Original article

Gender Differences in Bullying Reflect Societal Gender Inequality: A Multilevel Study With Adolescents in 46 Countries

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A B S T R A C T

Purpose: Social patterns in bullying show consistent gender differences in adolescent perpetration and victimization with large cross-national variations. Previous research shows associations between societal gender inequality and gender differences in some violent behaviors in adolescents. Therefore, there is a need to go beyond individual associations and use a more social ecological perspective when examining gender differences in bullying behaviors. The aim of the present study was twofold: (1) to explore cross-national gender differences in bullying behaviors and (2) to examine whether national-level gender inequality relates to gender differences in adolescent bullying behaviors.
Methods: Traditional bullying and cyberbullying were measured in 11-year-olds to 15-year-olds in the 2017/18 Health Behaviour in School-aged Children study ($n = 200,423$). We linked individual data to national gender inequality (Gender Inequality Index, 2018) in 46 countries and tested their association using mixed-effects (multilevel) logistic regression models.
Results: Large cross-national variations were observed in gender differences in bullying. Boys had higher odds of perpetrating both traditional and cyberbullying and victimization by traditional bullying than girls. Greater gender inequality at country level was associated with heightened gender differences in traditional bullying. In contrast, lower gender inequality was associated with larger gender differences for cyber victimization.

IMPLICATIONS AND CONTRIBUTION

This cross-national study shows that gender differences in bullying share a robust association with societal gender inequality. Gender inequality is associated with larger gender differences; however, bullying directionality differs across bullying behaviors. Prevention efforts must go beyond working directly with adolescents and address also sociocultural gender disparities in society.

Discussion: Societal gender inequality relates to adolescents' involvement in bullying and gendered patterns in bullying. Public health policy should target societal factors that have an impact on young people's behavior.

Bullying and school violence remain an issue of serious concern for adolescents across the world despite systematic prevention and intervention efforts in many countries. The experience of bullying is highly detrimental to adolescents' health and well-being in both the short and long term [1]. Across the countries included in the 2018 Programme for International Assessment (PISA) study, 23% of students reported being bullied at least a few times a month but the data reveal large between-country differences in students' reported exposure to bullying [2]. Gender differences in bullying behaviors are reported in most European countries; however, the magnitude and the direction of these differences vary across countries [3,4]. Previous findings suggest an association between country-level gender inequality and interpersonal violence [5,6]. Because most bullying research focuses on individual-level determinants, the evidence on broader, structural determinants is limited [6]. As such, whether gender inequality at social level is associated with gender differences in their involvement in bullying (perpetration and victimization) has not been examined previously.

Traditional bullying is usually defined as repeated negative behavior, intended to cause harm, within the context of an unequal power relationship [7]. Cyberbullying is defined as an aggressive, intentional act carried out by a group or individual, using electronic forms of contact, repeatedly and over time against a victim who cannot easily defend him or herself [8]. Gender differences in these behaviors are well documented. Most studies report that boys are more likely to bully others than girls [9,10]. These gender differences are less pronounced for cyberbullying perpetration compared to traditional bullying [10,11]. While earlier research found that boys are more likely to be victims than girls [6], a recent meta-analysis found no gender differences in traditional bullying victimization [12]. For cyber-victimization, the literature on gender differences is inconclusive [10,11]. A recent international report, however, based on the EU Kids Online data points to relatively small age and gender differences in both online victimization and perpetration, less or equal to 5 percentage points [13].

One way to understand the role gender plays in bullying is to examine links to gender norms. Gender norms are the spoken and unspoken rules of acceptable behaviors of girls and boys [14] that sustain a hierarchy of power [15]. Gender differences in bullying could thus be anchored in adolescents' ideals around hegemonic masculinity [16]. As such, adolescent bullying could be seen as perpetuating masculine dominance and gender inequality [16] and endorsing gendered cultural norms of behavior. Given the cross-country variations in structural gender inequalities and norms [17], we expect that gender differences in bullying would differ as per these inequalities and norms.

A power imbalance is a central characteristic of bullying. Despite its centrality in bullying, there are limited data on how power is manifested for individuals and within their social structures. Feminist theory suggests that the root cause of interpersonal violence is the power and control imbalance that exist between men and women on the societal level [18]. If men and women have unequal access to power through social structures such as politics, economics, social, health, and education, then unhealthy gender norms reinforce the notion of male superiority/female inferiority. If men dominate in the institutions of society, then the policies and practices of these institutions will reinforce and legitimize male domination over women and violence can be used as a tool to exclude and subordinate women and to maintain power [19]. From a developmental perspective, adolescence is the time when young people are consolidating their gender role identities [20] and dealing with the stressors and challenges of puberty and the developmental stage. Identity development takes place through processes of identification, internalization, and identity commitment [21] and is carried out in interaction with the models and messages communicated by the society [22]. However, these socializing processes and the impact of immediate social norms might influence boys and girls differently. We hypothesized that in societies with more gendered social structures (i.e., characterized by higher structural gender inequality), in which gender roles are more differentiated, adolescents are more likely to internalize and to adhere to more stereotypically gendered behaviors [23], as has been observed in adolescent dating violence victimization [24], physical child abuse [25], and adolescent physical fighting among boys [5]. Consequently, we would expect higher gender gaps in bullying behaviors in countries with higher structural gender inequality.

Present study

The aim of this study was twofold. First, to explore cross-national gender differences in bullying behaviors. Second, to examine whether national-level gender inequality relates to gender differences in adolescent bullying behaviors. Based on a feminist theoretical perspective which considers gender differences to be related to societal power and control imbalance that exists between men and women [18], and previous evidence of associations between societal gender inequality and gender differences in adolescents' violent behavior (e.g., dating violence, physical fighting), we hypothesize that gender differences in adolescent bullying behavior will be positively related to national-level gender inequality (i.e., greater gender inequality will be accompanied by larger gender differences). We also expected that girls will be more likely to be victimized than boys, especially in the countries with greater gender inequality.

Methods

Sample

The Health Behaviour in School-aged Children (HBSC) study is a large cross-sectional, school-based survey carried out every four years in collaboration with the World Health Organization

Regional Office for Europe. We used data from the 2017/2018 HBSC survey, in which 47 countries or regions participated by collecting self-report data on nationally representative samples of 11-year-old, 13-year-old, and 15-year-old adolescents using a standardized study protocol [26]. Samples were drawn using cluster sampling, with school classes or the whole school as the primary sampling unit. Data collection procedures and questionnaires were standardized and strictly followed the international research protocol. Each country obtained an ethical board approval. The present study includes data from 46 countries and regions that measured traditional bullying and from 43 countries that measured cyberbullying. The median response rate at the school level was 89.7% (interquartile range, 48.6%–92.8%) and at the individual level 83.0% (70.7%–87.5%).

Individual level variables

Bullying. Traditional bullying perpetration was measured with an item adapted from the Olweus Bullying Questionnaire [7,26] "How often have you taken part in bullying another person(s) at school in the last couple of months?", with possible answers: "I have not bullied another person at school in the last couple of months"; "It has happened once or twice"; "two or three times a month"; "About once a week"; and "Several times a week". The question was preceded by a five-sentence explanation of what was regarded as bullying. Responses were recoded as 0 (never or once) and 1 (twice or more). Bullying victimization was measured by responses to the next question "How often have you been bullied at school in the last couple of months?" with similar response categories and recoding. These measures have been widely validated across multiple cultural contexts [25].

Cyberbullying. Participants were asked "In the past couple of months how often have you taken part in cyberbullying?" to measure perpetration and "In the past couple of months how often have you been cyberbullied?" to measure victimization. Response categories were the same as for traditional bullying and were recoded as 0 (never) and 1 (at least once or more) [3].

Individual level control variables. At the individual level, control variables included in the regression models were gender (0 = female, 1 = male), age category (11-year-olds, 13-year-olds, and 15-year-olds) and material deprivation. The latter was based on the HBSC Family Affluence Scale, a six-item measure of material assets in the household (e.g., cars, computers) [27]. These data were transformed to a proportional rank index within each country that ranged from 0 (least deprivation, most affluent) to 1 (most deprivation, least affluent).

School level control variables. At school level, we included school deprivation (i.e., mean deprivation per school) and school gender (i.e., the proportion of male respondents per school).

Country level variables

Gender inequality. We used the 2018 Gender Inequality Index (GII) of the United Nations Development Programme [28]. This composite index combines a health dimension (maternal mortality ratio and adolescent fertility rate), an empowerment dimension (proportion of parliamentary seats occupied by females and educational attainment by gender), and a labor dimension (women's participation in the workforce). The GII

takes values from 0 to 1, with higher values indicating greater levels of inequality. This structural indicator is widely used as country-level indicator in exploring differences in individual behaviors [4,5].

We replicated our findings using an alternate index of gender inequality, the Gender Social Norms Index (GSNI), which was fielded in Wave 7 (2017−2020) of the World Values Survey and the 2017 wave of the European Values Survey [29]. The GSNI is a seven-item scale that measures four dimensions of inequality: political (e.g., "men make better political leaders than women"), educational (e.g., "university is more important for a man than for a woman"), economic (e.g., "men should have more right to a job than women"), and physical integrity (e.g., "it is justifiable for a man to beat his wife"). Country GSNI scores represent a weighted proportion of sampled adults who hold any gender bias in any of these dimensions.

Gross domestic product per capita. To control for differences in country wealth we used data on national gross domestic product per capita (PPP) (current international $) in the data bank of the World Bank, converted to thousands of dollars [30].

Data cleaning

Cases were dropped from the sample because of missing values for age (1,516 cases) or deprivation (12,599 cases). Furthermore, cases were removed if they were missing all four of the bullying and cyberbullying variables (4,604 cases). Data from Greenland were excluded from the main analyses due to unavailability of GII data (1,243 cases). The final analytic sample was 220,457 for traditional bullying perpetration and victimization and 220,372 for cyberbullying perpetration and victimization.

Analytical approach

Stata/SE v. 16 (College Station, Texas) was used for a statistical analysis. The main analyses consisted of separate multilevel mixed effects logistic regression analyses of each dependent variable: bullying perpetration, bullying victimization, cyberbullying perpetration, and cyberbullying victimization. Gender, age group, and deprivation were included as control variables at the individual level in each analysis, whereas school-level deprivation and gender composition were included at school level. Analyses for victimization also included perpetration of the corresponding form of bullying as a predictor and vice versa. Values of GII and gross domestic product per capita were included at the country level and additionally the interaction between gender and GII. Sensitivity analyses were run with the GSNI in place of GII (Appendix A1). Mixed-effects logistic regression models were fitted using the Stata command *melogit*. These models specified three levels of random variation among countries (n = 46), schools (n = 8,365), and individual students (n = 244,097) and were weighted to ensure the results represented national populations of 11-year-olds, 13-year-olds, and 15-year-olds. Forest plots of odds ratios obtained from regressions were created using the *coefplot* command. The *margins* and *marginsplot* commands were used to display interactions between gender and country-level gender inequality. Stratified analyses at the country level were also weighted and adjusted for the clustered sample design using Stata's *svy* command.

Results

Cross-national variation and gender gaps in bullying

Descriptive statistics on individual-level and country-level variables are presented in Table 1. The rates of bullying victimization, bullying perpetration, cyberbullying victimization, and cyberbullying perpetration by gender are shown for each country in Tables A1 to A4, respectively. Absolute differences between the rates for each gender reached 7.18 percentage points for bullying victimization in Israel, 10.99 for bullying perpetration in Lithuania, and 13.55 for cyberbullying perpetration, also in Lithuania; in all these cases, males had the higher rates. In the case of cyberbullying victimization, the largest absolute difference, 7.24 percentage points, occurred in both Greenland (where the female rate was higher) and Azerbaijan (a higher rate in males).

Bullying others and cyberbullying others were more prevalent in males than in females in most countries, whereas gender differences in victimization were mixed. These gender differences are also displayed as odds ratios in Figure 1. Across all countries, boys had higher odds in both traditional and cyber perpetration, whereas for bullying victimization and cyberbullying victimization the gender differences were less apparent. In almost half of the countries, girls had greater odds of cyberbullying victimization (highest odds in Switzerland), whereas boys had higher odds in about one third of the countries (highest odds in Azerbaijan).

Gender inequality and bullying behaviors

Results of the multilevel logistic regressions of bullying are shown in Table 2. Male gender was positively associated with both traditional and cyber perpetration but not with victimization outcomes. The interaction of country-level gender inequality and gender was associated with traditional and cyber victimization and traditional bullying perpetration. For traditional bullying perpetration and victimization, the direction of these interactions indicated a larger gender difference where national gender inequality was higher. However, for cyber victimization larger differences were observed in countries with low gender inequality (girls > boys). Increasing societal gender inequality led to a closing of the gender gap closes and a change in directions (boys > girls). This observation was confirmed by the marginal predicted probabilities of perpetration and victimization shown in Figure 2. These regression-based predicted probabilities of bullying show that in males (compared to females), gender inequality was more closely related to traditional victimization, cyberbullying victimization, and bullying others (i.e., steeper slopes). The interaction of gender and national gender inequality was not associated with cyberbullying perpetration. All four panels show probabilities for involvement in bullying increasing with higher gender inequality in both boys and girls. However, for both forms of victimization, the increase is steeper for boys. Scatterplot charts of the correlation between observed gender gaps in each form of bullying and gender inequality are shown in Figure A1.

Sensitivity analysis

We checked the robustness of our findings, first by substituting the GSNI for the GII in our regression analysis (Table A5). GII and GSNI values were highly correlated (Figure A3) and, as expected, these regressions produced results very similar to those shown in Table 2. The interaction between gender social norms index and gender was significant across all four regressions models. Second, we tested our models using a fixed-effects regression analysis in which all unmeasured country differences were dummy-coded (Table A6). Again, we found very similar results to the multilevel regression analysis.

Discussion

The present study examined the relationship between societal gender inequality and gender differences in traditional and cyberbullying perpetration and victimization among adolescents in 46 countries and regions. It contributes knowledge to the literature on bullying by focusing on the relationship between macro-level societal forces and individual behaviors in adolescence [31]. In line with previous studies [9,10], boys were more likely to be involved in three of the four bullying behaviors (traditional bullying perpetration, traditional victimization, and cyber bullying perpetration). The results relating to cybervictimization were also in line with previous studies [10,11] as the gender differences were not consistent in their direction across countries. While we hypothesized that girls would report higher victimization rates in countries with greater inequality, this was

Table 1
Descriptive statistics on key variables

	N	Unweighted %	Weighted %
Individual level (n = 244,097)			
Gender group			
Male	120,350	49.30	48.98
Female	123,747	50.70	51.02
Missing	0.00	0.00	0.00
Age group			
11 years	74,402	33.11	33.28
13 years	77,789	34.62	34.21
15 years	72,531	31.28	32.52
Missing	0.00	0.00	0.00
Bullying victimization			
Once or more	22,952	10.21	10.18
Never	199,478	88.77	88.81
Missing	2,292	1.02	1.02
Bullied perpetration			
Once or more	13,910	6.19	6.19
Never	208,254	92.67	92.66
Missing	2,558	1.14	1.15
Cyberbullying victimization			
2–3 times or more	28,651	12.75	12.66
Never or 'once or twice'	192,966	85.87	85.97
Missing	3,105	1.38	1.37
Cyberbullying perpetration			
2–3 times or more	21,533	9.58	9.53
Never or 'once or twice'	200,272	89.12	89.19
Missing	2,917	1.30	1.28

	Mean	Std. deviation	Missing (%)
Material deprivation	0.50	0.29	0.00
School level (n = 8,365)			
School deprivation	0.51	0.13	0.00
School gender	0.49	0.19	0.00
Country level (n = 46)			
Gross Domestic Product per capita, $000 seconds	41.65	21.02	0.00
Gender inequality	0.13	0.08	0.00

Notes: School deprivation represents mean deprivation per school. School gender represents the proportion of male respondents per school.
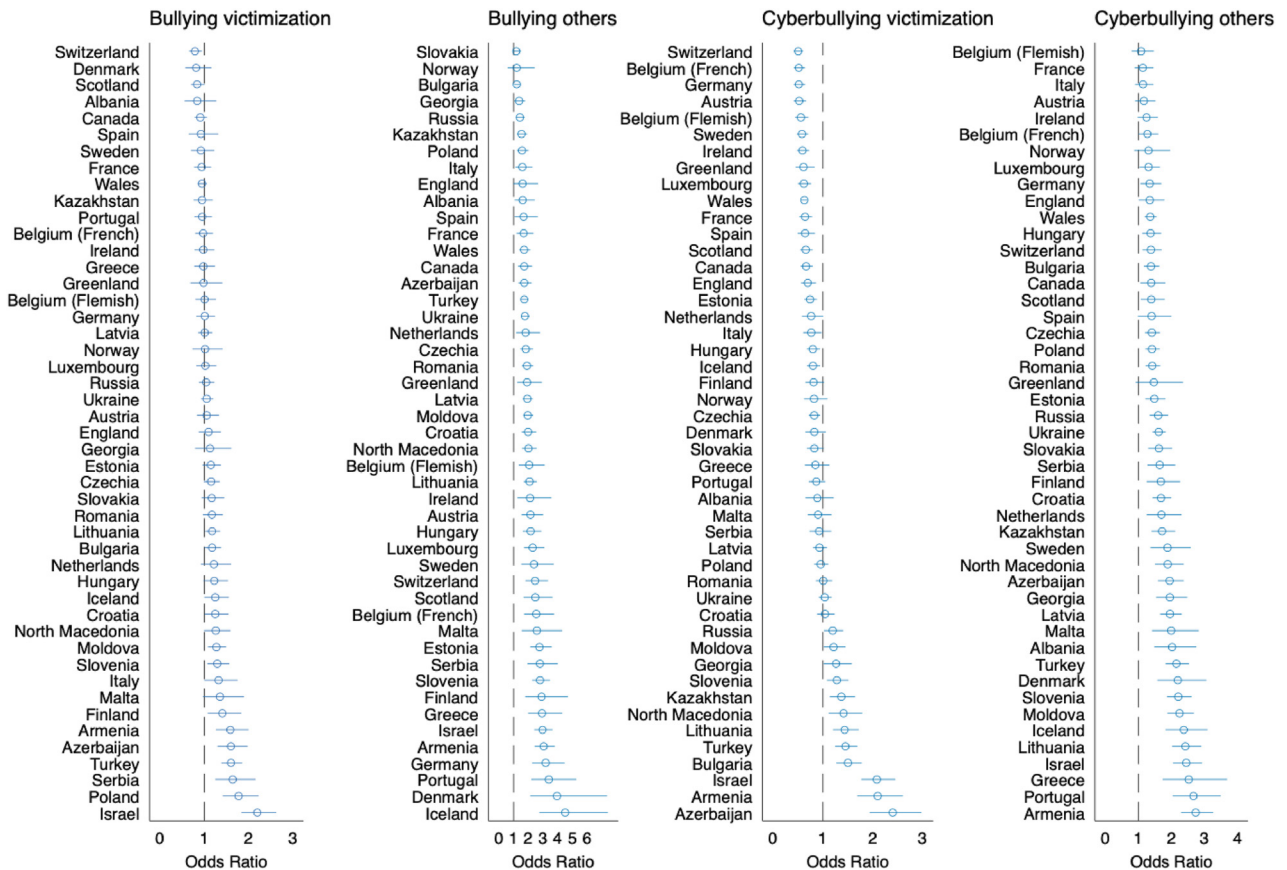
Figure 1. Logistic regressions of bullying and victimization by male gender (coded 0 = female, 1 = male).

not supported. Girls were more likely to be victims of cyberbullying than boys in countries with lower gender inequality. Specifically, whereas in most countries girls were more likely to report having been bullied online than boys, in several Eastern European countries the odds of being bullied online were higher among boys. These opposing gendered patterns in cyberbullying victimization could be explained by such factors as problematic social media use [3] or online gaming [13] which show a similar pattern. Overall, these findings reinforce the need for a gendered perspective of aggression in adolescents [32]. A greater understanding of the social determinants of school and online violence requires careful consideration of gender-related processes such as socialization [33], gender roles and norms expected of the two genders [34], and gender-related ways in which young people navigate the social and psychological challenges of adolescence [35].

The results showed cross-national differences in levels of involvement in bullying behavior, reinforcing an ecological perspective of bullying [33]. Specifically, in line with the study hypotheses, results showed that societal gender inequality relates to gender gaps in bullying behaviors. Across the distribution of gender inequality (from low to high), rates of traditional bullying (victimization and perpetration) and cyberbullying victimization increased more sharply in male adolescents than in females. More specifically, societal gender inequality corresponded to a divergence between gender groups in both forms of traditional bullying and a convergence in cyberbullying

victimization. The results support previous research on societal level determinants of interpersonal violence, such as dating violence victimization in girls [24], physical child abuse [25], and fighting among boys [5]. Smith, White, and Morocco [23] suggested that bullying takes place within a cultural context and gendered social structures that reinforce masculine power and authority by constraining women will lead to exacerbation of levels of bullying behavior among adolescent boys. From a developmental perspective, our results suggest that adolescent boys and girls may internalize societal messages regarding gender roles [36] and inequalities and these messages legitimize males' use of aggression as a means of control and enforcing power [16], which in turn may leave boys with inadequate tools for dealing with conflicts in alternate ways.

On a more general level, the study findings reinforce the literature on the relationship between societal inequality—especially regarding gender—and individual well-being and behaviors [37] and extend how this relationship is manifested in adolescence. Gender inequality and restrictive gender norms are known to be powerful but separate determinants of health and well-being [15]. However, our findings show that both these dimensions are associated with gender differences in bullying among adolescents. More importantly, despite extensive evidence showing that gender inequalities leave women and girls worse off across most dimensions of health and social circumstances [38], our results highlight the increased vulnerability that boys have toward involvement in bullying, especially in

Table 2
Multilevel regressions of bullying and victimization in adolescents (HBSC 2017/18)

Variable	Bullying victimization	Bullying perpetration	Cyberbullying victimization	Cyberbullying perpetration
	Odds ratio (95% CI)	Odds ratio (95% CI)	Odds ratio (95% CI)	Odds ratio (95% CI)
Gender (male)	0.88* (0.79–0.99)	2.44*** (2.13–2.79)	0.51*** (0.43–0.59)	1.88*** (1.67–2.11)
Age group				
11 years (ref.)	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
13 years	0.90** (0.84–0.97)	1.24*** (1.14–1.34)	1.01 (0.95–1.07)	1.34*** (1.23–1.46)
15 years	0.61*** (0.56–0.68)	1.39*** (1.24–1.56)	0.87*** (0.81–0.94)	1.50*** (1.34–1.67)
Deprivation	1.32*** (1.21–1.43)	.89** (0.81–0.97)	1.11** (1.03–1.19)	0.78*** (0.72–0.86)
Bullying perpetration	6.06*** (5.13–7.17)			
Bullying victimization		6.09*** (5.15–7.20)		
Cyberbullying perpetration			12.29*** (10.44–14.46)	
Cyberbullying victimization				12.26*** (10.45–14.38)
Country wealth	1.00 (1.00–1.01)	0.99 (0.98–1.00)	1.00 (1.00–1.01)	1.00 (0.99–1.00)
School deprivation	1.32 (0.98–1.79)	2.47*** (1.71–3.56)	1.25 (0.97–1.61)	2.30*** (1.64–3.23)
School gender	1.43*** (1.26–1.61)	1.33** (1.11–1.59)	1.00 (.86–1.15)	1.16** (1.04–1.31)
GII	4.62 (0.55–39.01)	275.97*** (20.30–3,750.97)	1.38 (.17–10.93)	53.68*** (9.24–311.96)
Gender X GII	2.26* (1.17–4.36)	0.23*** (0.11–0.45)	13.52*** (5.55–32.95)	0.90 (0.45–1.77)
Random variances				
Country	0.21	0.20	0.12	0.11
School	0.12	0.21	0.11	0.14
n (individuals)	220,457	220,457	220,372	220,372
n (schools)	8,361	8,361	8,357	8,357
n (countries)	46	46	46	46
Intraclass correlations				
Country	0.07	0.13	0.05	0.09
School	0.12	0.20	0.09	0.14
Goodness-of-fit				
2 ll	−66,399.46	−44,091.95	−71,627.29	−55,540.15
Likelihood Ratio test	18.41**	41.55**	211.02**	0.31
AIC	132,824.90	88,209.89	143,280.60	111,106.30
BIC	132,958.90	88,343.84	143,414.50	111,240.20

Note: Shown are odds ratios (OR) estimates and 95% confidence intervals (CIs) from weighted, multilevel logistic regressions. Likelihood ratio (LR) test compares the model with and without the Gender × GII interaction term. School deprivation represents mean deprivation per school. School gender represents the proportion of male respondents per school.
AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; GII = Gender Inequality Index.
*$p < .05$; **$p < .01$; ***$p < .001$.

societies characterised by high structural gender inequality. As such, dominance motives which sustain and promote group hierarchies could mediate the associations seen between societal inequality, norms, and individual behaviors [31], although these need to be investigated. There is a need for further research examining the mechanisms that may explain the relationship between societal-level gender inequality and adolescent bullying.

Extensive efforts to stop bullying behavior among school children have been reported worldwide; however, the effects of intervention programs are generally modest. Based on a meta-analysis, it has been reported that such programs reduce the prevalence for traditional bullying perpetration by 19%–20% and traditional victimization by 15%–16% [39]. The programs are even less effective in reducing cyber perpetration (10%–15%) and cyberbullying victimization (14%) [39]. One explanation for these low success rates in intervention programs is societal gender inequality. As intervention programs are carried out in contexts that are bound to gender norms and gender inequality over which the programs themselves have no direct influence, the intervention runs up against established social norms. Our results point to a need for an ecological or holistic approach to bullying prevention [40]. Behavior in the proximal environment is shaped by more distal phenomena and policies such as gender equality. Bullying perpetration was related to unequal societies, and therefore working toward higher gender equality may be critical in decreasing bullying behaviors. As power imbalance is

germane to both bullying and gender inequalities reinforcing boys' status over girls may contribute to boys' perceived power [16]. Thus, notions of hegemonic masculinity could be reinforced through bullying behavior [16] and this could explain why boys' involvement in bullying is more sensitive to structural gender inequalities. As such it could be that in societies with more traditional gender norms, there may be less emphasis on giving boys tools for expressing themselves in other ways which may be considered more female. Future violence interventions programs could, therefore, focus on widening the resources and tools available, particularly to boys, for dealing with conflicts and difficulties.

Despite the many strengths of this study, including the use of large nationally representative samples of adolescents, robust indicators of gender inequality, and wide geographical coverage, some limitations should be noted. Due to the cross-sectional nature of the data the findings are correlational in nature and no causality should be inferred. It could also be hypothesized that over time, gender differences in adolescent behaviors will reinforce social and structural inequality, and therefore these plausible transactional effects could not be captured by the current research design. A second limitation is that bullying behaviors were measured with single-item measures. Although single-item measures are commonly used in the international bullying research field, there is an ongoing debate on whether to use single-item or multiple-item scales to measure bullying perpetration and victimization [41]. One of the major arguments in the
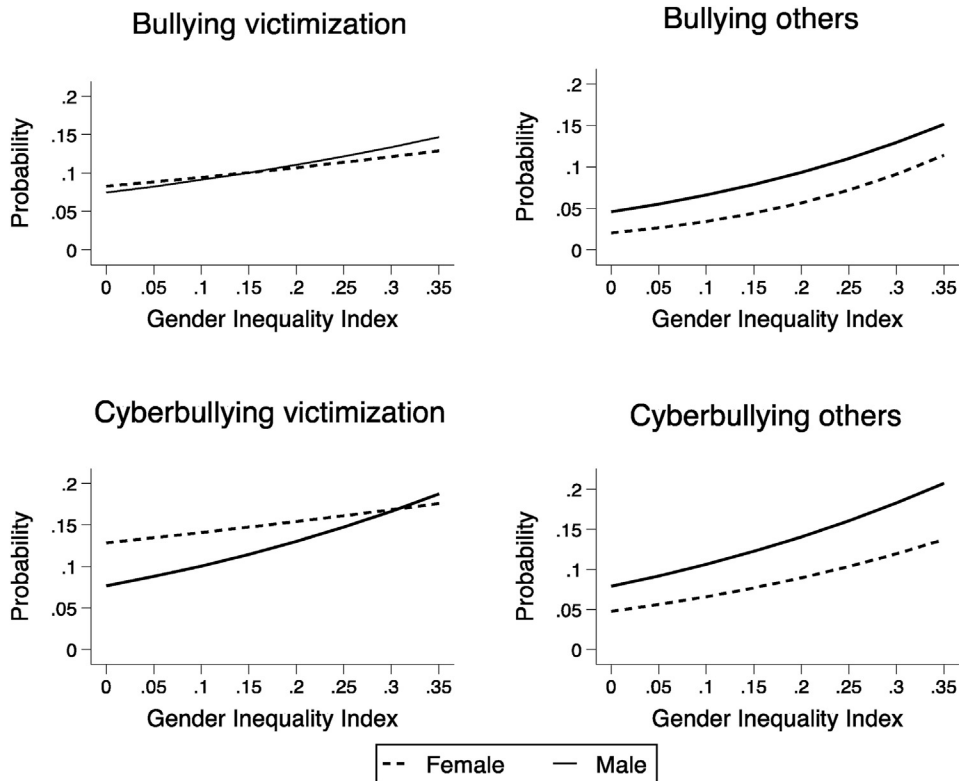
Figure 2. Predicted probabilities of bullying and victimization in female and male adolescents and country-level gender inequality. Probabilities are adjusted for regression covariates shown in Table 2.

critique against single-item measures is the risk of under-reporting bullying behavior. Measures that contain several items generally produce higher prevalence estimates than single-item measures [41]. Finally, the study sample was limited almost entirely to countries from the European region. We acknowledge that there are cultures, especially throughout the global south, where gender inequality is higher than in the countries included in the current sample, where opportunities for adolescent girls look much different than they do for boys, and there is a lack of important knowledge regarding gender differences in bullying and other domains of adolescent well-being. Future studies should strive to address these gaps.

In summary, our study highlights that both structural gender inequality and gender norms are associated with gender differences in adolescent involvement in bullying behaviors. As higher structural gender inequality was associated with larger gender differences in bullying, preventive work must strive for gender equality to increase its effectiveness. Bullying prevention efforts thus require more than working directly with adolescents and schools as gender equality is a societal matter. Prevention must also address and take into account sociocultural gender norms and gender inequalities at the national level. Public health policy should target social and cultural factors that shape gender norms in society and among young people.

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Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jadohealth.2022.05.015.

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