

# School bullying, homicide and income inequality: a cross-national pooled time series analysis

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## Abstract

**Objectives** To examine the relation between income inequality and school bullying (perpetration, victimisation and bully/victims) and explore whether the relation is attributable to international differences in violent crime.

**Methods** Between 1994 and 2006, the Health Behaviour in School-aged Children study surveyed 117 nationally representative samples of adolescents about their involvement in school bullying over the previous 2 months. Country prevalence rates of bullying were matched to data on income inequality and homicides.

**Results** With time and country differences held constant, income inequality positively related to the prevalence of bullying others at least twice ( $b = 0.25$ ), victimisation by bullying at least twice ( $b = 0.29$ ) and both bullied and victimisation at least twice ( $b = 0.40$ ). The relation between income inequality and victimisation was partially mediated by country differences in homicides.

**Conclusions** Understanding the social determinants of school bullying facilitates anti-bullying policy by identifying groups at risk and exposing its cultural and economic influences. This study found that cross-national differences in income inequality related to the prevalence of school bullying in most age and gender groups due, in part, to a social milieu of interpersonal violence.

**Keywords** Bullying · Adolescents · Social conditions · Income inequality · HBSC · Pooled time-series analysis

## Introduction

School bullying is widely recognised as a public health concern for adolescents (Anthony et al. 2010). Its links to emotional and physical health problems, academic problems, delinquency and crime are well documented (Kumpulainen and Rasanen 2000; Nansel et al. 2001, 2004).

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Bullying is also a common problem in many countries. A recent study of adolescents in 40 countries found that at least twice during the previous 2 months, 10.7 % of the sample had bullied others, 12.6 % had been victimised by bullying and 3.6 % had been both a bully and a victim (Craig et al. 2009). This study also found large international differences in the prevalence of bullying others (from 2 to 27 %) and victimisation (from 4 to 28 %).

Bullying is repeated physical, emotional or verbal aggressive acts that have hostile intent and involve a power differential between aggressors and their victims (Olweus 1999). These acts include direct aggression, both physical and verbal, and indirect aggression through gossip and peer rejection (Pepler et al. 2008). Direct aggression is more common among males than females and younger age groups. As verbal and social skills develop with age, rates of direct physical aggression decrease and direct verbal aggression and indirect bullying increase (Craig et al. 2009; Pepler et al. 2008).

The extant research on bullying typology, risk factors and outcomes makes a compelling case for school-level intervention and raises the profile of bullying as a legitimate focus of health policy (Hawker and Boulton 2000; Srabstein et al. 2008). However, contextual factors that relate to international differences in bullying have not been thoroughly examined. Specifically, the notion that some societies have more bullying than others due to economic inequality or other social determinants of violence requires in-depth study (Elgar et al. 2009; Srabstein et al. 2008).

Unlike health and behavioural problems that tend to be more common in lower socioeconomic status (SES) groups (Chen 2004), school bullying is not closely associated with individual or family SES (Craig et al. 2009; Due et al. 2009; Kim et al. 2004). It could be that SES differences in behavioural problems narrow during adolescence when peers exert stronger influences on health (West and Sweeting 2004). However, recent studies have found that relative differences in income might contribute more to bullying than absolute levels of SES. An ecological study by Pickett and Wilkinson (2007) found that income inequality in 21 rich countries correlated with the percentage of youths who were victims of bullying ( $r = 0.47$ ). A multilevel study of 11-year-olds in 37 European and North American countries found that income inequality related to bullying others at school (Elgar et al. 2009). Another multilevel study found similar links to victimisation by bullying among 11- to 15-year-olds (Due et al. 2009).

The evidence linking income inequality to school bullying is consistent with research on the contributions of income inequality to interpersonal distrust, racism, firearm assaults, sexual assaults, homicides, incarceration and a raft of health and social problems (Butchart and Engström 2002; Kawachi and Kennedy 2002; Wilkinson and Pickett

2009). Differences in income inequality account for about half of the variation in homicide rates between the US states and Canadian provinces (Daly et al. 2001) and between countries (Elgar and Aitken 2011; Pickett et al. 2005), and independent systematic reviews concluded that income inequality is a robust determinant of violence (Fajnzylber et al. 2002; Hsieh and Pugh 1993; Lee and Bankston 1999). Theoretical discussions describe income inequality as a form of structural violence because it intensifies class competition and fosters harsh social conditions that are rife with teasing, shame and violent retaliation (Wilkinson 2004). Research has not yet explored whether the relation between income inequality and school bullying is attributable to this milieu of violence that characterises unequal societies.

Psychological theorists have also explored how social inequality might contribute to antisocial behaviour. Arsenio and Gold (2006) integrated the tenets of the moral domain approach and social information processing theory to describe how unequal social environments might influence moral development. According to their model, children internalise social norms, including the notion that life does not revolve around equality and reciprocity, but around power and domination. Exposure to inequality biases how social information is processed such that instrumental goals are valued more than relational goals and violence is seen as an effective way to succeed (Crick and Dodge 1994). Arsenio and Gold (2006) and O'Donnell et al. (2006) argued that unequal social environments foster cynical notions of justice and fairness and affect how youths interpret and respond to social information, thereby promoting hostility and violent behaviour.

Anti-bullying policy requires knowledge about at-risk populations and how bullying relates to known socioeconomic determinants of violence. Previous epidemiologic studies on bullying have not explored whether income inequality relates to the prevalence of bullying across age groups and genders. Elgar et al. (2009) examined only the perpetration of bullying by 11-year-olds, Due et al. (2009) studied bullying among 11-, 13- and 15-year-olds but focused on victimisation, and neither of these studies had a sufficient sample size to test mediated paths through country characteristics. A second gap in the literature pertains to mechanisms through which income inequality relates to school bullying. Past research suggests that income inequality encourages violence or reduces social control over violence, and that school bullying is a potential consequence of this social influence. Such a mediated path has not yet been tested.

To address these issues, we used data on income inequality, school bullying and rates of homicide from as many countries and time points as possible and tested their associations using pooled time series analysis (Ostrom 1990; Soliday et al. 2002; Ward and Leigh 1993).

This regression-based approach enabled us to examine time-related associations in a pooled sample of country-level observations, thus providing greater statistical power than cross-sectional studies of small groups of countries. Our research questions were: (1) Does income inequality predict prevalence rates of bullying and victimisation across age and gender groups of adolescents? (2) Do cross-national differences in violent crime—operationalised by rates of homicide—mediate the association between income inequality and school bullying? We hypothesised that income inequality positively relates to prevalence rates of bullying, victimisation and “bully–victims” (i.e. youths who both bully others and are victims of bullying) due to country differences in violence.

## Methods

### Data sources

#### *Health Behaviour in School-aged Children study*

Self-report data on family affluence and school bullying were collected in the 1994, 1998, 2002 and 2006 cycles of the World Health Organisation-Health Behaviour in School-aged Children (HBSC) study (<http://www.hbsc.org>). Nationally representative samples of 11-, 13- and 15-year-olds participated from 23 countries in 1994, 25 countries in 1998, 32 countries in 2002 and 37 countries in 2006 (see [Appendix](#)). The sample represented European and North American countries. The pooled sample included 594,638 adolescents from 117 country/years (Table 1). Greenland was omitted from our analysis due to a lack of publicly available economic data. Survey data from England, Scotland and Wales were combined with equal weight to correspond to economic data on the UK. Survey data from French and Flemish samples in Belgium were also combined.

Classes within schools formed the sampling units. HBSC statistical criteria specify that samples submitted for international comparisons are sufficient to provide confidence intervals of  $\pm 3\%$  for representative estimates with sample design effects no more than 1.4 times greater than would be obtained from a simple random sample

(Currie et al. 2008a). Teachers or trained interviewers administered the survey in classroom settings. Student participation was voluntary. Each participating country obtained approval to conduct the survey from the ethics review board or equivalent regulatory body associated with the institution conducting each respective national survey.

Family affluence was included as a control variable in the analysis of income inequality given the range of material conditions represented in the sample (Currie et al. 2008a). Affluence was measured using the HBSC Family Affluence Scale (FAS; Currie et al. 2008b), which comprised four items that measure material assets: “Does your family have a car or a van?” (0 = no, 1 = one, 2 = two or more), “Do you have your own bedroom for yourself?” (0 = no, 1 = yes), “During the past 12 months, how many times did you travel away on holiday (vacation) with your family?” (0 = not at all, 1 = once, 2 = twice, 3 = more than twice) and “How many computers does your family own?” (0 = none, 1 = one, 2 = two, 3 = more than two). Summed together, these items produced a score that ranged from 0 (lowest affluence) to 9 (highest affluence). The HBSC FAS is an accepted socioeconomic construct for adolescent populations who provide information by self-report and, compared to longer measures of socioeconomic status that rely on parental education or income, has better criterion validity and is less affected by nonresponse bias (Currie et al. 2008b).

The HBSC survey included a definitional assessment of bullying adapted from the Revised Olweus Bully/Victim Questionnaire (Olweus 1996). To ensure consistency in responses, students were shown a standard definition of bullying:

We say a student is being bullied when another student, or a group of students, say or do nasty and unpleasant things to him or her. It is also bullying when a student is teased repeatedly in a way he or she does not like or when he or she is deliberately left out of things. But it is not bullying when two students of about the same strength or power argue or fight. It is also not bullying when the teasing is done in a friendly and playful way.

In the 1994 and 1998 surveys, this definition was followed with the questions: “How often have you taken part

**Table 1** Sample sizes in four cycles of the HBSC study, 1994–2006

Age group	1994		1998		2002		2006	
	Males	Females	Males	Females	Males	Females	Males	Females
11	17,182	18,018	21,240	21,897	27,897	27,690	32,832	33,875
13	16,801	17,890	21,181	21,790	26,975	28,564	34,394	35,560
15	15,891	16,885	19,101	20,523	23,990	26,590	33,007	34,865

in bullying other students in school this term?” and “How often have you been bullied at school this term?” (have not bullied others in school this term; once or twice; sometimes; about once a week; several times a week). In the 2002 and 2006 surveys, the time reference changed from “this term” to “past couple of months,” and the response option “sometimes” changed to “two or three times a month.” Previous analysis of trends in bullying did not find that this change affected prevalence estimates of bullying; however, the authors noted the possibility of spurious decreases in bullying in some countries or languages due to revised time reference and response options (Molcho et al. 2009). Translation and back-translation of the prose helped ensure that the meaning of each question was not lost between languages.

### Country data

Income inequality data for all country/year observations were supplied by the Standardized World Income Inequality Database (Solt 2009). These data are estimated, post-taxation Gini coefficients based on data from the United Nations University’s World Income Inequality Database and Luxembourg Income Study that were subjected to missing-data algorithms to address coverage problems of existing data sources. The Gini coefficient is a measure of inequality in net household income that theoretically ranges from 0 (where all persons have equal income) to 1 (where one person has all the income and the rest have none).

Data on homicides per 100,000 population were retrieved for most country/year observations from the 1994, 1998, 2002 and 2006 United Nations Surveys on Crime Trends and Operations of the Criminal Justice System (<http://www.unodc.org>). This variable was selected for its unambiguous and consistent measurement criteria between countries.

### Data analysis

Multilevel analysis is generally preferred to test associations between contextual characteristics and individual-level outcomes. However, because our repeated observations were countries and not individual participants, the data on family affluence and bullying were aggregated to the level of country/year to represent country affluence and prevalence rates of youths who bullied others, were victimised by bullying, and were both bullied and victimised (bully–victims) several times a week. These data were aggregated in each country/year in each age and gender group.

Given these data were repeated observations taken from a relatively small group of countries (23–37 per cycle), the data were analysed using pooled time series analysis (Ostrom 1990). This procedure pools repeated observations and partials out cross-national differences and serial

dependence in the data. Pooled time series analysis thus enabled us to test linear regression models on the pooled sample of observations ( $n = 117$ ) using the ‘xtreg’ commands in STATA 11.2 (StataCorp, College Station, TX, USA). Prevalence rates of bullying, victimisation and bully–victims and homicides were log transformed due to their negatively skewed distributions and then standardised to Z scores to produce standardised beta coefficients. We tested associations between income inequality, homicides and bullying whilst accounting for country differences in family affluence (e.g.  $BULLYING_{it} = \alpha + \beta_1 AFFLUENCE_{it} + \beta_2 GINI_{it} + \mu_{it} + \varepsilon_{it}$ , where observations varied across country,  $i$ , and time,  $t$ ,  $\alpha$  was the slope intercept,  $\mu_{it}$  was the between country/year error term and  $\varepsilon_{it}$  was the within-country/year error term). Random effect models were used because Hausman tests showed no associations between predictor variables and errors (Ward and Leigh 1993).

Indirect (mediated) effects of income inequality on prevalence rates of bullying, through homicides, were tested in a series of linear regression models (Baron and Kenny 1986). The first model tested a direct, unmediated effect of income inequality on bullying (Path  $c$ ). The second tested the effect of income inequality on homicides (Path  $a$ ). The third tested the effect of homicides on bullying with income inequality included in the model (Path  $b$ ). The fourth tested the effect of income inequality on bullying with homicides also included in the regression model (Path  $c'$ ). Statistical significance of mediation was determined using the Sobel test in which the mediated effect ( $ab$ ) was divided into its pooled standard error:  $Z_{ab} = ab / \sqrt{(b^2 s_a^2) + (a^2 s_b^2)}$ . All paths were tested with family affluence included in the models, and the data were not weighted in these analyses.

## Results

Descriptive statistics on the variables used in this study are shown in Table 2. Country/year observations with missing data on homicides (22 % of the sample) did not differ significantly from other country/years in terms of family

**Table 2** Descriptive statistics on pooled country/year observations from the HBSC study, 1994–2006

Variable	<i>n</i>	Mean	SD	Min	Max
Family affluence <sup>a</sup>	115	6.54	0.51	5.27	7.62
Income inequality (Gini index)	111	0.30	0.05	0.19	0.46
Homicides (per 100,000 population)	91	3.30	4.10	0.00	20.15
Bullied others (%)	115	3.38	2.03	0.73	11.02
Victimised (%)	115	4.58	2.50	1.10	13.59
Bully/victim (%)	115	0.72	0.64	0.08	3.84

<sup>a</sup> Index varies from 0 (lowest affluence) to 9 (highest affluence)

**Table 3** Regression analysis of school bullying by income inequality in HBSC countries (1994–2006), controlled for mean family affluence: standardised slope betas and standard errors

	11-year-olds		13-year-olds		15-year-olds		Total
	Males	Females	Males	Females	Males	Females	
Bullied others	0.26 (0.11)*	0.35 (0.11)**	0.16 (0.12)	0.34 (0.12)**	0.26 (0.12)*	0.28 (0.12)*	0.25 (0.11)*
$R^2$ , ICC	0.80, 0.64	0.83, 0.67	0.79, 0.65	0.75, 0.57	0.72, 0.57	0.78, 0.62	0.85, 0.73
Victimised	0.25 (0.11)*	0.26 (0.11)*	0.41 (0.10)**	0.36 (0.11)**	0.31 (0.12)*	0.25 (0.12)*	0.29 (0.11)**
$R^2$ , ICC	0.82, 0.60	0.85, 0.65	0.79, 0.52	0.77, 0.51	0.66, 0.47	0.76, 0.57	0.85, 0.66
Bully/victims	0.26 (0.11)*	0.35 (0.11)**	0.34 (0.11)**	0.36 (0.11)**	0.22 (0.12)	0.29 (0.12)*	0.40 (0.10)**
$R^2$ , ICC	0.70, 0.47	0.72, 0.45	0.67, 0.33	0.70, 0.38	0.53, 0.26	0.75, 0.43	0.74, 0.47

Standard error of the slope is shown in parentheses

$R^2$  proportion of variance in bullying explained by family affluence, income inequality, time and country differences, *ICC* intraclass correlation, or the proportion of variance in the outcome that was explained by within time (between country) differences

\*  $P < 0.05$

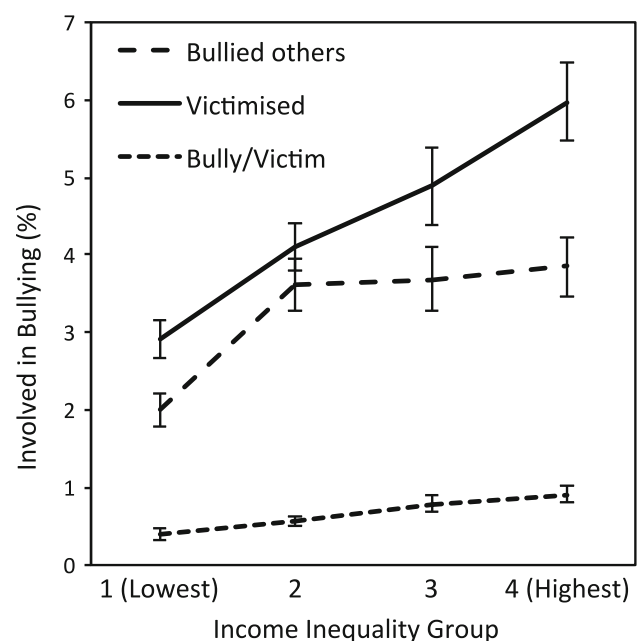
\*\*  $P < 0.01$

affluence, income inequality or school bullying. The prevalence of bullying others several times a week ranged from 0.73 % (Finland, 2006) to 11.02 % (Lithuania, 2002). The prevalence of victimisation by bullying ranged from 1.10 % (Sweden, 1998) to 13.59 % (Lithuania, 2002). The prevalence of bully–victims (both bullied others and victimised) ranged from 0.08 % (Poland, 1998) to 3.84 % (Lithuania, 2002).

Income inequality (Gini coefficient) ranged from 0.19 (Slovakia, 1994) to 0.46 (Russian Federation, 2006). Rates of homicide ranged from 0 (Malta, 2006) to 20.15 (Estonia, 1994) per 100,000 population.

As shown in Table 3, income inequality positively related to bullying others at school by all age groups and both genders except 13-old males. Income inequality also related to rates of victimisation by bullying and bully–victims in all age and gender groups. Post hoc comparisons of regression slopes showed no significant differences between age/gender groups in terms of the strength of these associations. A 1 SD difference in income inequality between countries and over time corresponded to 0.25–0.40 SD differences in the percentage of youths who were involved in bullying. Figure 1 shows graded associations between income inequality (quartiles) and the percentage of youths who were involved in school bullying as a perpetrator, victim or both.

Table 4 summarises the analysis of mediation by homicides. Income inequality positively related to homicides ( $b = 0.30$ ). However, homicides related only to rates of victimisation and bully–victims and not to the perpetration of bullying others. Sobel tests identified one significant mediated path—from income inequality, through homicides, to bullying victimisation (Fig. 2). However, we observed that the association between income inequality and victimisation was diminished, but still



**Fig. 1** Percentage of youths involved in bullying by income inequality quartile group in HBSC countries (1994–2006); 1 (Gini <0.26), 2 (Gini = 0.27–0.29), 3 (Gini = 0.30–0.34), 4 (Gini >0.34). Bars represent standard errors of the mean

statistically significant with homicides included in the regression model, which is indicative of partial mediation (MacKinnon et al. 2002).

## Discussion

The goals of this study were to examine links between income inequality and the percentage of 11-, 13-, and 15-year-olds who were involved in school bullying—either as perpetrators, victims or both—and determine whether



**Table 4** Regression analysis of direct and mediated paths between income inequality, homicides and school bullying in HBSC countries (1994–2006), controlled for mean family affluence: standardised slope betas and standard errors

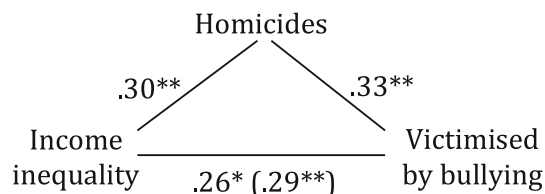
	Path <i>a</i>	Path <i>b</i>	Path <i>c</i>	Path <i>c'</i>	Sobel $Z_{ab}$
Bullied others	0.30 (0.10)**	0.09 (0.13)	0.25 (0.11)*	0.19 (0.13)	0.67
$R^2$ , ICC	0.91, 0.75	0.73, 0.85	0.85, 0.73	0.85, 0.72	
Victimised	30 (0.10)**	0.33 (0.12)**	0.29 (0.11)**	0.26 (0.12)*	2.03*
$R^2$ , ICC	0.91, 0.75	0.64, 0.85	0.85, 0.67	0.86, 0.62	
Bully/victims	30 (0.10)**	0.25 (0.12)*	0.40 (0.10)**	0.33 (0.13)*	1.71
$R^2$ , ICC	0.91, 0.75	0.47, 0.72	0.72, 0.47	0.72, 0.43	

Standard error of the slope is shown in parentheses

$R^2$  proportion of variance in bullying explained by family affluence, income inequality, time and country differences, ICC intraclass correlation, or the proportion of variance in the outcome that was explained by within time (between country) differences

\*  $P < 0.05$

\*\*  $P < 0.01$



**Fig. 2** Partially mediated path from income inequality to bullying victimisation through homicides in HBSC countries (1994–2006), Sobel  $Z_{ab} = 2.03$ ,  $P < 0.05$ . Standardised regression coefficients are shown. Value in parentheses represents direct (unmediated) path. \* $P < 0.05$ ; \*\* $P < 0.01$

the contextual levels of violence account for the association between income inequality and bullying. By pooling data on countries that participated in the HBSC study between 1994 and 2006, we found that income inequality positively related to both the perpetration of school bullying and rates of victimisation. The direction and strength of these associations were consistent with previously reported findings from cross-sectional, ecological and multilevel analyses (Due et al. 2009; Elgar et al. 2009). The present study replicated these associations on a larger sample of countries than studied previously across gender and age groups and types of involvement in bullying. The findings were consistent with our hypothesis that cross-national differences in income inequality correlated with the percentage of adolescents involved in school bullying.

Although no group differences were found in the strength of these associations, income inequality related to the perpetration of bullying others more consistently in females than in males. This result seems contradictory to evolutionary interpretations of status competition and physical violence that run through the extant literature on income inequality (Butchart and Engström 2002; Kawachi and Kennedy 2002; Wilkinson and Pickett 2009). An evolutionary perspective might predict that males are more likely than females to use

violence as a means to advance and maintain their social standing in unequal societies. However, our finding could be due to the generic bullying item used in the HBSC study that did not distinguish physical and verbal or direct and indirect types of bullying. It is possible that direct physical bullying relates more closely to income inequality in males than in females. Unfortunately, data that would have allowed separate analyses of different types of bullying were unavailable.

With regard to the association between income inequality and bullying by 13-year-olds (Table 3), it is worth noting that 13-year-old females do not stand out in epidemiological studies terms of the overall prevalence of bullying (i.e. either physical, verbal or relational). Levels of bullying are generally higher among males than females and, with regard to victimisation, the percentage of 13-year-old females who have been bullied by others at school is similar to other age and gender groups (Craig et al. 2009; Pepler et al. 2008). However, some research has found that a slightly higher percentage of 13-year-old females bully others at least twice in the past couple of months (9 %) than 11-year-old females (6 %) and 15-year-old females (7 %; Currie et al. 2008a). A study of bullying in Sweden found that the prevalence of bullying among females declines from grades 2–9, except for a small increase that occurs in grades 7 and 8 (Olweus 1999). Olweus (1999) attributed this temporary increase in bullying to the transition into lower secondary/junior high schools. Social difficulties in adjusting from being the eldest students at school to the youngest and heightened sensitivities to social status and material indicators of social class, along with the unstable, transient nature of friendships in early adolescence, all might account for young adolescent females appearing more likely than other youths to tease, shame and bully others in more unequal countries.

We also investigated whether income inequality directly related to bullying or if the association was mediated

through violence, which was operationalised by national homicide rates. Only one partially mediated path was found—from income inequality, through homicides, to victimisation—and we interpret this result with caution given that the association between inequality and bullying changed very little after differences in homicides were taken into account (Table 4). It is possible that homicides are not reflective of subtle social changes that occur as a consequence of inequality (e.g. distrust, low social capital, individualistic and materialistic values; Elgar and Aitken 2011). Further investigation is needed, using multiple data sources and multilevel analyses, to elucidate the causal mechanisms that account for its contribution to bullying.

Pooling data from repeated surveys offered an important power advantage in this study. It was not possible to test these associations across bullying outcomes and age and gender groups without pooling data from repeated surveys. However, the results of this ecological analysis should be cautiously interpreted with regard to cross-national differences in the prevalence of bullying and not individual differences in bullying behaviours. Only a multilevel analysis can determine the predictive significance of contextual-level variables on individual-level outcomes. Other limitations of the study were the exclusive reliance on self-reported involvement in bullying, a generalised measure of bullying that did not differentiate its types, and lacking information on school funding, curricula and policy differences between countries that might have also influenced the prevalence of bullying. Corroborating data from peers and educators, differentiation of types of bullying (e.g. physical and relational) and additional contextual data might be difficult to retrieve on large international samples of adolescents but would have provided a more complete picture of how income inequality relates to bullying. We also acknowledge that there were many contextual variables that we could not include in this cross-national analysis, and there was potential for sampling bias in the HBSC study given that youths who were most involved in bullying might have been absent from school when data were collected.

Although the cross-sectional design of the study precluded conclusive evidence about the direction of influence between income inequality and bullying, it seems likely, given the accumulation of research carried out on both topics, that the social sequelae of income inequality includes school bullying due to negative influences on moral development. The ways young people affiliate with, shun, tease and bully others at school are sensitive to their perceptions of class differences. Parents might intentionally or inadvertently reinforce class snobbery and acts of peer rejection by their children. At the community level, economic disparity reduces social control over violence either through the lack of effective sanctions or tacit approval of such behaviour (Kawachi and Kennedy 2002;

Wilkinson and Pickett 2009). Thus, the consequences of income inequality transcend social contexts and could perpetuate a vicious cycle in which income inequality undermines the social capacity of schools, families and communities to promote equality.

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## Appendix

See Table 5.

**Table 5** List of countries included in the HBSC study, 1994–2006

1994	1998	2002	2006
Austria	Austria	Austria	Austria
Belgium	Belgium	Belgium	Belgium
Canada	Latvia	Canada	Bulgaria
Czech Republic	Estonia	Croatia	Canada
Denmark	Denmark	Czech Republic	Croatia
Estonia	France	Denmark	Czech Republic
Finland	Finland	Estonia	Denmark
France	Germany	Finland	Estonia
Germany	Lithuania	France	Finland
Hungary	Hungary	Germany	France
Israel	Ireland	Greece	Germany
Latvia	Israel	Hungary	Greece
Lithuania	Poland	Ireland	Hungary
Netherlands	Portugal	Israel	Iceland
Norway	Russian Federation	Italy	Ireland
Poland	Canada	Latvia	Israel
Russian Federation	Norway	Lithuania	Italy

**Table 5** continued

1994	1998	2002	2006
Slovakia	Czech Republic	Macedonia	Latvia
Spain	Slovakia	Malta	Lithuania
Sweden	Greece	Netherlands	Luxembourg
Switzerland	Spain	Norway	Macedonia
United Kingdom	Sweden	Poland	Malta
	Switzerland	Portugal	Netherlands
	United Kingdom	Russian Federation	Norway
	United States	Slovakia	Poland
		Slovenia	Portugal
		Spain	Romania
		Sweden	Russian Federation
		Switzerland	Slovakia
		Ukraine	Slovenia
		United Kingdom	Spain
		United States	Sweden
			Switzerland
			Turkey
			Ukraine
			United Kingdom
			United States

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