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ORIGINAL SCIENTIFIC PAPER
IZVORNI ZNANSTVENI RAD

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The Impact of ADHD Symptoms on Children's Oral Health

Utjecaj simptoma ADHD-a na oralno zdravlje djece

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Abstract

Objectives: This study aimed to evaluate the relationship between attention-deficit/hyperactivity disorder (ADHD) symptoms and various oral health outcomes in children, including dental trauma, plaque accumulation, gingivitis, endodontic treatment, and molar incisor hypomineralization (MIH). **Materials and Methods:** Eighty children (42 boys and 38 girls) aged 3 to 17 years participated in the study. Caregivers completed a standardized ADHD diagnostic tool (ADHDT) assessing inattention, hyperactivity, and impulsivity. Each child underwent a comprehensive oral examination to assess the presence of plaque, gingivitis, dental trauma, endodontically treated teeth, and MIH. **Results:** No statistically significant associations were observed between ADHD symptoms and the presence of plaque, gingivitis, endodontic treatment, or MIH. However, a significant association was found between higher hyperactivity and impulsivity scores and increased incidence of dental trauma. Inattention symptoms did not demonstrate a significant relationship with any of the oral health indicators. **Conclusions:** Children exhibiting higher levels of hyperactivity and impulsivity may be at increased risk for dental trauma. These findings highlight the importance of integrating behavioral assessments into pediatric dental care to better identify and manage children who may be more vulnerable to oral injuries.

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Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a behavioral condition influenced by both genetic and neurological factors, typically manifesting in early childhood. It can have substantial and enduring effects on a child's educational progress, not only by impeding academic performance but also by adversely impacting their overall school experience. Beyond academic challenges, ADHD often disrupts social and emotional development, making it difficult for affected children to establish and sustain relationships with peers and adults alike. Recognized as a serious neurodevelopmental disorder, ADHD significantly limits a child's potential for academic success and social competence (1).

ADHD is categorized into three main subtypes: predominantly inattentive, predominantly hyperactive-impulsive, and combined type, based on the diagnostic criteria outlined in the DSM-IV. Diagnosis requires the presence of a suffi-

Uvod

Poremećaj pozornosti s hiperaktivnošću (ADHD) bihevioralno je stanje na koje utječu i genetski i neurološki čimbenici, a obično se manifestira u ranom djetinjstvu. Može imati značajne i dugotrajne učinke na obrazovni napredak djeteta, ne samo ometanjem akademskog postignuća, nego i negativnim utjecajem na cjelokupno školsko iskustvo. Osim akademskih izazova, ADHD često remeti socijalni i emocionalni razvoj jer otežava pogođenoj djeci uspostavljanje i održavanje odnosa s vršnjacima i odraslima. Prepoznat kao ozbiljan neurorazvojni poremećaj, ADHD značajno ograničava djetetov potencijal za akademski uspjeh i socijalnu kompetenciju (1).

ADHD se kategorizira u tri glavna podtipa na temelju dijagnostičkih kriterija navedenih u DSM-IV. To su dominantno nepozorni, dominantno hiperaktivno-impulzivni i kombinirani tip. Za dijagnozu je potreban dovoljan broja ka-

cient number of characteristic symptoms, as well as clear evidence of impairment in social, academic, or occupational functioning (2). While some symptoms, such as restlessness and concentration difficulties, may lessen with age, untreated ADHD increases the risk of behavioral issues during adolescence and may persist into adulthood (3).

According to the International Classification of Diseases (ICD-10), ADHD includes five subtypes: predominantly inattentive, predominantly hyperactive, combined, specified, and unspecified hyperkinetic disorder. The American Psychiatric Association's updated DSM-5 criteria require symptom onset before the age of 12, the presence in at least two settings (e.g., home and school), and persistence for a minimum of six months. For individuals over the age of 17, at least five symptoms must be present, and they must be inappropriate for the individual's developmental level (4).

Both children and adults with ADHD often experience challenges with maintaining attention, controlling impulses, and regulating hyperactivity. These symptoms frequently present as developmentally inappropriate behavior, such as difficulty focusing, excessive motor activity, and impulsive actions.

Inattention is one of the hallmark symptoms, commonly reported both at home and in school environments. Children with ADHD often struggle to maintain focus on tasks, are easily distracted, and may leave activities unfinished. Caregivers and teachers frequently describe these children using phrases such as "daydreams often", "has trouble working independently", "seems confused", and "does not complete tasks". Research has shown that children with ADHD have greater difficulty sustaining attention compared to their peers (5), although some studies have found minimal differences in distraction levels during task performance (6).

Impulsivity is another core feature, marked by hasty actions without forethought. Children may interrupt conversations, have trouble waiting their turn, or act in risky ways without considering consequences. These behaviors often impair peer relationships and can result in social rejection due to inappropriate verbal or physical interactions (7).

Hyperactivity, whether motor or vocal, is typically observed as continuous and purposeless movement. It is often described by teachers and parents with phrases like "cannot sit still", "acts as if driven by a motor", or "talks excessively". In school settings, hyperactive children may fidget, leave their seats frequently, speak out of turn, or make distracting noises (8-11).

Given the rising prevalence of ADHD diagnoses in children, the role of dental professionals is becoming increasingly important. Early recognition of behavioral symptoms and tailored treatment approaches within the dental setting can improve both oral health outcomes and patient cooperation.

Children with ADHD may also be more vulnerable to poor oral health due to difficulties in maintaining daily hygiene routines. Furthermore, dental visits may intensify behavioral symptoms, particularly impulsivity and inattentiveness, posing challenges to successful treatment. Morning appointments are generally recommended, as children tend to be more focused and cooperative earlier in the day (12).

rakterističnih simptoma i jasni dokazi o oštećenju socijalnoga, akademskoga ili radnoga funkcioniranja (2).

Iako neki simptomi, poput nemira i poteškoća s koncentracijom, mogu oslabjeti s godinama, neliječeni ADHD povećava rizik od bihevioralnih problema tijekom adolescencije i može potrajati i u odrasloj dobi (3).

Prema Međunarodnoj klasifikaciji bolesti (ICD-10), ADHD uključuje pet podtipova: dominantno nepozorni, dominantno hiperaktivni, kombinirani, specificirani i nespecificirani hiperkinetički poremećaj. Ažurirani kriteriji DSM-5 Američke psihijatrijske udruge zahtijevaju pojavu simptoma prije dobi od 12. godina, njihovu prisutnost u najmanje dva okruženja (npr., kod kuće i u školi) te trajanje od najmanje šest mjeseci. Za osobe starije od 17 godina potrebno je najmanje pet simptoma i oni moraju biti neprimjereni razvojnoj razini pojedinca (4).

I djeca i odrasli s ADHD-om često imaju poteškoće s održavanjempozornosti, kontrolom impulsa i regulacijom hiperaktivnosti. Ti se simptomi često očituju kao razvojno neprimjereno ponašanje poput poteškoća s koncentracijom, pretjerane motoričke aktivnosti i impulzivnih postupaka.

Nepozornost je jedan od ključnih simptoma, često se prijavljuje i kod kuće i u školskom okruženju. Djeca s ADHD-om često imaju poteškoće u održavanju fokusa na zadatcima, lako ih se omete i mogu ostaviti aktivnosti nedovršenima. Skrbnici i učitelji često opisuju takvu djecu izrazima poput „često sanjari", „ima poteškoća sa samostalnim radom", „izgleda zbunjeno" i „ne dovršava zadatke". Istraživanja su pokazala da djeca s ADHD-om teže održavaju pozornost u usporedbi s vršnjacima (5), iako su u nekim istraživanjima pronađene minimalne razlike u razini ometanja tijekom obavljanja zadataka (6).

Impulzivnost je još jedna ključna karakteristika, a obilježavaju je nagli postupci bez prethodnog promišljanja. Djeca mogu prekidati razgovore, imati poteškoće s čekanjem svojega reda ili djelovati na rizične načine bez razmatranja posljedica. Takva ponašanja često narušavaju odnose s vršnjacima i mogu rezultirati socijalnim odbacivanjem zbog neprimjerenih verbalnih ili fizičkih interakcija (7).

Hiperaktivnost, bilo motorička ili verbalna, obično se očituje kao stalno i besciljno kretanje. Učitelji i roditelji često je opisuju izrazima poput „ne može mirno sjediti", „ponaša se kao da ga pokreće motor" ili „previše pripovijeda". U školskom okruženju hiperaktivna djeca mogu biti nemirna, često napuštati svoja mjesta, govoriti izvan reda ili proizvoditi ometajuće zvukove (8 – 11).

S obzirom na sve veću učestalost dijagnoza ADHD-a kod djece, uloga stomatoloških stručnjaka postaje sve važnija. Rana prepoznatljivost bihevioralnih simptoma i prilagođeni pristupi liječenju u stomatološkom okruženju mogu poboljšati i ishode oralnoga zdravlja i suradnju pacijenata.

Djeca s ADHD-om također mogu biti osjetljivija kad je riječ o lošem oralnome zdravlju zbog poteškoća u održavanju svakodnevne higijenske rutine. Nadalje, posjeti stomatologu mogu pojačati bihevioralne simptome, posebno impulzivnost i nepozornost, što je izazov za uspješno liječenje. Preporučuju se jutarnji termini, jer su djeca obično fokusiranija i suradljivija ranije tijekom dana (12). Potpora roditelja tako-

Parental support is also critical in preparing children for dental visits, thus contributing to a more suitable treatment environment.

The combination of impaired attention, reduced motivation, and inconsistent routine can lead to suboptimal oral hygiene, increasing the risk of dental caries and periodontal disease. It is essential for both parents and dental professionals to adopt proactive strategies to address these challenges. Early intervention and customized oral hygiene plans can help mitigate the impact of ADHD on children's oral health (13, 14). The aim of this study was to examine the associations between dimensionally measured ADHD symptoms (inattention, hyperactivity, and impulsivity) assessed with the ADHDT and oral-health outcomes (K/E/P/KEP caries experience, plaque index, gingivitis, endodontic treatment, MIH, ORHI, and dental trauma) in a general pediatric dental population.

Materials and Methods

This study was conducted at the Department of Pediatric and Preventive Dentistry, School of Dental Medicine, University of Zagreb. The study was approved by the Ethics Committee of the University of Zagreb (No. 05-PA-30-VI-4/2019) and conducted in accordance with the ethical principles of the World Dental Association and the Declaration of Helsinki. All participants' parents or guardians were fully informed about the aims and procedures of the study, and they provided written consent to participate on a voluntary basis. Anonymity and confidentiality were assured for all participants and their families throughout the study.

A total of 80 children (42 boys and 38 girls) aged 3 to 17 years were randomly selected to participate. All participants, along with their parents or guardians, were informed of the objectives and procedures of the study. Written informed consent was obtained, confirming their voluntary participation, which included completing the ADHD assessment test (ADHDT) and allowing an oral examination of the child.

The ADHDT (Naklada Slap, 2006) is a standardized, age-normed caregiver questionnaire based on DSM-IV criteria, designed to identify symptoms of attention-deficit/hyperactivity disorder. It comprises three subtests: hyperactivity (13 items, e.g., excessive talking, climbing, jumping), impulsivity (10 items, e.g., acting before thinking, difficulty inhibiting behavior), and inattention (13 items, e.g., failure to complete tasks, difficulty sustaining focus). Following the examiner's manual, raw subtest totals were converted into age-specific standardized scores and centiles, and a composite ADHD quotient was calculated as the sum of standardized subtests. Internal consistency in our sample was excellent (Cronbach's α: hyperactivity=0.940, impulsivity=0.930, inattention=0.940, total ADHD=0.969).

Scores from each ADHDT subtest were standardized, and a total ADHD quotient was derived from the sum of standardized values (15). After questionnaire completion, each child underwent a clinical dental examination using standard instruments (e.g., probes and mirrors), supplemented by a review of dental records. Oral health parameters in-

đer je ključna u pripremi djece za posjete stomatologu jer pridonosi prikladnijem okruženju za liječenje.

Kombinacija smanjene pozornosti, smanjene motivacije i nepravilne rutine može dovesti do suboptimalne oralne higijene i povećavati rizik od karijesa i parodontne bolesti. Važno je također da i roditelji i stomatološki stručnjaci primjenjuju proaktivne strategije za rješavanje tih izazova. Rana intervencija i prilagođeni planovi oralne higijene mogu pomoći u ublažavanju utjecaja ADHD-a na oralno zdravlje djece (13,14).

Cilj ovog istraživanja bio je ispitati povezanosti između dimenzionalno mjerenih simptoma ADHD-a (nepozornost, hiperaktivnost i impulzivnost) procijenjenih s pomoću ADHDT-a i ishoda oralnoga zdravlja (iskustvo karijesa K/E/P/KEP, indeks plaka, gingivitis, endodontsko liječenje, MIH, ORHI i dentalna trauma) u općoj pedijatrijskoj populaciji.

Materijali i metode

Ovo istraživanje provedeno je u Zavodu za dječju i preventivnu stomatologiju Stomatološkog fakulteta Sveučilište u Zagrebu. Studiju je odobrilo Etičko povjerenstvo Sveučilišta u Zagrebu (br. 05-PA-30-VI-4/2019) i provedena je u skladu s etičkim načelima Svjetske stomatološke udruge i Deklaracijom iz Helsinkija. Svi roditelji ili skrbnici sudionika bili su u cijelosti informirani o ciljevima i postupcima istraživanja te su potpisali pristanak za sudjelovanje na dobrovoljnoj bazi. Tijekom cijelog istraživanja svim sudionicima i njihovim obiteljima bila je zajamčena anonimnost i povjerljivost.

Ukupno je za sudjelovanje nasumično odabrano 80 djece (42 dječaka i 38 djevojčica) u dobi od 3 do 17 godina. Svi sudionici, zajedno sa svojim roditeljima ili skrbnicima, bili su informirani o ciljevima i postupcima istraživanja. Dobiven je pisani informirani pristanak kojim je potvrđeno njihovo dobrovoljno sudjelovanje, što je uključivalo ispunjavanje procjenskoga testa za ADHD (ADHDT) i dopuštenje za oralni pregled djeteta.

ADHDT (Naklada Slap, 2006.) standardizirani je upitnik za skrbnike normiran prema dobi, temelji se na kriterijima DSM-IV i dizajniran je za prepoznavanje simptoma poremećaja pozornosti s hiperaktivnošću. Sastoji se od tri podtesta: za hiperaktivnost (13 stavki, npr., pretjerano pripovijedanje, penjanje, skakanje), impulzivnost (10 stavki, npr., djelovanje prije razmišljanja, poteškoće u inhibiranju ponašanja) i nepozornost (13 stavki, npr., nedovršavanje zadataka, poteškoće u održavanju fokusa). Prema priručniku ispitivača, sirovi rezultati podtestova pretvoreni su u standardizirane rezultate i percentile specifične za dob, a složeni ADHD kvocijent izračunat je kao zbroj standardiziranih podtestova. Interna konzistencija u našem uzorku bila je izvrsna (Cronbachova α: hiperaktivnost = 0,940, impulzivnost = 0,930, nepozornost = 0,940, ukupni ADHD = 0,969). Rezultati svakoga ADHDT podtesta standardizirani su, a ukupni ADHD kvocijent dobiven je zbrojem standardiziranih vrijednosti (15). Nakon ispunjavanja upitnika svako dijete podvrgnuto je kliničkom stomatološkom pregledu za što su se koristili standardni instrumenti (npr., sonda i zrcalo), uz pregled dentalne dokumentacije.

cluded the number of carious, filled, extracted, and endodontically treated teeth, dental trauma, plaque, gingivitis, and molar-incisor hypomineralisation (MIH). Caries experience was coded as K (carious/decayed), E (extracted/missing due to caries), and P (filled), with their sum (KEP) equivalent to the international DMFT/dmft index for permanent/primary dentitions where ascertainable. Oral hygiene was summarized as Oral Hygiene based on plaque presence (ORHI), classified as satisfactory or unsatisfactory. MIH was recorded from clinical/dental charts and exploratorily analyzed, recognizing that it may be non-assessable in younger children prior to eruption of permanent molars and incisors.

The obtained data were statistically analyzed using established methods, including the chi-square (χ^2) test, t-test for independent samples, the Mann–Whitney U test, analysis of variance (ANOVA), the Kruskal –Wallis test, and Pearson's and Spearman's correlation coefficients (16-20). The reliability of the ADHD questionnaire was evaluated using the Cronbach's alpha coefficient. Mediation analysis was employed to explore relationships among ADHD subtests (21). The sample size was determined using the G*Power programme (version 3.1.9.2). A statistical significance level of $p < 0.05$ was adopted for all tests. Statistical analyses were carried out using the software packages STATISTICA 64 (version 10), PASW Statistics 18, SPSS (version 18), and G*Power (19). For outcomes with skewed distributions or rare events (e.g., dental trauma), non-parametric tests such as the Mann–Whitney U, Kruskal–Wallis were prioritized and reported alongside parametric tests when informative

Results

The results of the study are summarized in Tables 1 to 11.

A total of N=80 children (42 boys, 38 girls) aged 3–17 years were included (mean age 8.37 years, SD 3.11). Boys were older than girls (9.14±3.27 vs 7.53±2.71 years; t (78) =2.392, p=0.019).

The presence of symptom domains (binary coding): hyperactivity 72.5% (58/80), impulsivity 83.8% (67/80), inattention 70.0% (56/80). The number of symptom domains per child was: 0 domains 10.0%, 1 domain 13.8%, 2 domains 16.3%, 3 domains 60.0% (Table 8).

Standardized categories (manual-normed) for subtests and ADHD quotient are presented in Table 9. Most children fall within very low, low, or below-average categories across subtests and in the ADHD quotient, consistent with expectations for a non-clinical population sample.

Gender Differences in ADHD Subtests (Table 1)

Gender differences in ADHD symptom expression were assessed using the t-test for independent samples. Male participants exhibited higher average scores across all three subtests—hyperactivity, impulsivity, and inattention. However, only the difference in inattention reached statistical significance ($p = 0.050$).

Parametri oralnoga zdravlja uključivali su broj karijesom zahvaćenih, plombiranih, ekstraktiranih i endodontski liječenih zuba, dentalne traume, plak, gingivitis i molarno incizivnu hipomineralizaciju (MIH). Indeks karijesa kodiran je kao K (karijesom zahvaćeni/zubi s karijesom), E (ekstrahirani/zubi izgubljeni zbog karijesa) i P (plombirani), a njihov zbroj (KEP) ekvivalentan je međunarodnom DMFT/dmft indeksu za trajne/privremene zube, gdje je moguće utvrditi. Oralna higijena sažeta je kroz Indeks oralne higijene (ORHI) i klasificirana kao zadovoljavajuća ili nezadovoljavajuća. MIH je zabilježen iz kliničkih/dentalnih kartona i analiziran eksperimentalno, uzimajući u obzir da može biti neprocjenjiv kod mlađe djece prije nicanja trajnih kutnjaka i sjekutića. Koristeći se uobičajenim metodama, prikupljeni podatci statistički su analizirani, uključujući hi-kvadrat (χ^2) test, t-test za neovisne uzorke, Mann–Whitneyjev U test, analizu varijance (ANOVA), Kruskal–Wallisov test te Pearsonove i Spearmanove koeficijente korelacije (16 – 20). Pouzdanost ADHD upitnika procijenjena je s pomoću Cronbachova koeficijenta alfa. Za istraživanje odnosa među podtestovima ADHD-a korištena je analiza medijacije (21). Veličina uzorka određena je s pomoću programa G*Power (verzija 3.1.9.2). Za sve testove prihvaćena je razina statističke značajnosti $p < 0,05$. Statističke analize provedene su korištenjem softverskih paketa STATISTICA 64 (verzija 10), PASW Statistics 18, SPSS (verzija 18) i G*Power (19). Za ishode s nesimetričnom distribucijom ili rijetkim pojavama (npr., dentalna trauma) prioritet su imali neparametrijski testovi (Mann–Whitneyjev U test, Kruskal–Wallisov test) koji su korišteni zajedno s parametrijskim testovima kada su pružali korisne informacije.

Rezultati

Rezultati istraživanja sažeti su u tablicama od 1. do 11.

Ukupno je bilo uključeno N = 80 djece (42 dječaka, 38 djevojčica) u dobi od 3 do 17 godina (prosječna dob 8,37 godina, SD 3,11). Dječaci su bili stariji od djevojčica (9,14 ± 3,27 prema 7,53 ± 2,71 godina; t (78) = 2,392, p = 0,019).

Prisutnost domena simptoma (binarno kodiranje): hiperaktivnost 72,5 % (58/80), impulzivnost 83,8 % (67/80), nepozornost 70,0 % (56/80). Broj domena simptoma po djetetu bio je: 0 domena 10,0 %, 1 domena 13,8 %, 2 domene 16,3 %, 3 domene 60,0 % (tablica 8.).

Standardizirane kategorije (normirane prema priručniku) za podtestove i ADHD kvocijent prikazane su u tablici 9. Većina djece svrstana je u kategorije vrlo nisko, nisko ili ispodprosječno u podtestovima i prema ADHD kvocijentu, što je u skladu s očekivanjima za uzorak nekliničke populacije.

Razlike među spolovima u podtestovima ADHD-a (tablica 1.)

Razlike u izražavanju simptoma ADHD-a između spolova procijenjene su t-testom za neovisne uzorke. Muški sudionici pokazali su veće prosječne rezultate u sva tri podtesta – za hiperaktivnost, impulzivnost i nepozornost. Međutim, statistički značajna razlika zabilježena je samo u podtestu nepozornosti ($p = 0,050$).

Table 1 Differences in ADHD Subtest Scores by Gender
Tablica 1. Razlike u rezultatima podtestova ADHD-a prema spolu

Subtest • Podtest	Gender • Spol	N	Mean • Prosjek	SD	t-value • t-vrijed.	df	p-value
Hyperactivity • Hiperaktivnost	Male • Muški	42	6.24	6.72	1.52	78	0.13
	Female • Ženski	38	4.16	5.32			
	Total • Ukupno	80	5.25	6.15			
Impulsivity • Impulzivnost	Male • Muški	42	5.86	5.65	1.63	78	0.10
	Female • Ženski	38	4.05	4.03			
	Total • Ukupno	80	5.00	5.00			
Inattention • Nepozornost	Male • Muški	42	5.88	6.67	1.95	78	0.05
	Female • Ženski	38	3.39	4.34			
	Total • Ukupno	80	4.70	5.78			

Legend • Legenda: N – number of participants; SD – standard deviation; t-value – test statistic from a t-test; df – degrees of freedom; $p < 0.05$ considered statistically significant • N – broj sudionika; SD – standardna devijacija; t-vrijednost – statistika t-testa; df – stupnjevi slobode; $p < 0,05$ smatra se statistički značajnim

Table 2 Differences in ADHD Subtest Scores by Number of Traumatized Teeth
Tablica 2. Razlike u rezultatima podtestova ADHD-a prema broju traumatski oštećenih zuba

Subtest • Podtest	Trauma • TRA-K	N	Mean • Prosjek	SD	t-value • t-vrijed.	df	p-value
Hyperactivity • Hiperaktivnost	0	70	4.73	5.95	-2.04	78	0.04
	1–2	10	8.90	6.61			
	Total • Ukupno	80	5.25	6.15			
Impulsivity • Impulzivnost	0	70	4.51	4.77	-2.36	78	0.02
	1–2	10	8.40	5.54			
	Total	80	5.00	5.00			
Inattention • Nepozornost	0	70	4.33	5.77	-1.53	78	0.13
	1–2	10	7.30	5.44			
	Total • Ukupno	80	4.70	5.78			
ADHD Total	0	70	13.57	14.86	-2.19	78	0.03
	1–2	10	24.60	15.27			
	Total • Ukupno	80	14.95	15.26			

Legend • Legenda: N – number of participants; SD – standard deviation; t-value – test statistic from a t-test; df – degrees of freedom; $p < 0.05$ considered statistically significant • N – broj sudionika; SD – standardna devijacija; t-vrijednost – statistika t-testa; df – stupnjevi slobode; $p < 0,05$ smatra se statistički značajnim

Dental Trauma and ADHD Symptoms (Table 2)

Participants with one to two traumatized teeth had significantly higher scores in the hyperactivity and impulsivity subtests compared to those without trauma ($p = 0.044$ and $p = 0.021$, respectively). The inattention subtest did not yield a statistically significant difference ($p = 0.129$). Nevertheless, overall ADHD scores were significantly higher in children with dental trauma ($p = 0.032$).

Endodontically Treated Teeth (Table 3)

The analysis of variance revealed that children with endodontically treated teeth had slightly higher scores across all ADHD subtests and the total ADHD score, although none of these differences were statistically significant ($p > 0.05$).

Plaque Index and ADHD (Table 4)

There were no statistically significant differences in subtest scores or total ADHD scores across varying levels of plaque accumulation. Regardless of whether plaque was absent, thin, or moderately present, the mean scores remained similar, suggesting no clear association between ADHD symptoms and plaque index.

Dentalna trauma i simptomi ADHD-a (tablica 2.)

Sudionici s jednim do dva traumatski oštećena zuba imali su značajno veće rezultate u podtestovima hiperaktivnosti i impulzivnosti u usporedbi s djecom bez traume ($p = 0,044$ i $p = 0,021$, redom). Podtest nepozornosti nije pokazao statistički značajnu razliku ($p = 0,129$). Ipak, ukupni ADHD rezultati bili su značajno viši kod djece s dentalnom traumom ($p = 0,032$).

Endodontski tretirani zubi (tablica 3.)

Analiza varijance pokazala je da su djeca s endodontski tretiranim zubima imala nešto veće rezultate u svim podtestovima ADHD-a i ukupnom ADHD rezultatu, iako nijedna od tih razlika nije bila statistički značajna ($p > 0,05$).

Indeks plaka i ADHD (tablica 4)

Nisu uočene statistički značajne razlike u rezultatima podtestova, ni u ukupnom ADHD rezultatu među različitim razinama nakupljanja plaka. Bez obzira na to je li plak odsutan, tanak ili umjereno prisutan, prosječni rezultati ostali su slični, što upućuje na odsutnost jasne povezanosti između simptoma ADHD-a i indeksa plaka.

Table 3 Differences in ADHD Subtest Scores by Number of Endodontically Treated Teeth
Tablica 3. Razlike u rezultatima podtestova ADHD-a prema broju endodontski tretiranih zuba

Subtest • Podtest	Treated Teeth • LIJ-K	N	Mean • Prosjek	SD	F	df1/df2	p-value
Hyperactivity • Hiperaktivnost	0	49	4.67	6.05	0.83	2/77	0.44
	1	22	5.64	5.53			
	2 or more • 2 i više	9	7.44	8.10			
	Total • Ukupno	80	5.25	6.15			
Impulsivity • Impulzivnost	0	49	4.41	4.86	0.90	2/77	0.41
	1	22	5.82	4.98			
	2 or more • 2 i više	9	6.22	5.85			
	Total • Ukupno	80	5.0	5.00			
Inattention • Nepozornost	0	49	3.96	5.32	1.06	2/77	0.35
	1	22	6.0	6.64			
	2 or more • 2 i više	9	5.56	5.98			
	Total • Ukupno	80	4.7	5.78			
ADHD Total	0	49	13.04	14.85	1.03	2/77	0.36
	1	22	17.45	14.27			
	2 or more • 2 i više	9	19.22	19.55			
	Total • Ukupno	80	14.95	15.26			

Legend • Legenda: N – number of participants; SD – standard deviation; F – ANOVA test statistic; df – degrees of freedom; p < 0.05 considered statistically significant • N – broj sudionika; SD – standardna devijacija; F – statistika ANOVA testa; df – stupnjevi slobode; p < 0,05 smatra se statistički značajnim

Table 4 Differences in ADHD Subtest Scores by Plaque Index
Tablica 4. Razlike u rezultatima podtestova ADHD-a prema indeksu plaka

Subtest • Podtest	Plaque Index • PI	N	Mean • Prosjek	SD	F	df1/df2	p-value
Hyperactivity • Hiperaktivnost	None • Nema	31	5.19	5.09	0.09	2/77	0.91
	Thin layer • Tanki sloj	33	5.55	7.32			
	Moderate layer • Umjereni sloj	16	4.75	5.71			
	Total • Ukupno	80	5.25	6.15			
Impulsivity • Impulzivnost	None • Nema	31	5.19	4.96	0.19	2/77	0.83
	Thin layer • Tanki sloj	33	5.15	5.22			
	Moderate layer • Umjereni sloj	16	4.31	4.87			
	Total • Ukupno	80	5.00	5.00			
Inattention • Nepaozornost	None • Nema	31	3.87	4.32	0.89	2/77	0.41
	Thin layer • Tanki sloj	33	4.73	6.49			
	Moderate layer • Umjereni sloj	16	6.25	6.72			
	Total • Ukupno	80	4.70	5.78			
ADHD Total	None • Nema	31	14.26	12.67	0.05	2/77	0.95
	Thin layer • Tanki sloj	33	15.42	18.10			
	Moderate layer • Umjereni sloj	16	15.31	14.30			
	Total • Ukupno	80	14.95	15.26			

Legend • Legenda: N – number of participants; SD – standard deviation; F – ANOVA test statistic; df – degrees of freedom; p < 0.05 considered statistically significant • N – broj sudionika; SD – standardna devijacija; F – statistika ANOVA testa; df – stupnjevi slobode; p < 0,05 smatra se statistički značajnim

Gingivitis and ADHD (Table 5)

Participants with gingivitis had comparable scores on all subtests and the total ADHD scale to those without gingivitis. Statistical analysis confirmed no significant differences.

Gingivitis i ADHD (tablica 5.)

Sudionici s gingivitisom imali su usporedive rezultate u svim podtestovima i na ukupnoj ADHD ljestvici kao i djeca bez gingivitisa. Statistička analiza potvrdila je da nema značajnih razlika.

Table 5 Differences in ADHD Subtest Scores by Presence of Gingivitis
Tablica 5. Razlike u rezultatima podtestova ADHD-a prema prisutnosti gingivitisa

Subtest • Podtest	Gingivitis • GIN	N	Mean • Prosjek	SD	t-value • t-vrijed.	df	p-value
Hyperactivity • Hiperaktivnost	Absent • Nema	63	5.46	6.28	0.59	78	0.56
	Present • Ima	17	4.47	5.76			
	Total • Ukupno	80	5.25	6.15			
Impulsivity • Impulzivnost	Absent • Nema	63	5.27	5.05	0.92	78	0.36
	Present • Ima	17	4.00	4.84			
	Total • Ukupno	80	5.00	5.00			
Inattention • Nepozornost	Absent • Nema	63	4.40	5.52	-0.90	78	0.37
	Present • Ima	17	5.82	6.73			
	Total • Ukupno	80	4.70	5.78			
ADHD Total	Absent • Nema	63	15.13	15.57	0.20	78	0.84
	Present • Ima	17	14.29	14.49			
	Total • Ukupno	80	14.95	15.26			

Legend • Legenda: N – number of participants; SD – standard deviation; t-value – test statistic from a t-test; df – degrees of freedom; $p < 0.05$ considered statistically significant • N – broj sudionika; SD – standardna devijacija; t-vrijednost – statistika t-testa; df – stupnjevi slobode; $p < 0,05$ smatra se statistički značajnim

Table 6 Differences in ADHD Subtest Scores by Presence of Molar-Incisor Hypomineralisation
Tablica 6. Razlike u rezultatima podtestova ADHD-a prema prisutnosti hipomineralizacije kutnjaka i sjekutića

Subtest • Podtest	MIH	N	Mean • Prosjek	SD	t-value • t-vrijed.	df	p-value
Hyperactivity • Hiperaktivnost	No • Ne	67	5.91	6.48	2.24	78	0.03
	Yes • Da	13	1.85	1.73			
	Total • Ukupno	80	5.25	6.15			
Impulsivity • Impulzivnost	No • Ne	67	5.33	5.32	1.34	78	0.18
	Yes • Da	13	3.31	2.25			
	Total • Ukupno	80	5.00	5.00			
Inattention • Nepozornost	No • Ne	67	5.09	6.10	1.38	78	0.17
	Yes • Da	13	2.69	3.20			
	Total • Ukupno	80	4.70	5.78			
ADHD Total	No • Ne	67	16.33	16.11	1.86	78	0.07
	Yes • Da	13	7.85	6.34			
	Total • Ukupno	80	14.95	15.26			

Legend • Legenda: MIH – Molar-Incisor Hypomineralisation; N – number of participants; SD – standard deviation; t-value – test statistic from a t-test; df – degrees of freedom; $p < 0.05$ considered statistically significant• MIH molarno incizivna hipomineralizacija; N – broj sudionika; SD – standardna devijacija; t-vrijednost – statistika t-testa; df – stupnjevi slobode; $p < 0,05$ smatra se statistički značajnim

Molar-Incisor Hypomineralisation (MIH) (Table 6)

Children without MIH had significantly higher scores on the hyperactivity subtest compared to those with MIH ($p = 0.028$). However, the impulsivity and inattention subtests, as well as the total ADHD score, did not show statistically significant differences, though the total score approached significance ($p = 0.066$).

Oral Hygiene and ADHD (Table 7)

When comparing participants with satisfactory and unsatisfactory oral hygiene (based on plaque presence), no statistically significant differences were observed across ADHD subtest or total scores.

Sample descriptives and the presence of ADHDT symptom domains (N=80) (Table 8)

The majority of children displayed symptoms across multiple domains, with hyperactivity, impulsivity, and inattention often occurring together.

Molarno incizivna hipomineralizacija i ADHD (tablica 6.)

Djeca bez MIH-a imala su značajno više rezultate u podtestu hiperaktivnosti u usporedbi s djecom s MIH-om ($p = 0,028$). No podtestovi impulzivnosti i nepozornosti, kao i ukupni ADHD rezultat, nisu pokazali statistički značajne razlike, iako je ukupni rezultat bio blizu značajnosti ($p = 0,066$).

Oralna higijena i ADHD (tablica 7.)

Pri usporedbi sudionika sa zadovoljavajućom i nezadovoljavajućom oralnom higijenom (temeljeno na prisutnosti plaka) nisu uočene statistički značajne razlike u rezultatima podtestova ADHD-a, ni u ukupnom ADHD rezultatu.

Opis uzorka i prisutnost domena simptoma ADHDT-a (N = 80) (tablica 8.)

Većina djece pokazivala je simptome u više domena, pri čemu su hiperaktivnost, impulzivnost i nepozornost često istodobni.

Table 7 Differences in ADHD Subtest Scores by Oral Hygiene Based on Plaque Presence
Tablica 7. Razlike u rezultatima podtestova ADHD-a prema oralnoj higijeni na temelju prisutnosti plaka

Subtest • Podtest	ORHI	N	Mean • Prosjek	SD	t-value • t-vrijed.	df	p-value
Hyperactivity • Hiperaktivnost	Unsatisfactory • Nezadovoljavajuća	49	5.29	6.78	0.00	78	0.95
	Satisfactory • Zadovoljavajuća	31	5.19	5.09			
	Total • Ukupno	80	5.25	6.15			
Impulsivity • Impulzivnost	Unsatisfactory • Nezadovoljavajuća	49	4.88	5.07	-0.27	78	0.79
	Satisfactory • Zadovoljavajuća	31	5.19	4.96			
	Total • Ukupno	80	5.00	5.00			
Inattention • Nepozornost	Unsatisfactory • Nezadovoljavajuća	49	5.22	6.53	1.02	78	0.31
	Satisfactory • Zadovoljavajuća	31	3.87	4.32			
	Total • Ukupno	80	4.70	5.78			
ADHD Total	Unsatisfactory • Nezadovoljavajuća	49	15.39	16.81	0.32	78	0.75
	Satisfactory • Zadovoljavajuća	31	14.26	12.67			
	Total • Ukupno	80	14.95	15.26			

Legend • Legenda: N – number of participants; SD – standard deviation; t – test statistic from a t-test; df – degrees of freedom; $p < 0.05$ considered statistically significant; "Present" reflects binary symptom coding and is not equivalent to exceeding a clinical cut-off. • N – broj sudionika; SD – standardna devijacija; t – statistika t-testa; df – stupnjevi slobode; $p < 0,05$ smatra se statistički značajnim; „Prisutan" označava binarno kodiranje simptoma i nije ekvivalentno premašivanju kliničkog praga.

Table 8 Sample descriptives and presence of ADHDT symptom domains (N=80)
Tablica 8. Opis uzorka i prisutnost domena simptoma ADHDT-a (N = 80)

Variable • Varijabla	Category • Kategorija	N	% or Mean±SD (range) • % ili M±SD (raspon)
Total • Ukupno		80	
Sex • Spol	Boys • Dječaci	42	52.5%
	Girls • Djevojčice	38	47.5%
Age (years), overall • Dob (godine), ukupno		80	**8.37 ± 3.11** (3–17)
Age, boys • Dob, dječaci		42	**9.14 ± 3.27** (4–17)
Age, girls • Dob, djevojčice		38	**7.53 ± 2.71** (3–15)
Age difference • Razlika u dobi		—	t(78)=**2.392**; **p=0.019**
Symptom domain present (binary) • Prisutnost domena simptoma (binarno)			
Hyperactivity (HA_01) • Hiperaktivnost (HA_01)	Present • Prisutan	58	**72.5%**
	Absent • Nije prisutan	22	27.5%
Impulsivity (IMP_01) • Impulzivnost (IMP_01)	Present • Prisutan	67	**83.8%**
	Absent • Nije prisutan	13	16.3%
Inattention (NEP_01) • Nepozornost (NEP_01)	Present • Prisutan	56	70.0%
	Absent • Nije prisutan	24	30.0%
Number of symptom domains per child (0–3) • Broj domena simptoma po djetetu (0–3)	0	8	10.0%
	1	11	13.8%
	2	13	16.3%
	3	48	60.0%

Legend • Legenda: N – number of participants; SD – standard deviation; t – test statistic from a t-test; df – degrees of freedom; $p < 0.05$ considered statistically significant; "Present" reflects binary symptom coding and is not equivalent to exceeding a clinical cut-off. • N – broj sudionika; SD – standardna devijacija; t – statistika t-testa; df – stupnjevi slobode; $p < 0,05$ smatra se statistički značajnim; „Prisutan" označava binarno kodiranje simptoma i nije ekvivalentno premašivanju kliničke granice.

Standardized categories (manual-normed) for subtests and ADHD quotient (N=80) (Table 9)

Most participants scored in the very low to below-average standardized ranges, confirming a non-clinical sample with predominantly mild symptom expression.

Standardizirane kategorije (normirane prema priručniku) za podtestove i ADHD kvocijent (N = 80) (tablica 9.)

Većina sudionika postigla je rezultate u rasponu od vrlo niskih do ispodprosječnih standardiziranih vrijednosti, što potvrđuje da je riječ o nekliničkom uzorku s pretežno blagom izraženošću simptoma.

Table 9 Standardized categories (manual-normed) for subtests and ADHD quotient (N=80)
Tablica 9. Standardizirane kategorije (normirane prema priručniku) za podtestove i ADHD kvocijent (N = 80)

Scale (standardized) • Ljestvica (standardizirana)	Category • Kategorija	N	%
Hyperactivity (HA-std-K) • Hiperaktivnost(HA-std-K)	Very Low • Vrlo nisko	8	10.0
	Low • Nisko	27	33.8
	Below-Average • Ispodprosječno	28	35.0
	Average • Prosječno	15	18.8
	Above-Average/High • Iznadprosječno/Visoko	2	2.5
Impulsivity (IMP-std-K) • Impulzivnost (IMP-std-K)	Very Low • Vrlo nisko	25	31.3
	Low • Nisko	30	37.5
	Below-Average • Ispodprosječno	21	26.3
	Average • Prosječno	2	2.5
	Above-Average/High • Iznadprosječno/Visoko	2	2.5
Inattention (NEP-std-K) • Nepozornost (NEP-std-K)	Very Low • Vrlo nisko	8	10.0
	Low • Nisko	27	33.8
	Below-Average • Ispodprosječno	28	35.0
	Average • Prosječno	15	18.8
	Above-Average/High • Iznadprosječno/Visoko	2	2.5
ADHD quotient (ADHD-quot.-K) • ADHD kvocijent (ADHD-quot.-K)	Very Low (≤69) • Vrlo nisko (≤69)	39	**48.8**
	Low (70–79) • Nisko (70–79)	21	26.3
	Below-Average (80–89) • Ispodprosječno (80–89)	12	15.0
	Average (90–110) • Prosječno (90–110)	6	7.5
	Above-Average (111–120) • Iznadprosječno (111–120)	1	1.3
	High (≥121) • Visoko (≥121)	1	1.3

Legend • Legenda: N – number of participants; Categories – distribution according to ADHDT manual norms; ADHD quotient = composite of standardized subtests; "Very Low" (≤69), "Low" (70–79), "Below-Average" (80–89), "Average" (90–110), "Above-Average" (111–120), "High" (≥121). Most children fall in lower-to-average standardized categories, consistent with a non-clinical population sample. • N – broj sudionika; kategorije – raspodjela prema normama iz priručnika ADHDT; ADHD kvocijent = zbroj standardiziranih podtestova; „Vrlo nisko" (≤69), „Nisko" (70–79), „Ispodprosječno" (80–89), „Prosječno" (90–110), „Iznadprosječno" (111–120), „Visoko" (≥121). Većina djece nalazi se u nižim do prosječnim standardiziranim kategorijama, što je u skladu s nekliničkim uzorkom populacije.

Table 10 Co-occurrence of symptom domains (2×2 summaries)
Tablica 10. Istodobna pojava domena simptoma (2 × 2 sažetci)

Symptom pair • Par domena simptoma	Test	p-value • p-vrijednost
Hyperactivity × Impulsivity • Hiperaktivnost × Impulzivnost	χ^2 (2×2)	**0.003**
Hyperactivity × Inattention • Hiperaktivnost × Impulzivnost	χ^2 (2×2)	**<0.001**

Legend • Legenda: χ^2 – chi-square test; $p < 0.05$ considered statistically significant. Symptom domains frequently co-occur, consistent with correlation/mediation results. • χ^2 – hi-kvadrat test; $p < 0,05$ smatra se statistički značajnim. Domene simptoma često se istodobno pojavljuju, što je u skladu s rezultatima korelacije i medijacijske analize.

Co-occurrence of symptom domains (2×2 summaries) (Table 10)

Symptom domains significantly co-occurred, showing strong overlap between hyperactivity, impulsivity, and inattention.

Associations between symptoms and oral-health outcomes (Table 11)

ADHDT domains did not associate with K/E/P/KEP (Decayed, Missing due to caries, Filled teeth; DMFT/dmft equivalent), plaque index, gingivitis, endodontic treatment, or ORHI. Dental trauma was associated with higher hyperactivity (t-test p=0.044) and higher impulsivity (p=0.021); inattention was non-significant by t-test (p=0.129) but it was significant by the Mann–Whitney (p=0.033). MIH findings are reported exploratorily; given potential non-ascertainment in younger children, results (lower hyperactivity in

Istodobna pojava domena simptoma (2 × 2 sažetci) (tablica 10.)

Domene simptoma pokazale su značajno preklapanje, osobito između hiperaktivnosti, impulzivnosti i nepozornosti.

Povezanost simptoma i ishoda oralnoga zdravlja (tablica 11.)

Domene ADHDT-a nisu bile povezane s K/E/P/KEP-om (zubi s karijesom, izgubljeni zbog karijesa, plombirani; ekvivalent DMFT/dmft-u), indeksom plaka, gingivitisom, endodontskim tretmanom ili ORHI-jem. Dentalna trauma bila je povezana s višom hiperaktivnošću (t-test p = 0,044) i višom impulzivnošću (p = 0,021); nepozornost nije bila značajna prema t-testu (p = 0,129), ali je bila značajna prema Mann–Whitneyjevu testu (p = 0,033). Nalazi MIH-a eksperimentalnu su i, s obzirom na moguću neprocjenjivost kod

Table 11 Associations of symptoms (HA/IMP/NEP/ADHD) with oral-health outcomes — summary of tests
Tablica 11. Povezanost simptoma (HA/IMP/NEP/ADHD) s ishodima oralnoga zdravlja — sažetak testova

Outcome • Ishod	Contrast / model • Kontrast / model	Direction • Smjer	Test	p
Dental trauma (0 vs 1–2) • Dentalna trauma (0 vs. 1–2)	Hyperactivity • Hiperaktivnost	Higher in traumatized • Viša kod traumatiziranih	t-test	**0.044**
	Impulsivity • Impulzivnost	Higher in traumatized • Viša kod traumatiziranih	t-test	**0.021**
	Inattention • Nepažnja	n.s. (t); higher by rank • n.s. (t); viša po rangu	t-test / Mann–Whitney	0.129 / **0.033**
	ADHD total • ADHD ukupno	Higher in traumatized • Viši kod traumatiziranih	t-test	**0.032**
Endodontic treatment (0 / 1 / ≥2) • Endodontsko liječenje (0 / 1 / ≥2)	HA/IMP/NEP/ADHD	No differences • Nema razlika	ANOVA (Welch)	>0.35
Plaque index (0/1/2) • Indeks plaka	HA/IMP/NEP/ADHD	No differences • Nema razlika	ANOVA (Welch)	>0.41
Gingivitis (No/Yes) • Gingivitis (Ne/Da)	HA/IMP/NEP/ADHD	No differences • Nema razlika	t-test (M-W)	≥0.356
MIH (No/Yes) • MIH (Ne/Da)	Hyperactivity • Hiperaktivnost	Lower in MIH=Yes • Niži kod MIH= Da	t-test / M-W	**0.028** / **0.044**
	Impulsivity / Inattention • Impulzivnost / Nepažnja	No differences • Nema razlika	t-test	≥0.173
	ADHD total • ADHD ukupno	Borderline (t), n.s. (M-W) • Granično (t), n.s. (M-W)	t-test / M-W	0.066 / 0.208
ORHI (Unsatisfactory/Satisfactory) • ORHI (Nezadovoljavajuća/Zadovoljavajuća)	HA/IMP/NEP/ADHD	No differences • Nema razlika	t-test (M-W)	≥0.311

Legend • Legenda: HA – hyperactivity; IMP – impulsivity; NEP – inattention; ADHD – total score; ANOVA – analysis of variance; Welch – ANOVA with Welch correction; M-W – Mann–Whitney U test; n.s. – not significant; $p < 0.05$ considered statistically significant. Trauma is a rare outcome; MIH findings are exploratory due to possible non-ascertainment in younger children. • HA – hiperaktivnost; IMP – impulzivnost; NEP – nepažnja; ADHD – ukupni rezultat; ANOVA – analiza varijance; Welch – ANOVA s Welchovom korekcijom; M-W – Mann–Whitney U test; n.s. – nije značajno; $p < 0,05$ smatra se statistički značajnim. Trauma je rijedak ishod; nalazi o MIH-u eksperimentalni su zbog moguće nemogućnosti procjene kod mlađe djece.

MIH=Yes, p=0.028;the Mann–Whitney p=0.044) should be interpreted cautiously.

Discussion

Recent literature offers limited guidance on how ADHD symptoms may influence children's oral health, particularly within the Croatian population. While some previous studies have explored behavioral patterns in dental settings (22) or speculated on potential links between ADHD and oral health, they remain scarce and fragmented, thus making direct comparisons with our findings challenging.

Gender-related differences in ADHD subtest scores were assessed using both the t-test and the Mann–Whitney U test due to non-normal data distribution. The results indicate a borderline significant difference in inattention between male and female participants ($p = 0.056$), with boys exhibiting higher levels of inattention.

The relationship between ADHD symptoms and the number of traumatized teeth was statistically examined. Although the data did not conform to a normal distribution, the Mann–Whitney U testing confirmed a statistically significant difference in inattention among children with dental trauma ($p = 0.033$). This supports the hypothesis that ADHD-related symptoms, particularly hyperactivity and impulsivity, may increase the risk of dental injuries.

With regard to endodontically treated teeth, analysis of variance revealed higher ADHD subtest scores among chil-

mlađe djece, rezultati se trebaju tumačiti s oprezom (niža hiperaktivnost kod MIH = Da, $p = 0,028$; Mann–Whitneyjev $p = 0,044$).

Rasprava

U najnovijoj literaturi samo su ograničene smjernice o tome kako simptomi ADHD-a mogu utjecati na oralno zdravlje djece, osobito unutar hrvatske populacije. Iako su autori nekih ranijih istraživanja ispitivali obrasce ponašanja u stomatološkom okruženju (22) ili spekulirali o mogućim poveznicama između ADHD-a i oralnoga zdravlja, ona su rijetka i fragmentirana, što otežava izravnu usporedbu s našim nalazima.

Spolne razlike u rezultatima podtestova ADHD-a procijenjene su korištenjem i t-testa i Mann–Whitneyjeva U testa zbog toga što podatci nisu slijedili normalnu raspodjelu. Rezultati upućuju na granično značajnu razliku u nepozornosti između muških i ženskih sudionika ($p = 0,056$), pri čemu su dječaci pokazali višu razinu nepozornosti. Povezanost između simptoma ADHD-a i broja traumatski oštećenih zuba statistički je ispitana. Iako podatci nisu slijedili normalnu distribuciju, Mann–Whitneyjev U test potvrdio je statistički značajnu razliku u nepozornosti kod djece s dentalnom traumom ($p = 0,033$). To podupire hipotezu da simptomi povezani s ADHD-om, posebice hiperaktivnost i impulzivnost, mogu povećati rizik od dentalnih ozljeda.

Kad je riječ o endodontski tretiranim zubima, analiza varijance pokazala je bolje rezultate podtestova ADHD-a kod

dren who had undergone such procedures. However, these differences were not statistically significant, suggesting no clear association. Results were confirmed using Welch's method due to non-normality in the data distribution.

Plaque index was similarly analyzed, and children across different plaque index categories showed comparable ADHD subtest scores. Again, no statistically significant associations were found, as confirmed by variance analysis and the Welch's correction. These findings do not support the hypothesis that ADHD symptoms correlate with poorer plaque control.

Gingivitis was examined using both the t-test and the Mann–Whitney U test, and the results consistently indicated no statistically significant differences between children with and without gingival inflammation.

A recent systematic review and meta-analysis supports this nuanced picture. Although it found that children and adolescents with ADHD exhibited significantly more gingival bleeding compared to their non-ADHD peers, no significant differences were observed for plaque index or general gingivitis diagnosis. The authors noted high variability among studies and highlighted that confounding factors were often not adequately controlled. This is consistent with our study findings, which showed no statistically significant association between ADHD symptoms and plaque accumulation or gingivitis. All considered, these results suggest that while some markers of gingival health (such as bleeding) may be more prevalent among children with ADHD, they do not uniformly present with worse clinical periodontal outcomes. These discrepancies underline the importance of considering individual behavior, oral hygiene routines, and contextual factors rather than relying on a categorical ADHD diagnosis to predict oral health risks (23).

The relationship between ADHD subtests and molar-incisor hypomineralisation (MIH) was initially analyzed using an independent sample t-test. However, as the variables did not follow a normal distribution, the Mann–Whitney U test was also applied, which confirmed the findings shown in Table 6. A statistically significant difference was observed for the hyperactivity subtest (the Mann–Whitney U = 283.0, p = 0.044), while the overall ADHD score did not reach significance (p = 0.066).

The association between ADHD subtests and oral hygiene, based on plaque presence (ORHI), was examined in the same manner. Due to non-normal distribution of the data, the Mann–Whitney U tests were conducted, which confirmed the results presented in Table 7.

Previous studies have generally suggested that children with ADHD struggle more with maintaining oral hygiene than their peers (24). One particularly relevant study highlights that children with ADHD tend to have higher plaque indices, suggesting poorer oral hygiene, with no statistically significant difference between boys and girls (25, 26, 27). However, the results of this study did not support this trend, as no statistically significant correlation between ADHD symptoms and plaque accumulation was identified.

Although a clear link was found between hyperactivity and impulsivity symptoms and the occurrence of den-

djece koja su bila podvrgnuta takvim zahvatima. Međutim, te razlike nisu bile statistički značajne, što upućuje na odsutnost jasne povezanosti. Rezultati su potvrđeni korištenjem Welchove metode jer podatci nisu slijedili normalnu raspodjelu.

Indeks plaka analiziran je na sličan način, pri čemu su djeca u različitim kategorijama indeksa plaka pokazala usporedive rezultate podtestova ADHD-a. Ponovno nisu uočene statistički značajne povezanosti, što su potvrdile analiza varijance i Welchova korekcija. Ti nalazi ne podupiru hipotezu da simptomi ADHD-a koreliraju s lošijom kontrolom plaka.

Gingivitis je ispitivan korištenjem t-testa i Mann–Whitneyjeva U testa, a rezultati su dosljedno pokazali da nema statistički značajnih razlika između djece s gingivalnom upalom i bez te upale.

Nedavni sustavni pregled i metaanaliza dodatno potvrđuju takvu složeniju sliku. Iako je pokazano da djeca i adolescenti s ADHD-om značajno češće pate od gingivalnog krvarenja u usporedbi s vršnjacima bez ADHD-a, nisu utvrđene značajne razlike u indeksu plaka, ni u općoj dijagnozi gingivitisa. Autori su istaknuli visoku varijabilnost među studijama te istaknuli da često nisu adekvatno kontrolirani faktori koji mogu zbuniti rezultate. To je u skladu s nalazima istraživanja koje nije pokazalo statistički značajnu povezanost između simptoma ADHD-a i nakupljanja plaka ili gingivitisa. Sveukupno, ti rezultati sugeriraju da, iako neki pokazatelji zdravlja gingive (poput krvarenja) mogu biti učestaliji kod djece s ADHD-om, oni se ne očituju univerzalno kao lošiji klinički parodontni ishodi. Te razlike ističu koliko je važno uzimati u obzir individualno ponašanje, rutinu oralne higijene i kontekstualne čimbenike, umjesto oslanjanja na kategorijsku dijagnozu ADHD-a za predviđanje rizika za oralno zdravlje (23).

Povezanost između podtestova ADHD-a i molarno incizivne hipomineralizacije (MIH) najprije je analizirana korištenjem t-testa za neovisne uzorke. No budući da varijable nisu slijedile normalnu distribuciju, primijenjen je i Mann–Whitneyjev U test koji je potvrdio nalaze prikazane u tablici 6. Statistički značajna razlika uočena je kod podtesta hiperaktivnosti (Mann–Whitneyjev U = 283,0, p = 0,044), dok ukupni ADHD rezultat nije dosegao značajnost (p = 0,066).

Povezanost između podtestova ADHD-a i oralne higijene, temeljene na prisutnosti plaka (ORHI), ispitivana je na isti način. Zbog nenormalne distribucije podataka provedeni su Mann–Whitneyjevi U testovi koji su potvrdili rezultate prikazane u tablici 7.

U dosadašnjim studijama autori su uglavnom sugerirali da djeca s ADHD-om imaju veće poteškoće u održavanju oralne higijene u usporedbi s vršnjacima (24). U jednoj posebno relevantnoj studiji ističe se da djeca s ADHD-om imaju tendenciju prema višim indeksima plaka, što upućuje na lošiju oralnu higijenu, pri čemu nije uočena statistički značajna razlika između dječaka i djevojčica (25, 26, 27). Međutim, naši rezultati nisu potvrdili taj trend jer nije utvrđena statistički značajna korelacija između simptoma ADHD-a i nakupljanja plaka.

Iako je pronađena jasna povezanost između simptoma hiperaktivnosti i impulzivnosti te pojave dentalne traume, nisu

tal trauma, no significant associations were observed between ADHD symptoms and other oral health issues such as plaque accumulation, gingivitis, or MIH. This shows that behavioral characteristics do not necessarily influence all aspects of oral health equally. A similar pattern was observed in a recent study that explored the relationship between intelligence quotient and orthodontic treatment need. In that study, no significant connection was found between cognitive ability and the severity of malocclusion. These results, taken together, suggest that while behavioral and cognitive traits can influence specific oral health outcomes, they should not be used as a general predictor for overall dental condition. Instead, a case-by-case approach remains crucial in both diagnosis and treatment planning (28).

Some reports suggest that children with ADHD show a higher prevalence of gingivitis, although they do not necessarily experience more frequent dental trauma (29). In contrast, our results did not confirm a statistically significant association between hyperactivity, impulsivity, or inattention and the presence of gingivitis in children. However, in regard to dental trauma, the findings show a statistically significant relationship with both hyperactivity and impulsivity subtest scores, while inattention remained non-significant. These results support the notion that children with ADHD are more prone to dental trauma and soft tissue injuries (30).

The results of our study point to a statistically significant association between hyperactivity and impulsivity symptoms and the incidence of dental trauma in children with ADHD symptoms. These findings confirm the hypothesis that core ADHD symptoms, particularly restlessness and poor impulse control, may elevate the risk of oral injuries. However, an additional public health concern arises from the fact that professionals who frequently work with children, such as teachers, educators, and healthcare providers, often lack adequate knowledge of how to manage dental trauma. In a study conducted by Ivkošić et al. (2020), students from five different university programs demonstrated low average knowledge levels about emergency dental trauma management, with only 20.9% reporting any training on this topic during their education. When considered alongside the increased vulnerability of children with ADHD to traumatic injuries, this gap in preparedness underscores the urgent need for systematic education of future professionals and a multidisciplinary approach to early recognition and proper response in such cases (31).

The results related to endodontically treated teeth and molar-incisor hypomineralisation (MIH) remain difficult to interpret due to the lack of comparable studies in the current literature. Considering all the results obtained in our study, it is important to emphasize that they are generally difficult to compare due to the limited availability of relevant data in the existing literature. This was a single-center, cross-sectional study with a heterogeneous age range (3–17 years), which limits comparability across developmental stages. Dental trauma was a rare event, reducing statistical power. MIH ascertainment is age-dependent (pre-eruption cases unassessable), so MIH findings are exploratory and may be biased toward under-ascertain-

uočene značajne povezanosti između simptoma ADHD-a i drugih problema oralnoga zdravlja, poput nakupljanja plaka, gingivitisa ili MIH-a. To pokazuje da bihevioralne karakteristike ne utječu nužno jednako na sve aspekte oralnoga zdravlja. Sličan obrazac uočen je i u nedavnome istraživačkom radu u kojemu se ispitivala povezanost kvocijenta inteligencije i potrebe za ortodontskim tretmanom. U toj studiji nije uočena značajna povezanost između kognitivnih sposobnosti i težine malokluzije. Ti rezultati zajedno sugeriraju da, iako bihevioralne i kognitivne osobine mogu utjecati na specifične ishode oralnoga zdravlja, one se ne bi trebale koristiti kao opći prediktor ukupnoga dentalnoga stanja. Umjesto toga, pristup individualnog slučaja ostaje ključan i u dijagnostici i u planiranju liječenja (28).

U nekim se izvještajima sugerira da djeca s ADHD-om pokazuju veću učestalost gingivitisa, iako ne doživljavaju nužno češće dentalne traume (29). Suprotno tomu, dobiveni rezultati nisu potvrdili statistički značajnu povezanost između hiperaktivnosti, impulzivnosti ili nepozornosti i prisutnosti gingivitisa kod djece. Međutim, u odnosu na dentalnu traumu, nalazi pokazuju statistički značajnu povezanost s rezultatima podtestova hiperaktivnosti i impulzivnosti, a nepozornost je ostala statistički neznačajna. Ti rezultati podupiru pretpostavku da su djeca s ADHD-om sklonija dentalnim traumama i ozljedama mekih tkiva (30).

Dobiveni rezultati pokazuju statistički značajnu povezanost između simptoma hiperaktivnosti i impulzivnosti te učestalosti dentalne traume kod djece sa simptomima ADHD-a. Ti nalazi potvrđuju hipotezu da ključni simptomi ADHD-a, posebice nemir i loša kontrola impulsa, mogu povećati rizik od oralnih ozljeda. Međutim, dodatna briga u javnome zdravstvu proizlazi iz činjenice da stručnjaci koji često rade s djecom, poput učitelja, odgojitelja i zdravstvenih djelatnika, često nemaju odgovarajuće znanje o upravljanju dentalnim traumama. U studiji Ivkošića i suradnika (2020.) studenti pet različitih sveučilišnih programa pokazali su nisku prosječnu razinu znanja o hitnom postupanju u slučaju dentalnih trauma, pri čemu je samo njih 20,9 % izvijestilo da je tijekom obrazovanja dobilo bilo kakvu informaciju o toj temi. Uzimajući u obzir povećanu ranjivost djece s ADHD-om na traumatske ozljede, taj nedostatak pripremljenosti ističe hitnu potrebu za sustavnom edukacijom budućih stručnjaka i multidisciplinarnim pristupom za rano prepoznavanje i adekvatno reagiranje u takvim slučajevima (31).

Rezultate vezane uz endodontski tretirane zube i molarno incizivnu hipomineralizaciju i dalje je teško interpretirati zbog premalo usporedivih studija u dostupnoj literaturi. Uzimajući u obzir sve rezultate dobivene u ovoj studiji, važno je istaknuti da ih je općenito teško uspoređivati zbog ograničene dostupnosti relevantnih podataka u postojećoj literaturi.

Ovo istraživanje provedeno je u ustanovi s presječnim dizajnom i heterogenim rasponom dobi (3 – 17 godina), što ograničava usporedivost između razvojnih faza. Dentalna trauma bila je rijetka pojava, što smanjuje statističku snagu. Procjena MIH-a ovisi o dobi (slučajevi prije nicanja nisu procjenjivi), stoga su nalazi o MIH-u eksperimentalni i mogu biti pristrani prema podprocjeni kod mlađe djece. Što

ment in younger children. For endodontic outcomes, available records did not consistently indicate whether treatment involved primary or permanent teeth, which constrains interpretation across ages. Finally, population sampling yields predominantly low-to-average standardized ADHD scores, which favors a dimensional (rather than categorical) analytic approach.

Conclusion

In conclusion, the findings of this study suggest that children with ADHD symptoms, particularly those exhibiting hyperactivity and impulsivity, are at greater risk for dental trauma. However, no significant relationship was found between ADHD symptoms and the presence of plaque, gingivitis, or other oral pathologies. These insights underscore the importance of tailored prevention strategies and greater awareness among dental professionals when managing patients with ADHD. These findings also suggest a need for interdisciplinary collaboration and improved education among professionals who regularly interact with children at risk of dental trauma.

Conflict of interest: None

Author's contribution: V. Nj. G. – design, data collection, data processing, data interpretation, manuscript drafting, final approval; **D. V.** – data processing, data interpretation, manuscript drafting, critical revision, final approval; **D. K.** – data processing, data interpretation, critical revision, final approval; **Ž. V.** – design, data collection, data interpretation, critical revision, final approval; **I. Č. B.** – design, data processing, critical revision

se tiče endodontskih ishoda, dostupni zapisi nisu dosljedno *naznača*vali je li riječ o primarnim ili trajnim zubima, što ograničava interpretaciju na temelju dobnih skupina. Na kraju, uzorkovanje populacije daje pretežno niske do prosječne standardizirane ADHD rezultate, što pogoduje dimenzionalnom (umjesto kategorijskom) analitičkom pristupu.

Zaključak

Zaključno, nalazi iz ove studije sugeriraju da su djeca sa simptomima ADHD-a, posebice ona koja pokazuju hiperaktivnost i impulzivnost, izložena većem riziku od dentalne traume. Međutim, nije utvrđena značajna povezanost između simptoma ADHD-a i prisutnosti plaka, gingivitisa ili drugih oralnih patologija. Ovi uvidi ističu važnost prilagođenih preventivnih strategija i veće osviještenosti stomatoloških stručnjaka pri zbrinjavanju pacijenata s simptomima ADHD-a. Nalazi također upućuju na to da je potrebna interdisciplinarna suradnja i bolja edukacija stručnjaka koji redovito rade s djecom izloženom riziku od dentalnih trauma.

Sukob interesa: Autori nisu bili u sukobu interesa.

Doprinos autora: V. Nj. G. – dizajn, prikupljanje podataka, obrada podataka, interpretacija podataka, izrada nacrta rukopisa, konačno odobrenje; **D. V.** – obrada podataka, interpretacija podataka, izrada nacrta rukopisa, kritička dorada, konačno odobrenje; **D. K.** – obrada podataka, interpretacija podataka, kritička dorada, konačno odobrenje; **Ž. V.** – dizajn, prikupljanje podataka, interpretacija podataka, kritička dorada, konačno odobrenje; **I. Č. B.** – dizajn, obrada podataka, kritička dorada.

Sažetak

Cilj rada: Cilj autora ove studije bio je procijeniti odnose između simptoma poremećaja pozornosti s hiperaktivnošću (ADHD) i različitih oralnih zdravstvenih ishoda kod djece, uključujući dentalne traume, nakupljanje plaka, gingivitis, endodontski tretman i molarno incizivnu hipomineralizaciju (MIH). **Materijali i metode:** U istraživanju je sudjelovalo osamdesetero djece (42 dječaka i 38 djevojčica) u dobi od 3 do 17 godina. Skrbnici su ispunili standardizirani dijagnostički alat za ADHD (ADHDT) kojim se procjenjuje nepozornost, hiperaktivnost i impulzivnost. Svako dijete podvrgnuto je sveobuhvatnom oralnom pregledu radi procjene prisutnosti plaka, gingivitisa, dentalne traume, endodontski liječenih zuba i MIH-a. **Rezultati:** Nisu uočene statistički značajne povezanosti između simptoma ADHD-a i prisutnosti plaka, gingivitisa, endodontskog liječenja ili MIH-a. No pronađena je značajna povezanost između viših rezultata hiperaktivnosti i impulzivnosti te povećane učestalosti dentalnih trauma. Simptomi nepozornosti nisu pokazali značajnu povezanost ni s jednim pokazateljem oralnoga zdravlja. **Zaključci:** Djeca koja pokazuju višu razinu hiperaktivnosti i impulzivnosti mogu biti izložena povećanom riziku od dentalnih trauma. Ti nalazi ističu važnost integriranja procjena ponašanja u pedijatrijsku stomatološku skrb kako bi se bolje identificirala i zbrinula djeca koja mogu biti podložnija oralnim ozljedama.

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References

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th ed. Washington (DC): American Psychiatric Publishing; 2013. p. 59-66.
2. Salkičević S, Tadinac M. Neuropsihološki aspekti istraživanja ADHD-a kod djece. Jastrebarsko: Naklada Slap; 2017.
3. Velki T. Priručnik za rad s hiperaktivnom djecom u školi. Jastrebarsko: Naklada Slap; 2018.
4. Jukić V, Arbanas G. Dijagnostički i statistički priručnik za duševne poremećaje. 5. izd. Jastrebarsko: Naklada Slap; 2013.
5. Douglas VI. Attention and cognitive problems. In: Rutter M, ed. Developmental neuropsychiatry. New York: Guilford Press;1983. p. 280-329.
6. Barkley RA. The problem of stimulus control and rule-governed behavior in children with attention deficit disorder with hyperactivity. In: Swanson J, Bloomingdale L, eds. Attention deficit disorders. New York: Pergamon Press; 1989. p. 203-34.
7. Barkley RA. ADHD and the nature of self-control. New York: Guilford Press; 1997.
8. Abikoff H, Gittelman-Klein R, Klein D. Validation of a classroom observation code for hyperactive children. J Consult Clin Psychol. 1977;45:772-83.
9. Barkley RA, DuPaul G, McMurray MB. A comprehensive evaluation of attention deficit disorder with and without hyperactivity. J Consult Clin Psychol. 1990;58:775-89.
10. Cammann R, Miehlke A. Differentiation of motor activity of normally active and hyperactive boys in schools: some preliminary results. J Child Psychol Psychiatry. 1989;30:899-906.
11. Luk S. Direct observations studies of hyperactive behaviors. J Am Acad Child Adolesc Psychiatry. 1985;24:338-44.

12. Sujlana A, Dang R. Dental Care for Children with Attention Deficit Hyperactivity Disorder. J Dent Child 2013;80(2):67-70.
13. Blomqvist M, Holmberg K, Fernell E, Ek U, Dahllöf G. Dental caries and oral health behavior in children with attention-deficit/hyperactivity disorder. Eur J Oral Sci. 2007;115(3):186-191.
14. Blomqvist M, Ahadi S, Fernell E, Ek U, Dahllöf G. Dental caries in adolescents with attention-deficit/hyperactivity disorder: a population-based follow-up study. Eur J Oral Sci. 2011;119(5):381-385.
15. Gillian JE. Test za deficit pažnje/hiperaktivni poremećaj (ADHDT): Priručnik za ispitivača. Jastrebarsko: Naklada Slap; 2006.
16. Petz B, Kolesarić V, Ivanec D. Petzova statistika. Osnovne statističke metode za nematematičare. Jastrebarsko: Naklada Slap; 2012.
17. Ivanković D i sur: Osnove statističke analize za medicinare. Zagreb: Medicinski fakultet Sveučilišta u Zagrebu; 1991.
18. Hill T, Lewicki P. Statistics: methods and applications : a comprehensive reference for science, industry, and data mining. Tulsa: StatSoft; 2006.
19. Faul F, Erdfelder E, Buchner A, Lang AG. Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. Behav Res Methods. 2009;41: 1149-1160.
20. Palant, J. SPSS Priručnik za preživljavanje. Beograd: Mikro knjiga; 2011.
21. uEdufy. How to run mediation analysis in SPSS [Internet]. [cited 2025 Apr 14]. Available from: https://uedufy.com/how-to-run-mediation-analysis-in-spss/
22. Njari V, Verzak Ž, Ćatović Dž, Ćatović A, Ćatović D. Procedures (methods) for controlling the behaviour of children in the dental office. Journal of dentistry and oral care medicine. 2016;1:1-11.
23. Drumond VZ, Andrade AA, de Arruda JAA, Mesquita RA, Abreu LG. Periodontal outcomes of children and adolescents with attention deficit hyperactivity disorder: a systematic review and meta-analysis. Eur Arch Paediatr Dent. 2022 Aug;23(4):537-546.
24. Njari Galić V, Karlović D, Verzak Ž. Attention Deficit / Hyperactivity Disorder and Paediatric Dentistry. Archives of Psychiatry Research. 2024;60(2):153-157.
25. Hidas A, Fux Noy A, Birman N et al. Oral health status, salivary flow rate and salivary quality in children, adolescents and young adults with ADHD. Arch Oral Biol. 2011;56:1137-1141.
26. Carlsson V, Hakeberg M, Blomkvist K, Wide Boman U. Attention deficit hyperactivity disorder and dental anxiety in adults: relationship with oral health. Eur J Oral Sci. 2013;121:258-263.
27. Bain LJ. A parent's guide to attention deficit disorders. New York: Dell; 1991.
28. Sen Yavuz B, Yilmaz MA, Yilmaz HN, Agrali OB, Bilsel SO, Kargul B. Assessment of Relationship between Intelligence Quotient and Orthodontic Treatment Need. Acta Stomatol Croat. 2023 Sep;57(3):248-255.
29. Chau YC, Lai KY, McGrath CP, Yiu CK. Oral health of children with attention deficit hyperactivity disorder. Eur J Oral Sci. 2017 Feb;125(1):49-54.
30. Sabuncuoglu O. Traumatic dental injuries and attention-deficit/hyperactivity disorder: is there a link? Dent Traumatol. 2007;23(3):137-142.
31. Ivkošić I, Gavić L, Jerković D, Macan D, Vladislavić NZ, Galić N, Tadin A. Knowledge and Attitudes about Dental Trauma Among the Students of the University of Split. Acta Stomatol Croat. 2020 Sep;54(3):302-313.