

School bullying and traumatic dental injuries in East London adolescents

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IN BRIEF

- Summarises the literature on the possible link between school bullying and dental trauma.
- Discusses possible explanations for the lack of association between school bullying and dental trauma found in the present study.
- Highlights areas for further research that will help clarify the effect of school bullying on dental trauma.

Aim To explore the association between school bullying and traumatic dental injuries (TDI) among 15–16-year-old school children from East London. **Design** Data from phase III of the Research with East London Adolescents Community Health Survey (RELACHS), a school-based prospective study of a representative sample of adolescents, were analysed. Adolescents provided information on demographic characteristics, socioeconomic measures and frequency of bullying in school through self-administered questionnaires and were clinically examined for overjet, lip coverage and TDI. The association between school bullying and TDI was assessed using binary logistic regression models. **Results** The prevalence of TDI was 17%, while lifetime and current prevalence of bullying was 32% and 11%, respectively. The prevalence of TDI increased with a growing frequency of bullying; from 16% among adolescents who had never been bullied at school, to 21% among those who were bullied in the past but not this school term, to 22% for those who were bullied this school term. However, this association was not statistically significant either in crude or adjusted regression models. **Conclusion** There was no evidence of an association between frequency of school bullying and TDI in this sample of 15–16-year-old adolescents in East London.

INTRODUCTION

Being bullied is a common experience for many children and adolescents with varying degrees of severity. Bullying in schools is becoming an increasingly important problem taking various forms, with cyber-bullying becoming an emerging threat.^{1,2} In a large-scale study in the United Kingdom, 26% of children aged 8–9 years reported being bullied 'sometimes or more often' and 10% reported being bullied 'more than once a week', which contrasted with 15% and 2% of 11–12-year-olds, respectively.³ Later, Salmon *et al.*⁴ found that 4.2% of 12–17-year-olds reported being bullied, suggesting that the incidence of bullying may decrease with age.

The effects of bullying can be long-term, resulting in both physical and psychological symptoms.⁵ Academic performance may be affected,⁶ and there is a risk of self-harm as a result of being bullied.⁷ Victims of bullying

are also more likely to suffer from anxiety and depression.⁸ On the other hand, injurious events related to school bullying represent the tip of a global public health iceberg because of the underestimated magnitude of injuries associated with this type of maltreatment.⁹ A study of injured 10–15-year-old children in a Stockholm hospital found that one out of ten had been bullied shortly before the injury, potentially acting as a trigger for the incident.¹⁰ Lalloo *et al.*^{11–13} also reported that certain behavioural and emotional risk factors could contribute to the occurrence of accidents, and that hyperactivity, but not peer problems, was significantly associated with minor and major accidents among 4–15-year-old children in England.

The role of bullying as a risk factor for traumatic dental injuries (TDI) has not been formally tested. A study among East London adolescents reported that peer relationship problems, as indicated by the strengths and difficulties (SDQ) questionnaire, were associated with TDI and bullying was given as an example of peer relationship problems.¹⁴ Another study in Brazil found that 29% of TDI cases were caused by the intentional actions of another person and speculated that this could be caused by physical abuse or bullying from peers.¹⁵ However, these studies did not measure bullying directly.

To fill this gap in knowledge, a study was set to explore the association between

bullying and traumatic dental injuries among 15–16-year-old school children from East London.

METHODS

This study used data from phase III of the Research with East London Adolescents Community Health Survey (RELACHS) a longitudinal, school-based study of a representative, ethnically diverse sample of adolescents from 28 state secondary schools in East London, UK. There have been three cross-sectional RELACHS surveys to date. Phase I took place in 2001 (when pupils were in year 7 and aged 11–12 years), phase II took place in 2003 (year 9, 13–14 years) and phase III took place in 2005 (year 11, 15–16 years). Adolescents were selected using stratified two-stage cluster sampling in 2001. All 42 eligible schools were stratified by borough and school type (comprehensive, voluntary or other). Thirty schools were randomly selected and balanced to ensure representation by single-sex and mixed-sex ones. In each of the 28 schools that agreed to participate, two representative mixed ability classes of year 7 pupils were selected.¹⁶ Ethical approval for RELACHS was obtained from the East London and City Local Research Ethics Committees. Parents were fully informed about the study and students were given the opportunity to opt out.¹⁶

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Table 1 Characteristics of the sample (n = 728)

Explanatory variables	n*	(%)
Sex		
Male	333	(43.6)
Female	395	(56.4)
Age		
15 years old	309	(43.2)
16 years old	419	(56.8)
Ethnicity		
White	180	(25.8)
Asian	299	(40.0)
Black	161	(23.1)
Mixed/Other	88	(11.0)
Parental employment		
One/both employed	486	(66.8)
Both unemployed	242	(33.2)
Lip coverage		
Adequate	725	(99.8)
Inadequate	3	(0.2)
Overjet		
Up to 6 mm	717	(98.7)
More than 6 mm	11	(1.3)

*Counts are unweighted

Data collection

Phase III data were collected through self-completed questionnaires and clinical oral examinations. Questionnaires were completed individually in the classroom under the supervision of trained researchers, who addressed adolescents' queries and checked the questionnaires for missing data. The questionnaire included items on family socioeconomic factors, participants' demographic characteristics (age, gender and ethnicity) and experience of bullying at school. Socioeconomic measures included parental employment (both employed, one unemployed, both unemployed), household overcrowding (>1.5 persons/room) and family car ownership. In addition, adolescents' data for eligibility for free school meals were obtained from school records. Ethnicity was self-assigned using an adaptation of the 2001 UK census categories, including 24 ethnic subcategories grouped into five main groups: white, black, asian, mixed and other. School bullying was assessed with six items derived from the revised Olweus Bully/Victim Questionnaire.¹⁷ The first item asked participants whether they have ever

Table 2 Bullying frequency by socio-demographic and clinical characteristics (n = 728)

Explanatory variables	Never been bullied		Bullied in the past but not this term		Bullied this term		p value [†]
	n*	(%)	n*	(%)	n*	(%)	
Sex							
Male	274	(81.9)	37	(11.1)	22	(7.1)	<0.001
Female	300	(75.0)	80	(21.1)	15	(3.8)	
Age							
15 years old	239	(76.2)	56	(19.6)	14	(4.2)	0.195
16 years old	335	(79.4)	61	(14.5)	23	(6.0)	
Ethnicity							
White	126	(68.4)	43	(24.6)	11	(6.9)	0.004
Asian	261	(86.5)	29	(10.4)	9	(3.0)	
Black	127	(78.8)	24	(15.2)	10	(6.0)	
Mixed/Other	60	(67.8)	21	(24.2)	7	(8.0)	
Parental employment							
One/both employed	196	(77.6)	31	(15.3)	15	(7.1)	0.352
Both unemployed	378	(78.2)	86	(17.4)	22	(4.3)	
Lip coverage							
Adequate	571	(78.0)	117	(16.8)	37	(5.3)	0.759
Inadequate	3	(100)	0	(0.0)	0	(0.0)	
Overjet							
Up to 6 mm	564	(77.8)	116	(16.8)	37	(5.3)	0.578
More than 6 mm	10	(91.6)	1	(8.4)	0	(0.0)	

*Counts are unweighted; [†]chi-square was used for comparison

been bullied at school (yes/no). Those who gave a positive response were subsequently asked about the frequency with which they had been bullied this school term, in the second question, with five response options ('I haven't been bullied in school this term', 'once or twice', 'sometimes', 'about once a week', or 'several times a week'). The other questions asked participants how often this school term they had experienced treatment that might be considered bullying: made fun of because of race or religion; made fun of because of their appearance or speech; been hit, slapped or pushed; and had rumours or lies spread about them, with the same five possible response options for each ('not this term', 'once or twice', 'sometimes', 'about once a week' or 'more than once a week').

Oral clinical examinations were conducted according to the World Health Organisation (WHO) methodology.¹⁸ Two examiners (GS and PE) carried out the oral clinical examinations with participants seated on an adjustable chair. Participants' teeth were not brushed nor professionally cleaned before

examination. Teeth were dried with cotton pellets and examined with plane mouth mirrors under illumination by Daray light lamps. Diagnosis was visual and no radiographs were taken. TDI were recorded using Glendor *et al.*¹⁹ classification. Training and calibration of examiners was conducted before the main study. Training for the criteria used for clinical assessment of TDI was carried out through the WHO manual for oral health surveys¹⁸ and computer-based practical exercises. Kappa values for intra-examiner reliability were 0.87 and 0.91, and that for intra-examiner reliability was 0.80. Lip coverage and overjet were also measured during oral clinical examinations. An overjet of up to 6 mm was recorded as normal and as increased if greater than 6 mm.²⁰ Lip coverage was recorded as being adequate or inadequate depending on lip contact in rest position.²¹

Data analysis

All analyses took into account sampling weights to compensate for unequal

probabilities of selection and RELACHS complex survey design to adjust standard errors and 95% confidence intervals (CI) accordingly. It has been shown that parental employment was the most sensitive socio-economic measure of the four assessed in this sample,²² therefore only this measure was used for regression modelling.

We first present the distribution of the sample by socioeconomic (parental employment), demographic (sex, age and ethnicity) and clinical characteristics (lip coverage and overjet), followed by comparisons of bullying frequency by demographic, socioeconomic and clinical factors using Chi-square test. The crude and adjusted association of bullying frequency with TDI was assessed in binary logistic regression models since the outcome was a dichotomous variable (prevalence of TDI). Odds ratios (OR) were therefore reported as a measure of association. The adjusted model controlled for socioeconomic, demographic and clinical factors as potential confounders. We also explored whether specific bullying experiences (bullied about race or religion, bullied about appearance or speech, been hit, slapped or pushed and had rumours or lies spread) were related to TDI in separate unadjusted and adjusted models using binary logistic regression.

RESULTS

One thousand four hundred and fifty one 15–16-year-old adolescents were invited to participate in RELACHS phase III, of whom 1,030 (71%) completed the questionnaire, 975 (67%) had an oral examination and 728 had all information for the relevant variables. The characteristics of the sample are presented in Table 1. Evidence of TDI was seen in 17% of participants. Notably, just 11 and three adolescents displayed increased overjet and inadequate lip coverage on examination, respectively. The lifetime and current prevalence of bullying was 32% and 11%, respectively. As for the type of bullying experienced in school this term, 28% of adolescents reported having been bullied about appearance or speech, 25% having rumours or lies spread, 17% having been hit, slapped or pushed, and 13% having been bullied about race or religion.

Table 2 presents the frequency of bullying by socioeconomic, demographic and clinical characteristics. There were significant differences in the frequency of bullying by sex and ethnicity. While lifetime prevalence of bullying was higher in female than male adolescents (24.9% *vs* 18.2%), current prevalence was higher in males than females (7.1% *vs* 3.8%). Lifetime and current prevalence of bullying were significantly higher in White adolescents and those of mixed or

Table 3 Association between bullying frequency and traumatic dental injuries (n = 728)

Explanatory variables	(% with TDI)	Unadjusted associations		Adjusted associations [†]	
		OR [*]	[95%CI]	OR [*]	[95%CI]
Sex					
Male	(20.9)	1.00	[Reference]	1.00	[Reference]
Female	(14.1)	0.62	[0.40–0.95]*	0.56	0.38–0.85**
Age					
15 years old	(12.3)	1.00	[Reference]	1.00	[Reference]
16 years old	(14.0)	1.40	[0.91–2.16]	1.37	0.86–2.16
Ethnicity					
White	(18.3)	1.00	[Reference]	1.00	[Reference]
Asian	(16.1)	0.86	[0.53–1.38]	0.71	[0.45–1.15]
Black	(14.6)	0.76	[0.41–1.41]	0.78	[0.43–1.41]
Mixed/other	(22.7)	1.31	[0.74–2.33]	1.21	[0.66–2.21]
Parental employment					
One/both employed	(14.5)	1.00	[Reference]	1.00	[Reference]
Both unemployed	(22.5)	1.68	[1.09–2.57]	1.87	[1.20–2.91]**
Overjet					
Up to 6 mm	(17.1)	1.00	[Reference]	1.00	[Reference]
More than 6 mm	(12.7)	0.71	[0.08–6.18]	0.83	[0.11–6.27]
Bullying frequency					
Never been bullied	(15.9)	1.00	[Reference]	1.00	[Reference]
Not bullied this term	(21.0)	1.40	[0.81–2.44]	1.51	[0.83–2.76]
Bullied this term	(21.7)	1.47	[0.60–3.58]	1.16	[0.45–2.93]

[†]Model included as explanatory variables all those presented in the table; ^{*}logistic regression was used for testing associations and OR reported; OR: odds ratio. *p <0.05; **p <0.01; ***p <0.001

other ethnic groups than in Black and Asian adolescents (Table 2). Bullying frequency was not significantly associated with age, parental employment, lip coverage or size of overjet.

The prevalence of TDI increased with increasing frequency of bullying; from 15.9% for adolescents who had never been bullied, to 21.0% for those who were bullied in the past but not this term, to 21.7% for those who were bullied this term (Table 3). However, this association was not statistically significant (adjusted OR: 1.51 with 95% CI: 0.83–2.76 and 1.16 with 95% CI: 0.45–2.93, respectively). Gender and parental employment were significantly associated with TDI experience, while age, ethnicity and size of overjet were not. Lip coverage was dropped when modelling associations due to the small number of cases. Females were 44% less likely to experience TDI (OR: 0.56; 95% CI: 0.38–0.85) than males whereas adolescents with both parents

unemployed were 1.87 (95% CI: 1.20–2.91) times more likely to experience TDI than those with one or both parents employed.

The association between the different types of school bullying and TDI revealed similar patterns (Table 4). In the adjusted models, no significant associations were found between TDI and experiences of bullying about race or religion (OR: 0.65; 95% CI: 0.33–1.26), about appearance or speech (OR: 0.99; 95% CI: 0.62–1.58), having been hit, slapped or pushed (OR: 0.92; 95% CI: 0.54–1.55) or having been subjected to rumour spreading (OR: 0.90; 95% CI: 0.55–1.48).

DISCUSSION

This study shows that 17% of 15–16-year-old schoolchildren in three East London boroughs had evidence of TDI, whereas 32% have ever been bullied at school. However, there was no association between bullying frequency and TDI in this sample of

Table 4 Association between specific types of bullying and traumatic dental injuries (n = 728)

Types of bullying	(% TDI)	Unadjusted associations		Adjusted associations [†]	
		OR*	[95% CI]	OR*	[95% CI]
Bullied about race or religion					
No	(17.7)	1.00	[Reference]	1.00	[Reference]
Yes	(12.9)	0.69	[0.35–1.36]	0.65	[0.33–1.26]
Bullied about appearance or speech					
No	(16.9)	1.00	[Reference]	1.00	[Reference]
Yes	(17.4)	1.03	[0.65–1.64]	0.99	[0.62–1.58]
Been hit, slapped or pushed					
No	(17.1)	1.00	[Reference]	1.00	[Reference]
Yes	(17.0)	1.00	[0.58–1.70]	0.92	[0.54–1.55]
Had rumours or lies spread					
No	(17.3)	1.00	[Reference]	1.00	[Reference]
Yes	(16.3)	0.93	[0.58–1.52]	0.90	[0.55–1.48]

[†]Model for each type of bullying was adjusted for sex, age, ethnicity, parental employment and overjet; [†]logistic regression was used for testing associations and OR reported; OR: odds ratio. *p <0.05; **p <0.01; ***p <0.001

adolescents. Similar non-significant findings were found when analysing the four types of bullying individually; bullied about religion or race, bullied about appearance or speech, been hit, slapped or pushed and having had rumours or lies spread about them. While Odoi *et al.*¹⁴ reported that peer relationship problems were significantly associated with TDI and Traebert *et al.*¹⁵ found that 29% of TDI cases were caused by the intentional actions of another person, the findings of this study do not support these conclusions.

There are a number of possible explanations to consider for the lack of association found between bullying and TDI. The first explanation relates to sample size, which was not purposefully estimated to explore this association. However, a post-hoc power calculation indicated that the sample size was adequate (a statistical power of 0.87 to estimate an effect size of 0.25). In addition, other common risk factors for TDI, such as gender and parental employment were found to be significantly related to TDI, suggesting that the sample was large enough to identify common determinants of TDI.

A second explanation relates to the age group selected, which included 15–16-year-olds, representing late adolescence. There is some evidence suggesting that the prevalence of bullying decreases with age.^{3,4} Similarly, findings from RELACHS phase I show the current prevalence of bullying to be higher in year 7 children (24.3%), compared to 13.1% in year 9 adolescents.¹⁶ This would suggest that enquiring about bullying in late adolescence may be too late since

there would be underrepresentation of bullying experience if it had not occurred in that term at school.

A third explanation for the lack of association between bullying and TDI relates to the way information on school bullying was collected. With bullying being a sensitive issue, accurate estimates are difficult to achieve due to under-reporting. There is therefore a concern that instruments may not elicit the true bullying experience of the participants. Having said that, the questions used to measure bullying in RELACHS were derived from the revised Olweus Bully/Victim Questionnaire,¹⁷ commonly used by others investigating the effects of bullying on health.^{10,23,24} Furthermore, the prevalence of bullying in this study was very similar to that previously reported in the UK.³

A final explanation is that there is no true association between school bullying and TDI among adolescents. The odds of having TDI for adolescents who were bullied this term in school was relatively low (1.16) and even if a significant confidence interval can be reached by increasing the sample size, the strength of association is still likely to be weak.

As this is the first study to formally test the bullying-TDI association, the present findings may act as a starting point for further research into the association between bullying and TDI, looking specifically at physical bullying and TDI. Stronger research designs must be used to add to the body of evidence in the literature. Although we should advocate for policies in schools to take firmer action on bullying, at the present

time they cannot be based on the long-term implications of sustaining dental trauma.

Some limitations of this study need to be addressed. First, this study was based on analyses of cross-sectional data. This means that we were limited to identifying associations rather than causal relationships. Second, even though RELACHS was a representative sample of adolescents in three East London boroughs, the present findings should not be inferred to larger populations, especially given the demographic profile of Hackney, Newham and Tower Hamlets compared to the entire city of London. Third, although current experiences of bullying were included to minimise the risk of recall bias, it is also important to consider that with a sensitive topic such as bullying, many students may not wish to admit to being bullied, which leads to underestimation. This study attempted to eliminate this problem by reminding participants that responses were strictly confidential during classroom discussions before the survey and reminders on each questionnaire page. What is more, questionnaires are the standard method to measure bullying and have been used by many to address the question among children.^{10,23,24} It is also more likely that an individual would be more willing to reveal their true experience of bullying in a confidential questionnaire than in a face-to-face interview.²⁵ However, it would be advantageous to confirm reports of bullying by parents or teachers accounts, rather than relying solely on adolescents' self-reports. Fourth, there were a number of established risk factors for TDI (such as the adolescents' participation in sports, certain medical conditions and the presence of oral piercings) that were not included in the present analysis. However, they are unlikely to confound the association between bullying and TDI. Further work into this topic would be required before completely ruling out an association between TDI and bullying.

CONCLUSION

This study provided no support for an association between school bullying and TDI among adolescents in an East London population. As this was the first study exploring such an association formally, these findings have important implications for future research and may act as a platform for future studies into the topic. Clearly, further research is required in this area before the results can be generalised to a wider population and before the implication for policies can be identified.

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ac.uk/relachs/academics/academic_page_index.htm). We are grateful for the support of the schools, parents and students involved in this study. We also thank the RELACHS field research team. Special thanks to Drs Gramatti Sarri (GS) and Patricia Evans (PE), who conducted the clinical oral examinations.

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