



Tomislav Škrinjaric

Injury Repetition in Children with Dental Trauma: the Role of Aggressive Behavior

Ponavljjanje ozljeda kod djece s traumama zuba: uloga agresivnog ponašanja

Department of Pediatric and Preventive Dentistry, University of Zagreb School of Dental Medicine
Sveučilište u Zagrebu Stomatološki fakultet, Zavod za dječju i preventivnu dentalnu medicinu, Zagreb, Hrvatska

Abstract

Introduction: Traumatic dental injuries (TDI) are widespread and, according to their frequency, they are second most frequent oral disease after dental caries. Dental trauma occurs in a complex interaction of child with social and physical environment. It is considered that child's aggressiveness could play an important role as a risk factor. **Objectives:** The aim of the present study was to evaluate role of child's aggression in the occurrence of repeated injuries in a group of children aged 9 – 17 years. **Material and Methods:** The aggressive behavior was assessed in 114 patients (80 males and 34 females) with TDI. The group comprised children with single injury (SI) and with repeated injuries (RI). The Overt Aggression Scale (OAS) was used to assess children's aggression and to obtain information about four types of aggressive behavior (verbal aggression and aggression against objects, self, and others). **Results:** Males with RI displayed significantly higher aggression against others than males with SI ($F = 13.66$; $P < 0.001$). Aggressive behavior in males with RI was significantly higher in age groups 9-11 and 12-17 years. Males aged 12-17 years have 7 times higher risk for injury repeating than males with SI ($OR = 7.000$; $CI = 1.485-41.360$). Females with RI in both age groups showed similar level of aggressive behavior. **Conclusion:** Aggressive behavior and increased score of aggression against others are frequent symptoms of male patients with repeated injuries. The use of OAS in children with TDI could help detect patients with increased risk for injury repetition. Referral of aggressive children to the child psychiatrist could contribute to the improvement of child's behavior and decrease a risk for further injuries.

Received: June 29, 2026

Accepted: August 26, 2026

Address for correspondence

Assoc. prof. Tomislav Škrinjaric, PhD
University of Zagreb School of Dental Medicine
Department of Pediatric and Preventive Dentistry,
Gundulićeva 5, 10 000 Zagreb, Croatia
tskrinjaric@sfgz.hr

MeSH Terms: Tooth Injuries; Risk Factors; Aggression; Child; Adolescent
Author Keywords: Dental trauma; Risk factors; Overt aggression

Tomislav Škrinjaric ORCID No. 0000-0002-7036-0381

Introduction

Traumatic dental injuries (TDI) are widespread and represent a serious dental public health problem in childhood. Injury results as a complex interaction of child with his physical and social environment (1, 2). The causes of dental injuries are complex, involving various psychosocial elements (3, 4). Specific risk factors include gender, age, socioeconomic status, and distinct child and family characteristics (4-8). Consequently, children from lower socioeconomic groups show a higher incidence of oral trauma (8, 9).

Epidemiological studies show that about one third of preschool children and one fourth of all school children suffer some kind of TDI (4). Not all children are equally affected by dental trauma, as there is evidence that some children are at higher risk for injuries than others. While some patients experience only a single injury during their school years, others suffer from repeated trauma to their teeth or other body areas. Epidemiological model the agent-host-environment was found relevant in determining risks for inju-

Uvod

Traumatske dentalne ozljede (TDI) široko su rasprostranjene i ozbiljan su javnozdravstveni problem u dječjoj dobi. Nastaju u kompleksnoj interakciji djeteta s fizikalnim i socijalnim okruženjem (1, 2). Uzroci ozljeda zuba kompleksni su i s povećanim rizikom od ozljeda može biti povezan niz psihosocijalnih čimbenika (3, 4). Identificiran je niz čimbenika koji povećavaju rizik od dentalne ozljede kao što su spol, dob, socioekonomski status i neka obilježja djeteta i obitelji (4 – 8). Djeca iz nižih socioekonomskih skupina pokazuju višu zastupljenost kad je riječ o oralnim traumama (8, 9).

U epidemiološkim studijama ističe se da oko trećina predškolske djece i četvrtina školske djece dožive neki oblik traumatske dentalne ozljede (4). Sva djeca nisu podjednako pogođena dentalnim traumama. Postoje dokazi da su neka u većem riziku od ozljeđivanja nego druga. Neki pacijenti dožive samo jednu ozljedu tijekom školske dobi, a kod drugih se ponavljaju ozljede zuba ili drugih dijelova tijela. Epidemiološki model sredstvo-domaćin-okoliš prihvaćen je kao rele-

ry repetition in children. Injury repetition was found to be significantly associated with gender. Boys were found more susceptible to dental trauma because of their physical activity and risk-prone behaviors (10-12). Banerjee et al. (11) established that recurrent injuries occur in 3.28% of the total population and are significantly more prevalent among male subjects. They also found that after the initial injury, 13% of children presented with a repeat injury before the age of 13. Studies show that children with repeated injuries differ from children with a single injury in certain sociodemographic characteristics (8, 13). Children whose mothers were aged less than 25 years at birth exhibit an almost fourfold increase in recurrent injuries during early life compared to children whose mothers were 35 years or older (13).

Among the multiple factors contributing to an increased risk for injuries are conduct disorders, hyperactivity, and aggression (2, 6, 14, 15). Children who suffered an injury during the preschool years were identified to be at risk for injury repetition at older ages (2, 4, 16). Glendor (16) pointed out those children with a first dental injury before 9 years of age have an 8.4 times higher risk for recurrent injuries. Spinks et al. (6) found that children with high scores for hyperactivity and aggression have an increased risk of all injuries. There are significant gender and developmental differences in aggression (17). Boys were almost twice more hyperactive or aggressive as girls. Studies show significant gender and age differences in physical and relational aggression. Boys who exhibit high levels of aggression at 10–13 years of age are more likely to continue displaying physical aggression or violence later in life. In contrast, girls tend to display more relational aggression during adolescence, whereas boys are more prone to physical aggression (15, 17, 18).

Our study addresses the issue of injury repetition from the point of view of different host characteristics. Injury repeaters were defined as individuals sustaining injuries of teeth or other parts of the body on more than one occasion over the period of previous years.

The aim of this study was to examine the association between aggression and the repetition of unintentional traumatic dental injuries among a cohort of children aged 9–17 years. Despite its clinical importance, very few studies have analyzed the association between injury repetition and a child's aggressiveness. Specifically, this research investigates whether the level of aggressiveness in injury repeaters differs from that of children with a single injury.

Material and Methods

The study was performed on a random sample of children and adolescents who had suffered one or more dental injuries and other body injuries. Children with one dental trauma episode or with more trauma episodes were randomly included. Dental injuries were diagnosed on the basis of clinical and radiographic examination. Occlusal radiographs were taken to diagnose dental injuries (19).

Patients were classified into two groups: 1. the group with single injury (SI) or one trauma episode, and 2. the group with repeated injuries (RI) or multiple trauma episodes. In-

vantan za utvrđivanje rizika od ponavljanja ozljeda kod djece. Utvrđeno je da je ponavljanje ozljeda značajno povezano sa spolom. Dječaci su skloniji dentalnim traumama zbog svoje fizičke aktivnosti i rizičnog ponašanja (10 – 12). Banerjee i suradnici (11) utvrdili su da se ozljede ponavljaju kod 3,28 % ukupne populacije i pritom je zastupljeno mnogo više dječaka. Također su ustanovili da poslije prve ozljede 13 % djece doživi ponovnu ozljedu prije dobi od 13 godina.

Istraživanja pokazuju da se djeca s ponavljanjem ozljeda razlikuju od one s jednom ozljedom u nekim sociodemografskim obilježjima (8, 13). Djeca čije su majke bile mlađe od 25 godina kada su se oni rodili gotovo četiri puta češće ponavljaju ozljede u ranim godinama od djece čije su majke imale 35 godina ili više (13).

Među mnogobrojnim čimbenicima koji povećavaju rizik od ozljede jesu poremećaji ponašanja, hiperaktivnost i agresija (2, 6, 14, 15). Djeca koja su doživjela ozljedu u predškolskoj dobi identificirana su kao rizična za ponavljanje ozljeda u kasnijoj dobi (2, 4, 16). Glendor (16) ističe da djeca s prvom dentalnom ozljedom prije dobi od 9 godina imaju 8,4 puta veći rizik od ponavljanja ozljede. Spinks i suradnici (6) utvrdili su da su djeca s visokim skorom hiperaktivnosti i agresivnosti u povećanom riziku od svih vrsta ozljeda. Postoje značajne spolne i razvojne razlike u agresivnosti (17). Dječaci su gotovo dvostruko hiperaktivniji i agresivniji od djevojčica. Istraživanja pokazuju značajne razlike prema spolu i dobi u fizičkoj i relacijskoj agresiji. Dječaci koji su bili visoko agresivni u dobi od 10 do 13 godina vjerojatno će i u kasnijoj dobi nastaviti s fizičkom agresijom i nasiljem. Za djevojčice se očekuje da će se češće koristiti relacijskom agresijom od dječaka koji su fizički agresivniji u adolescenciji (15, 17, 18).

Ovo istraživanje bavi se pitanjem ponavljanja ozljeda i različitih obilježja domaćina. Ponavljači ozljeda definirani su kao osobe koje su doživjele ozljedu zuba ili drugih dijelova tijela nekoliko puta nakon prethodnog razdoblja.

Svrha ovog istraživanja bila je ustanoviti razlikuje li se razina agresivnosti kod ponavljača ozljeda od one kod osoba s jednom ozljedom u skupini djece u dobi od 9 do 17 godina. Unatoč važnosti, samo su se autori nekoliko istraživanja bavili povezanošću ponavljanja ozljeda i djetetove agresivnosti. Svrha ovog istraživanja bila je istražiti povezanost između agresije i ponavljanja nenamjernih ozljeda u skupini djece s traumatskim ozljedama zuba u dobi od 9 do 17 godina.

Materijal i metode

Istraživanje je provedeno na slučajnom uzorku djece i adolescenata s jednom ili više ozljeda zuba ili drugih dijelova tijela. Djeca s jednom ozljedom ili više njih slučajno su bila odabrana. Dentalne traume dijagnosticirane su na temelju kliničkoga i radiološkoga nalaza. Okluzalne radiološke snimke korištene su za dijagnostiku dentalnih ozljeda (19).

Pacijenti su podijeljeni u dvije skupine: u 1. skupinu s jednom ozljedom (SI) i u 2. skupinu s ponavljanjem ozljeda (RI). Ponavljači ozljeda definirani su kao pacijenti koji su do-

jury repeaters were defined as patients sustaining more than one injury of teeth or other body areas of medical attention.

The aggressive behavior was assessed in 114 patients (80 males and 34 females) with TDI aged from 9-17 years (Table 1). The Overt Aggression Scale (OAS) was used to assess aggressive behavior in children with traumatic dental injuries (TDI). The OAS comprises four categories of aggression: verbal aggression, physical aggression against objects, physical aggression against self, and physical aggression against others. Each subtype was rated using weighted scores: (1) verbal aggression (1-4 points), (2) physical aggression toward objects (2-5 points), (3) physical aggression toward self (3-6 points), and (4) physical aggression toward others (3-6 points). The sum of the scores across all categories can range from 0 to 21, representing the total OAS score.

Informed consent for each subject was obtained from the parent after the study was fully explained. In this study, OAS parent ratings of aggression were employed. During the visit, parents were asked to complete the OAS form for their child. The principal investigator (T.S.) explained to the parents the data collection procedure regarding the child's behavior. Both the OAS recording form and the specific types of aggression were thoroughly explained to the parents.

The aggression score (AS) is the sum of the weighted scores of the most severe behavior in each category of behavior. Children scoring 3 or higher on the AS for physical aggression were categorized as aggressive (20, 21), confirming literature reports that the OAS is a reliable clinical research instrument (20, 22, 23). Comparisons of aggression levels and types between injury repeaters and single-injury patients were performed using F-tests and chi-square tests. Additionally, odds ratios (ORs) with 95% confidence intervals (CIs) estimated the impact of high AS on pediatric injury repetition.

Results

The comparison of aggression scores was performed between injury repeaters (RI) and children with a single injury (SI). In our study, we found significant differences between the groups with regard to gender, age, and the level of physical aggression. Males in this age group show a considerably higher risk for injury repetition than females. Table 2 shows the results of the comparison between the RI and SI groups. Significant differences between males with SI and RI were observed for physical aggression against others. The score was higher in the group with RI ($F = 13.66$; $P < 0.001$). Females with SI and RI did not show significant differences in any type of overt aggression (Table 2). Males aged 9-17 years with high AS (3+) have 3.2 times higher risk for injury repeating than males with low AS ($OR = 3.214$; $CI = 0.991-14.424$) (Table 3). Aggressive behavior in males with RI was the highest in age group 12-17 years (Figure 1). It is interesting that even 78% of boys with RI displayed high overt aggression score (scores 3 or higher). There was only 33% of boys with RI who displayed low aggression score (0-2). Odds ratios were considerably higher for males with dental injuries than for females. Males in this age group with high

živjeli više od jedne ozljede zuba ili drugih dijelova tijela, a koje su zahtijevale medicinsko liječenje.

Agresivno ponašanje procijenjeno je kod 114 pacijenata (80 dječaka i 34 djevojčice) s TDI-jem u dobi od 9 do 17 godina (tablica 1.). Za procjenu agresivnog ponašanja djece s dentalnim traumama korištena je Overt Aggression Scale (OAS). OAS obuhvaća četiri kategorije agresije: verbalnu agresiju, fizičku agresiju prema stvarima i fizičku agresiju prema sebi i drugima. Svaka podvrsta stupnjevana je korištenjem težinskih skorova: 1. verbalna agresija (1-4 boda), 2. fizička agresija prema stvarima (2-5 bodova), 3. fizička agresija prema sebi (3-6 bodova) i 4. fizička agresija prema drugima (3-6 bodova). Zbroj bodova iz svih kategorija mogao se kretati od 0 do 21 kao ukupni skor OAS-a.

Za svakog ispitanika roditelji su potpisali informirani pristanak nakon što im je istraživanje bilo objašnjeno. U ovom istraživanju za roditelje je korišteno vrjednovanje OAS-a. Tijekom posjeta zatraženo je da roditelji za svoje dijete ispune OAS-ov upitnik. Glavni istraživač (T. S.) objasnio im je postupak uzimanja podataka o djetetovu ponašanju. Roditeljima je objašnjen postupak označavanja svakog oblika agresije u OAS-ovu obrascu.

Agresijski skor (AS) bio je zbroj težinskih bodova najtežega oblika ponašanja u svakoj kategoriji. Ponašanje djece s agresijskim skorom (AS) od 3 ili višim za fizičku agresiju kategorizirano je kao agresivno (20, 21). Autori dosadašnjih studija pokazali su da je OAS pouzdan i prikladan za klinička istraživanja kad je riječ o djeci (20, 22, 23).

Usporedba razine i vrste agresije između ponavljača ozljeda i pacijenata s jednom ozljedom provedena su primjenom F-testa i hi-kvadrat testa. Omjeri neslaganja (ORs) s intervalom pouzdanosti (CIs) od 95 % korišteni su za procjenu utjecaja visokoga agresijskog skora (AS) na ponavljanje ozljeda kod djece.

Rezultati

Obavljena je usporedba agresijskih skorova između ponavljača ozljeda (RI) i djece s jednom ozljedom (SI). Nađene su značajne razlike između skupina kad je riječ o spolu, dobi i fizičkoj agresiji. U tablici 2. rezultati su usporedbe djece s ponovljenim ozljedama (RI) i one s jednom ozljedom (SI). Utvrđene su značajne razlike između dječaka sa SI-jem i RI-jem za fizičku agresiju prema drugima. Skor je bio viši za skupinu s RI-jem ($F = 13.66$; $P < 0.001$). Djevojčice sa SI-om i RI-jem nisu pokazivale razlike ni za jednu vrstu otvorene agresije (tablica 2.). Dječaci u dobi od 9 do 17 godina s visokim AS-om (3+) imali su 3,2 puta veći rizik od ponavljanja ozljeda od dječaka s niskim AS-om ($OR = 3.214$; $CI = 0.991-14.424$) (tablica 3.). Agresivno ponašanje dječaka s RI-jem bilo je najčešće u dobnoj skupini od 12 do 17 godina (slika 1.). Zanimljivo je da čak 78 % dječaka s RI-jem ima visoki skor otvorene agresije (skor 3 ili više). Bilo je samo 33 % dječaka s RI-jem koji su pokazivali nizak agresijski skor (0-2). Omjeri neslaganja bili su značajno viši za dječake s dentalnim traumama nego za djevojčice. Dječaci u toj dobnoj skupini s visokim AS-om imaju 7 puta veći rizik od ponavljanja ozljeda od dječaka s niskim AS-om (OR

Table 1 Structure of the sample
Tablica 1. Struktura uzorka

AGE (Years)	Males (N=80)		Females (N = 34)		Total	
	N	%	N	%	N	%
1) 9 - 11	53	67.9	25	32.1	78	100.0
2) 12 - 17	27	75.0	9	25.0	36	100.0
Total	80	76.9	34	32.7	114	100.0

Table 2 Mean aggression scores in children with single injury (SI) and repeated injuries (RI)
Tablica 2. Srednje vrijednosti agresijskoga skora kod djece s jednom ozljedom (SI) i ponavljanjem ozljeda (RI)

Gender	Type of Aggression	Single injuries			Repeated injuries			F	
		N	Mean	s.d.	N	Mean	s.d.		
Males (N=80)	1. Verbal	34	1.56	.75	46	1.63	.88	.15	n.s.
	2. Against objects	34	.82	1.17	46	.87	1.13	.03	n.s.
	3. Against self	34	.35	1.18	46	.13	.62	1.20	n.s.
	4. Against others	34	.74	1.36	46	2.07	1.74	13.66	***
	5. Total aggression	34	3.47	2.98	46	4.70	2.88	3.44	n.s.
Females (N=34)	1. Verbal	14	1.55	.83	20	1.43	.85	.17	n.s.
	2. Against objects	14	.90	1.17	20	.57	.94	.76	n.s.
	3. Against self	14	.00	.00	20	.43	1.09	3.17	n.s.
	4. Against others	14	.70	1.45	20	.64	1.28	.01	n.s.
	5. Total aggression	14	3.15	2.30	20	3.07	2.97	.01	n.s.

*** $P < 0.001$; n.s. – non significant

Table 3 Differences in physical aggression between boys with repetition of injuries and single injury (N = 80)
Tablica 3. Razlike u fizičkoj agresiji između dječaka s ponavljanjem ozljeda i onih s jednom ozljedom (N = 80)

AGE (Years)	OAS score	INJURY REPETITION				Total	
		YES		NO			
		n	%	n	%	n	%
9 - 11	3 +	15	71.4	6	28.6	21	100.0
	0 - 2	14	43.8	18	56.3	32	100.0
	Total	29	54.7	24	45.3	53	100.0
	$\chi^2 = 3.920$	df = 1		P = 0.044 *			
OR		OR = 3,214		95% CI = 0,991 – 10,424			
12 - 17	3 +	14	77.8	4	22.2	18	100.0
	0 - 2	3	33.3	6	66.7	9	100.0
	Total	17	63.0	10	37.0	27	100.0
	$\chi^2 = 5.082$	df = 1		P = 0.034 *			
OR		OR = 7.000		95% CI = 1.185 – 41.360			

Legend: n – number of patients; d.f. – degrees of freedom

OAS score 0-2 – low score of overt aggression; OAS score 3+ (three or higher) – high score of overt aggression

OR – odds ratio

AS had 7 times higher risk for injury repeating than males with low AS (OR = 7.000; CI = 1.485-41.360). There were no cases with a high OAS score in either group of girls aged 12–17 years. The level of total overt aggression in girls was not significantly different between injury repeaters (RI) and SI individuals (Table 4). Females with RI in both age groups showed a similar level of aggressive behavior (Table 4 and Figure 2). The results show that the male gender was much more prevalent within the groups of children with SI and RI. An age of 12 to 17 years is an important factor increasing the

= 7.000; CI = 1,485 – 41,360). Nije bilo slučajeva s visokim skorom OAS-a ni u jednoj skupini djevojčica u dobi od 12 do 17 godina. Razina ukupne otvorene agresije nije bila značajno različita između ponavljača ozljeda (RI) i onih s jednom ozljedom (SI) (tablica 4.). Djevojčice s RI-jem u obje su dobne skupine pokazivale sličnu razinu agresivnog ponašanja (tablica 4. i slika 2.).

Rezultati pokazuju da su dječaci mnogo češće zastupljeni u skupini djece sa SI-jem i RI-jem. Dob od 12 do 17 godina za dječake je značajan čimbenik za povećanje rizika od po-

Table 4 Differences in physical aggression between girls with repetition of injuries and single injury (N = 34)
Tablica 4. Razlike u fizičkoj agresiji između djevojčica s ponavljanjem ozljeda i s jednom ozljedom (N = 34)

AGE (Years)	OAS score	INJURY REPETITION					
		YES		NO		Total	
		n	%	n	%	n	%
9 - 11	3 +	3	33.3	6	66.7	9	100.0
	0 - 2	7	43.8	9	53.6	16	100.0
	Total	10	40.0	15	60.0	25	100.0
	$\chi^2 = 0,260$	df = 1		P = 0.470 n.s.			
OR		OR = 0.643		95% CI = 0.117 – 3.526			
12 - 17	3 +	0	-	0	-	0	-
	0 - 2	4	44	5	55.6	9	100.0
	Total	4	44.4	5	55.6	9	100.0
	χ^2						
OR*							

Legend: n – number of patients; d.f. – degrees of freedom

OAS score 0-2 – low score of overt aggression; OAS score 3+ (three or higher) – high score of overt aggression

OR – odds ratio

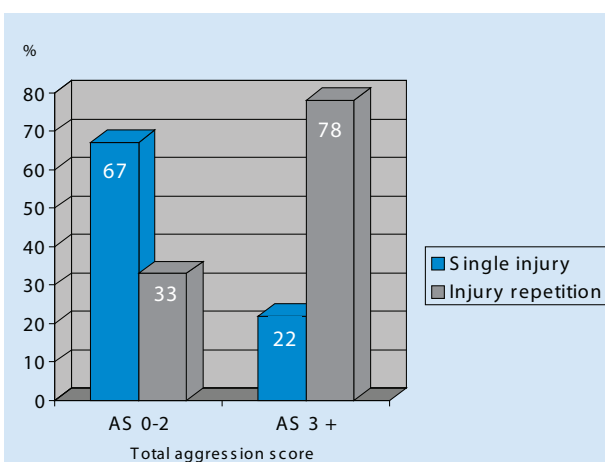


Figure 1 Aggressive behavior in males aged 12 - 17 years
Slika 1. Agresivno ponašanje dječaka u dobi od 12 do 17 godina

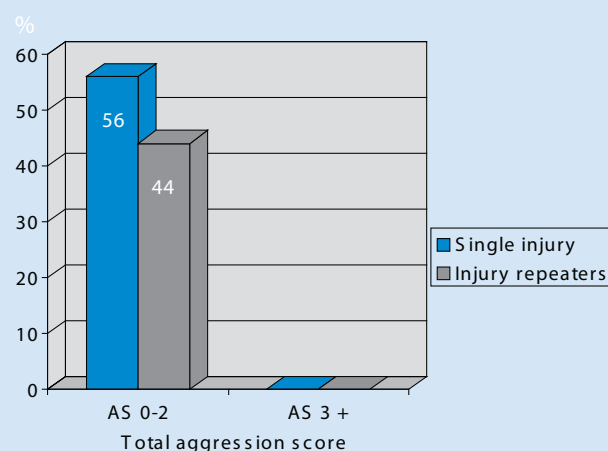


Figure 2 Aggressive behavior in females aged 12 - 17 years
Slika 2. Agresivno ponašanje djevojčica u dobi od 12 do 17 godina

risk for injury repetition in males. Injury repeaters exhibit a significantly higher level of physical aggression than single-injured individuals.

Discussion

Certain individual characteristics, such as being male and exhibiting aggressive behaviour, act as predictor variables for injuries. Bijur et al. (2) consider that the number of injuries sustained before 5 years of age is the best predictor of injury repetition between 5 and 10 years of age, followed by male gender and aggressive behavior. Consequently, children with several identified risk factors can be predicted to have a high rate of injuries.

Recurrent injuries in children can be associated with several social factors and children's behavioural characteristics. Among the factors significantly associated with recurrent episodes of injuries in children are maternal age and the child's own age (13). Cameron et al. (13) showed that children with repeated injuries differ from those with a single injury in cer-

navljanja ozljeda. Ponavljači ozljeda dijele značajno višu razinu fizičke agresije od onih s jednom ozljedom.

Rasprava

Neka individualna obilježja kao što su muški spol i agresivnije ponašanje prediktivne su varijable za ozljeđivanje. Bijur i suradnici (2) smatraju da je broj ozljeda prije dobi od 5 godina najbolji prediktor za ponavljanje ozljeda u dobi između 5 i 10 godina. Poslije toga slijede muški spol i agresivno ponašanje djeteta. Može se pretpostaviti da će djeca s više identificiranih čimbenika rizika imati visoku zastupljenost ozljeda.

Ponavljanje ozljeda kod djece može se povezati s nekoliko socijalnih čimbenika i obilježjima djetetova ponašanja. Među čimbenike značajno povezane s ponavljanjem ozljeda ubrajaju se i dob majke od 35 godina i više u vrijeme djetetova rođenja (13). Cameron i suradnici (13) pokazali su da se djeca s ponavljanjem ozljeda razlikuju od one s jednom oz-

tain sociodemographic characteristics. Specifically, children born to mothers aged less than 25 years exhibit an almost fourfold increase in recurrent injuries during early life compared to children whose mothers were 35 years or older (13). Furthermore, Banerjee et al. (11) established that recurrent injuries occurred in 3.28% of the total population and are significantly more prevalent among male subjects.

The present study has revealed a significant relationship between gender and physical aggression, which indicates that males were more physically aggressive than females in late childhood and adolescence. In the age group of 12 to 17 years, boys with high aggression scores displayed a high rate of injury repetition, while girls of that age did not show repeated injuries associated with a high aggression score. This finding is consistent with the results of some previous studies (2, 6, 23, 24). It could be explained by the fact that boys are more likely to use physical and overt aggression, while girls at that age preferentially use the relational form of aggression. Developmental differences in aggression regarding gender show that boys preferentially use overt and physical aggression, while girls utilize more indirect or relational aggression. This pattern is particularly evident during late childhood and early adolescence (14, 17, 24, 25). The findings in our study could be interpreted in relation to the gender, age, and level of overt aggression of our subjects, who fall within the range of late childhood and early adolescence.

The epidemiological agent-host-environment model was found relevant in determining the risk for repeat injuries in children. Risk factors include certain host characteristics, as well as the social and physical environment. Repeat injuries were significantly associated with the male gender; it is widely considered that boys are more susceptible to dental trauma due to their higher physical activity and risk-prone behaviors (10-12).

Some longitudinal studies show that most children initiate physical aggression in the second year of life (25). This physical aggression starts to decline during the remainder of childhood, dropping more rapidly in girls than in boys. Consequently, the gender difference in physical aggression during puberty is considerable. Generally, boys display more physical aggression than girls across all cultures; while relational aggression is more common in girls, boys display more physical aggression against other individuals and objects (26 - 28). This represents one of the significant gender differences in childhood and adolescence. The minor gender variations in aggressiveness among preschool-aged children grow rapidly between 5 and 11 years of age. By the age of 11, physical aggression in girls is very low, whereas it remains high in boys (26).

Aggression in children has a tendency to decrease over time as brain structures and cognitive functions develop (29, 30). Some research has pointed to the protective role of school connectedness on aggressive behavior. School represents a supportive environment, enabling positive effects on aggressive children with a high risk for injuries. It has also been noted that boys from poor families were more aggressive than those coming from wealthier families (30, 31).

According to Glendor et al. (16), multiple dental trauma episodes to permanent teeth in the age interval of 6–10 years

ljudom u nekim sociodemografskim obilježjima. Djeca čije su majke bile mlađe od 25 godina u vrijeme njihova rođenja imala su gotovo četiri puta više ponavljanih ozljeda od djece čije su majke imale 35 ili više godina u vrijeme njihova rođenja (13). Banerjee i suradnici (11) utvrdili su da se ponavljane ozljede događaju kod 3,28 % ukupne populacije i da su mnogo zastupljenije kod dječaka.

Ovo istraživanje pokazalo je značajnu povezanost između spola i fizičke agresije što upućuje na to da su dječaci fizički agresivniji od djevojčica u kasnome djetinjstvu i adolescenciji. U dobnoj skupini od 12 do 17 godina dječaci s visokim agresijskim skorom pokazuju visoku zastupljenost u ponavljanju ozljeda, a djevojčice u toj dobi ne pokazuju ponavljanje ozljeda povezanih s visokim agresijskim skorom. Taj nalaz u skladu je s rezultatima nekih istraživanja (2, 6, 23, 24). To se može objasniti činjenicom da se dječaci mnogo češće koriste fizičkom i otvorenom agresijom, a djevojčice u toj dobi preferiraju relacijski oblik agresije. To je posebice izraženo tijekom kasnog djetinjstva i rane adolescencije (14, 17, 24, 25). Nalazi u našem istraživanju mogu se interpretirati u smislu spola, dobi i razine otvorene agresije naših ispitanika koji su u rasponu od kasnog djetinjstva do rane adolescencije.

Epidemiološki model *sredstvo-domaćin-okoliš* smatra se relevantnim za utvrđivanje čimbenika rizika od ponavljanja ozljeda kod djece. Čimbenici rizika uključuju neka obilježja domaćina, socijalni i fizikalni okoliš. Ponavljanje ozljeda povezano je s muškim spolom. Smatra se da su dječaci skloniji dentalnim traumama zbog njihove fizičke aktivnosti i rizičnih ponašanja (10 – 12).

Neka longitudinalna istraživanja pokazala su da većina djece počinje s fizičkom agresijom već u drugoj godini (25). Fizička agresija počinje se smanjivati tijekom djetinjstva i to mnogo izraženije kod djevojčica nego dječaka. Razlike u fizičkoj agresiji među spolovima tijekom puberteta su značajne. Općenito, dječaci u svim kulturama pokazuju više fizičke agresije nego djevojčice. Dok je relacijska agresija zastupljenija kod djevojčica, dječaci pokazuju više fizičke agresije prema stvarima i prema drugim osobama (26 – 28). To je jedna od značajnih spolnih razlika u djetinjstvu i adolescenciji. Male spolne razlike u agresivnosti u predškolskoj dobi rastu rapidno između 5 i 11 godina. U dobi od 11 godina fizička agresija kod djevojčica vrlo je niska, ali ostaje visoka kod dječaka (26).

Agresija kod djece ima tendenciju smanjivanja s vremenom/dobi kako se razvijaju strukture mozga i kognitivne funkcije (29, 30). Autori nekih istraživanja upozoravaju na protektivnu ulogu škole kad je riječ o agresivnom ponašanju. Škola je potpuno okruženje koje omogućuje pozitivan utjecaj na agresivnu djecu s visokim rizikom od ozljeda. Također je zapaženo da su dječaci iz siromašnih obitelji agresivniji od onih iz imućnijih obitelji (30, 31).

Prema dr. Glendor i suradnicima (16), višestruko ozljeđivanje trajnih zuba u dobi od 6 do 10 godina povećava rizik od višestrukog ozljeđivanja za 8,4 puta ako se prva ozljeda dogodila u dobi od 9 godina. Povećan rizik od dentalne traume uočen je kod djece s visokom razinom hiperaktivnosti i impulzivnosti (32). Naši rezultati pokazuju da visok agresijski skor kod dječaka u dobi od 9 do 11 godina ima prediktiv-

represent an increased risk of sustaining another trauma episode. The risk for multiple injuries was 8.4 times higher when the first injury occurred at 9 years of age. An increased risk for dental injuries has also been observed in children with high levels of hyperactivity and impulsivity (32). Our results show that a high aggression score in boys aged 9–11 years has predictive value for future injuries in children. Present findings indicate that a high overt aggression score (3 or higher) in boys aged 9–11 years corresponds to a 3.2-fold increased risk for injury repetition. In the group of boys aged 12 to 17 years, a high aggression score increases the risk for injury repetition sevenfold.

Laloo (32) found that hyperactivity in children, lower social class, and single-parent households represent risk factors for injuries to the face and teeth. Bijur et al. (2) consider that injuries before 5 years of age were the best predictor of injuries between 5 and 10 years of age. In addition to that, male gender, aggressive behavior, and young maternal age also contribute to the risk for injuries. Children with more risk factors can be predicted to be at a high risk for unintentional injuries (2). Social factors were found to be among the risk factors for recurrent injuries in children (8, 11, 33, 34).

The results of the present study show that males who are more aggressive are more likely to have experienced injury-related outcomes. This study demonstrates that injury repeaters differ significantly from single-injured individuals regarding the level of physical aggression. Three individual characteristics—gender, age, and aggressiveness—are associated with injury repetition. As males age, they are more likely to become engaged in certain risk-taking activities. As a result of such behavior, a higher incidence of injuries and injury repetition occurs.

Conclusion

Children with RI significantly differ from those with SI with regard to gender, age, and the level of aggressive behavior. There are significant differences in the type and level of aggression between boys and girls. Boys display much more physical and overt aggression than girls during late childhood and adolescence. The most significant risk factor for injury repetition was a high level of physical aggression in males. Aggressiveness in boys increases risk-taking and exposes them to injuries. The use of the OAS in children with TDI could help detect patients with an increased risk for injury repetition.

Conflict of interest: None declared

Acknowledgements: This research is a part of the project on Dental trauma in children which was approved by the Ethical Committee University of Zagreb School of Dental Medicine (# 065-0653147-1197).

Author contributions: Conceptualization, Methodology, Formal analysis, writing original draft preparation.

nu vrijednost za buduće ozljede. Dobiveni rezultati visokoga skora otvorene agresije (3 ili viši) za dječake u dobi od 9 do 11 godina znače 3,2 puta povećani rizik od ponavljanja ozljeda. U skupini dječaka u dobi od 12 do 17 godina visok agresijski skor povećava rizik od ponavljanja ozljeda za 7 puta.

Autorica Laloo (32) utvrdila je da su hiperaktivnost djece, nizak socijalni razred i kućanstvo s jednim roditeljem čimbenici rizika za ozljede lica i zuba. Bijur i suradnici (2) smatraju da su ozljede prije dobi od 5 godina najbolji prediktor ozljeđivanja u dobi između 5 i 10 godina. Uz to, muški spol, agresivno ponašanje i rano materinstvo povećavaju rizik od ozljeđivanja. Može se pretpostaviti da su djeca s više čimbenika rizika u većem riziku od nenamjerne ozljede (2). Utvrđeno je da je socijalni status među čimbenicima rizika od ponavljanja ozljeda kod djece (8, 11, 33, 34).

Rezultati ovog istraživanja pokazuju da su agresivniji dječaci izloženiji ozljeđivanju. Istraživanje pokazuje da se ponavljači ozljeda značajno razlikuju od onih s jednom ozljedom kad je riječ o razini fizičke agresije. Osobna obilježja, spol, dob i agresivnost povezani su s ponavljanjem ozljeda. Kako dječaci postaju stariji uključuju se u rizične aktivnosti, a kao rezultat takvog ponašanja nastaje više ozljeda i njihovo ponavljanje.

Zaključci

Djeca s ponavljanjem ozljeda značajno se razlikuju od djece s jednom ozljedom kad je riječ o spolu, dobi i razini agresivnog ponašanja. Postoje značajne razlike u vrsti i razini agresije između dječaka i djevojčica. Dječaci pokazuju mnogo više fizičke i otvorene agresije od djevojčica tijekom kasnoga djetinjstva i adolescencije. Najznačajniji čimbenik rizika od ponavljanja ozljeda jest visoka razina fizičke agresije kod dječaka. To povećava preuzimanje rizika i izlaže ih ozljedama. Primjena OAS-a kod djece s traumatskim ozljedama zuba može pomoći u otkrivanju pacijenata s povećanim rizikom od ponavljanja ozljeda.

Sukob interesa: Nije naveden.

Zahvala: Ovo istraživanje dio je projekta o dentalnim traumama kod djece koje je 2014. godine odobrilo Etičko povjerenstvo Stomatološkog fakulteta Sveučilišta u Zagrebu (# 065-0653147-1197).

Doprinos autora: konceptualizacija, metodologija, analiza, pisanje originalnog rada.

Sažetak

Uvod: Traumatske dentalne ozljede (TDI) široko su rasprostranjene i prema zastupljenosti na drugom su mjestu najučestalijih oralnih bolesti nakon zubnog karijesa. Dentalna trauma nastaje u kompleksnoj interakciji djeteta sa socijalnim i fizikalnim okolišem. Smatra se da djetetova agresivnost može biti itekako važna kao čimbenik rizika. **Svrha rada:** Svrha ovoga istraživanja bila je evaluirati ulogu djetetove agresivnosti u nastanku ponavljanih ozljeda u skupini djece u dobi od 9 do 17 godina. **Materijali i metode:** Agresivno ponašanje procijenjeno je kod 114 pacijenata (80 dječaka i 34 djevojčice) s TDI-jem. U skupini su bila djeca s jednom ozljedom (SI) i s ponavljanim ozljedama (RI). Overt Aggression Scale (OAS) korištena je za procjenu djetetove agresivnosti i dobivanje informacije o četirima tipovima agresivnog ponašanja (verbalna agresija i agresija prema stvarima, prema sebi i drugim osobama). **Rezultati:** Dječaci s RI-jem pokazivali su značajno višu agresiju prema drugim osobama od dječaka sa SI-jem ($F = 13,66$; $P < 0,001$). Agresivno ponašanje dječaka s RI-jem bilo je značajno češće u dobnim skupinama od 9 do 11 godina te od 12 do 17. Dječaci u dobi od 12 do 17 godina imali su 7 puta veći rizik za ponavljanje ozljeda od dječaka sa SI-jem ($OR = 7,000$; $CI = 1,485 - 41,360$). Djevojčice s RI-jem u objema dobnim skupinama pokazivale su sličnu razinu agresivnog ponašanja. **Zaključak:** Agresivno ponašanje i povećani skor agresije prema drugim osobama često su obilježje dječaka s ponavljanim ozljedama. Uporaba OAS-a kod djece s TDI-jem mogla bi pomoći u detekciji pacijenata s povećanim rizikom od ponavljanja ozljeda. Upućivanje agresivne djece dječjem psihijatru moglo bi pridonijeti poboljšanju djetetova ponašanja i smanjiti rizik od budućih ozljeda.

Zaprimljen: 29. lipanja 2026.

Prihvaćen: 26. kolovoza 2026.

Adresa za dopisivanje

izv. prof. dr. sc. Tomislav Škrinjaric
Zavod za dječju i preventivnu
stomatologiju
Stomatološki fakultet Sveučilišta u
Zagrebu
Gundulićeva 5, Zagreb
tskrinjaric@sfgz.hr

MeSH pojmovi: ozljede zuba; agresija;
dijete; adolescent

Autorske ključne riječi: dentalna trauma, čimbenici rizika, otvorene agresija

References

- Andreasen JO, Andreasen FM, Andersson L. Textbook and color atlas of traumatic injuries to the teeth. Oxford, Copenhagen: Blackwell Munksgaard, 2007.
- Bijur P E, Golding J, Haslum M. Persistence of occurrence of injury: can injuries of preschool children predict injuries of school-aged children? *Pediatr*. 1988;82:707-712.
- Guyer B, Gallagher SS: An approach to the epidemiology of childhood injuries. *Pediatr Clin North Am*. 1985; 32:5-15.
- Glendor U. Aetiology and risk factors related to traumatic dental injuries – a review of the literature. *Dent Traumatol*. 2009; 25:19–31.
- Hasselberg M, Laflamme L. The social patterning of injury repetitions among young car drivers in Sweden. *Accident Anal Prev*. 2005; 37:163-8.
- Spinks AB, Nagle C, Macpherson AK, Bain C, McClure R. Host Factors and Childhood Injury: The Influence of Hyperactivity and Aggression. *J Dev Behav Pediatr*. 2008; 29:117-123.
- Soriano EP, Caldas Jr AF, Góes PSA. Risk factors related to traumatic dental injuries in Brazilian schoolchildren. *Dent Traumatol*. 20:246-250, 2004.
- Škrinjaric T, Čuković-Bagić I, Gorseta K, Verzak Ž, Škrinjaric I. Socioeconomic Status and Dental Injury Repetition in Children. *Acta stomatol Croat*. 2013;47(2):154-162.
- Laforgia A, Inchingolo AM, Inchingolo F, Sardano R, Trilli I, Di Noia A, Ferrante L, Palermo A, Inchingolo AD, Dipalma G. Paediatric dental trauma: insights from epidemiological studies and management recommendations. *BMC Oral Health*. 2025; 25:6.
- Peters SM, Davies M-A, Van As AB. Repeat injuries in childhood. *S Afr Med J*. 2020; 110(12):1218-1225.
- Banerjee B, Yadav P. A mixed-method study on recurrent unintentional injuries in children and adolescents in a rural area of Delhi. *MAMC Journal of Medical Sciences*. 2021;7(2):144–148.
- Akgun OM, Yildirim C, Guven Polat G, Altun C, Basak F. Evaluation of traumatic dental injuries in pediatric patients: A crosssectional study. *Ulus Travma Acil Cerrahi Derg* 2025; 31:698-704.
- Cameron CM, Spinks AB, Osborne JM, Davey TM, Sipe N, McClure RJ. Recurrent episodes of injury in children: an Australian cohort study *Austr Health Rev*. 2017;41:485–91.
- Vacirca MF, Giletta M, Rabaglietti E, Ciairano S. Physical and relational aggression in friend dyads from primary Italian schools: Gender differences and the contribute of socialization process. *Cognition, Brain, Behavior: An Interdisciplinary Journal*. 2011; 15(1):39-55.
- Stewart SL, Celebre A, Hirdes JP, Poss JW. Risk of Injury to Others: The development of an algorithm to identify children and youth at high-risk of aggressive behaviours. *Front Psychiatry*. 2022;12:750625.
- Glendor U, Koucheiki B, Halling A. Risk evaluation and type of treatment of multiple dental trauma episodes to permanent teeth. *Endod Dent Traumatol*. 2000; 16: 205–210.
- Owens LD. Sticks and stones and sugar and spice: girls' and boys' aggression in schools. *The Journal of Psychologists and Counselors in Schools (JPCS)*. 1996; 6:51.
- Stattin H, Magnusson D. The role of early aggressive behavior in the frequency, seriousness, and types of later crime. *J Consult Clin Psychol*. 1989; 57:710–8.
- Ozmen B, Ayna NB. Occlusal Radiographs in a Turkish Pediatric Subpopulation. *Acta stomatol Croat*. 2024;58(1):52-58.
- Yudofsky SC, Silver JM, Jackson W, Endicott J, Williams D. The Overt Aggression Scale for the objective rating of verbal and physical aggression. *Am J Psychiatry* 1986;143:35-39.
- Silver JM, Yudofsky SC: The overt aggression scale: overview and guiding principles. *J Neuropsychiatry Clin Neurosci* 1991; 3: (suppl)S22–S29.
- Kafantaris V, Lee DO, Magee H, Winny G, Samuel R, Pollack S, Campbell M. Assessment of children with the overt aggression scale. *J Neuropsychiatry Clin Neurosci* 1996; 8:186-193.
- Amore M, Menchetti M, Tonti C, Scarlatti F, Lundgren E, Esposito W, Berardi D. Predictors of violent behavior among acute psychiatric patients: clinical study. *Psychiatry Clin Neurosci* 2008; 62(3):247-55.
- Crick NR, Grotpeter JK. Relational aggression, gender, and social-psychological adjustment. *Child Dev*. 1995; 66(3):710-22.
- Cairns RB, Cairns BD, Neckerman HJ, Ferguson LL, Gariépy J. Growth and aggression: I. Childhood to early adolescence. *Development Psychol*. 1989; 25(2):320-330.
- Côté S, Vaillancourt T, LeBlanc JC, Nagin DS, Tremblay RE. The development of physical aggression from toddlerhood to pre-adolescence: a nation-wide longitudinal study of Canadian children. *J Abnorm Child Psychol*. 2006; 34(1):68–82.
- Eliot L. Brain Development and Physical Aggression: How a Small Gender Difference Grows into a Violence Problem. *Current Anthropology*. 2021; 62:S23, S66-S78.
- Ostrov JM, Murray-Close D, Perry KJ, Blakely-McClure SJ, Perhamus GR, Mutignani LM, Kesselring S, Membra GV, Probst S. The development of forms and functions of aggression during early childhood: A temperament-based approach. *Development and Psychopathology*. 2023;35(2):941-957.
- Baker ER, Jensen CJ. Linking teacher-versus child self-report discrepancies in aggression to demographic and cognitive profiles. *Early Childhood Education J*. 2024; 52:443–58.
- Lee S-Y, Choi M. Changes in Aggressive Behaviors over Time in Children with Adverse Childhood Experiences: Focusing on the Role of School Connectedness. *Soc Sci*. 2025; 14(6): 385.
- Choi M, Lee S-Y, Kim J, Lee J. The interaction of race/ethnicity and school connectedness in presenting internalizing and externalizing behaviors among adolescents. *Child Youth Serv Rev*. 2024; 161:107605.
- Njari Galic V, Vlahović D, Karlović D, Verzak Ž, Čuković-Bagić I. The Impact of ADHD Symptoms on Children's Oral Health. *Acta stomatol Croat*. 2025;59(3):276-289.
- Lalloo R. Risk factors for major injuries to the face and teeth. *Dent Traumatol*. 2003;19:12-14.
- Braun PA, Beaty BL, DiGuseppi C, Steiner JF. Recurrent early childhood injuries among disadvantaged children in primary care settings. *Inj Prev*. 2005;11:251-255.