Title	Socioeconomic inequality in exposure to bullying during adolescence: a comparative cross-sectional multilevel study in 35 countries.
Author(s)	Nic Gabhainn, Saoirse
Publication Date	2009
Publication Information	Due, P., Merlo, J., Harel-Fisch, Y., Damsgaard, M.T., Holstein, B., Hetland, J., Currie, C., Nic Gabhainn, S., Gaspar de Matos, M., Lynch, J. (2009). Socioeconomic inequality in exposure to bullying during adolescence: a comparative cross-sectional multilevel study in 35 countries. American Journal of Public Health, 99(5), 907-914.
Publisher	American Public Health Association
Link to publisher's version	http://dx.doi.org/10.2105/AJPH.2008.139303
Item record	http://hdl.handle.net/10379/2794
DOI	http://dx.doi.org/10.2105/AJPH.2008.139303

Socioeconomic Inequality in Exposure to Bullying During Adolescence: A Comparative, Cross-Sectional, Multilevel Study in 35 Countries

Pernille Due, MD, Juan Merlo, MD, PhD, Yossi Harel-Fisch, PhD, Mogens Trab Damsgaard, Mag scient soc, Bjørn E. Holstein, Mag scient soc, Jørn Hetland, PhD, Candace Currie, PhD, Saoirse Nic Gabhainn, PhD, Margarida Gaspar de Matos, PhD, and John Lynch, PhD

Objectives. We examined the socioeconomic distribution of adolescent exposure to bullying internationally and documented the contribution of the macroeconomic environment.

Methods. We used an international survey of 162 305 students aged 11, 13, and 15 years from nationally representative samples of 5998 schools in 35 countries in Europe and North America for the 2001–2002 school year. The survey used standardized measures of exposure to bullying and socioeconomic affluence.

Results. Adolescents from families of low affluence reported higher prevalence of being victims of bullying (odds ratio [OR] = 1.13; 95% confidence interval [CI] = 1.10, 1.16). International differences in prevalence of exposure to bullying were not associated with the economic level of the country (as measured by gross national income) or the school, but wide disparities in affluence at a school and large economic inequality (as measured by the Gini coefficient) at the national level were associated with an increased prevalence of exposure to bullying.

Conclusions. There is socioeconomic inequality in exposure to bullying among adolescents, leaving children of greater socioeconomic disadvantage at higher risk of victimization. Adolescents who attend schools and live in countries where socioeconomic differences are larger are at higher risk of being bullied. (*Am J Public Health.* 2009;99:907–914. doi:10.2105/AJPH.2008.139303)

Social relations and social interaction are crucial aspects of adolescents' lives. An important negative social influence among school-aged children is bullying, and several studies have suggested that bullying is a precursor for health problems in childhood.[1–21] A recent study showed that boys who are victims of bullying at 8 years of age are at increased risk of anxiety disorders in adulthood.[22] Furthermore, studies show that bullying behavior and victimization continue over time,[9,23,24] leaving many children exposed to bullying for years. Long-term exposure to bullying has been mentioned as a contributing factor in many of the tragic school shootings that have occurred in several countries.[25] Prevalence of bullying is high in many countries, but there are large variations across countries. International studies with considerable geographic and cultural variation show that between 5% and 70% of children are exposed to bullying.[2,26]

Being bullied is defined as a deliberate, repeated or long-term exposure to negative acts performed by a person or group of persons regarded as having higher social status than the victim.[1] Although some authors have pointed out that peer and adolescent cultures may be most important for having a high status in an adolescent peer group,[27] others have observed that exposure to bullying is patterned by socioeconomic status. A Danish study found that higher prevalence of physical and psychological symptoms for adolescents from low social class backgrounds seemed to be partly explained by a higher level of exposure to bullying among these children.[28] Most studies on determinants or consequences of adolescent bullying did not consider socioeconomic position in the analyses[3,4,6–13,17,19,20] or regarded socioeconomic measures as confounders in analyses of the consequences.[5,15] In 2 international studies of the association between socioeconomic factors and exposure to bullying, the risk of being bullied was higher among adolescents with parents from lower socioeconomic position, expressed as educational achievement[14] or economic affluence.[29]

The socioeconomic patterns of bullying at the individual level[14,28,29] and the large differences in prevalence of bullying observed between schools[8] and between countries of varying wealth and wealth distribution (e.g., Lithuania [bullying prevalence: 39.8%] and Sweden [5.7%])[2] led to our hypotheses: (1) across schools and countries, children from less-affluent families are at higher risk of exposure to bullying and (2) between schools and countries, macroeconomic differences such as overall economic level and economic inequality may explain part of the variation in bullying prevalence. We know of no other studies that have examined the macroeconomic context of schools and countries in the prevalence and socioeconomic patterns of bullying.

METHODS

Health Behavior in School-Aged Children is a standardized, international World Health Organization collaborative study with repeated cross-sectional surveys among students aged 11, 13, and 15 years.[30] (For more information, see http://www.hbsc.org.) Each national study included students from a representative random sample of schools and adapted the international standard version of the questionnaire, with an independent translation and backtranslation and careful checking against the original English version, at the international coordinating center. Table 1 contains bullying prevalence data from the 35 participating countries in the 2001–2002 school year survey, comprising 5998 schools with an average of 27.1 pupils per school.[31]

Because the study was anonymous, we were unable to analyze the characteristics of students who did not participate because they were sick or away from school when the survey

TABLE 1—Characteristics of Study Populations and Countries of Residence for Students Aged 11, 13, and 15 Years From 35 Countries: the Health Behavior in School-Aged Children Study, 2001–2002 School Year

Country (Principal Investigator)	Pupils, No.	Schools, No.	GNI[c]	Gini Coefficient[d] (Year of Survey)	Family Affluence Scale[a]			Exposed to Bullying[b]	
					Low, %	Medium, %	High, %	Boys, % (98% CI)	Girls, % (98% CI)
Austria (W. Dür)	4472	204	23.390[e]	0.305 (1995)	16.8	48.2	35.0	19.1 (17.4, 20.7)	13.2 (11.8, 14.6)
Belgium (Flemish speaking; L. Maes)	6289	162	23.250[e]	0.250 (1996)	16.9	46.8	36.4	13.6 (12.5, 14.9)	10.0 (8.9, 11.0)
Belgium (French speaking; D. Piette)	4323	181	23.250[e]	0.250 (1996)	23.1	42.6	34.4	19.6 (17.9, 21.3)	11.4 (10.1, 12.7)
Canada (W. Boyce)	4361	179	22.300[e]	0.315 (1997)	10.7	39.1	50.2	16.0 (14.4, 17.7)	13.9 (12.5, 15.3)
Croatia (M.Kuzman)	4397	131	4.640[f]	0.290 (2001)	23.2	45.0	31.9	11.3 (10.0, 12.6)	7.0 (5.9, 8.1)
Czech Republic (L. Csèmy)	5012	80	5.560[f]	0.254 (1996)	18.3	48.4	33.3	6.7 (5.7, 7.7)	5.5 (4.6, 6.4)
Denmark (P. Due, B. Holstein)	4672	65	30.290[e]	0.247 (1997)	13.5	47.2	39.3	11.0 (9.8, 12.3)	10.8 (9.6, 12.1)
England (A. Morgan)	6081	80	25.250[e]	0.360 (1995)	15.2	46.6	38.3	13.6 (12.4, 14.9)	11.3 (10.2, 12.4)
Estonia (M. Maser)	3979	60	4.130[f]	0.376 (1998)	20.8	43.5	35.7	21.5 (19.7, 23.3)	15.7 (14.1, 17.3)
Finland (J. Tynjälä)	5388	277	23.510[e]	0.256 (1995)	17.8	48.2	34.1	10.2 (9.1, 11.4)	8.0 (7.0, 9.0)
France (E. Godeau)	8185	554	22.010[e]	0.327 (1995)	16.1	42.0	42.0	13.2 (12.1, 14.2)	12.8 (11.8, 13.8)
Germany (K. Hurrelman)	5650	121	22.670[e]	0.382 (1998)	16.4	44.4	39.2	15.0 (13.7, 16.3)	10.9 (9.7, 12.0)
Greece (A. Kokkevi)	3807	411	11.660[e]	0.355 (1998)	28.7	48.5	22.8	9.3 (8.0, 10.6)	6.7 (5.6, 7.9)
Greenland (M. Pedersen)	891	32	...	...	31.2	45.8	23.0	19.6 (15.6, 23.6)	24.9 (21.1, 28.7)
Hungary (A. Aszmann)	4164	120	5.280[f]	0.244 (1998)	20.4	39.5	40.1	5.3 (4.3, 6.3)	6.5 (5.5, 7.5)
Israel (Y. Harel)	5661	139	16.710[e,g]	0.355 (1997)	27.5	41.2	31.4	9.7 (8.6, 10.8)	5.4 (4.6, 6.2)
Italy (F. Cavallo)	4386	265	18.960[e]	0.360 (1998)	26.0	47.4	26.7	11.3 (10.0, 12.6)	8.3 (7.2, 9.4)
Latvia (I. Pudele)	3481	122	3.480[f]	0.324 (1998)	35.1	41.0	23.9	23.2 (21.1, 25.2)	16.1 (14.4, 17.8)
Lithuania (A. Zaborskis)	5645	33	3.660[f]	0.363 (2000)	31.1	45.2	23.7	36.3 (34.5, 38.0)	32.3 (30.5, 34.0)
Macedonia (L. K. Unkovska)	4161	98	1.700[h]	0.282 (1998)	9.25	33.4	57.3	11.7 (10.3, 13.1)	9.5 (8.2, 10.7)
Malta (M. Massa)	1980	38	9.200[e,g]	...	43.1	45.1	11.8	9.2 (7.3, 11.1)	4.1 (2.9, 5.3)
The Netherlands (W. Vollebergh)	4268	136	23.960[e]	0.326 (1994)	9.0	45.2	45.7	11.1 (10.0, 12.4)	8.5 (7.3, 9.6)
Norway (O. Samdal)	5023	165	37.850[e]	0.258 (1995)	5.8	36.7	57.5	11.7 (10.5, 12.9)	9.9 (8.7, 11.1)
Poland (B. Woynarowska)	6383	274	4.570[f]	0.316 (1998)	23.7	42.8	33.5	12.4 (11.3, 13.5)	8.0 (7.0, 8.9)
Portugal (M. G. de Matos)	2940	122	10.840[e]	0.385 (1997)	28.9	46.1	25.0	22.6 (20.5, 24.8)	13.0 (11.3, 14.7)
Republic of Ireland (S. N. Gabhainn)	2875	93	23.870[e]	0.359 (1987)	20.7	48.3	31.0	9.6 (8.0, 11.2)	6.5 (5.3, 7.7)
Russian Federation (A. Komkov)	8037	149	2.140[h]	0.456 (2000)	16.4	41.9	41.7	18.3 (17.1, 19.5)	16.8 (15.7, 17.9)
Scotland (C. Currie)	4404	194	25.250[e]	0.360 (1995)	20.2	45.5	34.4	8.0 (6.9, 9.1)	8.7 (7.5, 9.9)
Slovenia (E. Stergar)	3956	194	9.810[e]	0.284 (1998)	20.5	48.1	31.4	7.2 (6.1, 8.3)	6.6 (5.5, 7.7)
Spain (C. M. Rodriguez)	5827	217	14.430[e]	0.325 (1990)	22.4	47.9	29.7	10.0 (8.9, 11.1)	7.4 (6.5, 8.4)
Sweden (U. Marklund)	3926	102	24.820[e]	0.250 (1995)	9.3	41.1	49.6	5.6 (4.3, 6.3)	4.1 (3.2, 5.0)
Switzerland (H. Schmidt)	4679	429	37.930[e]	0.331 (1992)	13.1	46.0	40.8	16.1 (14.6, 17.6)	11.6 (10.3, 12.9)
Ukraine (O. Balakireva)	4090	277	770[h]	0.290 (1999)	24.0	49.0	27.0	17.2 (15.5, 18.9)	18.3 (16.6, 19.9)
United States (M. Overpeck)	5025	233	35.060[e]	0.408 (1997)	13.1	36.7	50.2	14.3 (12.9, 15.8)	10.2 (9.1, 11.4)
Wales (C. Roberts)	3887	61	25.250[e]	0.360 (1995)	14.4	46.5	39.2	9.0 (7.8, 10.2)	9.4 (8.1, 10.7)
Entire study (C. Currie)	162 305	5998	NA	NA	19.3	44.1	36.7	11.0 (10.7, 11.2)	10.9 (10.7, 11.1)

Note. GNI = gross national income; CI = confidence interval; NA = not applicable. Ellipses indicate that data were not available. The same GNI and Gini coefficients were used for the 2 Belgian areas; for England, Scotland, and Wales, the numbers for The United Kingdom were assigned to all 3 countries. Percentages may not total 100 because of rounding.

[a]For lower middle-income economies, scores from the Family Affluence Scale were trichotomized into low = 0–1, medium = 2–3, and high = 4–7; for upper middle-income economies, low = 0–2, medium = 3–4, and high = 5–7; and for high-income economies, low = 0–3, medium = 4–5, and high = 6–7.

[b]Students were considered to be exposed to bullying if they responded that they were bullied 2 to 3 times a month, once a week, or several times a week.

[c]GNI per capita in 2002 US dollars from the World Development Indicators 2003 database[40] was used as the measure of a country's economic level.

[d]Gini coefficients from the United Nations Development Programme[39] were used as a measure of economic inequality at the country level.

[e]These countries were classified as having high-income economies.

[f]These countries were classified as having upper middle-income economies.

[g]Data for 2002 were not available.

[h]These countries were classified as having lower middle-income economies.

was issued. We excluded Greenland (n=891 students) and Malta (n=1980 students) from further analyses because gross national income (GNI) or income inequality data (determined by the Gini coefficient) were not accessible. We also excluded the 18 schools where prevalence of bullying exposure was 0% (4035 students; 2.5% of the total sample). Because 65% of the sample from Germany consisted of schools reporting on 10 or fewer pupils, we excluded all data from Germany (n=5650 students). We excluded all other schools with information from fewer than 10 pupils (n=35 schools). Finally, we excluded 3599 students (2.3%) with missing information on family affluence and 1444 students (0.9%) with missing information on bullying exposure, leaving 142 911 students for our analyses.

Individual-Level Measures

After reading an abbreviated version of the Olweus Bullying Questionnaire's definition of bullying (available as a supplement to the online version of this article at http://www.ajph.org), students responded to the global question from the Olweus Bullying Questionnaire: "How often have you been bullied at school in the past couple of months?"[32] Responses were (1) I haven't been bullied at school the past couple of months, (2) it has only happened once or twice, (3) 2 or 3 times a month, (4) about once a week, and (5) several times a week. In agreement with the recommendations of the questionnaire developer on prevalence estimation, the 5-point questions were dichotomized so that responses 1 and 2 were 0 (not bullied) and responses 3 to 5 were scored as 1 (bullied). This question has been developed over the past 2 decades with careful determination of validity and reliability,[33,34] and it has been shown to be useful as a measure of bullying prevalence with good psychometric properties.[35]

Socioeconomic position at the individual level was measured by a summary index, the Family Affluence Scale (FAS), which comprises 4 items:[36] (1) Does your family own a car, van, or truck? (no=0 points; yes, 1=1; yes, 2 or more=2); (2) Do you have your own bedroom for yourself? (no=0, yes=1); (3) During the past 12 months, how many times did you travel away on holiday [vacation] with your family? (not at all=0, once=1, twice or more=2); and (4) How many computers does your family own? (none=0, 1=1, 2 or more=2).

A validation study including data from 6 countries has shown strong parent–child agreement on the whole scale and on each FAS item except the vacation item.[37] FAS data from 25 countries showed good criterion validity in analyses with gross domestic product (GDP), and mean FAS score at the country level has been shown to be an improvement over GDP in predicting various national health indicators.[38] Test–retest reliability of young people's reports on FAS items has not been assessed, but disagreement is likely to be low because of the objectivity of the measures.[38] We wanted to study whether children from families of low affluence were bullied more often than children from backgrounds of high affluence within each country. Because of international differences in range and mean of FAS score, our focus within each country (rather than between countries) on relative socioeconomic differences in bullying exposure led us to use different cut points for trichotomization of FAS. For this purpose, we used an external objective measure of the countries' economic position: the World Bank's grouping of countries by income. For lower middle-income economies (e.g., Macedonia and Ukraine), FAS was trichotomized into low=0–1, medium=2–3, and high=4–7; for upper middle-income economies (e.g., Hungary and Poland), low=0–2, medium=3–4, and high=5–7; and for high-income economies (e.g., France and the United States), low=0–3, medium=4–5, and high=6–7.

School-Level Measures

We measured a school's socioeconomic level as the mean FAS score of the children supplying data from each school. We used the standard deviation of this mean as a measure of a school's socioeconomic disparity (i.e., a high value indicated larger variation of affluence among students at the school).

Country-Level Measures

We used Gini coefficients from the United Nations Development Programme[39] as a measure of economic inequality at the country level. Theoretically, the Gini coefficient represents the distribution of income in a population and varies between 0, which reflects complete equality, and 1, which indicates complete inequality (1 person has all the income, all others have none). GNI per capita in US dollars (divided by the midyear population; Atlas method) for 2002 from the World Development Indicators 2003 database,[40] was used as the measure of economic level of a country. The Atlas conversion factor reduces the impact of exchange-rate fluctuations in cross-country comparisons of national incomes.[41]

GNI measures the total domestic and foreign income claimed by the residents of the economy. It comprises GDP plus net factor income from abroad, which is the income residents receive from abroad for factor services (labor and capital) minus similar payments made to nonresidents who contributed to the domestic production. The proportion of pupils in each country rating their affluence as 6 or 7 (by the FAS) and that country's GNI were strongly correlated ($r=0.83$; $P<.001$; data available as a supplement to the online version of this article at http://www.ajph.org).

Statistical Analyses

The results of sensitivity analyses were consistent and robust to changes in the definition of exposure categories for FAS score and for the bullying outcome. Including the 0.3% of schools (and 0.3% of students) with 0% prevalence of exposure to bullying did not alter the results. Because of the 3-level hierarchical structure of the data and the research questions studied, we applied multilevel logistic regression. In the multilevel logistic regression, we estimated parameters with restricted iterative generalized least square method. MLwiN, Version 1.1 (Centre for Multilevel Modelling, Institute of Education, University of London, London, England) was applied for the analyses.

We used 4 sequential models. Model 1 analyzed the crude between-country variance in exposure to bullying without considering any individual, school, or country variables. This model indicates the crude amount of "clustering" of bullying by country. Model 2 included compositional characteristics, children's age group, gender, and FAS score. Model 3 added school-level variables and the mean and standard deviation of the FAS score. Model 4 included the country-level variables GNI and Gini coefficient. Thus, we were able to

quantify the size of the country and school differences (model 1) and assess how much of this variance was because of different individual compositions of the schools and countries (model 2). Finally, models 3 and 4 examined possible associations between school and country characteristics and the probability of being bullied that was independent of individual children's characteristics. In addition, these models examined how much of the school and country differences in bullying were explained by the socioeconomic characteristics of schools and macroeconomic characteristics of countries.

Measuring associations at the individual level. We assessed the association between the variables studied and bullying with odds ratios (ORs) and associated 95% confidence intervals (CIs) obtained from the regression coefficients and associated standard errors (Table 2).

In models 2 and 3, as a means of stratification, we studied school–child interactions by letting the regression coefficients of the individual variables be random at the school level (i.e., a random slopes analysis where we relax the assumption of constant effects of individual variables on bullying across schools). This analysis allowed us to investigate whether the effect of individual FAS scores on exposure to bullying differed across schools (e.g., children with low FAS scores may present a higher probability of being bullied in some schools but not in others; see the "Random Effects" section, Table 2, and Table 3).

TABLE 2—Multilevel Logistic Regression Analyses (ORs and Variances) for School and Country Variance of Exposure to Bullying Among Students Aged 11, 13, and 15 Years From 33 Countries: the Health Behavior in School-Aged Children Study, 2001–2002 School Year

	Model 1, OR (95% CI) or Variance (SE)	Model 2, OR (95% CI) or Variance (SE)	Model 3, OR (95% CI) or Variance (SE)	Model 4, OR (95% CI) or Variance (SE)
Fixed effects				
Individual level				
Age (Reference: 11-year-olds)		0.90 (0.89, 0.91)	0.90 (0.89, 0.91)	0.90 (0.89, 0.91)
Gender (Reference: girls)		1.34 (1.29, 1.38)	1.33 (1.29, 1.38)	1.33 (1.29, 1.38)
Family affluence (FAS)[a]		1.14 (1.11, 1.16)	1.13 (1.10, 1.16)	1.13 (1.10, 1.16)
School level				
School mean of FAS score			1.01 (0.97, 1.04)	1.01 (0.97, 1.04)
SD of school mean of FAS score			1.13 (1.04, 1.23)	1.13 (1.04, 1.23)
Country level				
GNI				1.00 (0.98, 1.01)
Gini coefficient				1.03 (1.01, 1.06)
Random effects				
Variance between countries	0.193 (0.048)	0.203 (0.051)	0.200 (0.050)	0.168 (0.043)
Variance between schools[a]	0.102 (0.008)			
Among individuals with high FAS		0.114 (0.016)	0.114 (0.016)	0.113 (0.016)
Among individuals with medium FAS		0.079 (0.008)	0.079 (0.008)	0.076 (0.008)
Among individuals with low FAS		0.164 (0.023)	0.164 (0.023)	0.153 (0.022)

Note. OR = odds ratio; CI = confidence interval; FAS = Family Affluence Scale; GNI = gross national income. Greenland and Malta were left out of these analyses because of a lack of country-level information on GNI or Gini coefficient. Model 1 analyzed the crude between-country variance in exposure to bullying without considering any individual, school, or country variables. Model 2 included all items from model 1 plus compositional characteristics, children's age group, gender, and FAS score. Model 3 included all items from model 2 plus school-level variables and the mean and standard deviation of the FAS score. Model 4 included all items from model 3 plus the country-level variables GNI and Gini coefficient.

[a]FAS scores ranged from 0 (low affluence) to 7 (high affluence); the item was inverted so that the OR estimates the mean increase in bullying exposure with each decreasing step of family affluence. For lower middle-income economies (e.g., Macedonia and Ukraine), FAS was trichotomized into low = 0–1, medium = 2–3, and high = 4–7; for upper middle-income economies (e.g., Hungary and Poland), low = 0–2, medium = 3–4, and high = 5–7; and for high-income economies (e.g., France and the United States), low = 0–3, medium = 4–5, and high = 6–7.

Measuring school and country differences. We used the median odds ratio (MOR) to express school and country variance in exposure to bullying.[42,43] The MOR is directly comparable with fixed effects ORs, making quantification of school and country variance easier to appreciate in terms of the familiar ORs. The MOR quantifies differences (i.e., variance σ^2) between schools and between countries by comparing 2 children with the same covariates but from 2 different, randomly chosen schools or countries. The MOR is a form of expressing the area variance on a scale—the OR scale. Independently of the measure used, interpreting variance in multilevel analysis is pertinent for obtaining information on a possible general effect of the context (e.g., countries, schools) on individual outcomes (e.g., exposure to bullying). It is well known that individuals within a specific context may be more similar to each other than to individuals from another, different context. This phenomenon generates an intracontext correlation that needs to be considered for statistical reasons and is a major impetus for applying multilevel analyses.

Measures of variance and intracontext correlation provide relevant information in themselves, and can be used to operationalize contextual and social phenomena from a Durkheimian perspective.[42,44–48] In calculating the MOR, we applied a simple formula[45]: $\text{MOR} = \exp[\sqrt{(2 \times \text{area-level variance})} \times 0.6745]$. To intuitively understand the MOR, imagine taking random pairs of individuals from different areas (i.e., one individual in the pair from one area and the other from another area) and calculate the OR for each of these pairs of individuals. In this calculation the individual in the pair with the highest odds is always in the numerator of the pairwise OR (i.e., creating pairwise ORs ≥ 1). If we perform all possible pairwise comparisons, we produce a distribution of ORs. The MOR is the median value of this distribution. For example, an MOR of 2 indicates that if—theoretically—that an individual moves to another area with this higher odds for being bullied, his or her odds for being bullied would, on average, be doubled (Table 3).

RESULTS

The proportion of students who reported being bullied at least twice during the past couple of months showed large variations

TABLE 3—Multilevel Logistic Regression Analyses (MORs) for School and Country Variance of Exposure to Bullying Among Students Aged 11, 13, and 15 Years From 33 Countries: the Health Behavior in School-Aged Children Study, 2001–2002 School Year

	Model 1, MOR	Model 2, MOR	Model 3, MOR	Model 4, MOR
Compared with another country	1.52	1.54	1.53	1.48
Compared with another school[a]	1.36			
Individuals with high FAS score		1.38	1.38	1.38
Individuals with medium FAS score		1.31	1.31	1.30
Individuals with low FAS score		1.47	1.46	1.45
Compared with another school in another country[a]	1.68			
Individuals with high FAS score		1.71	1.71	1.66
Individuals with medium FAS score		1.66	1.65	1.60
Individuals with low FAS score		1.78	1.77	1.72

Note. MOR = median odds ratio; FAS = Family Affluency Scale. Greenland and Malta were left out of these analyses because of a lack of country-level information on GNI or Gini coefficient. Model 1 analyzed the crude between-country variance in exposure to bullying without considering any individual, school, or country variables. Model 2 included all items from model 1 plus compositional characteristics, children's age group, gender, and FAS score. Model 3 included all items from model 2 plus school-level variables and the mean and standard deviation of the FAS score. Model 4 included all items from model 3 plus the country-level variables GNI and Gini coefficient. In models 2, 3, and 4, the coefficient of the association between FAS and exposure to bullying is set to vary at the county level (i.e., random slope), which allows us to obtain specific measures of variance between schools for adolescents with different levels of FAS scores.

[a]For lower middle-income economies (e.g., Macedonia and Ukraine), FAS was trichotomized into low = 0–1, medium = 2–3, and high = 4–7; for upper middle-income economies (e.g., Hungary and Poland), low = 0–2, medium = 3–4, and high = 5–7; and for high-income economies (e.g., France and the United States), low = 0–3, medium = 4–5, and high = 6–7.

across countries (Table 1). The lowest prevalence occurred in Sweden (for girls, 4.1%; 98% CI=3.2, 5.0; for boys, 5.6%; 98% CI=4.3, 6.3) and the highest in Lithuania (for girls, 32.3%; 98% CI=30.5, 34.0; for boys, 36.3%; 98% CI=34.5, 38.0). In all countries except Greenland, Hungary, Scotland, Ukraine, and Wales, more boys than girls reported being victims of bullying, but in most countries gender differences were minor.

GNI and Gini coefficients for the countries in the study showed great variation (Table 1). The poorest country was Ukraine, with a GNI of US$770 per capita. Switzerland had the highest GNI at, US$37 930 per capita. Gini coefficients ranged from .244 in Hungary to .456 in the Russian Federation. Table 1 also shows the country-specific distributions of family affluence trichotomized according to the World Bank's grouping of countries by income. The prevalence of family affluence in the trichotomized groups is therefore not comparable across countries.

Table 2 shows results of the multilevel logistic regression analyses. When country and school clustering and other individual-level variables are accounted for, boys were more likely than girls to be bullied (OR]=1.34; 95% CI=1.29, 1.38), and the prevalence of bullying exposure decreased with age (OR=0.90; 95% CI=0.89, 0.91). The analyses show that for every 1-point reduction on the 7-point FAS, the odds of being bullied increased by 14% (OR=1.14; 95% CI=1.11, 1.16), and this socioeconomic inequality remained after we controlled for economic level and income inequality at the school and country levels (OR=1.13; 95% CI=1.10, 1.16). Table 2 also shows that mean affluence of the school (the mean of the students' FAS scores) and economic level of the country (GNI) were not associated with bullying ($OR_{school\ affluence}$= 1.01; 95% CI=0.97, 1.04; OR_{GNI}=1.00; 95% CI=0.98, 1.01). However, socioeconomic disparity at the school level (standard deviation of the students' FAS scores) and economic inequality at the national level (Gini coefficient) were associated with prevalence of bullying, so that for each standard deviation of mean FAS score, the odds of being bullied increased (OR=1.13; 95% CI=1.04, 1.23), and each percentage-point increase in the Gini coefficient led to a 3% increase in the odds of being bullied (OR_{Gini}=1.03; 95% CI=1.01, 1.06).

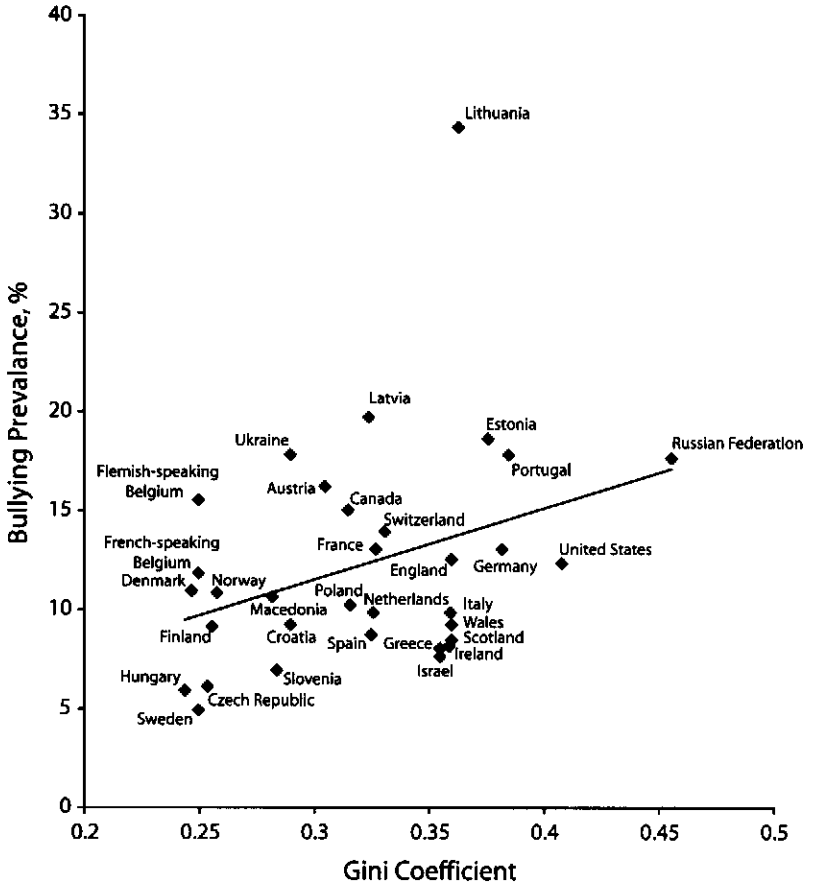
Figure 1 further illustrates the crude correlation between the national Gini coefficients and the overall gender-standardized prevalence of exposure to bullying.

There was statistically significant variation in the association between FAS score and exposure to bullying between countries as well as between schools ($variance_{country\ level}$=0.193; SE=0.048; $variance_{school\ level}$=0.102; SE= 0.008; Table 2). The school-level variance was smaller than the country-level variance and was not reduced by any of the factors included in the multivariate model (data not shown). The results indicate that even when divided into strata by affluence, almost none of the bullying variation between schools was explained by the introduction of school or country-level variables. However, the country-level variance was reduced to 0.168 (SE=0.043) when country-level factors were introduced into the model (model 4), indicating that the country variables included in the analyses accounted for approximately 17% of the bullying prevalence across countries. The association between individual FAS scores and exposure to bullying was modified at the school level, so that variance in the prevalence of bullying exposure between schools was larger for children from less-affluent families and smallest for children from families of medium affluence ($variance_{school\ level\ low\ FAS}$=0.164 vs $variance_{school\ level\ medium\ FAS}$=0.079).

There were differences in the probability of being bullied at the school and especially at the country level (MOR=1.36 and 1.52, respectively; Table 3). The factors involved in the analysis attenuate this increased risk at the country level slightly (from MOR_{modelI}=1.52 to $MOR_{modelIV}$=1.48). The mean difference in the probability of being bullied is slightly larger for children from families of low affluence at both the school and the country level (at the school level, MOR_{lowFAS}=1.45; at the country level, MOR_{lowFAS}=1.72), and the lowest variation was observed for children from medium-affluence backgrounds (at the school level, $MOR_{mediumFAS}$=1.30; at the country level, $MOR_{mediumFAS}$=1.60).

DISCUSSION

Because of the total anonymity of pupils in the study, it was not possible to perform



Note. The diagonal line is the correlation between national Gini coefficients and gender-standardized prevalence of exposure to bullying. $R^2 = 0.13$.

FIGURE 1—Income inequality and age and gender-standardized percentage of exposure to bullying among students aged 11, 13, and 15 years from 35 countries: the Health Behavior in School-Aged Children study, 2001–2002 school year.

nonresponse analyses to further clarify any selection bias. However, we suspect that students who were victims of bullying and students of low affluence may have been overrepresented among the nonparticipants. This selection bias may have resulted in an underestimation of the effect of low affluence on bullying exposure.

The translation of questions about bullying into more than 20 languages may have resulted in information bias. Also, the notion and severity of the concept of bullying may vary between cultural settings and were probably evidenced in some of the variability observed across countries. In all countries, bullying represents a negative social interaction, and our earlier studies showed similar and substantial associations between exposure to bullying and a range of physical and psychological symptoms.[2]

We cannot exclude the possibility of social bias in the self-reports of bullying. However, the association between bullying and symptoms across social classes have shown equal strengths of association,[28] which suggests that social bias in self-reports of bullying exposure is unlikely to be of major importance. The FAS was reliable in that students could report accurately and in agreement with parental reports.[37] It has also shown to be sensitive in differentiating levels of affluence when validated against other socioeconomic status measures.[38] Nevertheless, FAS is constructed by items that are sensitive to cultural and structural surroundings. For instance, car ownership is not a symbol of income status in Greenland, where roads are not an important part of the national infrastructure. Current studies are further developing the FAS measure, accounting for the recognized limitations.[36] The cross-sectional design of our study denies the opportunity to study causal mechanisms. However, students' responses to the FAS items are unlikely to be influenced by the bullying exposure status of the student.

Our examination of data from the Health Behavior in School-Aged Children study showed that adolescents of greater socioeconomic disadvantage are at higher risk of being victims of bullying. The overall prevalence of bullying was not associated with the economic level of the country of residence or of the school attended. However, adolescents who attend schools with larger economic inequality among students, and adolescents who live in countries with larger economic inequality, are at elevated risk of being victims of bullying. Our results suggest that, in general, a 10-percentage-point increase in income inequality (e.g., between Slovenia [28.4%] and Portugal [38.5%]) is associated with 34% higher prevalence of bullying. Likewise, every step of increased economic disparity (of the 7-step FAS score) between schools is associated with a 13% increase in the odds of being exposed to bullying. We found that the social gradient in bullying varies greatly between countries and schools. The variation in the slope of the gradient was attenuated when macroeconomic measures were included in our analysis, which means that countries with larger economic inequality have stronger relative social gradients in adolescent bullying.

Although prevalence differences in exposure to bullying between countries have been previously documented,[2,14,26] variation in prevalence between schools and school classes has not been widely discussed in the public health literature. However, the large prevalence differences across countries and schools confirm that bullying is not a "natural" adolescent behavior, but is conditioned by the surrounding social environment. Our results confirm earlier studies investigating determinants or consequences of exposure to bullying, which found that children from low socioeconomic positions have a higher prevalence of bullying victimization.[5,14,15,28,29] Two of these were national studies that used

socioeconomic measures as confounders; it was not possible to extract the estimate of the social differences in exposure to bullying from these studies.[5,15] Von Rueden et al. examined a nonrepresentative and relatively small pilot sample from 7 countries.[29] That study and the other existing international study have populations of wide age ranges that may not be directly comparable with our study.[14,29]

We found that societies with larger economic inequality have higher prevalence of bullying victimization but also a stronger social gradient in bullying. One underlying mechanism may be that acceptance of hierarchies and of having a more segregated society is reflected in behavior among children. In countries with large economic inequalities, hierarchies and status differences are distinct in the adult population and thus may gain more widespread acceptance among children and school officials. A societal norm of accepting socioeconomic inequality may lead to more widespread approval of behaviors associated with status differences, such as bullying.

A major strength of our study was the large, random school samples from countries representing very different economic and cultural settings. Each research team had to comply with standardized procedures for sampling, measurements, and data collection,[30,31] which have contributed to the cross-national comparability of the data.

As mentioned earlier, a study among Danish adolescents showed that bullying victimization was one of the most potent factors to attenuate social class differences in symptom burden, as measured by an index of 12 physical and psychological symptoms.[22] Our study has shown that exposure to bullying is socially patterned across a large number of countries. How much this increased risk of being bullied among children from poorer backgrounds contributes to health inequalities internationally remains an important future research question. Sen described social exclusion among adults as an important deprivation in itself (like being undernourished or homeless) and considered social exclusion a core component of the idea of poverty.[49] Bullying involves or can cause social exclusion, and our results suggest that it may be another factor contributing to the already-increased burden for less affluent children that may lead to future increased risk of poverty and illness. Future research should aim at disentangling the social mechanisms underlying socioeconomic inequalities in bullying victimization. Also, the social patterning of different types of bullying should be investigated further, so that growing knowledge of the mechanisms and social structure of the environments in which bullying and socioeconomic variance in bullying occur, will enable us to improve interventions.

In our study, the macroeconomic environment seemed to explain some of the country and school prevalence differences in exposure to bullying, but there were still considerable differences that need to be explained. Legislation against violence of all kinds in the school environment and the enforcement of these laws likely influenced the acceptance of violent behavior among the children. Only 42% of the world's children are legally protected from violence at school, and at least 106 countries do not prohibit the use of corporal punishment in schools.[50] Violence in schools, in the form of bullying or corporal punishment, should be discussed globally, and interventions against bullying should be implemented.[51] The UN report on violence against children states that "no violence against children is justifiable."[52(xiii)] In general, successful interventions that reduce school violence in the form of bullying may disproportionately benefit children from poorer social backgrounds, which is yet another important reason for public health to focus on school environments to reduce health inequalities now and in the future.[53] ■

About the Authors

At the time of the study, Pernille Due was with the Institute of Public Health, University of Copenhagen, Copenhagen. Juan Merlo is with the Department of Clinical Sciences, Faculty of Medicine, Lund University, Malmö, Sweden. Yossi Harel-Fisch is with the Department of Criminology and the School of Education, Bar-Ilan University, Ramat Gan, Israel. Mogens Trab Damsgaard and Bjørn E. Holstein are with the Institute of Public Health, University of Copenhagen, Copenhagen. Jørn Hetland is with the Research Center for Health Promotion, University of Bergen, Bergen, Norway. Candace Currie is with the Child and Adolescent Health Research Unit, Moray House School of Education, University of Edinburgh, Edinburgh, Scotland. Saoirse Nic Gabhainn is with the Department of Health Promotion, National University of Ireland, Galway. Margarida Gaspar de Matos is with the Faculdade de Motricidade Humana, Universidade Tecnica de Lisboa, Lisbon, Portugal. At the time of the study, John Lynch was with the Department of Epidemiology, Biostatistics, and Occupational Health, McGill University, Montreal, Canada.

Requests for reprints should be sent to Pernille Due, National Institute of Public Health, University of Southern Denmark Øster Farimagsgade 5 A, 2nd Floor, DK-1399 Copenhagen, Denmark (e-mail: pdu@niph.dk).

This article was accepted September 10, 2008.

Contributors

P. Due and J. Merlo designed the study and performed the statistical analyses. All authors helped gather or interpret data and contributed to the writing of the article. All authors approved the final version of the article.

Acknowledgments

We thank The Health Insurance Foundation and The Nordea Denmark Foundation for their support for our research.

We thank Oddrun Samdal, the databank manager of the Health Behavior in School-Aged Children study. We thank all principal investigators mentioned in Table 1 for thorough data sampling and the use of their data. We would also like to thank Dan Olweus, of the Research Center for Health Promotion, University of Bergen, Bergen, Norway, for valuable comments on the measurement and conceptualization of bullying exposure.

Human Participant Protection

The study conformed to the ethical standards of each of the countries involved.

References

1. Olweus D. *Bullying at School: What We Know and What We Can Do.* Oxford, England: Blackwell Publishers; 1993.

2. Due P, Holstein BE, Lynch J, et al. Bullying and symptoms among school-aged children: international comparative cross sectional study in 28 countries. *Eur J Public Health.* 2005;15(2):128–132.

3. Williams K, Chambers M, Logan S, Robinson D. Association of common health symptoms with bullying in primary school children. *BMJ.* 1996;313:17–19.

4. Salmon G, James A, Smith DM. Bullying in school: self reported anxiety, depression, and self esteem in secondary school children. *BMJ.* 1998;317:924–925.

5. Kaltiala-Heino R, Rimpelä M, Marttunen M, Rimpelä A, Rantanen P. Bullying, depression, and suicidal ideation in Finnish adolescents: school survey. *BMJ.* 1999;319:348–351.

6. Forero R, McLellan L, Rissel C, Bauman A. Bullying behaviour and psychosocial health among school students in New South Wales, Australia: cross sectional survey. *BMJ.* 1999;319:344–348.

7. Nansel TR, Overpeck M, Pilla RS, Ruan WJ, Simons-Morton B, Scheidt P. Bullying behaviors among US youth: prevalence and association with psychosocial adjustment. *JAMA.* 2001;285:2094–2100.

8. Due EP, Holstein BE, Jorgensen PS. Bullying as a health hazard among school children. *Ugeskr Laeger.* 1999;161:2201–2206.

9. Bond L, Carlin JB, Thomas L, Rubin K, Patton G. Does bullying cause emotional problems? A prospective study of young teenagers. *BMJ.* 2001;323:480–484.

10. Kumpulainen K, Rasanen E. Children involved in bullying at elementary school age: their psychiatric

symptoms and deviance in adolescence. *Child Abuse Negl.* 2000;24:1567–1577.

11. Juvonen J, Graham S, Schuster MA. Bullying among young adolescents: the strong, the weak and the troubled. *Pediatrics.* 2003;112:1231–1237.

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. Janssen I, Craig WM, Boyce WF, Pickett W. Associations between overweight and obesity with bullying behaviors in school-aged children. *Pediatrics.* 2004; 113:1187–1194.

14. Nordhagen R, Nielsen A, Stigum H, Köhler L. Parental reported bullying among Nordic children: a population-based study. *Child Care Health Dev.* 2005; 31(6):693–701.

15. Kim YS, Koh Y-O, Leventhal B. School bullying and suicidal risk in Korean middle school students. *Pediatrics.* 2005;115:357–363.

16. Due P, Hansen EH, Merlo J, Andersen A, Holstein BE. Is victimization from bullying associated with medicine use among adolescents? A nationally representative cross-sectional survey in Denmark. *Pediatrics.* 2007; 120(1):110–117.

17. Kshirsagar VY, Agarwal R, Bavdekar SB. Bullying in schools: prevalence and short-term impact. *Indian Pediatr.* 2007;44:25–28.

18. Liang H, Flisher AJ, Lombardc CJ. Bullying, violence, and risk behavior in South African school students. *Child Abuse Negl.* 2007;31:161–171.

19. Van Cleave J, Davis MM. Bullying and peer victimization among children with special health care needs. *Pediatrics.* 2006;118:e1212–e1219.

20. Fekkes M, Pijpers FIM, Fredriks AM, Vogel T, Verloove-Vanhoric SP. Do bullied children get ill, or do ill children get bullied? A prospective cohort study on the relationship between bullying and health-related symptoms. *Pediatrics.* 2006;117:1568–1574.

21. Arseneault L, Walsh E, Trzesniewski K, Newcombe R, Caspi A, Moffit TE. Bullying victimization uniquely contributes to adjustment problems in young children: a nationally representative cohort study. *Pediatrics.* 2006;118:130–138.

22. Sourander A, Jensen P, Rönning JA, et al. What is the early adulthood outcome of boys who bully or are bullied in childhood? The Finnish "From a Boy to a Man" study. *Pediatrics.* 2007;120:397–404.

23. Kumpulainen K, Rasanen E, Henttonen I. Children involved in bullying: psychological disturbance and the persistence of the involvement. *Child Abuse Negl.* 1999;23:1253–1262.

24. Sourander A, Helstela L, Helenius H, Piha J. Persistence of bullying from childhood to adolescence–a longitudinal 8-year follow-up study. *Child Abuse Negl.* 2000;24(7):873–881.

25. Nansel TR, Overpeck M, Haynie D, Ruan J, Scheidt P. Relationships between bullying and violence among US youth. *Arch Pediatr Adolesc Med.* 2003;157:348–353.

26. Due P, Holstein BE. Bullying victimization among 13 to 15-year-old school children: results from two comparative studies in 66 countries and regions. *Int J Adolesc Med Health.* 2008;20(2):209–221.

27. West P, Sweeting H. Evidence on equalisation in health in youth from the West of Scotland. *Soc Sci Med.* 2004;59:13–27.

28. Due P, Lynch J, Holstein BE, Modvig J. Socioeconomic health inequalities among a nationally representative sample of Danish adolescents: the role of different types of social relations. *J Epidemiol Community Health.* 2003;57:692–698.

29. Von Rueden U, Gosch A, Raimil L, Bisegger C, Raven-Sieberer U. The European KIDSCREEN group. Socioeconomic determinants of health related quality of life in childhood and adolescence: results from a European study. *J Epidemiol Community Health.* 2006;60: 130–135.

30. Roberts C, Currie C, Samdal O, Currie D, Smith R, Maes L. Measuring the health and health behaviours among adolescents through cross-national survey research: recent developments in the Health Behaviour in School-aged Children (HBSC) study. *J Public Health.* 2007;15:179–186.

31. Currie C, Roberts C, Morgan A, et al, eds. Young people's health in context. *Health Policy for Children and Adolescents No. 4.* Copenhagen, Denmark: World Health Organization; 2003. Available at: http://www.euro.who.int/Document/e82923.pdf. Accessed January 3, 2008.

32. Olweus D. *The Olweus Bullying Questionnaire.* Center City, MN: Hazelden Publishing; 2007.

33. Olweus D. Bullying among schoolchildren: intervention and prevention. In: Peters RD, McMahon RJ, Quinsey VL, eds. *Aggression and Violence Throughout the Life Span.* Newbury Park, CA: Sage Publications; 1992:100–125.

34. Olweus D. Bullying at school: long-term outcomes for the victims and an effective school-based intervention program. In: Huesmann LR, ed. *Aggressive Behavior: Current Perspectives.* New York, NY: Plenum Press; 1994:97–130.

35. Solberg ME, Olweus D. Prevalence estimation of school bullying with the Olweus Bully/Victim Questionnaire. *Aggress Behav.* 2003;29:239–268.

36. Currie C, Molcho M, Boyce W, Holstein BE, Thorsheim T, Richter M. Researching health inequalities in adolescence: the development of the HBSC family affluence scale. *Soc Sci Med.* 2008;66(6):1429–1436.

37. Andersen A, Krolner R, Currie C, et al. High agreement on family affluence between children's and parents' reports: international study of 11-year-olds. *J Epidemiol Community Health.* Published online April 15, 2008. doi: 10.1136/jech.2007.065169.

38. Boyce W, Torsheim T, Currie C, Zambon A. The family affluence scale as a measure of national wealth: validation of an adolescent self-report measure. *Soc Indic Res.* 2006;78:473–487.

39. United Nations Development Programme. *Human Development Report 2003.* New York, NY: Oxford University Press; 2003. Available at: http://hdr.undp.org/reports/global/2003. Accessed August 20, 2007.

40. World Development Indicators 2003. Washington, DC: The World Bank; 2003. Available at: http://go.worldbank.org/110R74XOQ0. Accessed August 20, 2007.

41. World Bank Atlas method. Available at: http://go.worldbank.org/8MH1UTJVK0. Accessed August 20, 2007.

42. Larsen K, Merlo J. Appropriate assessment of neighborhood effects on individual health: integrating random and fixed effects in multilevel logistic regression. *Am J Epidemiol.* 2005;161(1):81–88.

43. Larsen K, Petersen JH, Budtz-Jorgensen E, Endahl L. Interpreting parameters in the logistic regression model with random effects. *Biometrics.* 2000;56(3):909–914.

44. Merlo J. Multilevel analytical approaches in social epidemiology: measures of health variation compared with traditional measures of association. *J Epidemiol Community Health.* 2003;57(8):550–552.

45. Merlo J, Chaix B, Ohlsson H, et al. A brief conceptual tutorial of multilevel analysis in social epidemiology: using measures of clustering in multilevel logistic regression to investigate contextual phenomena. *J Epidemiol Community Health.* 2006;60(4):290–297.

46. Merlo J, Chaix B, Yang M, Lynch JW, Rastam L. A brief conceptual tutorial on multilevel analysis in social epidemiology: interpreting neighbourhood differences and the effects of neighbourhood characteristics on individual health. *J Epidemiol Community Health.* 2005;59(12):1022–1028.

47. Merlo J, Chaix B, Yang M, Lynch J, Rastam L. A brief conceptual tutorial of multilevel analysis in social epidemiology: linking the statistical concept of clustering to the idea of contextual phenomenon. *J Epidemiol Community Health.* 2005;59(6):443–449.

48. Merlo J, Yang M, Chaix B, Lynch J, Rastam L. A brief conceptual tutorial on multilevel analysis in social epidemiology: investigating contextual phenomena in different groups of people. *J Epidemiol Community Health.* 2005;59(9):729–736.

49. Sen A. Social exclusion: Concept, application, and scrutiny. *Social Development Papers* no 1. Manila, Philippines: Asian Development Bank; 2000.

50. Waterston T, Mok JYQ. Violence against children: the UN report. *Arch Dis Child.* Published online September 5, 2007. doi: 10.1136/adc.2006.113340.

51. Vreeman RC, Carrol AE. A systematic review of school-based interventions to prevent bullying. *Arch Pediatr Adolesc Med.* 2007;161:78–88.

52. United Nations Secretary General's Study on Violence Against Children. New York: United Nations; 2006. Available at: http://www.violencestudy.org. Accessed January 3, 2008.

53. Satcher D, Higginbotham EJ. The public health approach to eliminating disparities in health. *Am J Public Health.* 2008;98:400–403.