



Original article

Income Inequality or Performance Gap? A Multilevel Study of School Violence in 52 Countries


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ABSTRACT

Purpose: The purpose of the study was to examine the association between income inequality and school violence and between the performance inequality and school violence in two international samples.

Methods: The study used data from Trends in International Mathematics and Science Study 2011 and from the Central Intelligence Agency of United States which combined information about academic performance and students' victimization (physical and social) for 269,456 fourth-grade students and 261,747 eighth-grade students, with gross domestic product and income inequality data in 52 countries. Ecological correlations tested associations between income inequality and victimization and between school performance inequality and victimization among countries. Multilevel ordinal regression and multilevel regression analyses tested the strength of these associations when controlling for socioeconomic and academic performance inequality at school level and family socioeconomic status and academic achievement at student level.

Results: Income inequality was associated with victimization rates in both fourth and eighth grade ($r \approx .60$). Performance inequality shows stronger association with victimization among eighth graders ($r \approx .46$) compared with fourth graders ($r \approx .30$). Multilevel analyses indicate that both an increase in the income inequality in the country and school corresponds with more frequent physical and social victimization. On the other hand, an increase in the performance inequality at the system level shows no consistent association to victimization. However, school performance inequality seems related to an increase in both types of victimizations.

Conclusions: Our results contribute to the finding that income inequality is a determinant of school violence. This result holds regardless of the national performance inequality between students.

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IMPLICATIONS AND CONTRIBUTION

Research has reported through separate studies that both socioeconomic inequality and students' performance inequality may increase prevalence of school victimization. Using data from countries on five continents, we analyze the relation of both types of inequality and school violence. Results suggest that socioeconomic inequality has a greater impact on school victimization.

School violence and peer victimization is a public health and safety issue that is receiving an increasing amount of academic attention due to the pervasiveness that it may have and the high

private and social costs associated with it. Only considering school bullying, a specific type of peer victimization defined as a type of violence that is repetitive, intentional, and takes place between two parties that have a power differential that prevents the victim from defending him or herself using his or her own means [1]; the prevalence can reach >50% in some specific contexts [2].

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Furthermore, extensive literature shows that being frequently victimized by peers in school is linked to lower academic performance [3–5] and the development of multiple psychosocial problems in children and young people. For example, children near the age of 8 years who are victims of school bullying report having issues such as sleeping problems, bedwetting, and head and stomach aches, and young people around the age of 15 years who are victims of school bullying show a greater likelihood of having symptoms of depression, suicidal thoughts, feelings of insecurity, sadness, and exclusion from the school community [6–9].

There are also studies that show that victims of violence in school may have permanent costs, such as increases in (1) future use of psychopharmacological medication; (2) the likelihood of teen pregnancy; and (3) the likelihood of earning a lower salary as an adult [10–12].

Owing to the high costs associated with school peer victimization, it is important to examine its causes. Research focused on studying its determinants has found that student characteristics such as an unattractive physical appearance, students that have an inadequate connection with their parents, or those with low levels of trust in their teachers are more likely to be victimized [10,13,14].

However, research is less clear about the potential effect of socioeconomic status on violence in school. Although some studies show that students from a low socioeconomic status are more likely to be victims of school violence [15,16], others find that students from a high socioeconomic status could have a higher likelihood of victimization [17]. Despite the above, an increasing body of evidence suggests that there is a relationship between school violence and the socioeconomic inequality to which the students are exposed [18,19]. There are at least three studies that find that the socioeconomic inequality of the society which the children are exposed is related to the prevalence of bullying [18–20]. The theory is that there are dominant relationships between those who have more and those who have less in more unequal countries and that it is possible for children and adolescents who grow up in these social contexts to develop peer relationships that replicate the unequal relationships that they observe among adults through victimization [21].

There is no consensus in the literature on the effect that socioeconomic inequality may have on levels of school peer victimization. For example, Akiba et al. [22] analyzed determinants of school violence and concluded that it is not associated with the country's income inequality but that it is linked to inequalities in students' academic performance. Specifically, higher levels of school violence are found in educational systems where there is a larger performance gap between high and low academic outcomes. This would be explained by the fact that educational systems with a significant performance gap among high- and low-achieving students may have a higher percentage of young people who perceive themselves as academic failures compared with other students. This would be a source of frustration that could translate into higher levels of school peer victimization.

This article seeks to contribute to this debate, examining which type of inequality (socioeconomic or academic) has a stronger connection to school violence. Multilevel models are estimated separately to explain social and physical peer victimization based on socioeconomic inequality and academic performance at the school and national levels. The study was conducted separately for two groups of students: fourth-grade

preadolescents (age 9 years) and eighth-grade adolescents (age 13 years).

Methods

Owing to the retrospective nature of this study, it was granted an exemption in writing by the University Diego Portales Ethics Committee.

Sample

We use the 2011 Trends in International Mathematics and Science Study (TIMSS) assessment (<http://timssandpirls.bc.edu/>). The 2011 TIMSS gathers information on standardized test results in mathematics and science for 269,456 fourth graders and 261,747 eighth graders in 52 and 45 countries, respectively. Some countries participate in both grade levels, and others only take part in one. In addition to academic performance, this assessment provides context information gathered through questionnaires filled out by students, teachers, and principals from each of the schools evaluated. Students have an extra 30 minutes after taking the academic test for completing the anonymous questionnaires.

The TIMSS study uses a two-stage random sampling design. In the first stage, a sample of schools is selected proportional to size. In the second, one or more classes and all their students are chosen at random from the schools selected in the first stage. Only one class was selected for close to 80% of the schools. Given the sample precision standards set for the TIMSS study, any estimate at the student level must have a confidence interval of $\pm 3.5\%$. For most countries, this is achieved with a sample of approximately 150 schools and 4,000 students.

Measurements and procedures

Individual data. The victimization data come from the following six questions posed to students regarding the frequency with which they feel that they have been the victims of different types of violence during the school year: (1) if they were called names or made fun of; (2) if they were ignored by other students during games or similar activities; (3) if lies were spread about them; (4) if something was stolen from them; (5) if they were hit or injured by other students; and (6) if they were forced to do things they did not want to do. The answer to each of the questions consists of an ordinal four-point scale (0 = at least once a week, 1 = once or twice a month, 2 = a few times a year, and 4 = never).

In addition, two variables were constructed that measure the frequency with which the student is a victim of physical or social violence. Physical victimization was measured using an ordinal variable created on the basis of three variables associated with such behavior (i.e., stealing, injury or being forced to do something). Each one of these variables was dichotomized and took a value of one when students said that they had been a victim of each type of victimization at least once or twice per month. It has been found that using this frequency is convenient and has a reasonably well-defined meaning in terms of the psychosocial consequences that victims present [23]. The physical victimization variable is the sum of these three dichotomous variables. The social victimization variable was defined in an equivalent manner but based on the three variables associated with verbal and relational victimization (called names, left out of games, lies spread about them).

At the individual level, two variables were considered for the analysis: learning results and the socioeconomic level of the family. The former was measured by a standardized mathematics test organized around two dimensions: (1) a content dimension related to subject matters to be assessed and (2) a cognitive dimension specifying the thinking processes expected of students as they engage with the mathematics content. The student achievement scale in each grade has a range of 0–1000, although it typically falls between 300 and 700.

The socioeconomic level is measured based on the work of Caro and Cortés [24] who proposed a methodology for constructing a single index of socioeconomic status using data from a cross-country study similar to TIMSS. Following this methodology, we construct a socioeconomic index based on available variables in both fourth and eighth grade. In particular, we combine the student answers about five possessions they had available at home. Four of these possessions were answered in a binary code (yes/no): computer, study desk, own room, and Internet connection. These four possessions were fitted using the one-parameter Rasch model [25], then we used the conditional maximum likelihood method to estimate item parameters, and finally we apply the expected a posteriori method [26] to estimate a home possessions individual score.

To obtain the final socioeconomic index, the home possession score was combined with the “number of books in the household” (0 = 0–10, 1 = 11–25, 2 = 26–100, 3 = 101–200, 4 = >200) through a principal component analysis. The final socioeconomic index was transformed to have a mean of 10 and a standard deviation of 2.

School data. At this level, we define the level of socioeconomic inequality of the school as the coefficient of variation of the socioeconomic index by school. We also define the level of inequality of learning in the school as the coefficient of variation of the TIMSS mathematics test score, also by school.

Country data. The income and income inequality data were obtained from the United States Central Intelligence Agency. Since 1975, the Central Intelligence Agency has gathered data from various public and private sources in the United States, centralized it, and made it available for public use. Other academic research studies also draw on this database [27]. The country income for 2011 was measured as the gross domestic product adjusted for purchasing power parity and is expressed in 2012 dollars. Income inequality is measured using the Gini index. The income Gini index represents the distribution of income among all members of a society and has a theoretical range between 0 (everyone has the same income) and 1 (one person has all the income, and everyone else has no income).

Finally, the variable that measures academic inequality was also defined by a Gini index of math scores ranging between 0 (perfect equality) and 1 (perfect inequality).

Table 1 shows descriptive data at the country level. According to this data, the percentage of students that are frequent victims of social or physical violence declines between fourth and eighth grade in all countries with data in both grades.

Data analysis

The ecological analysis was conducted by aggregating the data by level. To measure social and physical victimization at the school level, the percentage of students in each school who said

that they had been victims of at least two (of three) types of violence at least once or twice a month was used (for social and physical violence separately). At the country level, equivalent definitions were used.

The multilevel analysis was conducted using the work of Rabe-Hesketh and Skrondal [28] as a reference. The data were analyzed assuming a three-level structure, with students grouped into schools and schools grouped into countries. Ordinal logistic regressions were estimated for each of the victimization variables in six models of random coefficients. Control variables were included at each level in all the analyses. At the student level, the socioeconomic level of the family and score obtained on the TIMSS mathematics test were included. At the school level, students' socioeconomic inequality and academic inequality were used. Finally, at the country level, income, income inequality, and performance inequality were used. The concept of thresholds was applied in these models assuming that a latent and continuous variable was related to responses in the following four possible categories: has never been the victim of school violence, a few times per year, once or twice each month, and at least once per week. The odds ratios of peer victimization were calculated at any frequency or more, compared with less frequent peer victimization.

In addition, based on these six variables, two more ordinal variables were built that indicated how many types of peer victimizations the student had experienced between none and three physical victimizations or between none and three social victimizations. For each one of these variables, a random coefficient ordinal logit model was estimated using the same control variables as the earlier models. The concept of thresholds is equivalent to the previous case: a latent and continuous variable is related to responses in four possible categories: no victimization, one victimization, two victimizations, and three victimizations. As before, the odds ratios of peer victimization were calculated at any frequency or more, compared with less frequent peer victimization.

For all the estimates, weights were used to consider the sample design and differences in the likelihood of selection of the various individuals and schools. These weights consider that each country has the same weight in the estimates. In addition, to facilitate the interpretation of the intercepts and odds ratio of all variables included in these models, they were standardized such that the average is centered on 0 and its standard deviation is 1.

Results

Associations were tested at all levels using ecological correlations. At the student level, correlations between socioeconomic level, academic performance, and physical and social victimization were tested. At the school level, correlations between socioeconomic inequality, academic performance inequality, and both types of victimization were tested. At the country level, correlations were tested between the per capita Gross Domestic Product, income Gini index, performance Gini index, and the two types of victimization. As Table 2 shows, the country's income inequality is significantly correlated with physical and social victimization among both preadolescents and adolescents. At this level, performance inequality is also correlated with victimization but presents a stronger correlation with physical and social victimization among adolescents than that among preadolescents.

Table 1
Wealth, income inequality, performance inequality, and school victimization in 52 countries

Country	GDP per capita (PPP, US \$ 2012)	Income Gini	Performance Gini fourth grade	Performance Gini eighth grade	Social victimization fourth grade, %	Social victimization eighth grade, %	Physical victimization fourth grade, %	Physical victimization eighth grade, %
1. Thailand	\$ 10,000	.536	.093	.107	45.5	35.2	48.7	26.0
2. Botswana	\$ 16,800	.630	.115	.104	44.0	32.9	40.0	28.5
3. Honduras	\$ 4,600	.577	.112	.117	39.7	18.9	18.3	8.8
4. Chile	\$ 18,400	.521	.094	.103	39.2	15.6	18.4	3.9
5. Hungary	\$ 19,800	.247	.094	.097	34.8	18.3	12.8	3.3
6. New Zealand	\$ 28,800	.362	.093	.096	34.6	18.2	23.8	6.9
7. Iran, Islamic Republic of	\$ 13,100	.445	.116	.123	34.5	20.3	14.2	8.2
8. Russian Federation	\$ 17,700	.420	.073	.082	34.0	16.1	7.7	2.1
9. Turkey	\$ 15,000	.402	.115	.137	33.1	19.8	26.1	13.9
10. Morocco	\$ 5,300	.409	.158	.120	30.9	21.3	23.6	9.8
11. Spain	\$ 30,400	.320	.078	—	30.5	—	16.9	—
12. Slovak Republic	\$ 24,300	.260	.084	—	30.2	—	10.2	—
13. Romania	\$ 12,800	.333	.119	.122	29.2	20.8	12.1	7.6
14. Tunisia	\$ 9,700	.400	.139	.094	28.6	16.2	17.9	8.1
15. Yemen	\$ 2,200	.377	.220	—	28.6	—	18.3	—
16. Singapore	\$ 60,900	.473	.069	.075	28.1	21.7	15.7	7.3
17. Czech Republic	\$ 27,200	.310	.073	—	27.7	—	10.6	—
18. Lithuania	\$ 20,100	.355	.075	.086	27.6	15.3	8.2	3.2
19. Belgium (Flemish)	\$ 38,100	.280	.057	—	27.2	—	12.0	—
20. Australia	\$ 42,400	.305	.090	.093	26.8	17.4	18.4	6.8
21. England	\$ 36,700	.340	.089	.093	26.7	15.0	13.3	3.9
22. Netherlands	\$ 42,300	.309	.051	—	25.7	—	9.2	—
23. Malta	\$ 26,100	.274	.084	—	25.6	—	16.3	—
24. Chinese Taipei	\$ 38,500	.326	.065	.095	25.5	14.7	11.2	4.4
25. Austria	\$ 42,500	.260	.066	—	25.4	—	9.4	—
26. Portugal	\$ 23,000	.385	.069	—	25.4	—	9.2	—
27. Slovenia	\$ 28,600	.284	.071	.076	25.1	14.5	11.2	3.9
28. Korea, Republic of	32,400	.310	.059	.080	25.0	11.1	8.1	5.5
29. Italy	\$ 30,100	.319	.075	.080	25.0	11.8	9.5	1.6
30. Germany	\$ 39,100	.270	.062	—	24.8	—	6.1	—
31. Hong Kong SAR	\$ 50,700	.533	.057	.078	23.7	21.4	11.6	6.5
32. United States	\$ 49,800	.450	.075	.083	23.5	17.6	13.5	5.4
33. Japan	\$ 36,200	.376	.066	.081	23.0	13.4	11.7	6.4
34. Poland	\$ 21,000	.342	.081	—	21.3	—	7.1	—
35. Kazakhstan	\$ 13,900	.267	.091	.089	21.0	16.0	8.3	4.1
36. Serbia	\$ 10,500	.282	.092	—	20.3	—	7.6	—
37. Croatia	\$ 18,100	.320	.072	—	18.5	—	5.9	—
38. Norway	\$ 55,300	.250	.073	.074	17.0	7.4	8.3	2.8
39. Georgia	\$ 5,900	.408	.107	.134	16.4	7.7	7.2	2.4
40. Denmark	\$ 37,700	.248	.070	—	16.3	—	4.4	—
41. Finland	\$ 36,500	.268	.067	.069	15.3	10.6	5.5	2.9
42. Ireland	\$ 41,700	.339	.079	—	14.3	—	8.7	—
43. Sweden	\$ 41,700	.230	.070	.075	13.6	7.8	3.4	1.7
44. Azerbaijan	\$ 10,700	.337	.119	—	9.8	—	5.0	—
45. Armenia	\$ 5,600	.309	.105	.105	9.6	4.9	5.8	2.2
46. Ghana	\$ 3,300	.394	—	.132	—	40.4	—	33.1
47. Indonesia	\$ 5,000	.368	—	.114	—	28.2	—	17.2
48. Jordan	\$ 6,000	.397	—	.133	—	25.0	—	12.8
49. Malaysia	\$ 16,900	.462	—	.115	—	18.9	—	9.8
50. South Africa	\$ 11,300	.650	—	.125	—	35.4	—	22.6
51. Ukraine	\$ 7,600	.275	—	.102	—	14.4	—	2.2
52. Macedonia, Republic of	\$ 10,700	.442	—	.139	—	13.4	—	6.3

PPP = purchasing power parity.

Figure 1 presents the correlation of physical victimization and the income Gini index in the case of fourth-grade students. This type of victimization is nearly five times as frequent in countries with high income inequality as it is in countries with low income inequality.

The individual contribution of income inequality in the country and the performance inequality of the educational system for different types of physical and social victimization were examined in multilevel models that control for national income, socioeconomic and academic inequality at the school level, and socioeconomic level and academic performance at the individual level.

Table 3 shows the results for six types of student victimization. The association between socioeconomic inequality at the national level and victimization is positive and significant in nine of 12 estimates and has a higher magnitude for the sample of adolescents compared with preadolescents. This association is also stronger in the case of students who say that their belongings were stolen compared with the other types of school violence. By contrast, the association between the performance inequality and different types of victimization is not consistent. There is a negative association in two of the 12 estimates. There is no relationship in the others. With regard to other variables, both academic

Table 2

Student-, school-, and country-level correlations between victimization, performance and SES variables

Student-level variables	1	2	3	4	
1. SES	—	.51***	-.11***	-.14***	
2. Performance	.47***	—	-.13***	-.16***	
3. Social victimization (student)	-.06***	-.11***	—	.35***	
4. Physical victimization (student)	-.08***	-.15***	.38***	—	
School-level variables	5	6	7	8	
5. SES inequality	—	.44***	.25***	.31***	
6. Performance inequality	.34***	—	.15***	.21***	
7. Social victimization (school)	.18***	.13***	—	.63***	
8. Physical victimization (school)	.21***	.20***	.57***	—	
Country-level variables	9	10	11	12	13
9. GDP (PPP)	—	-.22	-.76***	-.33**	-.38**
10. Income Gini	-.25	—	.39*	.61***	.58***
11. Performance Gini	-.69***	.29*	—	.43***	.49***
12. Social victimization (country)	-.25*	.60***	.23	—	.92***
13. Physical victimization (country)	-.26*	.65***	.37**	.78***	—

Fourth graders are shown below the diagonal and eighth graders above. GDP = gross domestic product; PPP = purchasing power parity; SES = socioeconomic status.

* $p < .1$; ** $p < .05$; *** $p < .01$.

inequality and socioeconomic inequality within the school are associated with an increase in various types of school violence: nine of 12 specifications for the former case and eight of 12 in the latter. At the student level, better academic performance is associated with a lower level of victimization, and the socioeconomic level of the household does not present a consistent relationship with the various types of school violence.

Finally, the determinants of physical and social victimization were studied for fourth- and eighth-grade students. The results of this exercise are presented in Table 4. They confirm most of the results presented in Table 3. At the country level, socioeconomic

inequality is associated with greater levels of both physical and social violence. However, the performance inequality is not consistently associated with either. At the school level, socioeconomic inequality are associated with an increase in both types of victimization, and regarding academic inequality and victimization, although that in three of the four specifications the association is not statistically significant, they all show a positive association with both types of victimization. Finally, at the student level, although a higher academic performance is associated with a lower intensity of physical and social victimization, the socioeconomic level of the student does not show a consistent association with peer victimization.

Discussion

Studies have found that both income inequality and academic performance inequality can be related to more school violence. The main finding of this work is that at the national level, only greater income inequality is consistently associated with higher levels of school victimization.

The results do not support the hypothesis that educational systems that produce a wider performance gap among high- and low-achieving students tend to demonstrate greater school violence. Despite this, academic inequality between students could be relevant on a smaller scale. Our results suggest that more unequal schools in terms of academic performance tend to present higher levels of school violence. It is possible that a greater proportion of students who perceive that they are academic failures feel a high level of frustration that could cause them to be involved in acts of school violence. However, this self-perception seems to be more influenced by the academic performance of their peers than that by the performance of students outside their school.

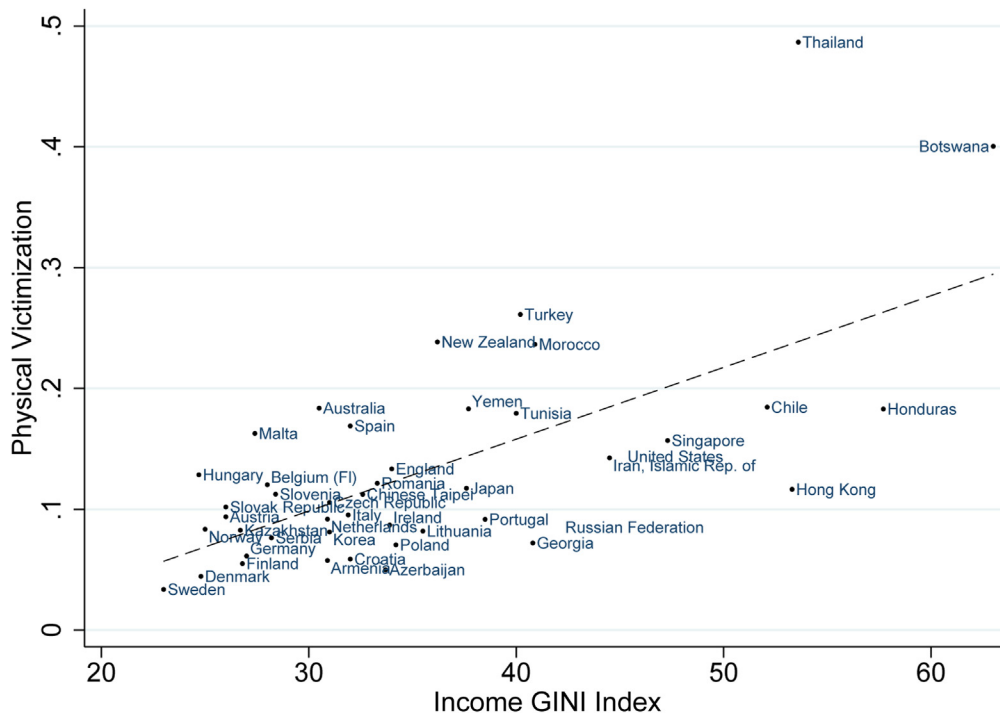


Figure 1. Income inequality and (victim of two or more types) school physical violence at country level by 9-year olds in 45 countries ($r = .65$).

Table 3
Hierarchical ordinal regression analysis for variables predicting different types of victimization

Variable	Made fun of		Left out of games		Spread lies		Stolen		Hurted by others		Forced to do things	
	B (SE)	OR (95% CI)	B (SE)	OR (95% CI)	B (SE)	OR (95% CI)	B (SE)	OR (95% CI)	B (SE)	OR (95% CI)	B (SE)	OR (95% CI)
1. Fourth grade (N = 207,073)												
Student SES	.00 (.01)	1.00 (.97–1.03)	.01 (.02)	1.01 (.97–1.04)	.07 (.01)	1.08 (1.05–1.11)	.10 (.01)	1.10 (1.07–1.13)	.04 (.01)	1.04 (1.01–1.07)	.10 (.01)	1.11 (1.08–1.14)
Student performance	-.08 (.02)	.92 (.89–.96)	-.27 (.03)	.77 (.73–.81)	-.23 (.02)	.80 (.76–.83)	-.24 (.03)	.79 (.74–.84)	-.09 (.02)	.91 (.88–.95)	-.39 (.03)	.68 (.64–.71)
School SES inequality	.05 (.02)	1.06 (1.01–1.10)	.02 (.3)	1.02 (.97–1.07)	.07 (.02)	1.07 (1.02–1.12)	.11 (.02)	1.12 (1.07–1.17)	.03 (.02)	1.03 (.99–1.09)	.03 (.03)	1.03 (.97–1.09)
School performance inequality	.08 (.02)	1.08 (1.05–1.12)	.04 (.02)	1.04 (1.00–1.08)	.03 (.02)	1.03 (.99–1.08)	.08 (.02)	1.08 (1.04–1.12)	.09 (.02)	1.10 (1.04–1.15)	.01 (.02)	1.01 (.97–1.06)
Country GDP (PPP)	.14 (.1)	1.19 (.98–1.45)	.14 (.09)	1.15 (.96–1.38)	.05 (.10)	1.05 (.87–1.27)	.27 (.10)	1.31 (1.07–1.61)	.11 (.10)	1.12 (.91–1.37)	.42 (.10)	1.53 (1.26–1.85)
Country income Gini	.24 (.06)	1.27 (1.13–1.42)	.09 (.06)	1.10 (.97–1.24)	.21 (.06)	1.23 (1.09–1.39)	.46 (.08)	1.58 (1.33–1.87)	.13 (.09)	1.14 (.95–1.37)	.28 (.08)	1.33 (1.14–1.55)
Country performance Gini	-.17 (.17)	.84 (.73–.98)	-.06 (.07)	.94 (.82–1.08)	-.14 (.06)	.87 (.77–.97)	.14 (.11)	1.15 (.93–1.43)	-.11 (.08)	.89 (.76–1.05)	.10 (.08)	1.11 (.94–1.30)
Thresholds												
One (few times a year)	-.24 (.07)		.20 (.07)		.13 (.07)		.80 (.07)		.23 (.09)		1.29 (.07)	
Two (once or twice a month)	.75 (.06)		1.04 (.06)		1.10 (.06)		1.93 (.08)		1.31 (.08)		2.13 (.08)	
Three (once a week)	1.47 (.06)		1.87 (.07)		1.94 (.06)		2.73 (.07)		2.18 (.08)		2.90 (.08)	
2. Eighth grade (N = 193,323)												
Student SES	-.03 (.02)	.97 (.93–1.01)	-.04 (.03)	.96 (.92–1.01)	.06 (.01)	1.06 (1.03–1.09)	.05 (.01)	1.05 (1.03–1.08)	-.03 (.02)	.97 (.94–1.01)	.05 (.02)	1.05 (1.01–1.09)
Student performance	.03 (.03)	1.03 (.98–1.09)	-.22 (.05)	.80 (.72–.89)	-.11 (.03)	.90 (.85–.95)	-.05 (.03)	.96 (.89–1.02)	-.05 (.03)	.95 (.89–1.01)	-.22 (.06)	.80 (.71–.90)
School SES inequality	.06 (.02)	1.06 (1.02–1.12)	.01 (.02)	1.01 (.97–1.05)	.05 (.01)	1.05 (1.02–1.08)	.11 (.02)	1.11 (1.07–1.15)	.04 (.02)	1.04 (1.00–1.08)	.04 (.02)	1.04 (1.00–1.09)
School performance inequality	.04 (.02)	1.04 (1.00–1.08)	.04 (.02)	1.04 (1.00–1.08)	.03 (.01)	1.03 (1.00–1.06)	.06 (.03)	1.06 (1.01–1.12)	.08 (.02)	1.08 (1.05–1.12)	.03 (.02)	1.02 (.98–1.07)
Country GDP (PPP)	.20 (.12)	1.22 (.97–1.55)	.09 (.12)	1.09 (.85–1.41)	-.08 (.08)	.92 (.77–1.09)	.06 (.16)	1.06 (.77–1.45)	.04 (.11)	1.04 (.84–1.29)	.39 (.14)	1.47 (1.13–1.92)
Country income Gini	.33 (.06)	1.39 (1.22–1.57)	.19 (.08)	1.21 (1.02–1.43)	.23 (.07)	1.26 (1.09–1.46)	.53 (.13)	1.70 (1.33–2.18)	.11 (.08)	1.11 (.94–1.31)	.33 (.11)	1.39 (1.13–1.71)
Country performance Gini	.00 (.14)	1.00 (.76–1.33)	.00 (.13)	1.00 (.78–1.28)	-.15 (.10)	.86 (.69–1.06)	.19 (.23)	1.21 (.77–1.91)	.08 (.12)	1.09 (.86–1.38)	.28 (.17)	1.33 (.95–1.86)
Thresholds												
One (few times a year)	-.24 (.09)		.98 (.08)		.05 (.07)		.69 (.12)		.96 (.08)		1.69 (.10)	
Two (once or twice a month)	.89 (.08)		1.89 (.09)		1.39 (.07)		2.07 (.13)		2.03 (.09)		2.70 (.12)	
Three (once a week)	1.71 (.09)		2.77 (.10)		2.45 (.07)		3.11 (.14)		2.90 (.10)		3.61 (.12)	

R² (McFadden) = .18–.23.

CI = confidence interval; GDP = gross domestic product; OR = odds ratio; PPP = purchasing power parity; SE = standard error; SES = socioeconomic status.

Table 4
Hierarchical ordinal regression analysis for variables predicting physical and social victimization

Variable	Physical victimization		Social victimization	
	B (SE)	OR (95% CI)	B (SE)	OR (95% CI)
1. Fourth grade				
Student SES	.06 (.01)	1.06 (1.04–1.09)	.00 (.01)	1.00 (.97–1.03)
Student performance	–.37 (.03)	.68 (.65–.72)	–.32 (.02)	.72 (.70–.75)
School SES inequality	.09 (.03)	1.09 (1.04–1.15)	.08 (.02)	1.08 (1.03–1.13)
School performance inequality	.03 (.2)	1.03 (.99–1.07)	.02 (.2)	1.02 (.99–1.06)
Country GDP (PPP)	.10 (.10)	1.10 (.91–1.33)	.01 (.08)	1.01 (.86–1.18)
Country income Gini	.35 (.10)	1.42 (1.17–1.73)	.25 (.05)	1.28 (1.15–1.42)
Country Performance Gini	–.08 (.09)	.92 (.78–1.09)	–.21 (.05)	.81 (.73–.90)
Thresholds				
One (one victimization)	.70 (.08)		–.03 (.06)	
Two (two victimizations)	2.15 (.08)		1.15 (.06)	
Three (three victimizations)	3.06 (.08)		2.38 (.07)	
2. Eighth grade				
Student SES	.02 (.02)	1.02 (.99–1.05)	–.01 (.02)	.99 (.95–1.03)
Student Performance	–.26 (.03)	.77 (.73–.82)	–.22 (.03)	.80 (.75–.85)
School SES inequality	.09 (.02)	1.09 (1.05–1.13)	.07 (.02)	1.08 (1.03–1.12)
School performance inequality	.05 (.02)	1.05 (1.01–1.09)	.02 (.02)	1.02 (.99–1.06)
Country GDP (PPP)	.00 (.12)	1.00 (.79–1.27)	.05 (.10)	1.05 (.86–1.29)
Country Income Gini	.40 (.11)	1.48 (1.19–1.84)	.29 (.07)	1.33 (1.15–1.54)
Country Performance Gini	.14 (.18)	1.15 (.82–1.63)	.01 (.11)	1.01 (.82–1.25)
Thresholds				
One (one victimization)	1.26 (.09)		.33 (.07)	
Two (two victimizations)	2.83 (.11)		1.67 (.07)	
Three (three victimizations)	4.29 (.12)		3.09 (.08)	

R² (McFadden) = .19–.23.

CI = confidence interval; GDP = gross domestic product; OR = odds ratio; PPP = purchasing power parity; SE = standard error; SES = socioeconomic status.

With regard to the relationship between income inequality and school violence, our results show a positive and consistent association that is stronger in the sample of adolescents than preadolescents and in physical victimization compared with social victimization.

The above notwithstanding, the association between socioeconomic inequality and other types of victimization is stronger compared with the results presented in similar research [18–20]. There are two possible reasons that may help explain these differences. The first is that compared with these studies, our estimates consider more countries with high levels of socioeconomic inequality and peer victimization outside Europe and North America (e.g., Thailand, Botswana, and Chile). The second could be related to the way in which the data were gathered. Our analysis is based on self-reporting of specific experiences of violence, whereas other studies generally use self-reporting of bullying, which could reduce the precision of the measure of victimization [29].

Above and beyond the quantitative relationship between income inequality and school violence reported here, there is a growing body of evidence that shows the negative effects of income inequality. A recent study that reviews this evidence within an epidemiological causal framework found that large income differences within a country have detrimental consequences in terms of social violence, population health, and well-being [30]. Moreover, it has also been found that higher country income inequality is associated with lower child well-being, a measure that includes among other dimensions, child exposure to violence, and well-being at school [31].

There are several possible explanations about how higher income inequality can cause violence. One of the most cited explanations maintains that social relationships are important for individuals and that differences in status become more

pronounced in a context of high levels of inequality. This causes distance between people to grow, which could reduce the number of interactions between individuals from different groups and generate feelings of stress and tension between people of different statuses. It could even result in relationships of domination between individuals from high and low statuses. Children and young people in more unequal societies could seek to replicate relationships that they observe between adults competing to win more status than their peers [19,21,30,32,33].

A second explanation is that in countries with high income inequality, social norms may be more likely to accept inequality that might lead to the approval of behaviors associated with status differences, which might foster discrimination, teasing, and peer rejection [18,19].

A third perspective suggests that among humans, there is a “natural aversion” to inequality that could generate tension between individuals. In fact, some researchers argue that this aversion to inequity is an innate part of human behavior and would have played a key role in the evolution of cooperation among human beings [34,35].

Whatever the mechanism through which greater income inequality generates more school violence, the results of this study suggest that income inequality matters not only at the country level but also at the school level. Consistent with previous evidence [18], we find that a student who attends a school with higher socioeconomic inequality would also be more likely to be exposed to more violence. Owing to data limitations, we constructed a socioeconomic index at the individual and school level that represents an approximation to family income. Despite this limitation, it is important to note that our index aggregated to the country level is highly correlated with the official country income data used in this study (.75 for fourth-grade data and .70 for eighth-grade data).

Many countries have designed policies to prevent school violence by implementing programs that train teachers and parents and develop students' social skills, such as self-confidence and tolerance. Some meta-analyses have assessed these interventions, and most of them have found relatively low levels of effectiveness [36–38]. One of the studies compares the effectiveness of these programs in various countries and finds that they seem to be more effective in countries with less socioeconomic inequality [38]. Future research should expand on this issue and evaluate how restricted these types of interventions are when a country has high levels of socioeconomic inequality.

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