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School bullying: Prevalence and variation in and between school systems in TIMSS 2015

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ABSTRACT

Bullying is a substantial problem in schools worldwide and it can have severe consequences for individuals in both short and long-term. One aim of this study was to explore the bullying prevalence among 10-year-olds in school-systems participating in TIMSS 2015. Another aim was to examine the variability in bullying prevalence across schools in the participating countries to, finally, explore how school-related factors could reduce bullying prevalence. The main method was multilevel modeling. Overall, the results showed relatively high bullying prevalence even though the variability was large among the 50 countries. Some countries had substantial school differences and these were selected for further scrutiny. While socioeconomic status did not impact on bullying prevalence in a sub-sample of countries, factors like school climate and a sense of school belonging had an effect in most of them. Implications of the results were discussed.

1. Introduction

School bullying is a serious problem internationally bringing many negative short- and long-term consequences (Olweus, 2010; Smith, 2014). Moreover, bullying is considered a significant public health issue, resulting in anti-social behaviour and increased risk for depression later in life (Farrington, 2012; Kowalski et al., 2014). There is also ample evidence of bullying being related to lower school engagement, lower academic self-perceptions, and lower academic achievement (Hellfeldt et al., 2018; Ladd et al., 2017). Olweus (Olweus, 1993) defined bullying as an intentional and repeated aggressive behaviour towards an individual carried out by a single person or a group. Its power imbalance is also central, implying that the victim has difficulties defending her- or himself.

While much research has focused on consequences for individual students being bullied, previous research underlines the importance of understanding bullying in the context of schools as bullying most often takes place there (Muijs, 2017; Turner et al., 2014). Much of the previous research has centered on the characteristics of the individual victims and the perpetrators. Students age, gender, socioeconomic status, ethnicity, sexuality, number of friends etc. are common in describing the characteristics of bullied students but also for explaining the causes for being bullied (see, for example, (Lee, 2017; Smith, 2013). Moreover, causes are also found in students' home environment; bullied children tend, to a higher degree, to come from over-protective and enmeshed families (Smith, 2013). While all these factors are important to reveal the causes for bullying there is a need to highlight potential factors at school level that can alter the bullying prevalence. In the present study, we will focus on characteristics that are different across schools rather than between students. We hypothesize that some schools are more successful in preventing bullying than others. The present study investigates whether levels of bullying depend on school-level factors and we first determine how bullying vary across schools and countries. It should be recognized that some school features may not readily be improved by actions on school or teacher level. Such features might include availability of resources of various kinds or student body composition. However, other school features, for example, school climate and safety can more often be directly handled and improved by teachers and principals.

Furthermore, while research has addressed how schools can reduce bullying, studies conducted with large-scale data are scarce (Biswas et al., 2022). It is of vital interest to research, communities and schools to get more knowledge about fruitful strategies to reduce bullying prevalence. The Trends in International Mathematics and Science Study (TIMSS) 2015 has an appropriate design for studying these issues. As students all over the world responded to a set of bullying items in TIMSS

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2015, it makes bullying an area apt for investigation also in a cross-country perspective.

Our present inquiry is organized as follows: we first present conceptual and theoretical basis of school bullying, followed by an overview of the literature on cross-country prevalence and school factors related to bullying. Following the purpose of the study is data and method section describing study variables and analytical approaches. Results of the study are presented according to the research questions posed and are further discussed. Finally, the study's strengths and limitations are addressed, and conclusion remarks are presented.

2. Theoretical and conceptual premises of school bullying

While the definition of bullying coined by Olweus (Olweus, 1993) is commonly used in educational research, a number of its shortcomings were brought up in recent literature on school bullying (Schott & Søndergaard, 2014). One of the key criticisms concerned the definition's individualistic approach to bullying, while the emphasis on the social nature of the phenomenon is lacking (Schott, 2014). The latter, however, appears critical to the bullying concept, as outside of a social context, a repeated aggressive behavior towards others would not occur (Gendron, Williams & Guerra, 2011). Besides, bullying has traditionally taken place in school and has been considered a common aspect of childhood (Dake et al., 2003).

One of the strengths of Olweus definition is that different types of bullying behavior are taken into account. One of the widely used typology is by Smith (Smith, 2014) who classifies bullying in four main types: physical bullying, verbal bullying, relational bullying (social exclusion and rumour spreading), and cyberbullying.

The issue of cyberbullying came into focus of the researchers worldwide in recent years (Camerini et al., 2020; Gaffney, Farrington, Espelage et al., 2019; Olweus, 2017). Due to having both common and specific characteristics in relation to the traditional face-to-face bullying, there is currently no agreement whether cyberbullying should be treated as distinct phenomenon or as part of traditional bullying (Camerini et al., 2020). Johansson and Englund (Johansson & Englund, 2020), for example, suggest that the more direct types of traditional bullying (i.e., verbal bullying carried out face-to-face) have generally less similarities with cyberbullying while relational bullying have higher degree of similarity with cyberbullying. In this study, the definition of bullying encompasses cyberbullying where relevant, e.g., name calling over texting or Internet.

While we rely on the definition of bullying coined by Olweus, we particularly emphasize a social aspect of bullying. Using Bronfenbrenner's socio-ecological model (Bronfenbrenner, 1979), which postulates that an individual is situated within the interrelated levels of the micro-, meso-, exo- and macro-systems, we can facilitate the understanding of the complex nature of bullying. From the socio-ecological perspective, factors related to bullying prevalence are not limited to individual characteristics only, but also include family, peers, school and community (Espelage, 2014). This perspective may be particularly useful when studying bullying in a school setting as it exemplifies the interplay of the factors within and between levels, either direct or indirect (Swearer & Doll, 2001; Swearer & Espelage, 2011). For example, an individual student is both influenced by and influences peer and family relationships. These relationships manifest themselves in peer and family norms regarding bullying which a student carries into the classroom. Further, teacher attitudes and beliefs about classroom/school safety and discipline have an indirect influence on a student (Espelage, 2014). Thus, it is an interaction between several factors at different levels that comprises a complex phenomenon of school bullying. Finally, a broader cultural setting, which represents a macrosystem level, is important when investigating school bullying from a cross-cultural perspective. Schools are organizations which are situated within the national context of a given country characterized by specific political, socio-economic and cultural conditions. These conditions shape how bullying may be perceived and addressed in a particular country context, which is important for our understanding of the phenomenon from a cross-national perspective (Swearer et al., 2010).

2.1. Cross-country differences in bullying prevalence

The prevalence of traditional bullying in school settings is well documented internationally (Cosma et al., 2020; Modecki et al., 2014; Smith et al., 2016; Zych et al., 2017) With regards to the geographical scope, research on school bullying has been conducted either in individual countries, adopted a regional approach or a cross-national one to including many countries worldwide. Still, the geographical distribution of studies has been rather uneven, with most bullying research being conducted in Europe, North America, Australia and New Zealand (Smith et al., 2016). Quite a few studies have also focused on Japan, Hong Kong and South Korea. In contrast, research on school bullying in low- and middle-income countries has been quite scarce (Fleming & Jacobsen, 2010; Smith et al., 2016); even though in recent years studies originating in these parts of the world have appeared. For example, research on school bullying in South East Asian region is gradually emerging (Sittichai & Smith, 2015).

A growing volume of research adopts a cross-national perspective on school bullying, with the majority of the studies investigating bullying prevalence rates, often focusing on the different roles taken up by students in the process, be it a bully, a victim, or both (Menesini & Salmivalli, 2017; Gaffney, Farrington & Ttofi, 2019). Besides, a large number of studies looks at gender differences across those roles (Menesini & Salmivalli, 2017). For example, based on a survey of students aged 11–15 in 40 countries, Craig et al. (2009) concluded that 27% of children had been involved in bullying either as a victim, perpetrator, or both. There was also gender variation across countries, with ranges of bullying prevalence from around 9–45% for males and from 5% to 36% for females. Wang et al. (2009) also investigated the prevalence of school bullying across types and roles with students in grades 6–10 in the United States. They found that in the past two months 13% of students were victims and 13% were perpetrators of physical bullying, 37% of students were victims and 37% were perpetrators of verbal bullying, and 41% were victims and 27% were perpetrators of relational bullying. A meta-analysis of 80 studies worldwide (Modecki et al., 2014), reported the average prevalence rates of both traditional bullying victimization and perpetration to be 36% and 35%, respectively. Yet another study on cross-national trends in bullying in 33 countries on the basis of Health Behavior of School-Aged Children survey (Chester et al., 2015) has shown a decreasing tendency in bullying prevalence in around a third of the nations. However, the study concluded that large between-country differences in school bullying victimization still remain.

When it comes to the geographical distribution of school bullying prevalence, results of the international Health Behavior of School Children survey demonstrated that bullying was most prevalent in Sub-Saharan Africa (48%), North Africa (43%) and the Middle East (41%) (UNESCO, 2018). Bullying prevalence in Europe were reported to be lower (25%), similar to the rates in the Caribbean's (25%) and Central America (23%) (Gaffney, Farrington, Espelage et al., 2019). Overall, bullying prevalence in high-income countries of middle school students range between 5% and 57%, while in low to mid-income countries the range is between 12% and 100%. It is worth noting in this regard that research on bullying is scarce in those parts of the world were bullying prevalence rates are rather high.

Overall, despite the large amount of, above all, descriptive, school bullying research internationally, a number of challenges remains (Gaffney, Farrington, Espelage et al., 2019). Studies include various definitions and operationalizations of school bullying, that is, including or excluding cyberbullying, differentiating between victims and perpetrators and different criteria and methodologies to assess its prevalence. Since school systems differ in numerous aspects worldwide, between-country comparisons regarding what measures are most

effective to prevent school bullying are challenging to carry out (Bradshaw et al., 2017; Menesini & Salmivalli, 2017; Gaffney, Farrington, Espelage et al., 2019). While research on the frequency of bullying in schools is quite ample, studies on school characteristics related to bullying, particularly from a cross-national perspective are still limited (Bokhove et al., 2022; Cook et al., 2010; Muijs, 2017).

2.2. School characteristics related to bullying

From a global perspective, schools vary in a multitude of aspects, regarding, for example, individual characteristics of teachers and students, principles of government, rules, regulations, material resources, location and so forth. Furthermore, factors at different levels, from an individual to a societal level, are likely to interact. Consequently, it is not surprising that research not yet has established what school features are the most important ones in efforts to prevent and reduce bullying. Nevertheless, as bullying is an international phenomenon, it is of vast interest with studies from a cross-country perspective aiming to detect various patterns and causes of bullying (Bradshaw et al., 2017; Chester et al., 2015). As students spend their working days in schools in interaction with peers and bullying has large effects on the students' well-being and opportunities to learn it is of great importance to study and understand bullying in the context of schools (Muijs, 2017; Turner et al., 2014).

In certain respects, results are highly inconclusive. This applies to aspects of school organizational environment which in previous research have shown inconsistent relationships to school bullying rates. For example, studies in the European context find no association between student SES, school size or type and school bullying (Kyriakides & Creemers, 2013; Muijs, 2017). In turn, a comparative study of bullying-related factors in English and German primary schools found only a weak correlation with student SES and ethnic composition (Wolke et al., 2001).

On the other hand, a number of studies, in particular in the US context, provide evidence that school location and size, student ethnic and socio-economic composition as well as student mobility predicted school bullying (Bradshaw et al., 2009, 2013). Still other studies find that the aspects of school organizational environment have an indirect effect on bullying through safe and orderly climate (Wang & Degol, 2016).

However, some school characteristics stand out as crucial over countries. This holds true for the two factors: school climate and students' sense of belonging in school. Several previous studies have investigated the relation between school climate and bullying. A recent systematic review of meta-analyses of anti-bullying protective factors (covering studies on school bullying worldwide written in English or Spanish) concluded that a positive school climate was a consistent protective factor against both bullying victimization and perpetration (Zych et al., 2019). School climate is often defined as a set of values, norms and beliefs shared by all school members (Wang & Degol, 2016). Wang and Degol (Wang & Degol, 2016) distinguish between four domains of the school climate, namely safety, community (denoting relationships between school members), teaching and learning (related to academic school environment), and institutional environment (comprising organizational/structural characteristics of the school). Various domains of school climate have been found to consistently predict bullying (Cook et al., 2010; Olweus, 1993; Wang & Degol, 2016). In particular, safe and orderly school climate has shown strong positive links with lower school bullying rates (Thapa et al., 2013; Wang & Degol, 2016). Safety domain of school climate, according to Thapa et al. (2013) comprises the three dimensions: socio-emotional safety, physical safety, and discipline and order, ensured by relevant school policies.

Student sense of school belonging has also demonstrated a solid association with both student academic and socio-emotional outcomes (Osterman, 2000; Osterman, 2010; Rose et al., 2016). In educational research a sense of school belonging is often referred to as relatedness, sense of community, acceptance, membership or attachment (e.g., Wang & Degol, 2016). These different conceptualizations, however, have some common features, such as student experiences at school, student-teacher relationships and student perceptions of school as a whole unit (Allen et al., 2018). According to Allen et al.'s. meta-analysis of school belonging it has been positively linked to social adjustment and psychological well-being, self-esteem and self-concept. On the other hand, it is negatively correlated with anti-social behaviors, including bullying.

A number of studies in national school settings support these conclusions. In the analysis of 35 Cyprus primary schools, for example, school factors linked to lower bullying prevalence were school learning environment, student-teacher relationships, parent-school cooperation, and out-of-classroom discipline rules (Kyriakides & Creemers, 2013). Similar results were reached by Muijs (2017), who, in his study of 35 English primary schools found that school behavioral policies as well as teacher cooperation and parent-school relationships demonstrated the strongest links with bullying prevalence.

Table 1
Indicators of bullying behaviour.

		At least once a week	Once or twice a month	A few times	Never
1	Made fun of me or called me names	18.9	11.2	20.2	49.7
2	Left me out of their games or activities	15.4	12.4	17.9	54.3
3	Spread lies about me	13.3	10.9	18.0	57.8
4	Stole something from me	9.6	7.3	14.9	68.2
5	Hit me or hurt me (e.g., shoving, hitting, kicking)	12.9	10.8	19.6	56.8
6	Made me do things I didn't want to do	8.5	7.2	12.4	71.9
7	Shared embarrassing information about me	9.6	7.9	15.0	67.5
8	Threatened me	8.9	6.6	11.7	72.7

3. Purpose

Based on the results of the previous research and in accordance with a socio-ecological model, bullying should be recognized as a multilevel problem. That is, individual students, teachers and principals bring knowledge, attitudes and behaviors to school. Schools are institutions shaped by these individuals where certain ways of communication and organization have developed over time. The features of schools, in turn, affect individual students and staff over time. Any research interested in what happens at the school level needs to acknowledge that this level is affected by the characteristics of individuals (and the ongoing interaction between individuals and school institutions). By means of multilevel analysis sources of variation stemming from the individual level can be portioned out. At the same time, each school in every country has been, and is, circumscribed by laws, rules and principles as well as by a wider societal or national culture. It follows that some similar patterns or relations may be detected over countries and that universally applicable conclusions about effective ways of reducing bullying may be identified but also that between country differences can be expected. Table 1.

The present study investigates how bullying prevalence varies across countries using the TIMSS 2015 data. We will elucidate how bullying prevalence varies depending on school-level factors such as available school resources and school climate – and shed light on differences and similarities across countries. The present study aims to answer the following questions:

1. How large is the bullying prevalence in the TIMSS countries?
2. How is bullying prevalence across schools differing among the participating TIMSS countries?

3. How can school bullying be explained by school-level factors?

4. Data and method

We make use of the student and teacher data from IEA TIMSS 2015 to study bullying as our non-cognitive outcome. Our focus is on a cross-country comparison of bullying prevalence and school differences and we use data from all countries that participated with 4th grade students. The main reason for using 4th graders as target group is that the levels of bullying tend to peak in middle school and then decrease with student age (Wang & Iannotti, 2012). The 2015 wave included 50 countries at the 4th grade (For the sample N and the participating countries see Table 4).

4.1. Variables

We made use of data from the student, home, teacher and school questionnaires in our effort to address the research questions. The outcome variable in our study is student bullying and this variable will be presented below.

The student bullying variable was based on students' responses to eight bullying behaviors. The eight statements are similar to those used in the Olweus questionnaire (Olweus, 1996) and has been widely used in previous research. The statements include aspects of physical, verbal and relational bullying. While these questions initially were developed to measure bullying as defined traditionally it is stated in the introductory text to the questions that students should include cyberbullying too. The eight questions in the student questionnaire are presented below, along with percentages for each response category, all countries being pooled together.

A bullying scale was created based on students' responses to eight questions about bullying behaviours. Instead of using the different statements separately, we have used a scale constructed by the IEA (see, Martin et al., 2016). Using IRT partial credit scaling, the data from student responses were placed on a scale which was constructed so that the scale center point of 10 was located at the mean score across all TIMSS countries. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation across all countries. Students who almost never experienced bullying had a scale score greater than or equal to 9.6. Students who experienced bullying about monthly or weekly had a score corresponding to below 9.6 and 8.0 respectively on the bullying in scale. We have used this index to shed light on the bullying prevalence in the participating countries (Table 4). This scale is thus continuous and will serve as an outcome in the multilevel analyses. Additionally, from the continuous scale described above, IEA computed an index-variable with three categories.

4.1.1. Covariates

In order to explore how the variability in the bullying prevalence across schools we added a set of covariates. We mainly focused on school-context variables as our hypothesis is that schools with a certain climate will have lower levels of bullying. Based on the results of previous research, we use a measure of socioeconomic status (SES), achievement heterogeneity, teachers' assessments of safe and orderly schools, school discipline problems and school resources as indicated by the principal, and students' sense of school belonging. In Table 2, information about the items are presented.

Descriptive statistics for the variables of interest are present in Table 3 below. The average SD across schools in all countries is about 67 points. However, the variability is different for the different schools and schools with large variability has generally a negative correlation to many of the other variables. Typically, these schools have lower SES (0.18) but more school resources (0.14). The other covariates we used have mean and SD close to the center points set by IEA. Notable from the correlations in Table 3 is the substantial correlation between SES and school discipline (SchDisp).

4.2. Methods of analysis

The main method in the present study was multilevel modeling. Separate analyses have been performed for the participating countries. Multilevel modelling takes into account the hierarchical nature of the data and it enables the identification of the amount of variation within and between schools respectively (e.g., (Heck et al., 2013); (Kline, 2016). Multilevel modeling involves an estimation of a level 1 model within each higher level unit, in our case schools. Then, a series of between-unit models were estimated using the within-unit estimates, that is intercepts and slopes as dependent variables. In multilevel regression a single-level equation is thus estimated within each school, whereas in a single-level regression an effect of for example SES on Bullying is assumed to be fixed across all students in the sample. By accounting for potential cluster effects, robust standard errors are estimated, which in turn yields correct t-values and significance levels for the regression coefficients (see (Hox, 2002). While the effects of clustering typically are larger than those of stratification, we did also include the house weight (HOUWGT) to account for the sampling design. HOUWGT is a transformation of the total student weight, TOTWGT, and ensures that the weighted sample corresponds to the actual sample size in each country (Foy, 2017). HOUWGT is designed for use in student-level analyses from all student-level and school-level files and was deemed adequate for the analyses we performed. It should be noted however that recent evidence suggests that weights adapted for the school-level may be more appropriate in multilevel modeling (Mang et al., 2021). All analyses were performed in SPSS 28. In the multilevel

Table 2
Description of covariates used in the study.

Variable	Information
Ach_SD	The mathematics achievement (PV1) SD for each school. High SD indicate large achievement heterogeneity. This measure shows the variation in students' achievement in each school. Low SD in a school suggests homogeneous achievement among students.
SES (ASBGHRL)	The Home Resources for Learning (HRL) scale was created by IEA based on students' and parents' responses concerning the availability of 1) number of books at home, 2) Number of study supports, 3) Number of children's books, 4) Highest education of either parent, 5) Highest level of education of either parent.
Safe (ATBGSOS)	The Safe and Orderly School – Teachers' Reports (SOS) scale was created by IEA based on teachers' degree of agreement (on a 4-point scale) with eight statements on whether they feel safe at the school, students behave orderly, students respect school property, etc.
Sch_discipline (ACBGDAS)	The School Discipline Problems scale was created by IEA based on principals' reports on ten statements concerning school theft, vandalism, absentism, physical fights, etc. The ten indicators had four alternatives (Not a problem to Serious problem).
Belonging (ASBGSSB)	The Students' Sense of School Belonging (SSB) scale was created by IEA based on students' degree of agreement with the seven statements concerning whether they liked being in school, feeling safe in school, that teachers are fair etc. Students perceived their belongingness on a 4-point scale ranging 'Agree a lot' – 'Disagree a lot'.
Sch_resources	The amount of school resources was calculated as an average by authors based on information from principals (ACBG14AA – ACBG14CD) concerning shortage of resources for different subjects, access to library, number of teachers etc. Principals perceived the shortage on a 4-point scale ranging 'not at all' (4) – ' a lot' (1).

Table 3
Correlations, mean and SD at school level for all countries (pooled).

Variable		1	2	3	4	5	6	7	Mean	SD	N
1	Ach_SD	1	-0.15*	-0.05*	-0.00	-0.18*	-0.12*	.14*	67.66	15.23	10,950
2	Bullying		1	.13*	.26*	.17*	.18*	-0.13*	9.86	.96	10,941
3	Safe			1	.20*	.16*	.21*	-0.10*	10.30	2.00	10,609
4	Belonging				1	-0.28*	-0.07*	.05*	10.10	.99	10,941
5	SES					1	.36*	-0.26*	9.97	1.49	10,372
6	SchDisp						1	-0.26*	9.86	1.96	10,428
7	SchReso							1	2.11	.71	10,407

* $p < .001$.

analysis, all independent variables were standardized to a mean of 0 and a standard deviation of 1.

5. Results

In a first step, we evaluate the level of bullying in the different countries by means of the bullying index used in TIMSS 2015. In the second step, we run a multilevel null model to determine the school variation in the different countries by means of the intraclass correlation (ICC), which provides a mean for describing the variation across schools. Based on the ICC, we select countries with relatively high between school variation and thereafter we introduce covariates at teacher and school level in the multilevel model in order to explain the between school differences.

5.1. Bullying prevalence in the TIMSS 2015 countries

In order to investigate the bullying prevalence in the TIMSS countries, we used information from the bullying scale provided by IEA. As was noted in the method section, cut-off values were created from the continuous scale and a three-category index variable was constructed. We use the latter to shed light on the percent of bullied students in the different countries. Previous research most often reports percentages of students who experience bullying and this is what we do as well. In Table 4 below, the participating countries, N, missing and the bullying prevalence is presented.

The results show bullying prevalence to be rather high in many countries. The prevalence differs depending on what criterion is adopted for being bullied. If one adopts the criterion that students' experiences bullying *about monthly*, the prevalence ranges between 18% to about 60%. If one, instead, adopts the criterion that students' experience bullying *about weekly*, the prevalence ranges from about 4% in Korea to almost 35% in Bahrain. On average, across countries, about 43% experience bullying at least monthly, which must be considered as high given the previous evidence on the matter (e.g., Modecki et al., 2014). To be bullied as frequently as about weekly is less common, the average is about 15% for the participating countries. While we note that the bullying rates vary considerably between the countries, we anticipate variation between schools within countries too, especially since we hypothesize that school-level factors may impact on the prevalence. We performed a series of multilevel models in order to investigate school-level bullying and what characterize schools with higher and lower bullying rates.

5.2. Variation between schools in the different countries

To begin with, the extent to which variation in student bullying existed within schools relative to its variation between schools was explored. By means of a multilevel model without predictors we investigate if there exists significant variance in bullying across schools. If schools differ in terms of bullying prevalence, this warrant further examination of causes – what are the characteristics of successful schools? Therefore, in a first step, we ran a null model to partition the variance of the bullying scale into variation within and between schools respectively. Equation 1 below displays the null model where γ_{00} is the intercept or the estimated mean bullying across schools. It also decomposes the variance into level 1(ε_{ij}) and level 2 (u_{0j}) components, where u_{0j} is the school's deviation from the average bullying level and ε_{ij} the individual-level residual, or variation in individual bullying prevalence for a student i within a school j.

$$\Upsilon_{ij} = \gamma_{00} + u_{0j} + \varepsilon_{ij}$$

In the second step we were particularly interested in calculating the intraclass coefficient (ICC). From the variance components, we can calculate the ICC (ρ). The ICC can be denoted,

$$\rho = \sigma_B^2 / (\sigma_B^2 + \sigma_W^2),$$

where σ^2 represents the variance and B and W stand for between groups and within groups respectively. Table A1 in appendix 1 provide the results of the null model for all participating countries along with the ICC. The intercept corresponds to the mean level of bullying across schools. As described in the method the average level of bullying is 10 across all countries and lower values imply higher prevalence of bullying.

The second research question concerned whether average bullying vary across schools in the participating countries, and the results in Table A1 suggest that bullying varies substantially across schools between countries. In some countries the ICC is around 0.05 or below which indicates that variability in bullying prevalence is low across schools and such low ICC typically suggests that multilevel modeling may not be warranted (Heck et al., 2013).

5.3. Factors explaining school differences in bullying

Our next step was to select some countries for further scrutiny; the main criteria for selection being that included countries should have substantial difference in bullying across schools (high ICC). We selected eight countries for further analysis. Furthermore, we focused on educational systems with different levels of bullying prevalence and we aimed for some variation with respect to regions, language and culture. The countries selected were Bulgaria, Denmark, Indonesia, Japan, Kazakhstan, Morocco, South Africa and United Arab Emirates (UAE).

5.3.1. SES

In the following we attend to factors explaining variance at the school-level. After predictors were added, we studied how these affected the average bullying. In addition to the fixed effects we observed the explained variance by means of the ICC. We introduced covariates stepwise, however, for sake of simplicity we only presented the final model[1] for each of the countries.

Variables SES and Belong could be introduced both as level 1 and level 2 covariates while the other variables were school variables on level 2 only (derived from teachers or principals). Though we are interested to explain variation at level 2, it should be noted that the

[1] All models can be provided upon request.

Table 4
Participating countries. N. missing and bullying prevalence.

Country	N	Missing	Percent			
			Almost never	About monthly	About weekly	At least monthly
Australia	5975	82	44.5	35.9	19.5	55.4
Bahrain	4089	57	33.7	32.6	33.7	66.3
Armenia	4727	657	83.4	9.1	7.5	16.6
Belgium (Flemish)	5332	72	46.8	36.1	17.1	53.2
Bulgaria	4182	46	53.6	30	16.4	46.4
Canada	12,039	244	52.7	30.4	16.9	47.3
Chile	4646	110	60.1	24	15.9	39.9
Chinese Taipei	4277	14	58.2	28.7	13.1	41.8
Croatia	3972	13	73.5	18.6	7.9	26.5
Cyprus	4060	65	55	29.4	15.6	45
Czech Republic	5156	46	59.6	28	12.4	40.4
Denmark	3605	105	58	31.9	10.1	42
England	3912	94	54.3	30.6	15.1	45.7
Finland	4983	32	71.5	21.9	6.6	28.5
France	4819	54	65.4	26.4	8.2	34.6
Georgia	3792	127	73	18	9	27
Germany	3321	627	57.2	29.8	12.9	42.7
Hong Kong. SAR	3586	14	54.4	31.5	14.1	45.6
Hungary	5012	24	58.4	30.6	10.9	41.5
Indonesia	3919	106	43.5	30.6	25.9	56.5
Iran. Islamic Republic of	3754	69	49.2	31.8	19.1	50.9
Ireland	4296	48	73.5	20.3	6.2	26.5
Italy	4313	60	50.2	34.7	15.1	49.8
Japan	4368	15	68.3	23.4	8.2	31.6
Jordan	7675	186	52.5	26.2	21.4	47.6
Kazakhstan	4661	41	74.9	17.9	7.2	25.1
Korea. Republic of	4659	10	76.1	19.9	4	23.9
Kuwait	3277	316	47.4	31.4	21.2	52.6
Lithuania	4505	24	56.1	30.6	13.2	43.8
Morocco	4815	253	43.7	35.3	21	56.3
Netherlands	4373	142	59.3	31.1	9.6	40.7
New Zealand	6197	125	40.4	35.8	23.8	59.6
Northern Ireland	3097	19	63.7	26.8	9.5	36.3
Norway	4253	76	69.8	23.3	6.9	30.2
Oman	8895	210	42.4	32.7	24.9	57.6
Poland	4722	25	72.5	19.2	8.3	27.5
Portugal	4673	20	56.6	28.7	14.7	43.4
Qatar	5079	115	43.5	28.1	28.4	56.5
Russian Federation	4894	27	51.1	32.7	16.2	48.9
Saudi Arabia	4125	212	47.1	26.7	26.2	52.9
Serbia	3996	40	72.6	18.9	8.5	27.4
Singapore	6501	16	47	33.7	19.3	53
Slovak Republic	5741	32	57.1	29.9	13	42.9
Slovenia	4397	48	57.8	28.6	13.7	42.3
South Africa	10,593	339	22.7	33.6	43.6	77.2
Spain	7656	108	47.8	32.8	19.5	52.3
Sweden	4108	34	64.8	28.1	7.2	35.3
Turkey	6405	51	57.3	28.4	14.2	42.6
United Arab Emirates	20,813	364	42.8	31.3	25.9	57.2
United States	9744	285	55.8	29	15.2	44.2
		Mean	56.42	28.10	15.48	43.58
		SD	12.08	5.71	7.80	12.08

within school predictor of SES and Belong also affect the between school variation in bullying. In some cases belonging is significant both within school and between schools. The estimate of the aggregated measure of sense of belonging is controlled for by the effect of the individual level belonging variable. At school level the effect of belonging refers to the compositional effect.

5.3.2. School belonging

The results show that students' sense of belonging is an important factor in reducing bullying both within and between schools. The compositional effect is however not significant in Bulgaria. As previously stated, independent variables were standardized to a mean of 0 and a standard deviation (SD) of 1. Considering the effect of belonging in United Arab Emirates, the dependent bullying variable increase 0.31 SD for 1 SD increase in the aggregate belonging variable. This implies that the intercept would increase with about 0.6 as one SD for the bullying scale is about 2 scale scores The average level of bullying would thereby be reduced, as higher values on the bullying scale indicates lower bullying prevalence. While sense of belonging cuts across all countries, there are varying effects of the other covariates depending on the country. For example, school SES has a negative relation with bullying in Japan, whilst a positive in South Africa. This implies that bullying prevalence is higher in high-status schools in Japan whereas it is lower in South Africa. Students' sense of belonging tends to correlate with bullying in most countries; the more students perceive sense of belonging, the less bullied students tend to be, also at school level. The results are presented in Table 5.

5.3.3. Safe and orderly climate

In the two European countries, there is a positive effect of school

Table 5
Estimated effects of covariates on bullying prevalence.

Country	Parameter	Estimate	SE	df	t	Sig.	95% confidence interval		ICC
Bulgaria	Intercept	9.89	0.06	111.54	153.75	< 0.001	9.76	10.02	0.10
	Ach_SD	-0.12	0.06	127.35	-2.06	0.04	-0.24	0.00	
	Sch_discipline	0.21	0.07	127.31	2.99	0.00	0.07	0.35	
	Belonging_w	0.40	0.03	4006.34	12.77	< 0.001	0.33	0.46	
Denmark	Intercept	10.06	0.04	127.41	225.44	< 0.001	9.97	10.15	0.07
	Sch_discipline	0.12	0.05	129.42	2.24	0.03	0.01	0.22	
	Belonging_b	0.10	0.05	149.28	2.01	0.05	0.00	0.21	
	Belonging_w	0.68	0.03	2419.84	20.24	< 0.001	0.61	0.74	
Indonesia	Intercept	9.34	0.08	182.08	114.41	< 0.001	9.18	9.50	0.18
	SES_w	-0.08	0.04	3396.71	-2.02	0.04	-0.17	0.00	
	Belonging_b	0.18	0.07	218.63	2.45	0.02	0.04	0.32	
	Belonging_w	0.38	0.04	3402.66	10.85	< 0.001	0.31	0.45	
Japan	Intercept	10.61	0.05	135.66	211.42	< 0.001	10.51	10.71	0.09
	SES_b	-0.16	0.05	145.83	-3.22	0.00	-0.26	-0.06	
	Belonging_b	0.22	0.05	143.93	4.05	< 0.001	0.11	0.32	
	Belonging_w	0.41	0.02	7087.38	18.55	< 0.001	0.36	0.45	
Kazakhstan	Intercept	11.06	0.07	148.46	170.14	< 0.001	10.94	11.19	0.12
	Sch_discipline	-0.18	0.07	154.13	-2.54	0.01	-0.32	-0.04	
	Belonging_b	0.24	0.07	169.39	3.74	< 0.001	0.12	0.37	
	Belonging_w	0.38	0.03	4566.20	13.17	< 0.001	0.32	0.44	
Morocco	Intercept	9.45	0.07	243.30	139.70	< 0.001	9.32	9.59	0.22
	Safe	0.20	0.07	246.48	2.79	0.01	0.06	0.33	
	Belonging_b	0.22	0.07	279.90	3.34	< 0.001	0.09	0.36	
	Belonging_w	0.35	0.03	3862.99	11.00	< 0.001	0.28	0.41	
South Africa	Intercept	8.53	0.05	201.07	162.76	< 0.001	8.43	8.63	0.14
	SES_b	0.23	0.05	243.49	4.50	< 0.001	0.13	0.34	
	Sch_resources	-0.16	0.06	200.08	-2.84	0.01	-0.27	-0.05	
	Belonging_b	0.21	0.05	212.05	3.99	< 0.001	0.11	0.31	
	Belonging_w	0.13	0.02	8386.77	6.48	< 0.001	0.09	0.16	
United Arab Emirates	Intercept	9.36	0.04	325.53	227.71	0.00	9.28	9.44	0.13
	Ach_SD	-0.12	0.04	338.55	-2.92	0.00	-0.21	-0.04	
	Belonging_b	0.31	0.05	340.86	6.70	< 0.001	0.22	0.40	
	Belonging_w	0.43	0.02	15,356.34	26.17	< 0.001	0.40	0.46	

Note. Analyses were run separately for each country. Only significant estimates are displayed.

discipline, which is not present in any other country. A reversed relationship was noted in Kazakhstan where it thus appears to be higher bullying prevalence in schools that have high school discipline as indicated by principals. A safe and orderly school climate as perceived by the teachers had a positive effect on the bullying prevalence in Morocco. Achievement heterogeneity did not have any relation with bullying except for United Arab Emirates and Bulgaria, where modest negative effects were observed. The bullying prevalence increased slightly when the achievement varied substantially in schools. The school variation, in terms of ICC, decreased most countries, showing that the reduction of variance was substantial. In Denmark, the reduction of variance between schools was calculated to about 50% and the ICC decreased to 0.07 when all covariates were accounted for. This can be compared with Morocco where the corresponding percent was about 10.

6. Discussion

The aim of this study was to explore the bullying prevalence among 10-year-olds in 50 school-systems participating in TIMSS 2015. Another aim was to examine the variability in bullying prevalence across schools in the participating countries to, finally, explore how school-related factors could reduce this variability and bullying prevalence.

6.1. Bullying prevalence in TIMSS 2015 countries

The results suggest that bullying is a common problem across the participating countries some discrepancies are found between countries. These differences mirror general cross-country trends found in international school bullying surveys (UNESCO, 2018). Thus, school bullying prevalence tends to be lower in the European countries, North America, East Asian countries, Australia and New Zealand. In contrast, in countries on the African continent and in the Middle East region the prevalence in school bullying is high. Given different possible criteria used to describe bullying prevalence presented in the earlier sections, these results should be interpreted with some caution.

6.2. Variability in bullying prevalence across schools

School differences in bullying prevalence exist in a number of school-systems, while for some, the bullying prevalence is about the same for each school. Some interesting patterns can be observed with regards to between-school differences in bullying prevalence. In countries with low bullying prevalence, between-school differences are quite small, whereas in countries with high levels of bullying, differences between schools are rather large. In order to address this issue, we selected a set of school-systems with large variability across schools for in-depth study by means of multilevel modeling.

6.3. School factors related to bullying prevalence

Below we discuss the factors found to be related to school bullying from the least to the most occurring ones in the countries under investigation.

6.3.1. Achievement heterogeneity and school resources

Factors like achievement heterogeneity and school resources were linked to school bullying in Bulgaria, South Africa and UAE. A recent investigation of bullying prevalence among school students in UAE (Alomosh et al., 2019) found only limited evidence that students' economic situation and residence were related to bullying. It may be possible that students whose achievement stands out in the classroom/school are categorized under 'Other reasons for bullying' in the study. In South African context, a study in two rural schools (Mlisa et al., 2008) found that geographical area (which may be considered as a proxy

for the availability of school resources) was significantly related to bullying. Better achievement as compared to classmates was also positively related to school bullying in the above study. There is certainly a need for a more nuanced investigation of the school-level factors behind bullying in national school settings.

6.3.2. Individual and school SES

While individual SES had only a modest effect on bullying prevalence in Indonesia, school SES more clearly predicted bullying in two national settings. The literature with respect to the link between SES and bullying is inconsistent, however a recent meta-analysis reported a tendency for a weak, yet significant, relationship between bullying victimization and low SES, reported in cross-national research (Tippett & Wolke, 2014). In this study, only in Japan and South Africa school SES was a significant predictor of bullying albeit in a different manner. Bullying prevalence was higher in high-SES schools in Japan whereas it was lower in high-SES South African schools. These results are supported by the studies in respective national settings. Thus, an in-depth investigation of school factors related to bullying in Japan (Yoneyama & Naito, 2003) suggested that bullying may be actually bred by the structure of the school system itself, such as elevated stress levels from strong academic pressure to achieve, a closed nature of the school environment, both in terms of physical space and an authoritarian climate, where teachers' control and students abide. It is likely that in higher SES schools the above school features become even more pronounced making them 'suitable' arenas for bullying behaviors to thrive. In South Africa, on the other hand, previous research on school bullying, similarly to our results, showed that students from lower-SES schools reported being bullied more often than their counterparts in higher-SES schools (Juan et al., 2018; Winnaar et al., 2018). The contextual differences are of course large across counties and a high SES school in Japan is not quite the same as in South Africa, the latter educational system also characterized by larger inequalities, or between-school differences (Juan et al., 2018).

6.3.3. School climate and discipline

Not surprisingly, a safe and orderly school climate and schools characterized by a good discipline were found to have lower bullying prevalence in most of the countries. The effects of school safety and school discipline may however be confounded by school SES in some countries because the variables typically are correlated. The findings are in line with a large body of research, which consistently cites school safety, order and discipline as strong anti-bullying factors (Wang & Degol, 2016; Wang et al., 2013; Zych et al., 2019). In Indonesia, one possible explanation for the lack of association may be that school social norms, one of the main constituents of school climate, tolerate the majority of bullying incidences, especially verbal and indirect ones (Bowes et al., 2019). Both teachers and students consider such instances of bullying as normal, and do not see the need to interfere or prevent them. The lack of the association between school safety, order and discipline and school bullying in South Africa is unexpected, however a national study based on TIMSS data (Winnaar et al., 2018) supports our results. In this study it was school emphasis on academic success, rather than school discipline, which was related to lower prevalence of school bullying. Finally, in Kazakhstan, school discipline contributed to increased bullying prevalence. This finding was counter to our expectations and certainly requires a more detailed exploration of the national school context. One possible explanation could be that when school policies and corresponding teacher interventions target educational achievement over student well-being, a reverse effect on bullying prevalence may be observed (Bokhove et al., 2022).

6.3.4. School belonging

Finally, students' sense of belonging in our study tends to reduce bullying in all of the countries under in-depth investigation. Interestingly, the link is present at both student and school levels, i.e., the more students perceive sense of belonging, the less bullied students tend to be, also at school level, in most national contexts The sense of school belonging is a rapidly emerging construct in the studies of bullying as an important school protective factor (Duggins et al., 2016; Goldweber et al., 2013). Previous research has demonstrated that a sense of school belonging is closely related to the safe and orderly climate of the school (Doumas & Midgett, 2019). Moreover, teachers and school leaders were found to play an essential role in fostering students' sense of school belonging, which in turn contributes to lower bullying prevalence (Allen et al., 2018). These links can be explained by a socio-ecological model's mesosystem which implies interactions within and between several levels, such as peers and schools (Espelage, 2014). Thus, when students feel that teachers and school principals care about their academic and social success, they feel safer at school (Doumas & Midgett, 2019). Importantly, students in these schools are more inclined to ask teachers and other school personnel for help when bullied. Further, student confidence that teachers will get involved when they notice bullying, contributes to their sense of belonging in the school (Duggins et al., 2016). This has critical implications for teacher and school leadership education and professional development programmes, as well as for school anti-bullying interventions.

6.4. Strengths and limitations

This study has several limitations. Cross-sectional data used in the study does not allow for strong causal claims. Studies employing longitudinal designs are thus encouraged. Since a measure of school bullying in this study is in no way a comprehensive one, it may suffer from construct underrepresentation and construct-irrelevant variance. A multi-informant perspective on bullying from different groups involved in the process, such as victims, bullies, bystanders as well as teachers and school principals can shed more light on the complex nature of school bullying. One of this study's main strengths is cross-national analysis of bullying prevalence involving many countries, which contributes to the knowledge on both differing and similar features of this phenomenon in various national school settings. Further, most of the countries in our in-depth analysis of the school-level factors related to bullying belong to the regions where research in the field is still scarce. A multi-level analysis is another strength of this study.

7. Conclusions

Results of this study suggest that bullying is a common problem across the participating countries with some variation between the countries, but even more differences between schools within particular countries.

However, in countries with large between-school differences in bullying prevalence one important similarity could be observed in that school safety climate and a sense of school belonging could account for a substantial share of the between school variability. These factors, unlike school resources and student body composition, are more malleable and are in the hands of teachers and school principals. Schools with competent leaders and teachers may not only achieve better but they may also be more successful in creating a bullying free school climate. This has important implications for school principals and teacher training programs, as well as when designing effective interventions to reduce and, more importantly, prevent school bullying. We urge future research to further dwell into the potential mechanisms by which school climate and a sense of school belonging may function as protective factors against bullying.

Appendix A

See Table A1.

Table A1
Average bullying for schools and variation between schools in the TIMSS countries.

Country	Bullying prevalence	SE	df	t	Sig.	95% Confidence Interval		ICC
Australia	9.40	0.04	263.06	258.43	0.00	9.33	9.47	0.07
Bahrain	8.91	0.07	172.36	134.11	0.00	8.78	9.04	0.16
Armenia	11.45	0.05	128.49	214.24	0.00	11.34	11.55	0.06
Bulgaria	9.88	0.07	133.33	142.43	0.00	9.74	10.01	0.14
Canada	9.71	0.03	388.93	341.53	0.00	9.66	9.77	0.06
Chile	10.13	0.05	171.18	211.10	0.00	10.03	10.22	0.07
Chinese Taipei	10.10	0.05	142.78	211.62	0.00	10.01	10.19	0.07
Croatia	10.84	0.05	133.70	208.02	0.00	10.74	10.94	0.07
Cyprus	9.86	0.06	133.01	167.96	0.00	9.74	9.97	0.09
Czech Republic	10.22	0.05	137.51	206.76	0.00	10.12	10.31	0.07
Denmark	10.03	0.05	189.06	206.50	0.00	9.94	10.13	0.12
Finland	10.52	0.04	141.91	255.45	0.00	10.43	10.60	0.06
France	10.40	0.05	142.36	216.54	0.00	10.31	10.50	0.07
Georgia	10.75	0.05	131.52	199.74	0.00	10.64	10.86	0.06
Germany	9.94	0.05	175.73	220.52	0.00	9.85	10.03	0.07
Hong Kong. SAR	9.89	0.05	131.45	212.49	0.00	9.80	9.98	0.06
Hungary	9.94	0.05	125.72	206.85	0.00	9.84	10.03	0.08
Indonesia	9.38	0.07	208.71	136.04	0.00	9.24	9.51	0.18
Iran. Islamic Republic of	9.57	0.06	224.41	168.90	0.00	9.46	9.68	0.13
Ireland	10.78	0.05	130.69	215.67	0.00	10.68	10.88	0.06
Italy	9.62	0.04	153.91	248.91	0.00	9.54	9.70	0.05
Japan	10.60	0.06	147.74	178.19	0.00	10.48	10.72	0.13
Kazakhstan	11.10	0.07	168.74	166.32	0.00	10.97	11.23	0.16
Korea. Republic of	10.96	0.05	141.41	237.56	0.00	10.87	11.05	0.07
Kuwait	9.59	0.06	163.04	156.47	0.00	9.47	9.71	0.12
Lithuania	9.86	0.05	206.46	218.03	0.00	9.78	9.95	0.08
Morocco	9.49	0.06	325.23	166.29	0.00	9.38	9.60	0.24
Oman	9.47	0.06	292.41	157.73	0.00	9.35	9.59	0.22
Netherlands	10.03	0.05	116.23	206.07	0.00	9.93	10.13	0.07
New Zealand	9.26	0.04	166.04	244.05	0.00	9.18	9.33	0.04
Norway	10.52	0.05	123.00	225.62	0.00	10.43	10.62	0.07
Poland	10.64	0.04	134.40	243.20	0.00	10.55	10.73	0.06
Portugal	10.06	0.05	203.15	222.95	0.00	9.97	10.15	0.06
Qatar	9.35	0.06	198.85	159.78	0.00	9.23	9.47	0.12
Russian Federation	9.81	0.05	194.50	202.30	0.00	9.71	9.90	0.10
Saudi Arabia	9.55	0.09	184.33	107.11	0.00	9.38	9.73	0.25
Serbia	10.81	0.05	142.44	199.94	0.00	10.70	10.92	0.07
Singapore	9.52	0.03	175.82	283.20	0.00	9.45	9.59	0.04
Slovak Republic	10.01	0.06	186.78	171.17	0.00	9.89	10.12	0.13
Slovenia	9.97	0.04	130.00	222.04	0.00	9.88	10.06	0.04
Spain	9.67	0.04	334.50	266.98	0.00	9.59	9.74	0.08
Sweden	10.33	0.05	136.53	203.53	0.00	10.23	10.43	0.09
United Arab Emirates	9.31	0.04	551.02	243.39	0.00	9.23	9.38	0.17
Turkey	10.08	0.05	236.26	192.57	0.00	9.98	10.18	0.12
United States	9.93	0.03	246.99	288.13	0.00	9.87	10.00	0.05
England	9.82	0.05	140.98	197.10	0.00	9.72	9.92	0.09
Northern Ireland	10.27	0.06	108.86	174.09	0.00	10.16	10.39	0.08
Belgium (Flemish)	9.58	0.05	136.59	188.41	0.00	9.48	9.68	0.09

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