

Original article

Income Inequality and School Bullying: Multilevel Study of Adolescents in 37 Countries

Frank J. Elgar, Ph.D.^{a,*}, Wendy Craig, Ph.D.^b, William Boyce^c,
Antony Morgan, M.Sc.^d, and Rachel Vella-Zarb, B.A.^a

^aDepartment of Psychology, Carleton University, Ottawa, Ontario, Canada

^bDepartment of Psychology, Queen's University, Kingston, Ontario, Canada

^cDepartment of Community Health and Epidemiology, Queen's University, Kingston, Ontario, Canada

^dChild and Adolescent Health Research Unit, University of Edinburgh, Edinburgh, Scotland

Manuscript received December 31, 2008; manuscript accepted April 6, 2009

See Editorial p. 323

Abstract

Purpose: To examine the association between income inequality and school bullying in an international sample of preadolescents and to test for mediation of this association by the availability of social support from families, peers, and schools.

Methods: The study used economic data from the 2006 United Nations Development Program Human Development Report and survey data from the 2005/2006 Health Behavior in School-aged Children (HBSC) study which included 66,910 11-year-olds in 37 countries. Ecological correlations tested associations between income inequality and bullying among countries. Multilevel linear and ordinal regression analyses tested the effects of income inequality on perceived social support and bullying others at school.

Results: Income inequality was associated with rates of bullying among the 37 countries ($r = .62$). Multilevel analyses indicated that each standard deviation increase in income inequality corresponded with more frequent bullying by males (odds ratio = 1.17) and females (odds ratio = 1.24), less family support and school support but more peer support. Social support from families and schools was associated with less bullying after differences in wealth were taken into account; however, social support did not account for the association between income inequality and bullying.

Conclusions: Countries with high income inequality have more school bullying among preadolescents than countries with low income inequality. Further study is needed to understand the mechanisms that account for this association. Findings suggest that adolescents in areas of wide income inequality—not only those in deprived schools and neighborhoods—should be a focus of antibullying campaigns. © 2009 Society for Adolescent Medicine. All rights reserved.

Keywords:

Income inequality; Bullying; Violence; Multilevel modeling; Social inequalities; Health behavior of school-aged children study

Bullying is a form of repeated physical or verbal aggression that has hostile intent, and involves a power differential between the aggressors and those that they victimize [1]. Rates of bullying vary widely between countries. A U.S. survey of students in grades 6 to 10 found that 13% of students bullied others at school and 11% reported being

the target of bullying [2]. A survey of English and German school children found bullying rates of 14% to 19% in England and 21% in Germany [3]. An international survey of adolescents from across Europe and North America found that 9% of 11-year-olds had bullied others at school at least twice in the previous 2 months, ranging from 2% in Sweden to 24% in Greenland [4].

Bullying and victimization by bullying each have serious consequences for social and emotional development. Adolescents who bully are at greater risk of antisocial problems compared to adolescents who are uninvolved in bullying

*Address correspondence to: Frank J. Elgar, Ph.D., Department of Psychology, Carleton University, 1125 Colonel By Drive, Ottawa, Ontario, Canada, K1S 5B6.

E-mail address: frank_elgar@carleton.ca

[2,5]. Olweus (1993) [6] reported that 60% of adolescent boys who were characterized as bullies had at least one criminal conviction by age 24. Longitudinal studies found that bullying is linked to peer rejection [7], hyperactivity, and other externalizing problems [8], and internalizing problems such as depression and suicide ideation [9,10]. Victimization by bullying is associated with symptoms of anxiety [11], depression [12], and suicidal ideation [13], and somatic complaints (e.g., headaches, sleep disturbances, abdominal pain) [12].

Research into the determinants of school bullying has tended to focus more on individual traits and behaviors than on socioeconomic factors. Psychosocial problems are generally more common among lower socioeconomic groups [14], but there does not appear to be a consistent association between socioeconomic status and bullying [1,4,15]. However, studies of aggression and violence in adult populations suggest that adolescent bullying might be more closely related to income inequality than to socioeconomic status. A commonly used measure of income inequality is the Gini index, which theoretically ranges from 0 (*where all persons have equal income*) to 1 (*where one person has all the income and the rest have none*). Numerous studies that used the Gini index as a measure of income inequality found that countries, states, or neighborhoods that are less equal in wealth have higher rates of hostility, racism, violent crime, and homicide [16–18]. One study found that state-level income inequality in the United States accounted for 52% of the variance in homicide rates [19]. Another found that the correlation between U.S. state-level income inequality and firearm violent crime was .76 [20]. Wilson and Daly [21] examined Chicago neighborhoods and found a correlation of .75 between neighborhood income inequality and homicide rates, and among Canadian provinces this correlation was .85 [22]. A study by the World Bank examined trends in homicides and robberies in 39 countries between 1965 and 1995 and concluded that crime rates and income inequality were positively correlated, even after controlling for other crime determinants [23]. Also, a systematic review of 34 studies on income inequality and violent crime concluded that significant associations exist between income inequality and rates of homicide, assault, rape and robbery [24].

The association between income inequality and violence is consistent with links between income inequality and indicators of population health. One explanation of why income inequality relates to violence is that inequality has a corrosive effect on social relationships and the availability of “social capital” in communities [25]. Social capital is an expansive theoretic construct that refers to the availability of social resources to the individual [26]. The extent to which adolescents feel embedded in cohesive and cooperative family relationships, peer networks, and school environments is an important dimension of their available social capital. It is plausible that income inequality drives social stratification along levels of affluence and reduces a sense of community across social classes. Through this pathway, income

inequality creates social disorganization and reduces social controls over violence acts (e.g., by a lack of effective sanctions or tacit approval of the behavior) [25]. Evidence of these psychosocial effects comes from research that found that the association between income inequality and violence are partly accounted for by levels of interpersonal trust [25].

Income inequality could also intensify class competition within societies, making status more important for survival compared to more egalitarian societies [27,28]. Drawing upon evolutionary psychology, Wilkinson and Pickett [28] describe inequality as a form of structural violence that elicits shame, humiliation, and violent retaliation. They posit that in more hierarchical societies, status competition intensifies as more people are deprived of access to markers of status and success. Among adolescents, who are acutely aware of class differences, income inequality might increase social distance between individuals and foster a harsh social environment that is rife with teasing, rejection, and humiliation.

Whether it is low social capital or intensified class conflict, the ease at which adolescents interact in their social environment might account for links between income inequality and school bullying. To date, only two studies have examined associations between income inequality and bullying. The first was an ecological study by Pickett and Wilkinson [29], which used aggregated data on 21 countries retrieved from a UNICEF report on child well-being. They found that income inequality correlated with the percentage of children who have been victimized by bullying ($r = .47$). Income inequality was more closely associated with an index of fighting, bullying victimization, and not finding peers kind and helpful ($r = .61$). The second was a multilevel analysis of data from the Health Behavior in School-aged Children (HBSC) study that tested the effects of income inequality on victimization by bullying in 35 countries [30]. It found that income inequality predicted a 3% increase in the odds of victimization, after differences in wealth were accounted for. Although the results of ecological and multilevel studies are difficult to compare given their different units of analysis, both studies found an association of between income inequality and bullying victimization. However, neither study tested the association between income inequality and the perpetration of bullying, which is arguably more important for interventions than victimization. Also, neither study tested mediating mechanisms that might account for these associations.

To address these gaps in the literature, we examined the association between income inequality and bullying and tested for the mediation of this association by social support. We studied preadolescents (11-year-olds) because violence in younger adolescents is deemed to be a distinctive feature of lifecourse-persistent antisocial behavior, which poses a greater risk to public safety than adolescent-limited antisocial behavior [31], and because health outcomes in preadolescence appear to be more sensitive to class differences than in middle or late adolescence [32]. Males and females were studied separately because bullying manifests differently in

these groups (physical vs. verbal), and therefore social and economic factors might influence bullying by males differently than bullying by females [1,6].

We hypothesized that (a) income inequality is associated with the frequency of school bullying, after differences in wealth are taken into account, and (b) the strength of this association is diminished once social support is also accounted for—an indicator of statistical mediation [33].

Methods

Sample

Survey data were collected from 11-year-olds in the 2006 HBSC study (www.hbsc.org). The aim of the HBSC study was to identify behaviors and social factors that influence physical and psychosocial health in youth. Nationally representative samples of students in grades 7, 9, and 11 participated in 42 countries and regions in Europe, North America, and Israel. The average participation rate by students was 81.6% (SD = 12.0%), ranging from 40.6% (Germany) to 97.3% (Lithuania). Survey procedures were subjected to research ethics review in all member countries. In the present study, data from Flemish- and French-speaking samples in Belgium were combined, as were data from Welsh, Scottish, and English samples in Great Britain, to correspond to available economic data. Greenland was omitted from the study due to unavailable economic data. The data used in this study were collected from grade 7 classes and represented 66,817 11-year-olds (32,942 males, 33,875 females) in 37 countries (Table 1). The mean age of the sample was 11.61 (SD = .36) years.

Measures and procedures

Individual wealth was measured using the HBSC Family Affluence Scale [34]. The FAS was comprised of four items: “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*). Added together, these items produced a score that ranged from 0 (*lowest affluence*) to 9 (*highest affluence*). Previous research found that the FAS has better criterion validity and is less affected by nonresponse bias than longer measures of socioeconomic status that rely on parental education or income [34].

Social support was measured using items that asked about the quality of relationships at home, with peers, and at school. Six items asked about *family support*: “How easy is it to talk to your (mother, father, stepmother, stepfather, elder brother, elder sister)?” Responses were given on four-point scales that ranged from “very easy” to “very difficult.” Three questions asked about available *peer support*: “How easy is it to talk to

Table 1
Population, wealth, income inequality, and bullying in 37 countries

Country	Population (millions)	GDPpc (2005 US\$)	Gini index	Bullied others two or more times (%)
1. Denmark	5.4	47,769	.247	4.19
2. Iceland	0.3	53,290	.250	3.16
3. Sweden	9.0	39,637	.250	1.80
4. Czech Republic	10.2	12,152	.254	2.45
5. Slovakia	5.4	8,616	.258	7.46
6. Norway	4.6	63,918	.258	4.70
7. Luxembourg	0.5	79,851	.260	7.47
8. Hungary	10.1	10,830	.269	2.80
9. Finland	5.2	36,820	.269	3.35
10. Malta	0.4	13,803	.280	3.89
11. Ukraine	46.9	1,761	.281	14.38
12. Germany	82.7	33,890	.283	7.08
13. Slovenia	2.0	17,173	.284	6.11
14. Croatia	4.6	8,666	.290	4.88
15. Austria	8.3	37,175	.291	7.93
16. Bulgaria	7.7	3,443	.292	11.31
17. Netherlands	16.3	38,248	.309	6.85
18. Romania	21.6	4,556	.310	21.79
19. Canada	32.3	34,484	.326	7.48
20. France	61.0	34,936	.327	9.31
21. Belgium	10.4	35,389	.330	9.37
22. Switzerland	7.4	49,351	.337	8.83
23. Greece	11.1	20,282	.343	12.22
24. Ireland	4.1	48,524	.343	3.39
25. Poland	38.2	7,945	.345	9.44
26. Spain	43.4	25,914	.347	4.51
27. Estonia	1.3	9,733	.358	17.78
28. Italy	58.6	30,073	.360	9.75
29. Lithuania	3.4	7,505	.360	17.29
30. Great Britain	60.2	36,509	.360	3.75
31. Latvia	2.3	6,879	.377	15.83
32. Portugal	10.5	20,410	.385	11.27
33. Macedonia	2.0	2,835	.390	9.89
34. Israel	6.7	17,828	.392	18.42
35. Russian Federation	144.0	5,336	.399	16.72
36. United States	299.8	41,890	.408	8.97
37. Turkey	73.0	5,030	.436	18.85

your (best friend, friend of the same sex, friend of the opposite sex)?” Responses to these questions were also on four-point scales that ranged from “very easy” to “very difficult.” A third set of items assessed *school support*: “The students in my classes enjoy being together. Most of the students in my classes are kind and helpful. Other students accept me as I am.” Here, responses were on five-point scales ranging from “strongly agree” to “strongly disagree.”

The survey included a definitional assessment of bullying adapted from Olweus’s Bully/Victim Questionnaire [6]. Respondents were shown a 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.

The definition was followed by the question, “How often have you bullied others at school in the past couple of months?” Responses were on a five-point ordinal scale: 0 = *not at all*, 1 = *once or twice*, 2 = *two or three times per month*, 3 = *once a week*, 4 = *several times a week*. (An exception was respondents in Israel who responded on a slightly different scale: 0 = *not at all*, 1 = *once*, 2 = *sometimes*, 3 = *once a week*, 4 = *several times a week*.) Teachers or trained interviewers administered the survey in classroom settings in accordance with international protocol [4]. Participation was voluntary. Completion of the survey typically took less than 45 minutes.

Country data

The United Nations Development Program Human Development Report provided data on *country wealth* in terms of gross domestic product per capita (GDPpc) standardized to 2005 U.S. dollars, and *income inequality* (Gini index) [35]. The Gini index represents the distribution of income or consumption among everyone in a society, and ranges theoretically from 0 (*where all persons have equal income*) to 1 (*where one person has all the income and the rest have none*). These data are summarized in Table 1 and were available online at <http://hdr.undp.org/en/statistics/data>.

Data analysis

Ecological analyses were carried out using SPSS 17 (SPSS Inc., Chicago, IL) and data that were aggregated at the country level on wealth, income inequality, mean family support, peer support, and school support, and percentage of respondents that bullied others at least two or three times per month—a criterion that has been used in previous research [4].

Multilevel analyses were carried out using MLwiN version 2.02 (University of Bristol, Bristol, UK). The data had a three-level structure, with individuals clustered within schools, and schools within countries. Variance at individual (*i*), school (*j*), and country (*k*) levels were specified in linear regression models of social support. In random slope models, country wealth and income inequality were country-level variables and individual wealth and social support from families, peers, and schools were individual-level variables. No school-level variables were tested but specification of this level was still needed to account for a design effect of school cluster. (In linear regression models of family support, peer support, and school support, the Level 1 equation was $y_{ijk} = \beta_{0ijk} + \beta_1 \text{Countrywealth}_k + \beta_2 \text{Individualwealth}_{ijk} + \beta_3 \text{IncomeInequality}_k$, the Level 2 equation was $\beta_{0jk} = \beta_0 + \nu_{0k} + \mu_{0jk}$, and the Level 3 equation was $\beta_{1k} = \beta_1 + \nu_{1k}$.)

Ordinal regression models estimated the logit of more frequent bullying as a function of country and individual wealth, income inequality, and social support. The threshold concept was applied in which it was assumed that a latent continuous variable (*y*) was related to responses in five possible categories (*i*): never bullying others (y_{1jkl}), bullying

once or twice (y_{2jkl}), bullying two or three times (y_{3jkl}), bullying once a week (y_{4jkl}), and bullying several times a week (y_{5jkl}). These models computed the odds ratio of bullying at any frequency or more, compared to less frequent bullying. [Therefore, if the bullying variable was dichotomized then the odds ratio would be the same regardless of the cut point. Variance was specified at individual (*j*), school (*k*), and country (*l*) levels:

$$y_{5jkl} = \pi_{5jkl}; y_{4jkl} = \pi_{5jkl} + \pi_{4jkl}; y_{3jkl} = \pi_{5jkl} + \pi_{4jkl} + \pi_{3jkl}; y_{2jkl} = \pi_{5jkl} + \pi_{4jkl} + \pi_{3jkl} + \pi_{2jkl}; y_{1jkl} = 1$$

$$\text{logit}(y_{2jkl}) = \beta_5 \text{constant} (\geq \text{bullying once or twice})_{ijk} + h_{jkl}$$

$$\text{logit}(y_{3jkl}) = \beta_6 \text{constant} (\geq \text{bullying two or three times})_{ijk} + h_{jkl}$$

$$\text{logit}(y_{4jkl}) = \beta_7 \text{constant} (\geq \text{bullying once a week})_{ijk} + h_{jkl}$$

$$\text{logit}(y_{5jkl}) = \beta_8 \text{constant} (\geq \text{bullying several times a week})_{ijk} + h_{jkl}$$

The model structure was $h_{jkl} = \beta_0 \text{Constant} + \beta_{11} \text{Countrywealth}_1 + \beta_2 \text{Individualwealth}_{jkl} + \beta_3 \text{Socialsupport}_{jkl} + \beta_{41} \text{Incomeinequality}_1$; $\beta_{11} = \beta_1 + f_{11}$; $\beta_{41} = \beta_4 + f_{41}$. The social support variable (β_3) represented either family support, peer support, or school support.]

To facilitate interpretation of intercepts and odds ratios, data on country wealth, individual wealth, income inequality, and each source of social support were centered on means of 0 and scaled to standard deviations of 1. Some variables were reverse scored so that higher scores indicated more wealth, more inequality, or greater social support. Mediation analyses followed procedures for accommodating ordinal outcomes [33,36]. The significance of indirect, mediated effects was tested using the Sobel equation [33].

Results

Ecological correlations tested associations between wealth, income inequality, mean levels of social support, and the percentage of respondents who bullied others at school. As shown in Table 2, income inequality was significantly correlated with bullying among males, $r(36) = .58, p < .01$, and among females, $r(36) = .64, p < .01$. Figure 1 is a scatterplot of this relationship involving males and females, $r(36) = .62, p < .01$. As shown in this figure, the percentage of respondents who bullied others was four to five times greater in countries with high income inequality (e.g., Turkey, Russian Federation) than in countries with low income inequality (e.g., Sweden, Denmark). Country wealth and individual wealth were highly correlated ($r_s = .78$ to $.81$) and each was negatively associated with rates of bullying ($r_s = -.49$ to $-.64$). However, income inequality was not significantly associated with mean levels of social support. The associations between social support and bullying were also nonsignificant, with the exception of school support, which was correlated with low bullying in females ($r = -.37, p < .05$).

The unique contributions of income inequality and social support to bullying were examined in multilevel regression models that accounted for the influences of country wealth

Table 2
Country-level correlations between wealth, income inequality, social support, and the percentage of preadolescents who bullied others two or more times (N = 37)

Variable	1	2	3	4	5	6	7
1. Country wealth	—	.78**	-.29	-.11	-.51**	.33*	-.49**
2. Individual wealth	.81**	—	-.37*	-.12	-.35*	.33*	-.54**
3. Income inequality	-.29	-.36*	—	-.19	-.21	-.21	.58**
4. Family support	-.18	-.14	-.15	—	.39*	.05	.07
5. Peers support	-.14	-.06	.14	.33*	—	-.20	.24
6. School support	.36*	.38*	-.24	.06	-.08	—	-.29
7. Bullied others	-.50**	-.64**	.64**	-.01	.07	-.37*	—

Note: Data were aggregated at the country level. Males are shown above the diagonal and females below.

* $p < .05$.

** $p < .01$.

and individual wealth. Unlike the ecological correlations, Table 3 shows significant associations between income inequality and low family support and between income inequality and low school support. However, a positive association was found between income inequality and peer support. The strength of these associations was similar in males and females, although the combined contribution of these variables to social support was small, accounting for 2% of the variance.

Next, associations between income inequality and bullying and mediation of these associations by social support were tested using ordinal regression analysis (Table 4). Family support, peer support, and school support variables were entered separately in these models because of the different effects of income inequality on these social support variables. Bullying was first estimated as a function of country wealth, individual wealth and income inequality (Model 1). Then, each social support variable was added

separately—family support (Model 2), peer support (Model 3), and school support (Model 4). Differences in $-2 \log$ likelihoods between null and general models were not statistically significant ($p > .05$), indicating parallel effects along bullying response categories. Like the correlations in Table 2, these analyses revealed a significant contribution of income inequality to bullying, even after country and individual wealth were taken into account. Each standard deviation increase in income inequality corresponded to significantly more frequent bullying by males (odds ratio = 1.17) and by females (odds ratio = 1.24). Family support and school support were each associated with less frequent bullying by males and females. Peer support was unrelated to bullying. Sobel tests found no change in the strength of the association between income inequality and bullying after social support variables were added to the model, indicating a direct (unmediated) association between income inequality and bullying.

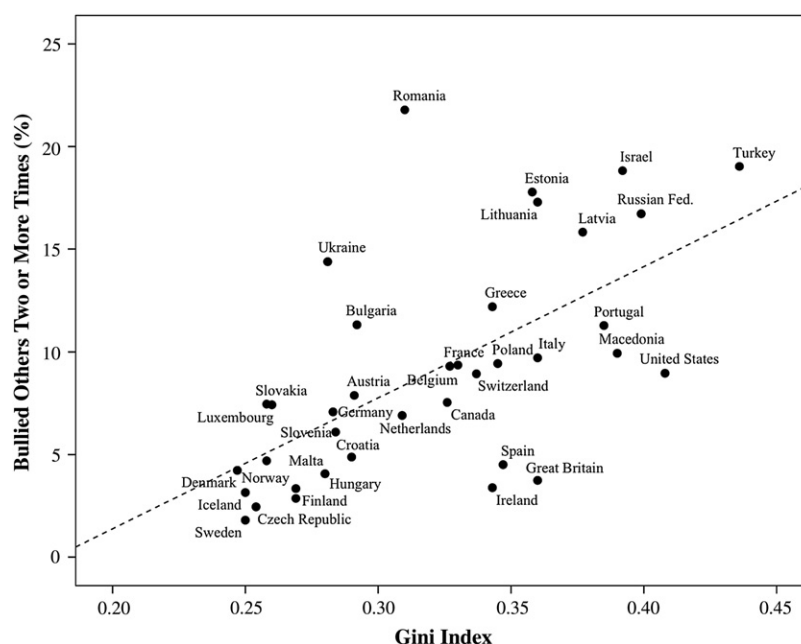


Figure 1. Income inequality and school bullying by 11-year-olds in 37 countries ($r = .62$).

Table 3
Summary of linear regression analysis for income inequality predicting social support.

Variable	Family support		Peer support		School support	
	B (SE)	t	B (SE)	t	B (SE)	t
Males (N = 32,942)						
Country wealth	-.02 (.01)	-2.24*	-.12 (.01)	-14.55***	.06 (.01)	5.19***
Individual wealth	.03 (.01)	4.63***	.07 (.01)	9.75***	.07 (.01)	10.01***
Income inequality	-.03 (.01)	-2.41*	.03 (.01)	4.29***	-.03 (.01)	-2.33*
Females (N = 33,968)						
Country wealth	-.05 (.01)	-5.56***	-.05 (.01)	-5.14***	.08 (.01)	6.29***
Individual wealth	.05 (.01)	6.93***	.10 (.01)	15.22***	.07 (.01)	10.24***
Income inequality	-.03 (.01)	-2.58*	.04 (.01)	5.37***	-.03 (.01)	-2.05*

Note: $R^2 = .02$ in all models.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Discussion

An association was found between country-level income inequality and school bullying. The association was similar in males and females and significant after differences in country wealth and individual wealth were taken into account. The results were consistent with studies on income inequality and violence among adults [17,20,23,24] and replicated the ecological associations reported by Pickett and Wilkinson [29] in their study of income inequality and children's involvement in fighting and bullying in 21 coun-

tries. Multilevel analysis indicated that correlations between income inequality and bullying are unlikely to be a statistical aberration that is attributable to a few outlier countries nor to an "ecological fallacy" whereby researchers ascribe group characteristics to individuals. Strongly significant associations between income inequality and bullying were found in both ecological and multilevel analyses of the data.

Associations between income inequality and bullying were stronger than those found in Due et al's [30] study of bullying victimization. This difference might be because of the fact that the perpetration of bullying others is more

Table 4
Hierarchical ordinal regression analysis for variables predicting bullying

Variable	Model 1		Model 2		Model 3		Model 4	
	B (SE)	OR (95% CI)	B (SE)	OR (95% CI)	B (SE)	OR (95% CI)	B (SE)	OR (95% CI)
1. Males (N = 32,942)								
Country wealth	-.20 (.01)	.82 (.79–.85)	-.20 (.02)	.82 (.79–.85)	-.20 (.02)	.82 (.79–.86)	-.19 (.02)	.83 (.80–.86)
Individual wealth	.04 (.01)	1.04 (1.01–1.07)	.04 (.02)	1.04 (1.02–1.07)	.04 (.02)	1.04 (1.01–1.07)	.05 (.01)	1.05 (1.02–1.08)
Income inequality	.16 (.02)	1.17 (1.12–1.21)	.15 (.02)	1.16 (1.12–1.20)	.14 (.02)	1.16 (1.11–1.20)	.15 (.02)	1.16 (1.12–1.20)
Family support			-.05 (.01)	.96 (.93–.98)				
Peer support					.01 (.01)	1.01 (.98–1.04)		
School support							-.23 (.02)	.80 (.77–.82)
Thresholds:								
1 (once or twice)	.60 (.02)		.59 (.02)		.60 (.02)		.60 (.02)	
2 (two or three times)	2.04 (.02)		2.05 (.02)		2.06 (.02)		2.05 (.02)	
3 (once a week)	2.73 (.03)		2.74 (.03)		2.75 (.03)		2.75 (.03)	
4 (several times a week)	3.39 (.04)		3.40 (.04)		3.42 (.04)		3.41 (.04)	
2. Females (N = 33,875)								
Country wealth	-.19 (.03)	.83 (.79–.87)	-.19 (.03)	.83 (.79–.87)	-.18 (.03)	.84 (.80–.88)	-.17 (.03)	.85 (.80–.89)
Individual wealth	-.03 (.02)	.97 (.94–1.00)	-.03 (.02)	.97 (.94–1.01)	-.03 (.02)	.97 (.94–1.01)	-.01 (.02)	.99 (.96–1.02)
Income inequality	.22 (.02)	1.24 (1.19–1.29)	.22 (.02)	1.24 (1.19–1.29)	.22 (.02)	1.24 (1.19–1.29)	.21 (.02)	1.23 (1.19–1.28)
Family support			-.11 (.02)	.89 (.86–.92)				
Peer support					.02 (.02)	1.02 (.99–1.06)		
School support							-.31 (.02)	.74 (.71–.76)
Thresholds:								
1 (once or twice)	1.22 (.02)		1.24 (.02)		1.22 (.02)		1.23 (.02)	
2 (two or three times)	2.83 (.03)		2.86 (.03)		2.85 (.03)		2.85 (.03)	
3 (once a week)	3.41 (.04)		3.44 (.04)		3.44 (.04)		3.43 (.04)	
4 (several times a week)	4.10 (.05)		4.13 (.05)		4.16 (.05)		4.13 (.05)	

Note: R^2 (Cox and Snell) = .03 to .05.

OR = odds ratio; CI = confidence interval; SE = standard error.

sensitive to class differences and social stratification along levels of affluence than victimization by bullying. The difference might also be because of underreporting victimization given that self-reports from adolescents about their experiences in violent situations are often inaccurate and affected by their emotional reactions to these events [37]. Other differences between the two studies make their effect sizes difficult to compare. Our study focused on 11-year-olds and used ordinal regression to examine effects of income inequality along a continuum of bullying frequency. Due et al analyzed data on 11- to 15-year-olds and used logistic regression of dichotomous outcomes. Nevertheless, both studies together provided strong evidence that school bullying is related to income inequality.

With regard to our second research hypothesis, we did not find that differences in social support accounted for the association between income inequality and bullying. This result was unexpected, given previous research that showed that social control over violence is weaker in communities that lack social cohesion or social capital, and that income inequality has detrimental effects on social capital [20]. There are several possible explanations for this finding. First, the social support measures simply might not have tapped the relevant dimensions of social capital that link income inequality to bullying. Indeed, social capital and social support are different theoretical constructs and it is possible that additional survey measures of cooperation, interpersonal trust, or respect for authority would have been more consistent with definitions of social capital and have produced evidence of mediation. Unfortunately, such data were unavailable in the HBSC study.

A second explanation is that social relationships were measured only in adolescents' immediate social environment, which theorist Urie Bronfenbrenner [38] called a "microsystem" of family members, peer groups, and classmates. The study did not measure social relationships outside this microsystem across neighborhoods, racial groups, and societies. A similar conceptual distinction exists in the social capital literature between "bonding" social capital (relationships between people who share common characteristics) and "bridging" social capital (relationships between groups) [26]. It is possible that income inequality and the class competition it creates relates to bridging social capital but not bonding social capital among adolescents.

Third, there may be other mechanisms at work besides having amiable and supportive social relationships. Adolescents who grow up in hierarchical societies with more inequality are exposed to more status competition than adolescents who grow up in egalitarian societies with less inequality [28]. The competition for markers of status and success fosters discrimination, teasing, peer rejection, and humiliation—all potential contributors to school bullying. In describing a chain reaction of shame and retaliation that passes down the social hierarchy, Wilkinson introduced the "bicycling reaction" (i.e., as if leaning forward on a bicycle and bowing to superiors while at the same time kicking down on inferiors) [39]:

There is a widespread tendency for those who have been most humiliated, who have had their sense of selfhood most reduced by low social status, to try to regain it by asserting their superiority over any weaker or more vulnerable group . . . Your status is as much a matter of whom you place yourself above as it is of whom you find yourself below (p. 225).

The cycle of discrimination and retaliation might start among adolescents who ostracize poorer classmates from their peer groups, or might start as class snobbery in parents that is passed down to their children. The discrimination could also be systemic in societies and revealed in people's attitudes toward equality or social dominance or in how neighborhoods and schools are segregated according to wealth. Regardless of its origin, feelings of shame, humiliation, and distrust intensify with greater income inequality and create a harsh social environment where violent acts such as school bullying may be condoned or ignored. Further research is needed to explore the mechanisms through which inequality affects bullying and other adolescent health outcomes.

Unexpectedly, income inequality was negatively associated with family support and school support, but *positively* associated with peer support. This result underscores that social support is context dependent, and suggests that inequality may have a detrimental effect on some domains (e.g., schools) while strengthening bonds in other domains (e.g., peers). The study also found that family support and school support was associated with bullying but peer support was not. This result might seem counterintuitive, but despite their propensity for aggressive behaviour, bullies actually have normal peer support (albeit from similarly aggressive peers), high self-esteem, and feel well liked and respected [1,6]. The lack of an association between peer support and bullying was consistent with previous research.

Discussion of the macroeconomic determinants of health is lacking in the existent research on bullying. Decades after Bronfenbrenner described direct and indirect effects of overlapping ecological systems on adolescent development, health researchers are just beginning to explore contextual effects on individual-level outcomes using sophisticated multilevel analyses. As Kawachi and Kennedy observed, "by focusing on the outcomes of socially isolated (or well connected) individuals, epidemiology has neglected the possibility that entire communities or societies might be lacking in social connections" (p. 1037) [25]. So, too, has psychological and pediatric research focused more on individual risk factors and outcomes than on their wider context of social inequities.

Strengths of this study include its large sample and the collection of individual self-reports in a large number of countries. Some previous studies on income inequality included too few countries to produce generalizable results or used only aggregate data. Another strength of the study is that income inequality was studied between countries rather than within countries, lending support to the notion that income inequality influences adolescent functioning independently of its cultural and political contexts. Two

limitations of the study are also worthy of attention. First, the measures of available social support were limited in scope and thus provided an inadequate test of both bonding and bridging social capital as mediating variables. Additional measures of interpersonal trust and cooperation might have provided a more accurate assessment of social capital. Second, the study relied on adolescents' reports of individual wealth, social support, and involvement in bullying. It would have been advantageous to corroborate these self-reports with other informants such as parents or teachers.

Achieving a better understanding of the socioeconomic context of school bullying helps in planning and resourcing prevention policies and interventions. In discussing the relationship between poverty and crime, criminologist John Braithwaite offered the rather grim conclusion that focusing on groups living in poverty would never have a significant effect on overall crime rates [40]. He argued that only "gross economic measures to reduce the gap between the rich and the poor" could effectively reduce overall crime rates (p. 231). With regard to school bullying, it is possible that redistributing wealth and creating more egalitarian societies would do more for reducing bullying than school-level policies or individual-level intervention. But a more pragmatic approach for antibullying policy is to teach adolescents to recognize the attitudes and behaviors that discriminate and to reach out to adolescents in areas where income inequality is high rather than only those from deprived socioeconomic backgrounds.

Acknowledgments

This research was supported by grants from the Canadian Institutes of Health Research and Social Sciences and Humanities Research Council awarded to the first author. The authors thank Pernille Due, Ron Iannotti, Richard Wilkinson, and Kate Pickett for their helpful comments on earlier drafts of this article.

References

- [1] Craig WM, Pepler DJ. Identifying and targeting risk for involvement in bullying and victimization. *Can J Psychiatry* 2003;48(9):577–82.
- [2] Nansel TR, Overpeck M, Pilla RS, et al. Bullying behaviors among US youth: prevalence and association with psychosocial adjustment. *JAMA* 2001;285(16):2094–100.
- [3] Wolke D, Woods S, Stanford K, Schulz H. Bullying and victimization of primary school children in England and Germany: prevalence and school factors. *Br J Psychol* 2001;92(Pt 4):673–96.
- [4] Currie C, Gabhainn SN, Godeau E, et al. Inequalities in Young People's Health: Health Behaviour in School-Aged Children: International Report from the 2005/2006 Survey. Edinburgh: Child and Adolescent Health Research Unit, University of Edinburgh, 2008.
- [5] Sourander A, Jensen P, Rönning JA, et al. Childhood bullies and victims and their risk of criminality in late adolescence: the Finnish From a Boy to a Man study. *Arch Pediatr Adolesc Med* 2007; 161(6):546–52.
- [6] Olweus D. *Bullying at School: What We Know and What We Can Do*. Cambridge, MA: Blackwell, ERIC Document Reproduction Service No. ED384-437, 1993.
- [7] Boulton MJ, Smith PK. Bully/victim problems in middle-school children: stability, self-perceived competence, peer perceptions, and peer acceptance. *Br J Dev Psychol* 2001;12:315–29.
- [8] Kumpulainen K, Räsänen E. Children involved in bullying at elementary school age: their psychiatric symptoms and deviance in adolescence. An epidemiological sample. *Child Abuse Negl* 2000; 24(12):1567–77.
- [9] Bond L, Carlin JB, Thomas L, et al. Does bullying cause emotional problems? A prospective study of young teenagers. *BMJ* 2001; 323(7311):480–4.
- [10] Slee PT. Peer victimization and its relationship to depression among Australian primary school students. *Pers Individ Diff* 1995; 18:57–62.
- [11] Yang SJ, Kim JM, Kim SW, et al. Bullying and victimization behaviors in boys and girls at South Korean primary schools. *J Am Acad Child Adolesc Psychiatry* 2006;45(1):69–77.
- [12] Fekkes M, Pijpers FI, Verloove-Vanhorick SP. Bullying behavior and associations with psychosomatic complaints and depression in victims. *J Pediatr* 2004;144(1):17–22.
- [13] Klomek AB, Sourander A, Kumpulainen K, et al. Childhood bullying as a risk for later depression and suicidal ideation among Finnish males. *J Affect Disord* 2008;109(1–2):47–55.
- [14] Chen E. Why socioeconomic status affects the health of children: a psychosocial perspective. *Curr Dir Psychol Sci* 2004;13:112–5.
- [15] Kim YS, Koh YJ, Leventhal BL. Prevalence of school bullying in Korean middle school students. *Arch Pediatr Adolesc Med* 2004; 158(8):737–41.
- [16] Butchart A, Engström K. Sex- and age- specific relations between economic development, economic inequality and homicide rates in people aged 0-24 years: a cross-sectional analysis. *Bull World Health Organ* 2002;80(10):797–805.
- [17] Pickett KE, Mookherjee J, Wilkinson RG. Adolescent birth rates, total homicides, and income inequality in rich countries. *Am J Public Health* 2005;95(7):1181–3.
- [18] Wilkinson RG, Pickett KE. Income inequality and population health: a review and explanation of the evidence. *Soc Sci Med* 2006; 62(7):1768–84.
- [19] Kennedy BP, Kawachi I, Prothrow-Stith D. Income distribution and mortality: cross sectional ecological study of the Robin Hood index in the United States. *BMJ* 1996;312(7037):1004–7.
- [20] Kennedy BP, Kawachi I, Prothrow-Stith D, et al. Social capital, income inequality, and firearm violent crime. *Soc Sci Med* 1998; 47(1):7–17.
- [21] Wilson M, Daly M. Life expectancy, economic inequality, homicide, and reproductive timing in Chicago neighbourhoods. *BMJ* 1997; 314(7089):1271–4.
- [22] Daly M, Wilson M, Vasdev S. Income inequality and homicide rates in Canada and the United States. *Can J Criminol* 2001;43:219–36.
- [23] Fajnzylber P, Lederman D, Loayza N. Inequality and violent crime. *J Law Econ* 2002;45(11):1–40.
- [24] Hsieh CC, Pugh MD. Poverty, income inequality, and violent crime: a meta-analysis of recent aggregate data studies. *Crim Justice Rev* 1993;18:182–202.
- [25] Kawachi I, Kennedy BP. *The Health of Nations: Why Inequality Is Harmful to Your Health*. New York: New Press, 2002.
- [26] Putnam RD. *Bowling Alone: Collapse and Revival of American Community*. New York: Simon and Schuster, 2000.
- [27] Wilkinson R. Why is violence more common where inequality is greater? *Ann N Y Acad Sci* 2004;1036:1–12.
- [28] Wilkinson G, Pickett KE. *The Spirit Level: Why More Equal Societies Almost Always Do Better*. London: Penguin, 2009.
- [29] Pickett KE, Wilkinson RG. Child wellbeing and income inequality in rich societies: ecological cross sectional study. *BMJ* 2007; 335(7629):108.
- [30] Due P, Merlo J, Harel-Fisch Y, et al. Socioeconomic inequality in exposure to bullying during adolescence: a comparative, cross-sectional, multilevel study in 35 countries. *Am J Public Health* 2009;99:907–14.

- [31] Moffitt TE. Adolescence-limited and life-course-persistent antisocial behavior: a developmental taxonomy. *Psychol Rev* 1993; 100(4):674–701.
- [32] West P, Sweeting H. Evidence on equalisation in health in youth from the West of Scotland. *Soc Sci Med* 2004;59(1):13–27.
- [33] Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic and statistical considerations. *J Pers Soc Psychol* 1986;51(6):1173–82.
- [34] Currie C, Molcho M, Boyce W, et al. Researching health inequalities in adolescents: the development of the Health Behaviour in School-Aged Children (HBSC) family affluence scale. *Soc Sci Med* 2008; 66(6):1429–36.
- [35] United Nations Development Program. *Human Development Report*. New York: Oxford University Press, 2007.
- [36] MacKinnon DP, Dwyer JH. Estimating mediated effects in prevention studies. *Eval Rev* 1993;17:144–58.
- [37] Graham S, Juvonen J. Self-blame and peer victimization in middle school: an attributional analysis. *Dev Psychol* 1998;34(3):587–99.
- [38] Bronfenbrenner U. *The Ecology of Human Development*. Cambridge, MA: Harvard University Press, 1979.
- [39] Wilkinson R. *The Impact of Inequality: How to Make Sick Societies Healthier*. New York: New Press, 2005.
- [40] Braithwaite J. *Inequality, Crime and Public Policy*. London: Routledge and K. Paul, 1979.