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Pediatrics; originally published online December 3, 2012;

DOI: 10.1542/peds.2012-1614

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://pediatrics.aappublications.org/content/early/2012/11/27/peds.2012-1614>

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American Academy of Pediatrics

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Trends and Socioeconomic Correlates of Adolescent Physical Fighting in 30 Countries

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KEY WORDS

adolescent, epidemiology, inequality, fighting, socioeconomic, trends, violence

ABBREVIATIONS

FAS—Family Affluence Scale

GDP—gross domestic product

HBSC—Health Behavior in School-Aged Children

RR—relative risk

Drs Pickett, Molcho, and Elgar and Ms Rathmann contributed to the conception and design of this study; acquisition of data involved Drs Pickett, Molcho, Brooks, ter Bogt, Nic Gabhainn, Gaspar de Matos, Harel-Fisch, and Currie and Ms de Looze; data analyses were conducted by Dr Pickett with support from Drs Molcho and Elgar and Mss Rathmann and de Looze; all authors were involved in the interpretation of the data; drafting of the article including subsections was performed by Drs Pickett, Molcho, Elgar, and Brooks; and all authors were involved in revision of the article for important intellectual content, and each provided final approval of the article for submission to the journal.

(Continued on last page)



WHAT'S KNOWN ON THIS SUBJECT: Adolescent physical fighting is an important public health concern with known social origins. However, existing international studies of adolescent fighting provide little evidence about its prevalence, trends over time, or possible socioeconomic determinants.



WHAT THIS STUDY ADDS: We studied frequent physical fighting among 494 874 adolescents in 30 countries over an 8-year period. Physical fighting declined in most countries. National measures of absolute wealth but not socioeconomic inequalities related to risk of frequent physical fighting.

abstract

BACKGROUND AND OBJECTIVES: No recent international studies provide evidence about its prevalence, trends, or social determinants of physical fighting in adolescents. We studied cross-national epidemiologic trends over time in the occurrence of frequent physical fighting, demographic variations in reported trends, and national wealth and income inequality as correlates.

METHODS: Cross-sectional surveys were administered in school settings in 2002, 2006, and 2010. Participants ($N = 493\,874$) included eligible and consenting students aged 11, 13, and 15 years in sampled schools from 30 mainly European and North American countries. Individual measures included engagement in frequent physical fighting, age, gender, participation in multiple risk behaviors, victimization by bullying, and family affluence. Contextual measures included national income inequality, absolute wealth and homicide rates. Temporal measure was survey cycle (year).

RESULTS: Frequent physical fighting declined over time in 19 (63%) of 30 countries (from descriptive then multiple Poisson regression analyses). Contextual measures of absolute wealth (relative risk 0.96, 95% confidence interval 0.93–0.99 per 1 SD increase in gross domestic product per capita) but not income inequality (relative risk 1.01, 95% confidence interval 0.98–1.05 per 1 SD increase) related to lower levels of engagement in fighting. Other risk factors identified were male gender, younger age (11 years), multiple risk behaviors, victimization by bullying, and national homicide rates.

CONCLUSIONS: Between 2002 and 2010, adolescent physical fighting declined in most countries. Specific groups of adolescents require targeted violence reduction programs. Possible determinants responsible for the observed declines are discussed. *Pediatrics* 2013;131:1–9

Youth violence is a major concern in most countries and physical fighting is the most common manifestation of such violence.^{1,2} Physical fighting increases risks for injury^{3,4} and relates to substance use and other problem behaviors.^{5–8} Children who fight report lower life satisfaction, poorer family and peer relationships, and worse perceptions of their school environments than do children not involved in fighting.^{9–11} Although patterns of adolescent fighting have been described cross-sectionally,^{1,4,10,12,13} no international studies have provided evidence about recent trends in physical fighting with the exception of one US-based study conducted in the 1990s.¹⁴

Adolescent physical fighting relates to individual, family, and societal factors. Individually, established risk factors include male gender, younger age, misuse of alcohol, and “multiple risk” or clustered problem behaviors^{15–17}; the latter are particularly strong for those who regularly fight.^{10,18} At contextual levels, fighting relates to socioeconomic position of families^{19,20} and to indicators of wealth and income inequalities within regions and countries.^{21–26} The recent Commission on Social Determinants of Health reported on the effects of socioeconomic position on the general health status of populations,²⁷ whereas others have identified specific associations between income inequalities and school bullying.^{28–30} Plausible social explanations (eg, violence as a response to deprivation and inequalities)^{1,31,32} and biological explanations (eg, physiologic responses to the stress of deprivation)³³ exist for such associations. Yet, there is a paucity of studies linking socioeconomic factors to adolescent fighting.

The Health Behavior in School-Aged Children study (HBSC) offers a unique opportunity to examine adolescent fighting and its potential determinants. The HBSC study is a World Health Organization collaborative study of health

and health risk behaviors in 11- to 15-year-olds, involving conduct of a survey every 4 years in 43 countries. HBSC measures, sampling, and data collection are common across countries and over time, and the study is based conceptually on socioecological theory.^{34,35} We used HBSC data on adolescent fighting to conduct a cross-national study of 493 874 young people from 30 countries surveyed over 8 recent years to (1) describe trends over time, (2) describe variations in reported trends by age, gender, and country, and (3) evaluate contextual measures of income inequality and national absolute wealth as possible determinants.

METHODS

Study Population and Procedures

School-based anonymous surveys were conducted in the academic years ending in 2002, 2006, and 2010 (2011 in Israel) according to a common research protocol.³⁵ National research teams surveyed students to produce representative national estimates for 11-, 13-, and 15-year-old children. Countries are required to sample children from schools representing at least 95% of this target population in their national sampling frames, including public and private schools (for a full discussion of HBSC sampling, see Roberts et al [2009] at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2732766/>?tool=pubmed). Classes within schools were selected with variations in sampling criteria permitted to fit country-level circumstances. Standardized weights were created to ensure representativeness.

The current analysis is based on 30 participating countries. Each obtained approval to conduct the survey from the ethics review board or equivalent regulatory body associated with their institution. Participation was voluntary, and consent (explicit or implicit) was sought from school administrators, parents and children as per national

human subject requirements. At the school level, sampling was done with replacement (as required) and school response rates varied by country (to illustrate: 47% to 100% in 2006, but >70% for 21 of 29 reporting countries). At the student-participant response rates also varied by country and but were >70% for almost all national surveys considered here.

Measures

Overview

Items used in the trends analysis included a physical fighting item, basic demographics (age group, gender, country), and time (survey cycle). Items used in the risk factor analysis included the fighting outcome, the primary socioeconomic predictors of interest, and demographic and additional individual and contextual factors that could confound or modify relations between socioeconomic factors and fighting.

Physical Fighting

Participants were asked how frequently they had been involved in a physical fight during the past 12 months. Frequency of fighting is a validated construct with extensive use in adolescent health surveys.^{10,34} Frequent physical fighting (reports of ≥ 3 fights in the past 12 months; yes versus no) was used as a primary measure to identify young people for whom violence is likely habitual as opposed to an occasional or non-existent behavior. This cut-point follows historical precedents as an indicator of habitual aggression.¹⁹ Frequent physical fighting during adolescence is associated with conduct disorders.³⁶

Time

Trends in the occurrence of frequent physical fighting were expressed in terms of changes in prevalence per 1-year study interval and for 2010 versus 2002.

Individual-Level Predictors

Sociodemographic variables considered included age group (11-, 13-, and 15-year-olds), gender (boys versus girls), and individual family affluence (Family Affluence Scale [FAS], the validated HBSC measure of socioeconomic status).³⁷ FAS is measured by assessing participants' responses to 4 items describing the material conditions of their household (respondents' own household bedrooms, family holidays, family vehicle ownership, family computer ownership). Responses to the individual items are summed on a 9-point scale with set cut-points for low (0 to 3), medium (4 to 5), and high (6 to 9) affluence.³⁷

For risk-taking behaviors, we used a composite measure of the following behaviors (1 vs 1, for ever versus never engaged during lifetime): smoking, drunkenness, cannabis, and sexual intercourse. These were considered in a combined score (0, no reported behaviors, to 4, all reported behaviors) with known excellent internal consistency.^{38–40}

Frequent victimization was assessed by using a standard item originally developed by Olweus (Smith et al⁴¹) and defined as experiencing bullying while at school regularly ("2 or 3 times per month" to "several times per week"), after existing precedents.¹⁹ This variable was included to control for one possible reason for engagement in physical fighting.

Contextual-Level Predictors

National summary measures for income inequality and absolute wealth were available for many countries at or around each survey cycle. The Gini coefficient is a measure of post-tax inequality that theoretically ranges from 0 (all persons have equal income) to 1 (where one person has all the income and the rest have none). Estimates were obtained from the Standardized World Income Inequality Database, based on

the United Nations University's World Income Inequality Database and Luxembourg Income Study.⁴² Due to missing data, Gini coefficient values for 2009 were substituted for 2010 in 5 countries (Canada, Croatia, Ireland, Russia, and Switzerland), whereas estimates for Macedonia and Ukraine were missing for both 2009 and 2010 and hence excluded for that cycle. Absolute wealth in countries was estimated by year using gross domestic product per capita (GDP), available from the World Bank. The latter is the "sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products, divided by the midyear population. GDP is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources."⁴³ Income inequality (Gini coefficient) and absolute wealth (GDP per capita) are traditionally examined together in social models of health.⁴⁴

Societal Violence

Published homicide rates per 100 000 were also available as a contextual indicator of societal violence for most countries, by year.^{45,46}

Statistical Analysis

Data analyses were conducted with SAS 9.2 (SAS Institute, Cary, NC). Descriptive analyses were used to characterize the international sample. The prevalence of frequent physical fighting was estimated by survey cycle in subgroups defined by age and gender. Age/gender standardized prevalence rates were then estimated by cycle for each of the 30 countries using the entire study population as the standard. We evaluated age- and gender-adjusted trends in reports of frequent physical fighting over time within each country using a Poisson regression analyses that modeled frequent physical fighting (yes versus no) as the dependent variable

with age, gender, and year of survey cycle as the independent variables. Models accounted for the clustered nature of the sampling scheme, with students nested within schools in 27 of 30 countries. Three countries (Germany, Greenland, Switzerland) had incomplete school identifiers; clustering by school was taken into account in these countries by down-weighting their respective samples by a design effect of 1.2, a conservative generic value that is based upon published historical precedents for mandatory HBSC items.³⁴ Both β coefficients and standard errors were used to generate estimates of relative risk (RR) first per year of study, then for 2010 versus 2002.

Multiple Poisson regression analyses were conducted to predict engagement in frequent physical fighting in the pooled international sample, with a focus on socioeconomic correlates. Countries and schools were included as random effects in these models, and random intercepts were also assumed by country. Standardized weights were applied to account for variations in sampling between countries, and the a priori combining of national/regional samples in the United Kingdom (England, Scotland, and Wales) and Belgium (Flemish and French speaking). A hierarchical series of models was developed as follows: model 1, bivariate estimation of relations between frequent physical fighting and each independent variable; model 2, Gini coefficient and GDP per capita (included together, to ensure that the relative importance of income inequalities and national absolute wealth were understood),⁴⁵ with age group and gender also forced into the model; and model 3, model 2 variables plus other individual factors (FAS, multiple risk behavior scale, frequent victimization by bullying). This was extended through inclusion of contextual factors (homicide rates) and time (survey cycle). Finally, cross-level interactions between each

survey cycle and FAS and the 2 contextual socioeconomic indicators (Gini coefficient and GDP per capita) were explored.

RESULTS

Young people (weighted $N = 493\,874$) in the 30 countries participated and provided full responses to the HBSC physical fighting question (Table 1). There was sufficient variability in basic demographic factors to permit meaningful subanalyses and statistical modeling. Table 1 profiles the sample demographically and by the contextual risk factors.

Engagement of young people in frequent physical fighting varied by country, gender, age group, and survey cycle (Table 2). In general, boys reported higher prevalence levels than girls, and the prevalence was lower in older age groups. Declines in physical fighting were reported over time in 19 (63%; at $P < .10$) of the 30 countries, with similar declines observed within specific age and gender subgroups. Notable exceptions were Greece, Latvia, and Ukraine, which reported statistically significant increases (Table 3; $P < .05$). There was wide variability in the prevalence of frequent fighting between participating countries (eg, age/gender-standardized rates varied from 5.3 to 16.0 per 100 by country in 2010). The overall declining trend is summarized in Fig 1, which shows adjusted relative risks for 2010 vs 2002 (point estimates only to illustrate the overall pattern; 95% confidence intervals can be inferred from Table 3). The majority of countries showed declining risk ($RR < 1.0$).

Table 4 presents a summary of the etiological analysis that focused upon socioeconomic and other correlates of engagement in frequent physical fighting in a pooled international analysis. In bivariate models (model 1), individual-level factors associated with increased engagement were: younger age (11

TABLE 1 Description of International Study Sample, HBSC Study, 2002 to 2010

Descriptor	No.
No. of countries	30
Total participants: weighted No. (%)	
All survey cycles	493 874 (100%)
2002 cycle	154 026 (31.2)
2006 cycle	165 705 (33.6)
2010 cycle	174 143 (35.3)
By country: weighted No. (country)	
Median	15 054
Minimum (country)	3464 (Greenland)
Maximum (country)	45 503 (United Kingdom)
By gender: weighted No. (%)	
Boys	241 699 (48.9%)
Girls	252 175 (51.1%)
By age group: weighted No. (%)	
11 y	161 427 (32.7%)
13 y	168 486 (34.1%)
15 y	163 961 (33.2%)

Contextual Level Indicators	Weighted No. Reporting	Mean (SD)	Minimum	Maximum
Gini coefficient	451 215	0.31 (0.05)	0.22	0.45
GDP per capita	455 104	27 186 (15 878)	851	67 464
Homicides per 100 000	380 281	3.1 (5.3)	0.3	29.7

years), male gender, lower socioeconomic status, increased involvement in common risk-taking behaviors, and victimization by bullying. Contextual factors associated with greater engagement were more homicides, lower income inequality (indicating that equality positively related to frequent fighting), and lower per capita GDP. There was also a lower observed risk for reported frequent physical fighting as time progressed from 2002 to 2010.

Model 2 (adjusted for age/sex only) and model 3 (adjusted for age/gender, FAS, multiple risk behavior scale, frequent victimization by bullying, and homicide rates) show that income inequality

became unrelated to frequent physical fighting once absolute wealth (GDP per capita) was included in the model. Higher absolute wealth associated with lower risks for frequent physical fighting. Higher homicide rates associated with higher prevalence levels of fighting. Additional adjustments for temporal effects were not possible due to the high degree of correlation between GDP per capita and time ($\rho = 0.47$; $P < .0001$). While cross-level interactions were explored between individual (FAS) and the 2 contextual-level socioeconomic indicators, and time and the latter indicators, these interactions either were not significant or did not

TABLE 2 Reported Engagement in Frequent Physical Fighting, HBSC Study, 2002 to 2010

	Median Prevalence per 100 Children Within Countries by Survey Cycle, Gender, and Age			Countries Reporting Trend Over Time ($P < .10$):		
	2002	2006	2010	Increases	No Change	Decreases
Boys						
11 y	26.5	24.0	20.5	2	16	12
13 y	21.1	21.0	16.8	3	13	14
15 y	14.9	17.1	14.6	3	9	18
Girls						
11 y	6.3	5.7	5.1	2	11	17
13 y	6.6	6.0	5.0	1	11	18
15 y	4.7	5.2	4.0	2	6	22

TABLE 3 Age/Gender-Standardized Prevalence and Temporal Trends in Frequent Physical Fighting, HBSC Study, 2002 to 2010

Country	Age/Gender-Standardized Rate per 100 Children			Age/Gender-Adjusted Temporal Trend (per year of study)				P	
	2002	2006	2010	β^b	SE	RR ^c	95% CI		
Austria	13.6	13.2	13.0	-.0066	.0083	0.99	0.98	1.01	.43
Belgium	17.9	17.9	14.6	-.0270	.0054	0.97	0.96	0.98	<.0001
Canada	10.5	14.7	11.3	-.0038	.0071	1.00	0.98	1.01	.59
Croatia	13.7	14.3	12.3	-.0132	.0070	0.99	0.97	1.00	.06
Czech Republic	17.2	19.1	15.1	-.0020	.0062	1.00	0.99	1.01	.74
Denmark	17.4	15.8	10.2	-.0617	.0076	0.94	0.93	0.95	<.0001
Estonia	19.5	11.2	8.2	-.1138	.0084	0.89	0.88	0.91	<.0001
Finland	8.3	7.9	7.7	-.0088	.0082	0.99	0.98	1.01	.28
France	12.8	13.0	12.4	-.0026	.0060	1.00	0.99	1.01	.66
Germany	7.6	8.3	5.3	-.0370	.0100	0.96	0.94	0.98	.0003
Greece	12.4	15.9	16.0	.0300	.0072	1.03	1.02	1.05	<.0001
Greenland	11.3	9.1	9.3	-.0250	.0200	0.98	0.94	1.01	.22
Hungary	20.6	17.9	14.7	-.0430	.0067	0.96	0.95	0.97	<.0001
Ireland	11.4	12.7	10.8	-.0170	.0087	0.98	0.97	1.00	.05
Israel	12.3	10.8	7.9	-.0454	.0077	0.96	0.94	0.97	<.0001
Italy	13.6	14.4	11.5	-.0210	.0074	0.98	0.97	0.99	.004
Latvia	12.6	13.7	14.8	.0206	.0078	1.02	1.01	1.04	.009
Lithuania	19.0	11.6	9.8	-.0729	.0091	0.93	0.91	0.95	<.0001
Netherlands	9.8	10.3	7.9	.0060	.0091	1.01	0.99	1.02	.009
Poland	16.7	13.8	12.2	-.0268	.0102	0.97	0.95	0.99	<.0001
Portugal	12.1	10.8	8.4	-.0403	.0067	0.96	0.95	0.97	<.0001
Russia	18.0	18.1	14.9	-.0742	.0096	0.93	0.91	0.95	.0001
Slovenia	14.5	14.2	13.3	-.0211	.0055	0.98	0.97	0.99	.11
Spain	12.1	10.1	15.5	-.0111	.0070	0.99	0.98	1.00	.05
Sweden	12.9	9.9	9.4	-.0211	.0109	0.98	0.96	1.00	<.0001
Switzerland	9.3	9.5	6.2	-.0420	.0099	0.96	0.94	0.98	.34
Ukraine	14.0	16.2	18.4	.0110	.0120	1.01	0.99	1.04	.02
TFYR Macedonia	7.8	12.3	8.2	.0162	.0067	1.02	1.00	1.03	.51
United Kingdom	13.2	13.5	10.6	-.0279	.0042	0.97	0.96	0.98	<.0001
United States	11.8	10.1	10.6	-.0138	.0073	0.99	0.97	1.00	.06
All countries	13.9	13.3	11.6	-.021	.001	0.98	0.98	0.98	<.0001

CI, 95% confidence interval.

^a Absolute change in age/gender-standardized rate of frequent physical fighting, 2010 versus 2002.

^b Modeled relative change in adjusted β for frequent physical fighting, per year.

^c Modeled relative change in age/gender adjusted relative risks of frequent physical fighting, per year.

produce meaningful effects. Therefore, no additional hierarchical models are presented.

DISCUSSION

This study of young people from 30 European and North American countries over 8 recent years identified a decline in physical fighting in most countries. This pattern was observed in both genders and across age groups. Exceptions were found in three countries (Greece, Latvia, Ukraine). Our modeling of socioeconomic correlates of frequent physical fighting suggested that income inequality and individual family affluence were not risk factors, while increased absolute wealth

negatively correlated with fighting. Other identified risk factors were younger age, male gender, multiple risk-taking, victimization from bullying, and national homicide rates.

Our analysis of trends in frequent physical fighting is unique. Existing studies focus on adolescent bullying⁴⁷ or have summarized the experiences of a single country.^{14,48,49} We observed declines in most countries, in both genders and different age groups, using the frequent fighting measure that is indicative of habitual negative behaviors. Exceptions to this general trend included 1 country that experienced severe social unrest in 2010 due to economic downturn (Greece)

and 2 countries with especially notable instability associated with postcommunist development (Latvia and Ukraine).⁵⁰

The observed declines in physical fighting are attributable to a complex set of factors operating at multiple levels, some of which (eg, overt risk-taking, bullying) are modifiable through interventions with individuals or indirectly via targeted interventions (eg, by age, gender), and others that are less modifiable unless addressed through societal changes (eg, societal violence, national wealth). At the societal level, wealth and the social milieu of violence and crime in countries are potential determinants. Lower levels of absolute wealth may result in social conditions that foster the acceptance of violence within society. When adolescent populations are embedded within impoverished or other cultures whose norms permit violence, these are likely to directly influence physical fighting behaviors. Additional factors that might mediate such relationships include restricted labor market opportunities, and at an individual level, lack of parental support, engagement in overt risk-taking, and lower education.^{51,52} Potential biological effects of poverty may lead to physiologic changes (eg, cortisol fluctuations) associated with emotional stress that also may contribute to violence.⁵³ Irrespective of the explanation, more youth from poorer and more violent cultures report more fighting.

Gender and age are established individual risk factors for physical fighting that exist across time and culture. Physical fighting is a gendered behavior that presents predominantly as a feature of young adolescent male life.⁵³ This gendered character also persists for girls. For example, even when having consumed excessive levels of alcohol, girls are still more likely than boys to resort to verbal assault and argument than to physical fighting.⁵⁴ Cultural changes with respect to the role of

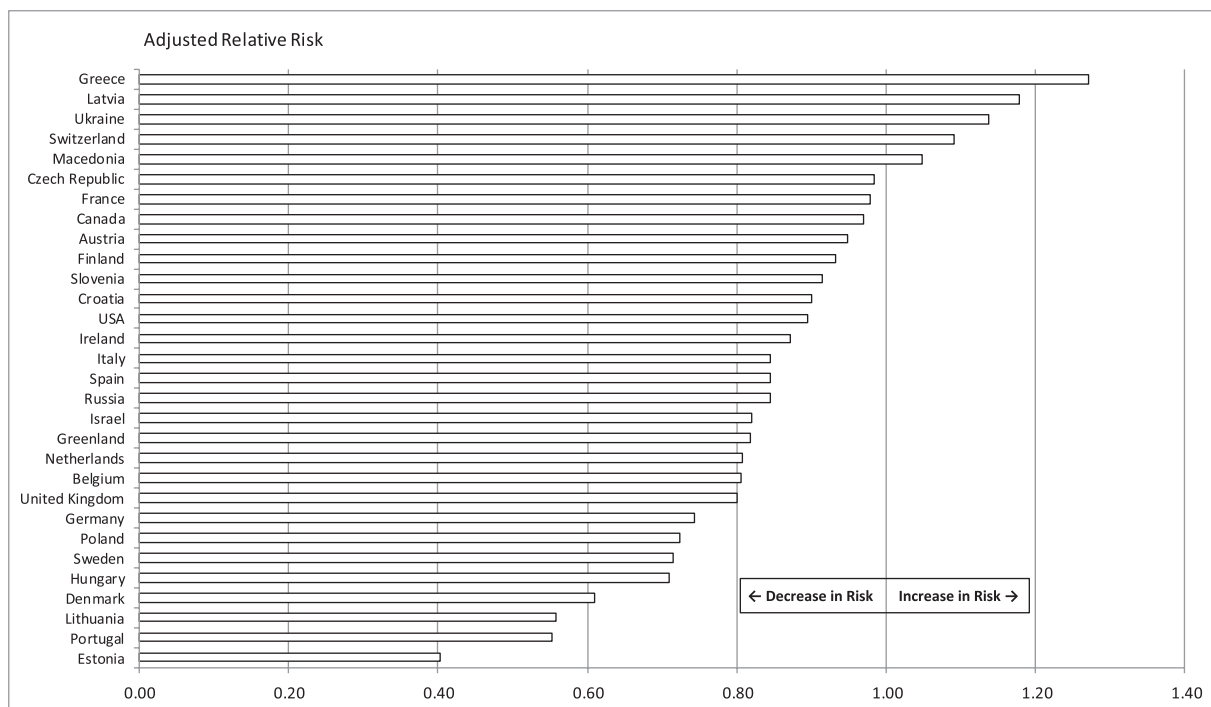


FIGURE 1
Cross-national comparison of the adjusted relative risk of frequent physical fighting, 2010 vs 2002.

gender may influence observed declines in physical fighting. Within cultures that have become less male oriented and where greater equality exists, social norms may dictate a reduced tolerance for violent episodes or even a shift of person-to-person physical violence to other types of aggression.⁵⁵ The most notable age effect was the elevation in fighting among 11-year-olds. This likely reflects a peer culture among younger adolescents that permits fighting as a socially accepted method of expressing conflict. Age-related declines in fighting reflect development in verbal skills, social skills and personal coping mechanisms. Declines in peak ages for fighting involvement also negatively correlated with age of onset of puberty.⁵⁶

Although relations between socioeconomic inequalities and physical fighting were expected and may be explained by both societal and individual factors, we did not find them. Past studies have demonstrated such links but with different outcomes, mainly bullying and homicides.^{28–30,57} These relations have

been attributed to the psychological consequences of economic segregation, including negative influences on moral development,⁵⁸ and neighborhood and community factors that exert social control over violence (eg, trust, cooperation).^{44,59} Socially disadvantaged young people from societies with large income inequalities may turn to violence as a means to cope with their deprivation.³² It is possible that associations between income inequalities and fighting are more attributable to the individual factors examined in our modeling (eg, developmental effects measured by age and gender, overt risk-taking, or victimization due to bullying). Alternatively, the use of a cutpoint of “3 or more physical fights in the past 12 months” to identify habitual fighting may have resulted in misclassification that made it difficult to identify relations with the income inequalities. In addition, our indicators of income inequality may not have been measured at the correct level; it may be important to measure this between

neighborhoods, versus the individual family measures of affluence or country inequalities studied here. Finally, it is recognized that the social class anxiety that relates to income inequality might still contribute to violence, albeit nonphysical types of aggression such as relational bullying.^{28–30}

Strengths of our study include the size and international nature of the sample and our multilevel etiological analysis. The HBSC study is one of the few international adolescent health surveys that use common measures and survey procedures internationally, facilitating trends analyses. Limitations include the repeated cross-sectional design, which, although ideal for trends analyses, is not a substitute for longitudinal designs best used for study of determinants of fighting. This in turn limits causal inferences. There is the possibility that key variables in our analysis were misclassified leading to bias or error in estimation. Assignment of national indicators as a proxy for local influences likely resulted in similar effects. Our

TABLE 4 Results of Multiple Poisson Regression Analysis Examining Correlates of Frequent Physical Fighting, HBSC Study, 2002 to 2010

Indicator	Relative Risk of Engagement for Frequent Physical Fighting		
	Bivariate (Model 1) (<i>n</i> = 451 215) RR (95% CI)	Age/Gender-Adjusted (Model 2) (<i>n</i> = 448 174) RR (95% CI)	Adjusted (Model 3) (<i>n</i> = 360 439) RR (95% CI)
Contextual level variables			
Gini coefficient per 1 SD increase	0.95 (0.93–0.98)	0.96 (0.94–0.99)	1.01 (0.98–1.05)
GDP per capita (per 1 SD increase)	0.87 (0.85–0.89)	0.88 (0.86–0.90)	0.96 (0.93–0.99)
Homicide rate (per 1 SD increase)	1.08 (1.05–1.12)		1.07 (1.03–1.11)
Time level			
Time per 1-y increase, 2002–2010	0.98 (0.98–0.98)		— ^a
Individual level covariates			
Age group			
11 y	1.41 (1.38–1.44)	1.39 (1.36–1.43)	3.12 (3.02–3.23)
13 y	1.25 (1.22–1.28)	1.24 (1.21–1.27)	2.18 (2.12–2.25)
15 y	1.00	1.00	1.00
Gender			
Girls	1.00	1.00	1.00
Boys	3.38 (3.31–3.45)	3.36 (3.29–3.43)	3.15 (3.07–3.23)
FAS			
Low (0–3)	0.96 (0.96–1.00)		1.02 (0.98–1.06)
Medium (4–5)	0.96 (0.93–0.98)		1.00 (0.98–1.02)
High (6–8)	1.00		1.00
Risk behaviors (per unit, range 0–4)	1.36 (1.35–1.37)		1.69 (1.67–1.71)
Victim of frequent bullying	1.95 (1.90–1.99)		1.67 (1.62–1.69)

CI, 95%, confidence interval.

^a Not included, as found to be highly correlated with GDP per capita.

analyses did not take into account variations between countries in violence-prevention initiatives that might in part account for differences in physical fighting. Finally, the HBSC sampling strategy excluded adolescents in non-classroom settings, which may impact upon the external validity of our findings. Elevations in the prevalence of fighting among 11-year-olds and among boys suggest that prevention programs should begin early and be developed with a gendered lens. Frequent fighting may be a marker for engagement in other serious forms of risk behavior in later adolescence and early adulthood.^{16,60} Early prevention is warranted. Second, those involved in prevention efforts should take encouragement from our findings that fighting has declined. This provides a positive message for prevention efforts, such as those that attempt to ban physical violence in school settings.⁶¹ Third, our findings identify population subgroups, both demographic and social, that are

particularly vulnerable and require targeted and perhaps tailored clinical and public health interventions. Known efficacious strategies include family-based training,⁶² minimization of violence in public media,^{63,64} school-based strategies involving individual counseling of violent children,⁶⁵ the tailoring of interventions to racial or ethnic compositions of communities, with specific attention to family and community influences,⁶⁶ as well as more general development of social skills and appropriate conflict resolution.¹⁸ Such strategies could have an impact on violence and associated problem behaviors.

CONCLUSIONS

In summary, we described temporal trends in frequent physical fighting within 30 mainly North American and European countries. We also explored risk factors for this fighting, with a focus on possible socioeconomic determinants. Although adolescent fighting remains important,

observed temporal declines provide positive support for the efforts of those involved in national violence-prevention efforts. Ongoing surveillance is required to confirm whether such trends persist, especially in the face of the ongoing economic crises. Finally, groups of young people who remain more consistently involved in frequent fighting, including boys, young adolescents, those growing up in poor countries, those engaged in multiple risk-taking, frequent victims of bullying, and youths from more violent settings, require ongoing and targeted intervention by clinicians and violence prevention specialists.

ACKNOWLEDGMENTS

The HBSC is a World Health Organization/Euro collaborative study; International Coordinator of the 2009–2010 study is Candace Currie, St. Andrews University, Scotland; Data Bank Manager is Oddrun Samdal, University of Bergen, Norway. The 30 countries involved in this analysis (current responsible principal investigator) were Austria (R. Felder-Puig), Belgium (D. Piette, C. Vereecken), Canada (W. Pickett, J. Freeman), Croatia (M. Kuzman), Czech Republic (M. Kalman), Denmark (P. Due), Estonia (K. Aasvee), Finland (J. Tynjälä), France (E. Godeau), Germany (P. Kolip), Greece (A. Kokkevi), Greenland (B. Niclasen), Hungary (Á. Németh), Ireland (S. Nic Gabhainn), Israel (Y. Harel-Fisch), Italy (F. Cavallo), Latvia (I. Pudule), Lithuania (A. Zaborskis), Netherlands (W. Vollebergh), Poland (J. Mazur), Portugal (M. Gaspar de Matos), Russia (team member A. Malinin), Slovakia (A. Madarasova Geckova), Slovenia (H. Jericek), Spain (C. Moreno), Sweden (L. Eriksson), Switzerland (E. Kuntsche), Ukraine (O. Balakireva), TFYR Macedonia (L. Kostarova Unkovska), the United Kingdom (England, A. Morgan; Scotland, C. Currie; Wales, C. Roberts), and United States (R. Iannotti). We thank Robert Smith (Norway) for his careful assembly of the international HBSC trends datafile.

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(Continued from first page)

www.pediatrics.org/cgi/doi/10.1542/peds.2012-1614

doi:10.1542/peds.2012-1614

Accepted for publication Aug 13, 2012

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: This present analysis was funded in part by the Canadian Institutes of Health Research and the Heart and Stroke Foundation of Canada (MOP 97962; PCR 101415).

Trends and Socioeconomic Correlates of Adolescent Physical Fighting in 30 Countries

William Pickett, Michal Molcho, Frank J. Elgar, Fiona Brooks, Margaretha de Looze, Katharina Rathmann, Tom F.M. ter Bogt, Saoirse Nic Gabhainn, Dagmar Sigmundová, Margarida Gaspar de Matos, Wendy Craig, Sophie D. Walsh, Yossi Harel-Fisch and Candace Currie

Pediatrics; originally published online December 3, 2012;

DOI: 10.1542/peds.2012-1614

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