posjeta stomatološkoj ordinaciji ustanovljene su Spearmanovim koeficijentom korelacije; identifikacija determinanti prisutnosti DSA-e provedena je binarnom logističkom regresijskom analizom.

Za većinu statističkih analiza postavljena je razina značajnosti od $p \leq 0,05$, osim za logističku regresijsku analizu za koju je iznosila $p \leq 0,25$ (20). Analize su obavljene u softveru SPSS IBM Statistics v. 23 za operativni sustav Windows.

Rezultati

Opisne vrijednosti studijskoga uzorka

Dobna i spolna distribucija dječjih pacijenata u uzorku prikazane su u tablici 1.

Izravni čimbenici za pojavu DSA-e

Opisne vrijednosti prosječnih DSA skorova na ljestvici CFSS-DS-mod nalaze se u tablici 2. Invazivna podskupina postigla je statistički značajno više rezultate na ljestvici u usporedbi s neinvazivnom općenito (Mann-Whitneyjevim test, $U = 2972,0$, $p < 0,0005$) i u skupini desetogodišnjaka (Wilcoxonov test označenih rangova, $Z = -2,307$, $p = 0,021$), jedanaestogodišnjaka ($Z = -4,289$, $p < 0,0005$), dječaka ($Z = -3,06$, $p < 0,0005$) i djevojčica ($Z = -3,818$, $p < 0,0005$). Daljnja analiza pokazala je statistički značajne dobne razlike u podskupini neinvazivnih tretmana (Kruskal-Wallisov test, $\chi^2 = 12,318$, $p = 0,006$) između dvanaestogodišnjaka (viši rezultati) i devetogodišnjaka ($U = 157,00$, $p = 0,008$) te između dvanaestogodišnjaka (viši rezultati) i jedanaestogodišnjaka ($U = 176,50$, $p = 0,001$).

U tablici 3. nalaze se rezultati za ponašanje dječjih pacijenata određeni Venhamovom ljestvicom.

Statističke analize (Wilcoxonov test označenih rangova) pokazale su značajne razlike između invazivnih i neinvaziv-

Table 1 Descriptive characteristics of study sample participants
Tablica 1. Opisne karakteristike sudionika u studijskom uzorku

Study sample • Studijski uzorak										
Age • Dob	9 years • 9 godina		10 years • 10 godina		11 years • 11 godina		12 years • 12 godina		Total • Ukupno:	
	n (%)		n (%)		n (%)		n (%)		N=200	
	49 (24.5)		46 (23.0)		55 (27.5)		50 (25.0)		M=10.53; SD=1.12	
Sex • Spol	m (%)	f (%)	m (%)	f (%)	m (%)	f (%)	m (%)	f (%)	m (%)	f (%)
	23 (11.5)	26 (13)	27 (13.5)	19 (9.5)	28 (14.0)	27 (13.5)	20 (10.0)	30 (15.0)	98 (49.0)	102 (51.0)
Non-invasive treatments • Podskupina neinvazivnih tretmana										
Age • Dob	9 years		10 years		11 years		12 years		total:	
	n (%)		n (%)		n (%)		n (%)		N=100	
	21 (21.0)		24 (24.0)		28 (28.0)		27 (27.0)		M=10.61; SD=1.10	
Sex • Spol	m (%)	f (%)	m (%)	f (%)	m (%)	f (%)	m (%)	f (%)	m (%)	f (%)
	10 (10.0)	11 (11.0)	15 (15.0)	9 (9.0)	17 (17.0)	11 (11.0)	7 (7.0)	20 (20.0)	49 (49.0)	51 (51.0)
Invasive treatments • Podskupina invazivnih tretmana										
Age • Dob	9 years		10 years		11 years		12 years		total:	
	n (%)		n (%)		n (%)		n (%)		N=100	
	28 (28.0)		22 (22.0)		27 (27.0)		23 (23.0)		M=10.45; SD=1.13	
Sex • Spol	m (%)	f (%)	m (%)	f (%)	m (%)	f (%)	m (%)	f (%)	m (%)	f (%)
	13 (13.0)	15 (15.0)	12 (12.0)	10 (10.0)	11 (11.0)	16 (16.0)	13 (13.0)	10 (10.0)	49 (49.0)	51 (51.0)

n-number of study participants in age group • broj sudionika u podobnim skupinama; m-males • muški spol; f-females • ženski spol; N-total number of study (sub)sample participants • ukupan broj sudionika unutar (pod)skupina; M-mean age of study participant • srednja vrijednost dobi sudionika; SD-standard deviation • standardno odstupanje

Table 2 Descriptive values of average scores obtained in the modified version of the Children's Fear Survey Schedule scale in study participants concerning treatment invasiveness, age, and sex

Tablica 2. Opisne vrijednosti prosječnih skorova postignutih na ljestvici CFSS-DS-mod kod sudionika studije obzirom na invazivnost tretmana, dob i spol

Treatment subgroups • Tretmanske podskupine	N	Range • Opseg	Minimum	Maximum	M	SD	
Non-invasive treatments • Neinvazivni tretmani	100	36.00	17.00	53.00	24.98	7.44	
Invasive treatments • Invazivni tretmani	100	63.00	17.00	80.00	31.25	10.91	
Non-invasive treatments • Neinvazivni tretmani	9 years • 9 godina	21	28.00	17.00	45.00	23.57	6.51
	10 years • 10 godina	24	30.00	17.00	47.00	25.38	8.69
	11 years • 11 godina	28	19.00	17.00	36.00	22.14	4.48
	12 years • 12 godina	27	35.00	18.00	53.00	28.67	8.12
	Boys • Dječaci	49	36.00	17.00	53.00	25.39	8.82
Girls • Djevojčice	51	25.00	17.00	42.00	24.59	5.87	
Invasive treatments • Invazivni tretmani	9 years • 9 godina	28	40.00	17.00	57.00	28.04	9.37
	10 years • 10 godina	22	37.00	17.00	54.00	30.41	9.11
	11 years • 11 godina	27	59.00	21.00	80.00	33.67	13.17
	12 years • 12 godina	23	35.00	17.00	52.00	33.13	10.89
	Boys • Dječaci	49	38.00	17.00	55.00	30.16	9.28
Girls • Djevojčice	51	63.00	17.00	80.00	32.29	12.27	

N-total number of study (sub)sample and age and gender groups of participants • ukupan broj sudionika u (pod)skupinama prema invazivnosti tretmana, dobi i spolu; M-mean CFSS-DS-mod scale score • srednja vrijednost skorova na ljestvici CFSS-DS-mod; SD-standard deviation • standardno odstupanje

ipants presented with higher scores and more negative dental behavior in invasive treatment subgroup of child patients (Table 3).

nih stomatoloških zahvata prema dobi i spolu djece sudionika, s višim rezultatima i negativnijim ponašanjem tijekom tretmana u podskupini u kojoj su učinjene invazivne intervencije (tablica 3.).

Table 3 Descriptive values of average scores obtained in the Venham scale in study participants concerning treatment invasiveness, age, and sex**Tablica 3.** Opisne vrijednosti prosječnih skorova postignutih na Venhamovoj ljestvici kod sudionika studije s obzirom na invazivnost tretmana, dob i spol

Treatment subgroups • Tretmanske podskupine	N	Range • Raspon	Minimum	Maximum	M	SD	Wilcoxon test
Non-invasive treatments • Neinvazivni tretmani	100	6.00	0.00	6.00	1.5200	1.41049	Z=-8.348
Invasive treatments • Invazivni tretmani	100	10.00	0.00	10.00	3.9300	2.06586	p≤0.0005
9 years-non-invasive • 9 godina – neinvazivni	21	6.00	0.00	6.00	1.5714	1.56753	Z=-2.661
9 years-invasive • 9 godina – invazivni	28	8.00	0.00	8.00	3.8214	2.05577	p=0.008
10 years-non-invasive • 10 godina – neinvazivni	24	5.00	0.00	5.00	1.5000	1.47442	Z=-3.237
10 years-invasive • 10 godina – invazivni	22	8.00	1.00	9.00	3.9091	2.50541	p=0.001
11 years-non-invasive • 11 godina – neinvazivni	28	5.00	0.00	5.00	1.5714	1.19965	Z=-3.426
11 years-invasive • 11 godina – invazivni	27	9.00	1.00	10.00	4.0000	2.25320	p=0.001
12 years-non invasive • 12 godina – neinvazivni	27	4.00	0.00	4.00	1.4444	1.50214	Z=-3.849
12 years-invasive • 12 godina - invazivni	23	5.00	2.00	7.00	4.0000	1.41421	p≤0.0005
Boys-non invasive • Dječaci - neinvazivni	49	5.00	0.00	5.00	1.6939	1.37241	Z=-4.916
Boys-invasive • Dječaci - invazivni	49	9.00	0.00	9.00	3.8367	1.98271	p≤0.0005
Girls-non-invasive • Djevojčice - neinvazivni	51	6.00	0.00	6.00	1.3529	1.43977	Z=-4.880
Girls-invasive • Djevojčice - invazivni	51	9.00	1.00	10.00	4.0196	2.15861	p≤0.0005

N - total number of study (sub)sample and age and gender groups of participants • ukupan broj sudionika u (pod)skupinama prema invazivnosti tretmana, dobi i spolu; M - mean Venham scale score • srednja vrijednost skorova na Venhamovoj ljestvici; SD - standard deviation • standardno odstupanje; Z - Z value • Z vrijednost; p - p value • p vrijednost

Dispositional factors for DFA appearance

Considering the SES, most of the study group participants had married parents (N = 187, 93.5%), and the mothers and fathers of the children had completed high school education (N = 89, 44.5%; N = 84, 42.0%, respectively). The mothers of the study participants were mostly unemployed (N = 93, 46.5%), while their fathers mostly had full-time jobs (N = 145, 72.5%). Household incomes per family member mostly ranged between 150 and 250 Euros (N = 54, 27.0%), and in the total sample, they were below the average level of monthly consumption for the mentioned survey period. Most parents of the study participants thought that dental care was completely available to them (N = 150, 75.0%).

Study group respondents mostly visited dentists between 11 and 30 times (56.5%) in total, with most often visiting the dentist office once in the first three months (81.0%), due to cavity preparation (62.5%). Most participants (54.0%) had previously been to two different dentists. The average caries experience (DMFT) of sample subjects was 8.0. Analyses showed that the children with a less average number of dental visits showed more negative behaviors in the dental office (Spearman's correlation coefficient, $\rho = -0.239$, $p = 0.001$). Also, the children had worse caries experience in cases where their parents considered dental care as less important ($\rho = 0.145$, $p = 0.040$), and when the reasons for dental visits were more invasive treatments ($\rho = 0.209$, $p = 0.003$).

Predictors of DFA presence

Since the potential predictors of DFA presence were mostly categorical variables (Table 4), binary logistic regression analysis was performed (Table 5). Regression model was good ($\chi^2 = 18.795$, $p = 0.005$), with the Hosmer and Lemesh test value $\chi^2 = 4.391$ ($p = 0.820$).

Dispozicijski čimbenici za pojavu DSA-e

S obzirom na SES, roditelji većine sudionika bili su vjenčani (N = 187, 93,5 %), a majke i očevi završili su srednju školu (N = 89, 44,5 %; N = 84, 42,0 %, respektivno). Majke su najčešće bile nezaposlene (N = 93, 46,5 %), a očevi su uglavnom radili puno radno vrijeme (N = 145, 72,5 %). Prihodi kućanstva po članu obitelji uglavnom su se kretali između 150 i 250 eura (N = 54, 27,0 %), a u ukupnom su uzorku bili ispod prosječne razine mjesečne potrošnje u razdoblju istraživanja. Većina roditelja smatrala je da im je stomatološka skrb dostupna u cijelosti (N = 150, 75,0 %).

Ispitanici studijske skupine uglavnom su stomatologe posjećivali između 11 i 30 puta (56,5 %), a najčešće su dolazili jedanput u prva tri mjeseca (81,0 %) zbog preparacije kaviteta (62,5 %). Većina (54,0 %) je prije toga bila kod dva različita stomatologa. Prosječno iskustvo ispitanika s karijesom (KEP indeks) bilo je 8,0. Analize su pokazale da se djeca s manjim prosječnim brojem posjeta stomatologu negativnije ponašaju u stomatološkoj ordinaciji (Spearmanov koeficijent korelacije, $\rho = -0,239$, $p = 0,001$). Također su imala lošije iskustvo s karijesom ako su njihovi roditelji stomatološku skrb smatrali manje važnom ($\rho = 0,145$, $p = 0,040$), te kada su invazivniji tretmani bili razlog za odlazak stomatologu ($\rho = 0,209$, $p = 0,003$).

Prediktori prisutnosti DSA-e

Budući da su potencijalni prediktori prisutnosti DSA-e većinom bile kategoričke varijable (tablica 4.), obavljena je binarna logistička regresijska analiza (tablica 5.). Regresijski model bio je dobar ($\chi^2 = 18,795$, $p = 0,005$), uz vrijednost Hosmerova i Lemeshova testa $\chi^2 = 4,391$ ($p = 0,820$).

Table 4 Central tendency measures potential predictors for the dental fear and anxiety occurrence**Tablica 4.** Mjere centralne tendencije kod potencijalnih prediktora za pojavu DSA-e

Predictors • Prediktori	Median	Percentiles • Percentili		
		25	50	75
CFSS-DS-mod scale • Ljestvica CFSS-DS-mod	1.00	1.00	1.00	1.00
Age • Dob	3.00	2.00	3.00	3.75
Sex • Spol	2.00	1.00	2.00	2.00
Number of dental visits • Broj posjeta stomatologu	3.00	2.00	3.00	4.00
Frequency of dental visits • Učestalost posjeta stomatologu	2.00	2.00	2.00	3.00
Reasons for dental visits • Razlozi za posjete stomatologu	2.00	2.00	2.00	2.00
Number of dentists so far • Dosadašnji broj ordinirajućih stomatologa	2.00	2.00	2.00	2.75

Table 5 Variables in the equation of binary logistic regression model**Tablica 5.** Varijable u jednakosti modela binarne logističke regresijske analize

Predictors • Prediktori	B	Wald	df	Sig.	Exp (B)	95.0% CI for EXP(B)	
						Lower bound • Donja granica	Upper bound • Gornja granica
Age • Dob	0.744	4.949	1	0.026	2.103	1.092	4.050
Sex • Spol	0.090	0.027	1	0.869	1.094	0.375	3.194
Number of visits • Broj posjeta stomatologu	-0.730	6.514	1	0.011	0.482	0.275	0.844
Frequency of visits • Učestalost posjeta stomatologu	-0.329	2.470	1	0.116	0.720	0.478	1.085
Reasons for visits • Razlozi za posjete stomatologu	0.868	7.709	1	0.005	2.381	1.291	4.393
Number of dentists • Dosadašnji broj ordinirajućih stomatologa	0.154	0.223	1	0.637	1.167	0.615	2.215

B – B values; S.E. – Wald – Wald test; df – degree of freedom; Sig. – p value; Exp (B) – odds ratio (OR); CI – confidence interval
p value is set to 0.25 (19)

The significant predictors of DFA presence were: the reasons for dental visits, where more uncomfortable reasons brought 2.381 times more chances to develop DFA (Exp /B/ = 2.381, 95% CI = 1.291–4.393; $p=0.005$); the patient's age in a way that older children had 2.103 times more chances to develop DFA (Exp /B/ = 2.103, 95% CI = 1.092–4.050; $p=0.026$); the frequency of dental visits, where rarely visiting brought 0.720 times more chances to develop DFA (Exp /B/ = 0.720, 95% CI = 0.478–1.085; $p=0.116$); and the number of dental visits, where the higher total number of visiting brought 0.482 times more chances to develop DFA (Exp /B/ = 0.482, 95% CI = 0.275–0.844; $p=0.011$).

Discussion

The study results confirmed our hypothesis that invasive treatments were among the major direct factors as strongest for DFA onset, through the Rachman mechanism of the development of DFA appearance, by proposing direct experience among three possible ways of DFA development through his conditioning theory of fear acquisition. In brief, classical conditioning is one of the mechanisms through which DFA can develop following previous negative dental encounters. When confronted with a stressful dental stimulus (cavity preparation, tooth extraction, for example), a person (child) could develop a reflexive psychological defensive reaction to it in a form of DFA appearance (21, 22). The reason for the DFA appearance is the fact that these direct invasive

Značajni prediktori prisutnosti DSA-e bili su: razlozi za posjet stomatologu te su oni neugodniji stvarali 2,381 puta više mogućnosti za razvoj toga stanja (Exp /B/ = 2,381, 95 % CI = 1,291 – 4,393; $p = 0,005$); dob ispitanika s time da su starija djeca imala 2,103 puta više mogućnosti za pojavu DSA-e (Exp /B/ = 2,103, 95 % CI = 1,092 – 4,050; $p = 0,026$); učestalost posjeta stomatologu – rijetki odlasci omogućivali su 0,720 puta veće izgleda za razvoj DSA-e (Exp /B/ = 0,720, 95 % CI = 0,478 – 1,085; $p = 0,116$); broj posjeta stomatologu – veći ukupni broj posjeta davao je 0,482 puta veće mogućnosti za razvoj DFA-e (Exp /B/ = 0,482, 95 % CI = 0,275 – 0,844; $p = 0,011$).

Rasprava

Rezultati studije potvrdili su našu hipotezu da su invazivni tretmani među glavnim i najsnažnijim izravnim čimbenicima za pojavu DSA-e na temelju Rachmanova mehanizma razvoja njezina nastanka, predlažući izravno iskustvo između triju mogućih načina razvoja DSA-e na temelju njegove uvjetovane teorije o stjecanju straha. Ukratko, klasično uvjetovanje jedan je od mehanizama na temelju kojega se DSA može razviti nakon prethodnih negativnih stomatoloških posjeta. Kada se suoči sa stresnim dentalnim podražajem (na primjer, preparacija karijesa, vađenje zuba), kod osobe (dijete) se može pojaviti refleksna psihološka obrambena reakcija na taj podražaj u obliku pojave DSA-e (21, 22). Razlog za to jest činjenica da ti izravni invazivni podražaji prijete narušavanjem

stimuli threaten to disturb the integrity of the organism itself. DFA presence in children is most directly expressed through various forms of behavior in the dental office, and negative behaviors in a form of dental behavior problems (DBP) are directly correlated with invasive dental procedures. If this pathway mostly in the child period could not be interrupted by applying the behavior and pain management control techniques in the dental office, DFA could strengthen through time and further develop in a form of odontophobia (2, 4).

Several studies reported that DFA prevalence is decreasing over time. The main reasons for this occurrence were related to the cognitive development from the child to adolescent period, where successful coping mechanisms to possible previously stressful dental stimuli were developed. Hence, a successful coping in the dental office with not expressing the DBP in now older adolescents was followed by the consequent decrease of DFA prevalence over time (2, 4). Nevertheless, our study results partially showed the opposite findings, where some older children had more chance of DFA presence. The reason for this could be the fact that possible oral health problems and invasive treatment factors in this period of life could be the reason for the DFA onset (23). Accordingly, an increase in the prevalence of DFA presence in adolescents has also been reported earlier, where it was stated that changing of psychological states during significant life transitions could be also the reason for the DFA appearance (23).

So far, several previous studies have investigated possible effects of SES components on DFA occurrence, where SES was considered a dispositional factor that possibly exacerbated DFA in children (24-26). These associations and differences in the DFA presence were not confirmed in our study. Moreover, our findings were confirmed by some more recent studies, where SES components do not have such an impact on the DFA onset as before (27-29). The reasons for this concordance could be various, including different methodologies and assessing tools, but it seems that the prevalence of DFA appearance does not vary significantly anymore to great extent between the children from different socioeconomic family groups to predict DFA appearance (27-29).

Furthermore, the non-visiting of dental offices is a global problem of modern dentistry in the context of mechanisms for avoiding stressors within them. The formation and development of a vicious circle, associated with previously experienced or assumed stressful situations within the dental office, lead to the onset of DFA, DBP, and avoidance of dental visits from an early age. This has been confirmed in our study, and also was the focus of research by others (30-33). This is the core problem of already impaired oral health in childhood, where the parents have to take more responsibilities and play more important roles, not only in managing better oral health in their children (proper oral hygiene, anticariogenic diet, fluoride usage) but also in cooperation for conducting of better cooperative behaviors of their children in the dental office. Thus, the avoidance of visiting the dental office would be significantly decreased over time (34, 35).

Predictors of the DFA presence in pediatric subjects were determined and analyzed in several previous studies, where direct and dispositional factors for the DFA appearance were

integriteta samoga organizma. Prisutnost DSA-e kod djece najizraavnije se vidi u različitim oblicima ponašanja u stomatološkoj ordinaciji, a negativna ponašanja (DBP) u izravnoj su korelaciji s invazivnim zahvatima. Ako se to u dječjem razdoblju ne uspije prevladati primjenom tehnika kontrole ponašanja i ublažavanja boli u stomatološkoj ordinaciji, DSA bi s vremenom mogla jačati i dalje se razvijati u obliku odontofobije (2, 4).

U nekoliko studija autori su istaknuli da se prevalencija DSA-e s vremenom smanjuje. Glavni razlozi za tu pojavu bili su, naime, povezani s kognitivnim razvojem od dječjega do adolescentskoga razdoblja kada su nastali uspješni mehanizmi suočavanja s mogućim stresnim dentalnim podražajima. Dakle, uspješno suočavanje u stomatološkoj ordinaciji, kod sada već starijih adolescenata, s neizraženim DBP-om praečno je posljedičnim smanjenjem prevalencije DSA-e tijekom vremena (2, 4). Ipak, rezultati naše studije djelomično su pokazali suprotno – neka starija djeca imala su više izgleda za prisutnost DSA-e. Razlog bi mogla biti činjenica da mogući problemi u oralnome zdravlju i čimbenici u obliku invazivnoga tretmana u tom razdoblju mogu biti razlog za nastanak DSA-e (23). U skladu s tim porast prevalencije DSA-e kod adolescenata zabilježen je i prije kada je navedeno da bi promjena psiholoških stanja tijekom značajnih životnih prijelaza također mogla biti razlog za pojavu DSA-e (23).

Dosad se u nekoliko studija proučavao mogući utjecaj komponenti SES-a na pojavu DSA-e, te se SES smatrao dispozicijskim čimbenikom koji je možda pogoršao DSA kod djece (24 – 26). Te povezanosti i razlike u prisutnosti DSA-e u našem istraživanju nisu potvrđene. Štoviše, naša su otkrića potvrđena u drugim, novijim studijama u kojima se ističe da komponente SES-a nemaju takav utjecaj na početak DSA-e kao prije (27 – 29). Razlozi za tu podudarnost mogu biti različiti, pa i različite metodologije i alati za procjenu, ali čini se da prevalencija pojave DSA-e više ne varira značajno u velikoj mjeri između djece iz različitih socijalno-ekonomskih obiteljskih skupina da bi se predvidjela njezin pojava (27 – 29).

Nadalje, neposjećivanje stomatoloških ordinacija globalni je problem suvremene dentalne medicine u kontekstu mehanizama izbjegavanja stresora unutar njih. Formiranje i razvoj začaranoga kruga povezanoga s već doživljenim ili pretpostavljenim stresnim situacijama u stomatološkoj ordinaciji od najranije dobi dovodi do pojave DSA-e, DBP-a i izbjegavanja posjeta stomatologu. To je potvrđeno u našoj studiji, a također je bilo u fokusu istraživanja drugih autora (30 – 33). To je temeljni problem već narušenoga oralnoga zdravlja u djetinjstvu pa roditelji moraju preuzeti više odgovornosti i imati važniju ulogu ne samo u upravljanju boljim oralnim zdravljem svoje djece (odgovarajuća oralna higijena, antikariogena prehrana, korištenje fluora), nego trebaju surađivati i u provedbi boljega ponašanja i suradnje svoje djece u stomatološkoj ordinaciji. Tako bi se s vremenom znatno smanjilo izbjegavanje posjeta ordinaciji dentalne medicine (34, 35).

Prediktori prisutnosti DSA-e kod dječjih ispitanika već su utvrđeni i analizirani u nekoliko studija gdje su izravni i dispozicijski čimbenici za pojavu toga stanja većinom kombinirani, kao što su invazivni dentalni podražaji koji mogu izazvati bol tijekom tretmana, dob i spol djece sudionika, pri-

mostly combined, such as invasive dental stimuli that could cause pain during dental treatment, age and sex of child participants, presence of DFA in parents, uncooperative behavior in the dental office (7, 30, 36-38). In our study, the most prominent were more stressful reasons for visiting the dental office and the children's age, as well as the frequency and number of dental visits to smaller extent.

Finally, according to the hypothesis of the study and the results of conducted analyses that were discussed, the hypothesis itself was accepted, in a way that direct factors had the strongest contribution to the DFA appearance in our study participants.

Past medical experiences represent a major part in the possible acquisition of medical fear and anxiety, in a similar way as dental experiences could cause DFA. Medically compromised child patients are usually dental patients as well, and mostly with the need for extensive invasive dental treatments (39, 40). When medical fear and anxiety are once established in a child patient, there is great certainty for the DFA to develop. The reasons are obvious and related to the similar content of medical and dental offices (content, smells, noises, stuff) and/or invasiveness of procedures. Also, DFA could be consequently intensified especially in medically compromised patients, and the time to correct the presence of DBP in children could be much longer (41, 42).

It is also well known that the parents are role models for their children. Their dental behaviors and attitudes (about oral health maintenance, attendance to the dental office, etc.) play a major role in the transfer of habits from generation to generation. If the parents develop the presence of DFA over time, there is great certainty that their children consequently could behave in the same way (43, 44).

These two important dispositional factors for the DFA appearance in children (in a form of past medical experiences in children and the presence of DFA in their parents) were not considered in the study, although they could widen the perspective and understanding of the prediction of DFA appearance. Our reasons were to avoid possible biases in study research, with a research proposal for their consideration in further research on predictors of DFA appearance in children.

Along with the strengths of our study which were presented by explaining and confirming the most significant determinants and predictors of the DFA appearance in children regarding the direct and dispositional dental stimuli, the limitations of the present study could be correlated with the fact that other previously mentioned related conditions important for DFA appearance in children were not considered.

Conclusions

The most powerful predictors of dental fear and anxiety presence were invasive dental treatments. Behavior during dental treatment is clinically the most accurate expression of the DFA presence in child patients.

Indirect factors for the onset of dental fear and anxiety could contribute to its strengthening through the creation of a vicious circle that could lead to avoiding dental office visits.

sutnost DSA-e kod roditelja i nekooperativno ponašanje u stomatološkoj ordinaciji (7, 30, 36 – 38). U našem istraživanju najviše su se istaknuli stresniji razlozi posjeta ordinaciji i dob djece te u manjoj mjeri učestalost i broj posjeta stomatologu.

Na kraju, prema hipotezi postavljenoj u istraživanju i rezultatima analiza o kojima se raspravljalo, prihvaćena je i sama hipoteza na način da su izravni čimbenici najviše pridonijeli pojavi DSA-e kod sudionika našeg istraživanja.

Već stečena medicinska iskustva itekako sudjeluju u mogućem stjecanju medicinskoga straha i tjeskobe, slično kao što stomatološka iskustva mogu prouzročiti DSA. Medicinski kompromitirani dječji pacijenti obično su i stomatološki pacijenti i uglavnom su im potrebni opsežni invazivni stomatološki tretmani (39, 40). Kada se kod dječjeg pacijenta ustanove medicinski strah i tjeskoba, gotovo je sigurno da će se pojaviti DSA. Razlozi su očiti i odnose se na sličan sadržaj medicinskih i stomatoloških ordinacija (sadržaj, mirisi, zvukovi i ostalo) i/ili invazivnost zahvata. DSA bi se također posljedično mogla intenzivirati, posebno ako je pacijent medicinski kompromitiran, a vrijeme za korekciju prisutnosti DBP-a kod djece moglo bi biti mnogo dulje (41, 42).

Također je dobro poznato da su roditelji uzor svojoj djeci, pa se i dentalno ponašanje i stajalište (o održavanju oralnoga zdravlja, odlasku u stomatološku ordinaciju i sl.) prenosi kroz generacije. Ako roditelji s vremenom razviju DSA, velika je mogućnost da će se i njihova djeca tako ponašati (43, 44).

Ta dva važna dispozicijska čimbenika za pojavu DSA-e kod djece (u obliku prošlih medicinskih iskustava kod djece i prisutnosti DSA-e kod njihovih roditelja) u studiji nisu uzeta u obzir, iako bismo mogli proširiti perspektivu i razumijevanje predviđanja te pojave. Naši su razlozi bili izbjegavanje mogućih pristranosti u studijskom istraživanju pa predlažemo njihovo razmatranje u daljnjem istraživanju prediktora pojave DSA-e kod djece.

Osim prednosti u našoj studiji koje su istaknute u objašnjavanju i potvrđivanju najvažnijih odrednica i prediktora pojave DSA-e kod djece s obzirom na izravne i dispozicijske dentalne podražaje, ograničenja studije mogla bi se povezati s činjenicom da nisu uzeta u obzir druga prethodno spomenuta srodna stanja važna za pojavu DSA-e kod djece.

Zaključci

Najsnažniji prediktori dentalnoga straha i anksioznosti bili su invazivni tretmani. Ponašanje tijekom stomatološkog liječenja klinički je najsnažniji pokazatelj prisutnosti DSA-e kod dječjih pacijenata.

Neizravni čimbenici za nastanak dentalnoga straha i anksioznosti mogli bi pridonijeti njegovu jačanju stvaranjem začaranoga kruga koji bi mogao rezultirati izbjegavanjem posjeta stomatološkoj ordinaciji.

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Conflict of interest

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Sažetak

Uvod: Oralno zdravlje djece dodatno opterećuju dentalni strah i anksioznost (DSA). Ti klinički psihološki entiteti u svojim progresivnim stadijima nužno završavaju izbjegavanjem stomatoloških pregleda, što otežava prevenciju i terapiju oralnih bolesti. U nastanku toga stanja općenito, kao jednoga od emocionalnih ishoda stresa u stomatološkoj ordinaciji, većina dječjih pacijenata mogla je definirati specifične stresore koji su za njih bili najintenzivniji, a na temelju njih mogla se predvidjeti prisutnost DSA-e. **Cilj:** Željelo se ispitati prediktore DSA-e kod djece u dobi od 9 do 12 godina kako bi se mogla objasniti ta pojava kod ispitanika u studiji. **Materijal i metode:** Uzorak se sastojao od 200 djece u dobi od 9 do 12 godina. Prisutnost DSA-e određena je prilagođenom verzijom ljestvice CFSS-DS. Ponašanje djeteta u stomatološkoj ordinaciji tijekom tretmana ocjenjivao je educirani promatrač s pomoću Venhamove ljestvice za ocjenu anksioznosti i ponašanja. Također su analizirani i socijalno-ekonomski status, obilježja posjeta stomatološkim ordinacijama te prethodno iskustvo s karijesom. **Rezultati:** Glavni prediktori DSA-e bili su povezani s invazivnim stomatološkim tretmanima pa je ponašanje tijekom stomatološkog tretmana bilo najprecizniji pokazatelj pojave DSA-e. **Zaključci:** Invazivni stomatološki zahvati glavni su stresni čimbenik za pojavu DSA-e. Predisponirajući čimbenici mogu pojačati tu pojavu.

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Adresa za dopisivanje

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