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When perpetrators are also victims: latent profiles of traditional and cyberbullying among adolescents who bully in 42 countries

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Abstract

Background

Adolescents who bully others are not a homogeneous group: some confine their behavior to face-to-face settings, whereas others also bully online or are themselves victimized. This study aimed to identify profiles of bullying perpetrators based on their patterns of traditional and cyberbullying perpetration and victimization, and to compare these profiles on individual well-being, health-related risk behaviors, and family, peer, and school characteristics.

Methods

Data from the 2017/2018 Health Behaviour in School-aged Children (HBSC) study were used. Latent class analysis was used to identify profiles based on indicators of traditional and cyberbullying perpetration and victimization among adolescents who reported bullying others (n = 48,465; 42 countries). Differences between profiles were explored separately for boys and girls using the Bolck–Croon–Hagenaars approach that takes into account classification error. Sensitivity analyses tested the robustness of the solution to alternative specifications of the sample, weighting, measurement, age-group categories, and frequency of bullying.

Results

Three profiles emerged: a traditional-only profile, a cyber-involved profile characterized by cyberbullying perpetration, and a multiple bully-victim profile of adolescents who both bullied others and were bullied in traditional and cyber contexts. For both genders, the multiple bully-victim profile was the least favorable, with lower levels of perceived health and life satisfaction, increased occurrence of psychosomatic complaints, greater risk behaviors, lower family and peer support, less ease of communication with their mothers, and more negative school experiences. Problematic use of social media increased from the traditional-only to the cyber-involved profile and was greatest in the multiple bully-victim profile. On most other variables, the cyber-involved profile fell between the other two. Sensitivity analyses mostly supported the three-profile solution, although the cyber-involved profile was not recovered using a stricter criterion related to the frequency of bullying behavior.

Conclusions

The adolescents under study who engage in bullying behaviors do not constitute a homogeneous group; rather they show distinctive involvement patterns. Those who both bully and are bullied across settings fare poorly on several dimensions of their lives and thus interventions and prevention programs should be designed to deal with the different behavioral and psychosocial profiles.

Background

Peer bullying is defined as repeated and harmful acts with a power imbalance carried out by an individual or group against a peer who is not easily able to defend themselves during childhood and adolescence [1, 2]. The defining characteristic distinguishing bullying behavior from typical peer conflicts is the imbalance of power between the parties and the persistence of the harmful behaviors; therefore, unlike disputes that arise between students who are in reciprocal and relatively equal positions, bullying refers to a relationship pattern in which one student maintains harmful behaviors by exploiting his/her physical, social, or psychological superiority over another student [3]. Peer bullying can be physical, verbal, relational, social/exclusionary, or in the form of cyberbullying in digital environments [4, 5].

Peer bullying has been identified as a significant developmental and public health problem with negative consequences for the physical and mental health of children and adolescents. In Organisation for Economic Co-operation and Development (OECD) countries, including Türkiye, on average 23% of students have reported being bullied at least a few times a month, and in Türkiye

this figure is 24% [6]. According to the 2021/2022 data from the Health Behaviour in School-aged Children (HBSC) study, an average of 11% of adolescents reported being bullied at school, approximately 15% reported being subjected to cyberbullying in online environments, and approximately 6% reported bullying others at school [7].

Bullying behaviors are linked with short- and long-term physical, psychological, and academic outcomes for students who are bullied, students who bully, students who both bully and are bullied, and bystanders who witness bullying [8]. Beyond these effects, peer bullying can extend beyond the individual level, resulting in negative outcomes for school culture, students' perceptions of school, and school safety, and can contribute to the normalization of violence in the broader social context [8]. Therefore, the prevalence of peer bullying and its multidimensional consequences for various stakeholders necessitate that this behavior be addressed not only in the context of victimization but also in conjunction with the characteristics of the students who engage in bullying and the social context in which this behavior emerges.

Being subjected to bullying has been associated with depressive symptoms, psychological distress, low life satisfaction, and academic difficulties [9–11], while engaging in bullying behavior is also associated with depressive symptoms, externalizing behaviors, and low life satisfaction [10–12]. Indeed, a meta-analysis covering 31 studies and 133,688 children and adolescents reported that the odds of depression were 2.77 times higher for those subjected to bullying, 1.73 times higher for those who bully, and 3.19 times higher for those who both bully and are subjected to bullying [11].

Bullying behavior is not merely an indicator of individual aggression by those who engage in it; it is a phenomenon that must be addressed by considering the student's personal characteristics, family, peers, and school context. Research shows that the behavior of bullying is related to behavioral and social difficulties, school problems, and various individual characteristics [13]. These findings indicate that the profile of students who bully needs to be examined by evaluating their individual, family, peer, and school-related characteristics together. However, it is not sufficiently clear how these factors form a pattern in bullying behavior among adolescents. Using data from the 2017/2018 HBSC survey, the present study therefore asks whether adolescents who report bullying others form distinguishable subgroups on the basis of their perpetration and victimization patterns, and whether these subgroups differ in individual, family, peer, and school characteristics.

When the literature on bullying is examined, profile analyses have investigated different dimensions of participation in bullying and the patterns formed by these dimensions across different groups of variables. Demaray et al. [14] profiled students based on bullying, assisting, victimization, defending, and outsider behaviors, focusing on how bullying participation roles are patterned together and how they change over time. Turunen et al. [15] examined subgroups defined by bullying, victimization, and peer status (popularity, likability, and rejection) together; they revealed that the bully-victim profile exhibits more psychosocial adjustment difficulties, while adolescents who bully and hold high peer status report lower levels of social anxiety. Liu et al. [16] evaluated physical, verbal, sexual, and cyber bullying/victimization dimensions together to identify seven different bullying participation patterns and associated these profiles with variables in individual, family, and school/peer domains. Chen et al. [17] examined profiles and profile transitions based on five participant roles: bully, victim, follower, defender, and outsider; they also considered self-perceived and peer-perceived popularity and likability as predictors of these profiles. While Yazıcı-Kabadayı et al. [18] examined cyberbullying, cyber-victimization, and cyber-bystander roles in relation to loneliness, psychological resilience, and self-regulation, Peras et al. [19] identified victimization profiles based on verbal, relational, and cyber-victimization experiences and evaluated these profiles in terms of psychosocial characteristics such as bullying perpetration, peer support, loneliness, social self-perception, and negative affect. When research is reviewed, it is observed that profile analyses mostly focus on a specific type of bullying, specific participant roles, or a limited number of psychosocial variables. Studies that address large-scale bullying behavior alongside indicators in individual, social, and school contexts appear to be limited in the literature.

A social-ecological framework

The domains examined in this study were not selected at random. Research on bullying has seen a turn towards a social-ecological perspective, which conceptualizes bullying not merely as a characteristic of individuals, but one that emerges in interaction between adolescents and the social environments in which they live [20, 21]. Within this perspective, Swearer and Hymel [21] identify factors associated with bullying and victimization across levels, with the individual, family, peer, school, and community levels each considered as contributing contexts for bullying experiences. Similarly, Hong and Espelage [20] structure

the literature according to Bronfenbrenner's ecological systems theory, where parent–youth relationships, peer relationships, school connectedness, and the school environment are conceptualized as falling within the microsystem that is most directly related to adolescents' experiences.

This view has two implications for the study. Firstly, characteristics across different social-ecological levels need to be examined together, as it is their combination that has the capacity to differentiate between patterns of bullying involvement. Secondly, the individual level is not only a potential risk factor but also an important area of consequence. Swearer and Hymel [21] conceptualize involvement in bullying as a stressful life experience, which may be reciprocally associated with psychosocial difficulties. In this way, the present study considers individual health and psychosocial characteristics with contextual variables. The domains reviewed below thus consider the individual, family, peer, and school levels of the social-ecological framework. Community-level indicators are not included given their limited availability in the mandatory HBSC questionnaire.

Individual health and psychosocial characteristics and bullying

In this study, adolescents' individual health characteristics were addressed within the framework of perceived health, headache, stomachache/abdominal pain, backache, and dizziness variables. The determination of these variables was based on the literature suggesting that adolescents' subjective health status and somatic complaints may be related to bullying behaviors. It has been found that involvement in bullying is associated with more psychosomatic problems [22]. Similarly, bullying victimization has been reported to be associated with poor general health and various somatic health problems [9]. Specifically, headache, stomachache/abdominal pain, and backache have been shown to be associated with bullying victimization [23]. Additionally, a positive relationship has been found between bullying victimization and backache [24].

In this study, adolescents' individual psychosocial characteristics were addressed within the framework of feeling low/depressed, irritability, feeling tense/nervous, difficulty falling asleep, and life satisfaction variables. The determination of these variables was based on the literature suggesting that adolescents' emotional well-being, psychological health, and life satisfaction may be related to bullying behaviors. It has been found that adolescents involved in bullying exhibit lower psychosocial adjustment [25]. Furthermore, it has been shown that bullying behavior is positively associated with depressive symptoms and that the risk of depression is higher in children and adolescents who bully [11]. It has been reported that sleep problems are associated with both bullying and victimization, and that these relationships can be reciprocal [26]. Similarly, low life satisfaction has been found to be associated with both traditional and cyberbullying perpetration and victimization [10]. Additionally, it has been shown that bullying victimization is associated with lower life satisfaction and positive affect [27].

Risky behaviors

Behaviors such as substance abuse, unprotected sexual behavior, and dangerous driving constitute a significant portion of preventable health problems during adolescence; furthermore, it is observed that adolescents take more risks compared to adults [28]. In this study, adolescents' risky behaviors were addressed within the framework of lifetime and past 30-day smoking, lifetime and past 30-day alcohol use, lifetime and past 30-day drunkenness, lifetime and past 30-day cannabis use, and participation in a physical fight in the last 12 months. The determination of these variables was based on the literature suggesting that substance use and aggressive behaviors during adolescence are not only independent risk indicators but can also be parts of behavior patterns that emerge together. It has been shown that risky behaviors such as substance use and physical aggression are associated with bullying behavior. Specifically, meta-analytic findings have revealed that bullying behavior is positively associated with subsequent drug, alcohol, and tobacco use [29]. Similarly, longitudinal research shows that the relationship between bullying and substance use can be reciprocal; bullying can predict subsequent substance use, and substance use can predict subsequent bullying [30]. Additionally, it has been reported that participation in physical fighting and bullying is higher in groups where alcohol and tobacco use are high among adolescents; and that physical fighting and bullying behaviors are more common in adolescents who show early-onset and multiple substance use [31]. These findings suggest that risk behaviors such as substance use and physical aggression may be associated with bullying behavior and may emerge in some adolescents as parts of a common risk behavior pattern. A latent profile analysis conducted using HBSC data also showed that smoking, substance use, and aggressive behaviors could be considered together within different risk behavior profiles [32].

In this study, problematic social media use was evaluated as an important risk indicator, especially regarding cyberbullying. It has been found that cyberbullying behavior is associated with problematic social media use [33, 34], online media usage duration, and perceived online anonymity [35]. Additionally, it has been found that problematic internet use is associated with both cyberbullying perpetration and being subjected to cyberbullying [34].

Family context and bullying

It is known that adolescents' behaviors, including the process of identity formation, are shaped by parental and family relationships [36]. In this study, characteristics related to the family context were addressed within the framework of family affluence, living in the same home with mother and father, being able to communicate with mother and father, the family providing help and emotional support, being able to talk to the family about problems, and the family assisting in decision-making processes. The determination of these variables was based on findings suggesting that family structure, parent-adolescent communication, parental involvement, and perceived support from the family may be related to adolescents' bullying behaviors. Research on the family context shows that parent-adolescent communication, parental involvement, and parental support are associated with bullying behavior and victimization [37]. Similarly, it has been found that positive parenting is negatively associated with bullying behavior and victimization; while negative, harsh, and neglectful parenting is positively associated [38]. Furthermore, it has been reported that differences in family structure are associated with bullying behavior and other risk behaviors [39]. Low socioeconomic status has been shown to be particularly associated with bullying victimization and the bully-victim role, while its relationship with bullying behavior is more limited [40].

Peer relationships

During adolescence, the time individuals spend with their peers increases, and their relationships with peers become more important compared to their other social relationships. These relationships influence their roles and behavioral patterns within peer groups [28]. In this study, characteristics related to peer relationships were addressed within the framework of friends trying to help, having friends to rely on in difficult times, having friends with whom to share thoughts and feelings, and being able to talk to friends about problems. The determination of these variables was based on findings suggesting that supportive friendships and social relationships within the peer group may be related to adolescents' bullying behaviors. Research on peer relationships shows that friend support and friendship quality are associated with bullying behavior and victimization [41, 42]. It has been found that higher friend support is associated with lower levels of bullying behavior and victimization at later assessments [41]. Additionally, it has been reported that bullying behavior is associated with higher popularity and peer rejection, and lower social preference; whereas it does not show a significant relationship with peer acceptance [43]. Classmate support has likewise been shown to be associated with physical fighting and bullying [44].

School and teacher context

In this study, the school and teacher context were addressed within the framework of liking school, school pressure, enjoying being with classmates, helpfulness of classmates, being accepted by other students, teachers accepting the student, valuing the student, and trust in teachers. The determination of these variables was based on the premise that the school experience consists of different social and contextual dimensions such as students' attitudes toward school, peer relationships, and teacher-student relationships. Research on the school and teacher context shows that school belonging and positive teacher-student relationships are negatively associated with bullying behavior [45, 46]. It has also been found that positive teacher-student relationships are negatively associated with peer victimization [46]. Similarly, it has been shown that teacher support is positively associated with school belonging and negatively associated with peer bullying [47]. Furthermore, it has been reported that pressure related to schoolwork and classmate support are associated with adolescents' psychosocial experiences [48].

The present study

Taken together, most of the above-described studies have two characteristics that limit their ability to generalize across adolescent bullies. First, they classify adolescents in the entire sample of students; as a result, since most adolescents are not involved in bullying, the uninvolved group dominates the resulting solutions, and the heterogeneity of those who do participate is compressed into one or two classes. Turunen et al. [15] is an exception in focusing on adolescents who bully; however, its profiles were based on victimization and peer status and were not examined across health, risk behavior, family, and school domains together. Second, characteristics are usually used in a single domain to describe the resulting profiles; thus, it is unclear whether adolescents who bully in different ways differ in several of the contexts in which bullying is embedded when considered together. Although meta-analytic evidence indicates that individual, family, peer, and school factors contribute to bullying behavior [13], it is unclear how individual, family, peer, and school factors that predict bullying might interact.

The current study tackles both limitations. Only adolescents who admitted perpetrating traditional or cyberbullying were included in the analyses; different bully types were explored within one specific group rather than focusing on the more evident comparison between involved and uninvolved youths. In particular, profiles were generated by using four variables: traditional bullying perpetration, cyberbullying perpetration, traditional victimization, and cybervictimization, which were compared across five domains explored as individual health and psychosocial characteristics, risk behaviors, family relationships, peer relationships, and school relationships.

The 2017/2018 HBSC survey has two additional advantages for the present purpose. Its large sample size makes it feasible to estimate latent class models for boys and girls separately instead of adjusting for gender, which means that any differences in the measurement structure between genders are unveiled instead of being hidden. Its cross-national coverage makes it possible to investigate whether a certain profile structure that was identified in a pooled sample is also present within countries. This question is rarely raised in the person-centered bullying literature, but the generalizability of profile solutions is always contingent on this. For these purposes, four research questions were addressed:

- How many latent classes are needed to characterize adolescents who report bullying perpetration?
- To what extent is the identified class structure comparable between boys and girls?
- To what extent can the identified class structure be replicated across countries?
- How do the identified profiles differ with respect to individual health and psychosocial characteristics, risk behaviors, family relationships, peer relationships, and school relationships?

Methods

Research design

This study makes use of a cross-sectional design and a person-centered approach. Our aim was not to examine average associations between bullying and individual correlates, but to identify whether adolescents who were involved in perpetration could be distinguished based on their patterns of perpetration and victimization and whether such subgroups differ on relevant psychosocial domains. Unlike the variable-centered approach, which focuses on associations between variables, the person-centered approach assumes that the population is heterogeneous with respect to the relationships between variables and seeks to identify subgroups of individuals who share similar response patterns [49, 50]. Moreover, in a cross-sectional design, all the measures were completed by the same participants at the same time, and thus, the findings only describe and compare the patterns and cannot follow developmental trends or causal relationships.

Sample

The study utilized the international dataset of the 2017/2018 HBSC survey, obtained with permission from the HBSC Data Management Centre (for the study design and the survey protocol, see [51, 52]). The dataset file released to the authors contains 244,097 adolescents from 47 countries and the published international report presents data from over 220,000 adolescents in 45 countries and regions [52]. However, the entire dataset was not used; instead, the study was conducted using data obtained after applying certain criteria. First, two countries where the traditional bullying item was not asked, one country lacking family support variables, and two countries lacking teacher/classmate support variables were excluded from the analysis. Since no data on

these variables was available for these countries, the entire dataset for those countries was excluded from the analysis. Second, adolescents with missing age or gender data or with missing data on any of the four bullying indicators were excluded from the sample. Third, since the purpose of the study was to draw inferences about adolescents who perpetrate bullying, male (n = 28,651) and female (n = 19,814) adolescents who reported having engaged in traditional or cyberbullying at least once or twice in the past few months constituted the study's subsample of bullying perpetrators (n = 48,465); hereafter, the perpetrator subsample. The sample flow is presented in Fig. 1, and the descriptive characteristics of the perpetrator subsample are presented in Table 1.

The perpetrator subsample consisted of 28,651 boys and 19,814 girls. The mean age was similar for boys (M = 13.61, SD = 1.62) and girls (M = 13.59, SD = 1.59). Family affluence was slightly higher for boys (M = 7.48, SD = 2.86) than for girls (M = 7.17, SD = 2.87). Traditional bullying perpetration at least once was reported by 85.2% of boys and 82.5% of girls. A higher percentage of boys than girls experienced involvement in traditional bullying more frequently (2–3 times a month or more often) (27.9% vs. 23.2%). Experiences of cyberbullying perpetration were less common, but the gender differences were more prominent, with 15.4% of boys and 10.5% of girls reporting involvement in cyberbullying at least two or three times a month. In terms of victimization, traditional forms were more prevalent than cyber forms. Experiences of frequent traditional victimization were reported by 21.8% of boys and 22.3% of girls, compared to 12.1% and 10.5% for cybervictimization.
Flow of participants from the HBSC 2017/18 international dataset to the perpetrator subsample; the number of adolescents excluded at each step is shown on the right.

Table 1
Descriptive Characteristics of the Perpetrator Subsample

Variable	Boys (n = 28,651)	Girls (n = 19,814)
Age, Mean (SD)	13.61 (1.62)	13.59 (1.59)
Age Group, % 11 / 13 / 15	30.8 / 35.5 / 33.7	30.6 / 36.6 / 32.8
Family affluence (FAS III), Mean (SD)	7.48 (2.86)	7.17 (2.87)
Traditional bullying, %		
Never	14.8	17.5
Once or twice	57.3	59.3
2 or 3 times a month	12.8	10.1
About once a week	7.0	6.5
Several times a week	8.1	6.6
Cyberbullying, %		
Never	60.2	61.8
Once or twice	24.4	27.7
2 or 3 times a month	6.8	4.8
About once a week	3.6	2.7
Several times a week	5.1	3.1
Traditional victimization, %		
Never	52.8	49.3
Once or twice	25.4	28.4
2 or 3 times a month	9.0	9.0
About once a week	5.7	5.8
Several times a week	7.2	7.5
Cybervictimization, %		
Never	72.1	68.7
Once or twice	15.8	20.8
2 or 3 times a month	5.4	5.2
About once a week	2.9	2.4
Several times a week	3.7	3.0

Note. Means, standard deviations, and percentages were calculated using country weights (wcountry) to ensure equal contributions across countries.

Measures

All measures were taken from the mandatory international HBSC 2017/18 questionnaire. The wording of items, response choices, and sources are provided in detail in the study protocol [51]. Composite scores were computed as the mean of the items belonging to each scale, and items were reverse-coded where necessary so that higher scores consistently indicated higher levels of the measured construct.

Bullying perpetration and victimization

The four latent class indicators were designed to measure traditional bullying perpetration, traditional victimization, cyberbullying perpetration, and cybervictimization. Traditional bullying indicators were based on the revised Olweus Bully/Victim Questionnaire [51, 53], whereas indicators for cyberbullying were mandatory HBSC items added in 2017/18. All items were initially measured on a five-point frequency scale. For the purpose of latent class analysis, the three highest categories were collapsed to form three ordered categories indicating never, once or twice, and two to three times a month or more. The collapsed categories were used for each indicator because they reduce the number of mutually exclusive response categories and ease interpretation while retaining the ordinal nature of the indicators. The distribution of the responses in the original 5 categories, as well as the results of the sensitivity analysis using the full range of categories are reported in Table 1 and in Table S1 (Additional file 1), respectively.

Sociodemographic variables

Age and gender were obtained from background items. Family Affluence was measured using the six-item Family Affluence Scale III (FAS III) [54]; item scores were summed to a 0–13 composite [55], with higher scores indicating higher affluence.

Health and psychosocial characteristics

Perceived health was measured on a four-point poor-to-excellent scale [56] and life satisfaction using the 0–10 Cantril ladder [51, 57]. Psychosomatic complaints were assessed using the eight-item HBSC Symptom Checklist and averaged symptom frequency as a composite score, with higher scores indicating more complaints.

Risk behaviors

Cigarette and alcohol use were measured for lifetime and past-30-day frequency. Lifetime and recent drunkenness and cannabis use were measured using parallel frequency items. Physical fighting was measured by the number of incidents in the past 12 months [51, 58]. Problematic social media use was measured using the nine-item Social Media Disorder Scale [59]; adolescents endorsing six or more of the nine criteria were classified as problematic users [55].

Family and peer relations

Family structure was indicated by living with one's mother and/or father. Family communication was measured separately for mothers and fathers using four-point ease-of-communication items. Perceived family and peer support was measured with the respective four-item subscales of the Multidimensional Scale of Perceived Social Support (MSPSS) [60], with item means indicating increased support.

School relations

Liking school and school pressure were each measured using a single four-point item. Classmate and teacher support was measured using three-item scales that assessed acceptance, care, trust, and positive peer relationships; item means were used as composite scores.

Data analysis

The study employed latent class analysis (LCA) to uncover distinct patterns of adolescents' experiences with bullying. After determining the number of latent classes, the researchers utilized the Bolck–Croon–Hagenaars (BCH) three-step approach, which accounts for classification error, to compare the profiles on distal variables (health and psychosocial characteristics, risk behaviors, and family, peer and school relationships). This approach allows obtaining class-specific estimates of distal variables while correcting for measurement error [61, 62].

BCH weights, derived from the classification-error probabilities of the latent class model, were applied so that uncertainty in latent class assignment was taken into account, thereby reducing bias in the comparison of distal outcomes across classes [61–63].

The statistical significance and practical magnitude of differences between pairs of profiles were evaluated by reporting Cohen's d effect size [64] and its 95% confidence intervals. Effect sizes were interpreted using the "traditional-only" profile as the reference category, thereby indicating how much the "cyber-involved" and "multiple bully-victim" profiles differed from the reference. In line with recommendations to supplement p values with multiplicity control, effect size estimates, and confidence intervals [65], effect sizes were used to judge practical relevance.

For continuous distal variables, class-specific estimates of the mean and standard error were reported, and for binary distal variables, class-specific estimates of the proportion (percentage) were reported. All statistical tests were performed at a .05 level of significance after Holm's sequentially rejective correction for multiple comparisons [66]. Holm's procedure controls the family-wise error rate and is more conservative than false discovery rate procedures such as the Benjamini–Hochberg correction [65]; differences retained after Holm correction would therefore also be retained under the less stringent alternative.

Estimation and model selection

Latent class models were estimated by using Mplus 8.3 statistical software with the robust maximum likelihood estimator (MLR) [67]. Class enumeration models were estimated with 500 random starts, of which the 100 best were retained for final optimization; the three- and four-class models used for the likelihood ratio tests and the final weighted models were re-estimated with 1,000 random starts (250 retained). The best log-likelihood value was replicated in all reported models. Class enumeration models were estimated without sampling weights or cluster correction because the parametric bootstrap likelihood ratio test (BLRT) does not support sampling weights. Once the number of classes had been established, the final model was re-estimated using country weights (wcountry) to give equal weight to countries and TYPE = COMPLEX to get standard errors that are robust to clustering at the school-class level.

The number of latent classes was chosen based on consideration of the Akaike information criterion (AIC), Bayesian information criterion (BIC), sample-size-adjusted BIC (aBIC), consistent AIC (CAIC), approximate weight of evidence (AWE) [49, 68], minimum class size, Lo–Mendell–Rubin adjusted likelihood ratio test (LMR) [69], BLRT [70], and substantive interpretability of the resulting profiles. Classification quality was evaluated using entropy and average posterior probabilities (AvePP), with AvePP values of .70 or higher indicating adequate class separation and assignment accuracy [49, 71].

Measurement invariance and cross-country comparisons

Whether the class structure was comparable across genders was tested in a multiple-group latent class model where gender was a known class. First, at the configural level, we tested whether the same number of qualitatively similar classes could be identified in boys and girls. Next, we compared the fully constrained measurement invariance model (i.e., item-response probabilities were constrained to be equal across groups) and the less constrained model using the Satorra-Bentler scaled chi-square difference test [72]. Because likelihood-ratio tests tend to be too conservative in large samples, indicating misfit even for minimal differences between models [73], we also compared the two models using the BIC and, to evaluate practical significance, report the absolute difference between the item-response probabilities for each item.

Cross-country comparability of the class structure was assessed as follows. The three-class model was tested separately for 40 countries with at least 300 respondents that reported perpetration of bullying. Within each country, similarity was determined as the Pearson correlation between the country-specific item-response probabilities and the corresponding probabilities from the pooled solution. Since class labels are arbitrary in latent class models, all 6 possible permutations of the three classes were considered for each country, and the one that yielded the highest similarity was chosen. Similar procedures were carried out in the sensitivity analyses.

Testing the sample definition

A further analysis was carried out to evaluate to what extent the choice of the perpetrator subsample influences the obtained class structure: the same four indicators were analyzed in the whole sample, including respondents who did not report any perpetration, and the profiles obtained were compared to those from the main analysis using the similarity criterion described above.

Sensitivity analyses and missing data

The sensitivity of the solution to decisions in analysis was tested using 18 alternative models grouped into seven specifications (S1–S7; see Table S1 in Additional file 1): exclusion of cases with questionable data quality, use of the original HBSC sampling weights, unweighted estimation, use of the indicators in their original five-category form, definition of bullying using a more stringent frequency threshold, separate estimation by age group, and replication of the BCH estimates in the cleaned sample.

Data were handled by using available cases for each variable and no attempt was made to impute missing data. By definition, the bullying indicators contained no missing data. The ratio of missing data was below 2% across school-related items, ranged from 2.5% to 6.4% across the support composites, and from 9.2% to 10.6% across the substance-use indicators.

Two sets of variables had substantially higher levels of missing data: 18% for the individual social media disorder items (22% for the total score), and 59–60% for cannabis-use indicators. No cannabis data were available for three countries, and in the remaining 39 countries the items were answered mainly by 15-year-olds, although some countries also administered them to younger age groups. Consequently, cannabis estimates were based on a different subsample to the rest and should be interpreted separately. In addition, 13% of responses were missing for ease of communication with the father.

Use of artificial intelligence tools

Claude (Anthropic), a large language model, was used to assist with English language editing and translation, cross-checking reported analysis outputs, and formatting the manuscript and its tables according to the journal's submission guidelines. All analyses were conducted by the authors, and all AI-assisted content was reviewed, edited, and approved by the authors, who take full responsibility for the content of the manuscript.

Results

Determination of the number of latent classes and profiles

First, latent class models ranging from one to six classes (see Table 2) were estimated separately by gender, and the optimal number of classes was determined. A closer inspection of the information criteria revealed that the AIC, BIC, aBIC, CAIC, and AWE values kept decreasing as the number of classes increased in both genders (except AWE for girls). However, the rate of change of the indices reduced considerably after the three-class solution for both boys and girls. The entropy for the three-class solution was .856 for boys and .850 for girls, which decreased to be .807 and .827 in four classes and further declined to .747 and .779 in the five-class solution. As shown in Table 2, the proportion of individuals in the smallest class was 15.8% in boys and 14.1% in girls in the three-class solution while it was less than 10% in the four- and higher-class solutions for both genders. The LMR test was not supportive of the four-class solution in the girls' data set ($p = .260$) while it provided a statistically significant result in favor of the four-class solution in boys' data ($p = .027$). The BLRT was significant for all comparisons of the class numbers.

Overall, the three-class solution was found to be the best solution because several criteria pointed to it as the most appropriate number of classes. First, the incremental improvement in the information criteria diminished substantially beyond the three-class solution. Second, the percentage of respondents in the smallest class dropped below 10% in the four- and higher-class solutions. Third, the four-class solution was not supported by the LMR test for girls. Finally, the three-class profiles were theoretically meaningful. While the LMR test provided some support for a four-class solution for boys, the LMR test tends to overestimate the number of classes when it misidentifies a solution [70]. Additionally, its p-values are not evenly distributed under the true null hypothesis, which makes it a less reliable criterion than the BIC or BLRT for deciding on the number of classes [74].

Table 2
Fit Indices for One- to Six-Class Models

Number of Classes	AIC	BIC	aBIC	CAIC	AWE	Entropy	Proportion in Smallest Class (%)	*LMR p*	*BLRT p*
Boys									
1	212,691.16	212,757.26	212,731.84	212,765.26	212,863.37	—	100.0	—	—
2	196,282.65	196,423.12	196,369.09	196,440.12	196,648.59	.935	37.8	< .001	< .001
3	192,066.16	192,281.00	192,198.37	192,307.00	192,625.83	.856	15.8	< .001	< .001
4	190,733.41	191,022.62	190,911.39	191,057.62	191,486.82	.807	9.6	.027	< .001
5	189,921.29	190,284.86	190,145.02	190,328.86	190,868.43	.747	9.4	< .001	< .001
6	189,407.37	189,845.31	189,676.87	189,898.31	190,548.24	.796	8.4	1.000	< .001
Girls									
1	147,961.65	148,024.80	147,999.38	148,032.80	148,127.95	—	100.0	—	—
2	136,863.80	136,998.00	136,943.98	137,015.00	137,217.20	1.000	38.8	< .001	< .001
3	134,018.91	134,224.16	134,141.53	134,250.16	134,559.41	.850	14.1	< .001	< .001
4	132,991.76	133,268.05	133,156.83	133,303.05	133,719.35	.827	8.8	.260	< .001
5	132,360.59	132,707.93	132,568.10	132,751.93	133,275.27	.779	8.0	< .001	< .001
6	132,186.95	132,605.34	132,436.90	132,658.34	133,288.73	.801	4.3	.015	< .001

Note. AIC = Akaike information criterion; BIC = Bayesian information criterion; aBIC = sample-size-adjusted BIC; CAIC = consistent AIC; AWE = approximate weight of evidence; LMR = Lo–Mendell–Rubin adjusted likelihood ratio test; BLRT = bootstrap likelihood ratio test.

When re-estimated with country weights and cluster correction, the entropy of the three-class model was .859 for boys and .850 for girls. The three-class solution yielded a similar structure for both genders. The item-response probabilities for the three-class model are presented in Table 3 and the classification-quality indices are reported in Table 4.

The first class was named traditional-only profile and it was the biggest one, encompassing 57.6% of boys and 58.0% of girls. Traditional bullying was the main characteristic of the class, while cyberbullying was practically absent. All members reported traditional bullying and virtually none reported cyberbullying (P[never] = 1.000 for boys, .993 for girls; Table 3). The probability of frequent traditional victimization was .166 for boys and .173 for girls, and cybervictimization was rare (P[never] = .911 for boys and .863 for girls). Overall, the class included adolescents who engaged in traditional bullying without cyberbullying.

The second class was defined as the cyber-involved group and constituted 27.4% of boys and 28.6% of girls. Its main characteristic was the involvement in cyberbullying. All members reported cyberbullying, mostly once or twice (.756 for boys, .839 for girls; Table 3). Nearly half of the boys (.477) and more than half of the girls (.556) in this profile reported no traditional bullying, and the probability of frequent traditional bullying was low (.157 and .103). Compared with the traditional-only profile, high-frequency traditional victimization was lower (.090 vs. .166 for boys; .088 vs. .173 for girls), whereas cybervictimization was more common: the probability of no cybervictimization was .609 for boys and .562 for girls, compared with .911 and .863 in the traditional-only profile. This additional cybervictimization was mostly occasional (“once or twice”: .297 for boys and .360 for girls). In other words, this profile does not resemble a traditional bully-victim group; its distinguishing feature is cyberbullying perpetration, accompanied mainly by occasional cybervictimization.

The third class was labeled the multiple bully-victim profile and was the smallest one, comprising 15.0% of boys and 13.4% of girls. This profile was distinguished from the other two by high involvement on all four indicators. For boys, the predicted

probabilities of reporting traditional bullying, cyberbullying, traditional victimization, and cybervictimization “2–3 times per month or more” were .608, .582, .650, and .578, respectively. For girls, they were .519, .415, .728, and .541, respectively.

Table 3
Item-Response Probabilities for the Three-Class Model

Indicator and Category	Boys			Girls		
	Traditional-Only	Cyber-Involved	Multiple Bully-Victim	Traditional-Only	Cyber-Involved	Multiple Bully-Victim
Class Proportion (%)	57.6	27.4	15.0	58.0	28.6	13.4
Traditional bullying						
Never	.000	.477	.116	.000	.556	.118
Once or twice	.748	.365	.276	.772	.340	.362
2–3 times per month or more	.252	.157	.608	.228	.103	.519
Cyberbullying						
Never	1.000	.000	.174	.993	.000	.314
Once or twice	.000	.756	.244	.000	.839	.271
2–3 times per month or more	.000	.244	.582	.007	.161	.415
Traditional victimization						
Never	.577	.625	.163	.534	.603	.085
Once or twice	.257	.285	.187	.293	.309	.188
2–3 times per month or more	.166	.090	.650	.173	.088	.728
Cybervictimization						
Never	.911	.609	.198	.863	.562	.191
Once or twice	.075	.297	.223	.119	.360	.268
2–3 times per month or more	.014	.095	.578	.018	.079	.541

Table 4
Classification Quality

Class	Boys (n = 28,651)			Girls (n = 19,814)		
	AvePP	Modal n	Modal %	AvePP	Modal n	Modal %
Traditional-Only	.982	16,638	58.1	.968	11,643	58.8
Cyber-Involved	.904	8,100	28.3	.916	5,936	30.0
Multiple Bully-Victim	.824	3,913	13.7	.827	2,235	11.3
Note. Modal counts incorporate sampling weights. AvePP = average posterior class probability.						

To test whether the class structure depended on the definition of the perpetrator subsample, the same four indicators were analyzed again in the whole sample, including participants who did not report any bullying perpetration (boys: n = 99,145; girls: n = 104,200). The four-class solution revealed not only a non-involved profile (representing participants who did not report any

bullying perpetration), but also all three profiles found in the perpetrator subsample: traditional-only, cyber-involved, and multiple bully-victim (Table 5). Similarities between the class profiles from the full sample and the perpetrator subsample ranged from r = .71 to .91 for boys and from r = .60 to .94 for girls. These results suggest that the underlying structure of the three profiles was not substantially affected by the inclusion of non-involved participants in the sample. In particular, the distinction between the traditional-only and cyber-involved profiles was also observed in the full sample, suggesting that this distinction was not merely a result of how the perpetrator subsample was defined.

Table 5
Four-Class Solution in the Full Sample Including Participants Who Did Not Report Perpetration

Profile	Boys (n = 99,145)		Girls (n = 104,200)	
	Proportion (%)	Similarity (r)	Proportion (%)	Similarity (r)
Non-Involved	69.3	—	71.0	—
Traditional-Only	19.8	.71	20.2	.60
Cyber-Involved	5.6	.88	4.4	.94
Multiple Bully-Victim	5.3	.91	4.4	.66

Measurement invariance by gender and cross-country profile reproducibility

A multiple-group latent class analysis (MG-LCA) was conducted to examine the similarity of the three-class latent structure identified in the previous analysis across genders. At the configural level, a similar number of qualitatively overlapping classes was identified in both genders. This indicates that a common class structure was present across genders (Table 3). A fully constrained measurement model was tested after assessing configural invariance. The Satorra-Bentler scaled chi-square difference test indicated that the model was rejected ($\Delta\chi^2(24) = 576.49$, $p < .001$) [72]. The BIC also favored the unconstrained model (391,196.99 vs. 391,730.54 for the fully constrained model). However, the mean absolute difference, which was computed for the 36 item-response probabilities, was also evaluated ($|\Delta| = .042$). This value suggested that the differences were not large enough to alter the class profiles qualitatively. Therefore, the classes could be considered similar in a qualitative sense, whereas the gender differences were quantitative, reflecting modest differences in item-response probabilities between boys and girls.

In order to determine generalizability of the three-class model, this was estimated separately in 40 countries with at least 300 adolescents who had reported perpetration of bullying (Figure S1 in Additional file 1). The traditional-only profile showed high similarity across all 40 countries (median r = .989). Similarly, the cyber-involved profile was also highly similar, with 36 of the 40 countries achieving $r \geq .90$ and a median r of .965. The reproducibility of the multiple bully-victim profile was lower, with 17 of the 40 countries achieving $r \geq .90$ and a median r of .875. Entropy values for the three-class models ranged from .768 to .951 with a median of .869. Proportions of class membership varied greatly between countries.

The three-class model was not interpreted as the single optimal latent class solution for all countries, but instead a framework by which to compare the profiles common to all countries and thus explore differences in their prevalence.

Differences in variables across latent classes

The BCH estimates examining whether individual health and psychosocial characteristics differed across three profiles (Table S2 in Additional file 1) indicated statistically significant differences across profiles for all variables among both boys and girls ($p < .001$). The findings showed a consistent pattern across genders: the multiple bully-victim profile exhibited the most adverse health and psychosocial pattern, whereas the traditional-only profile exhibited the most favorable pattern.

Among boys, the effect sizes for the differences between the multiple bully-victim and traditional-only profiles were d = − .27 for perceived health and d = − .33 for life satisfaction, indicating small differences. In contrast, psychosomatic complaints were substantially higher in the multiple bully-victim profile (2.54 vs. 2.03; $\chi^2(2) = 445.36$, $p < .001$), with a moderate effect size (d =

.61). Similar differences were observed for individual symptoms, including headaches, stomach/abdominal pain, feeling low or depressed, and dizziness, with the multiple bully-victim profile consistently showing higher symptom levels.

A similar pattern was observed among girls. The differences between the multiple bully-victim and traditional-only profiles were d = − .34 for perceived health and d = − .48 for life satisfaction. The multiple bully-victim profile also had the highest level of psychosomatic complaints (2.95; $\chi^2(2) = 302.86$, $p < .001$), with a moderate effect size (d = .61) relative to the traditional-only profile. The multiple bully-victim profile also showed higher levels of symptoms such as headaches, stomach/abdominal pain, feeling low or depressed, nervousness, difficulty falling asleep, and dizziness.

The BCH estimates examining whether risk behaviors differed across three profiles (Table S3 in Additional file 1) revealed statistically significant differences across profiles for all variables among both boys and girls ($p < .001$). The overall pattern indicated that the multiple bully-victim profile exhibited the highest levels of risk behaviors, whereas the traditional-only profile consistently showed the lowest levels.

Among boys, the lifetime and past-30-day frequencies of cigarette use were substantially higher in the multiple bully-victim profile (2.26 and 1.91, respectively) than in the traditional-only profile (1.63 and 1.33, respectively). Similarly, the multiple bully-victim profile showed higher levels of alcohol use and drunkenness. Notably, the between-profile difference in drunkenness during the past 30 days corresponded to an effect size of d = .57. Differences in cannabis use were more pronounced, with effect sizes of d = .54 for lifetime use and d = .72 for past-30-day use when comparing the multiple bully-victim and traditional-only profiles. The multiple bully-victim profile also had the highest level of physical fighting (3.04), significantly exceeding that of the traditional-only profile (2.40; d = .44).

Problematic social media use was one of the most pronounced areas of differentiation among the risk behaviors. Among boys, the estimated total problematic social media use scores were 2.08 for the traditional-only profile, 2.66 for the cyber-involved profile, and 3.61 for the multiple bully-victim profile ($\chi^2(2) = 580.28$, $p < .001$). The effect size for the difference between the multiple bully-victim and traditional-only profiles was d = .64. The proportions classified as problematic users were 8.3%, 12.5%, and 22.2%, respectively. Similarly, the multiple bully-victim profile had the highest levels across all individual indicators, including preoccupation, tolerance, withdrawal, persistence, displacement, problems, deception, escape, and serious conflict.

A largely similar pattern was observed among girls. The multiple bully-victim profile generally exhibited the highest levels of cigarette use, alcohol use, drunkenness, and cannabis use. Particularly for past-30-day cannabis use, the difference between the multiple bully-victim and traditional-only profiles corresponded to an effect size of d = .75, approaching a large effect. Physical fighting was also highest in the multiple bully-victim profile (2.47), with a d = .64 difference relative to the traditional-only profile.

Problematic social media use also showed substantial differentiation among girls. Estimated total problematic social media use scores were 2.56, 3.37, and 4.01 for the traditional-only, cyber-involved, and multiple bully-victim profiles, respectively ($\chi^2(2) = 439.01$, $p < .001$). The effect size for the difference between the multiple bully-victim and traditional-only profiles was d = .60. The corresponding proportions classified as problematic users were 11.4%, 20.1%, and 28.8%, respectively. The same hierarchical pattern was observed across all nine criteria (preoccupation, tolerance, withdrawal, persistence, displacement, problems, deception, escape, and serious conflict).

The BCH estimates examining whether family characteristics differed across three profiles (Table S4 in Additional file 1) indicated significant differences across profiles for all variables among girls and for all variables except the ability to talk to one's father among boys. The overall pattern suggests that the multiple bully-victim profile was characterized by lower levels of family support and family communication, whereas the traditional-only profile exhibited more favorable family characteristics.

Among boys, estimated family affluence scores were 7.56 for the traditional-only profile, 7.59 for the cyber-involved profile, and 6.93 for the multiple bully-victim profile; the between-profile difference was statistically significant ($\chi^2(2) = 67.81$, $p < .001$). The difference between the multiple bully-victim and traditional-only profiles was small (d = − .22). The proportions living in the same household as their mothers were 91.5%, 90.8%, and 83.9%, respectively, and also differed significantly across profiles ($\chi^2(2) = 72.76$, $p < .001$). Indicators of the ability to talk to one's mother and family support similarly showed lower levels in the multiple bully-victim profile. In particular, differences were moderate for composite family support (d = − .55), family help (d = − .56), and

emotional support from family (d = − .54). In contrast, the ability to talk to one's father did not differ significantly across profiles ($\chi^2(2) = 2.63$, p = .269).

A similar pattern was observed among girls. Family affluence was lowest in the multiple bully-victim profile (6.71), compared with 7.12 and 7.48 in the traditional-only and cyber-involved profiles, respectively ($\chi^2(2) = 58.64$, p < .001). The proportions living in the same household as their mothers and fathers were also lower in the multiple bully-victim profile. The ability to talk to one's mother differed significantly across profiles ($\chi^2(2) = 58.22$, p < .001), with a d = − .27 difference between the multiple bully-victim and traditional-only profiles. The ability to talk to one's father also differed significantly across profiles, although the effect size was negligible (d = − .09).

Across all indicators of family support, girls in the multiple bully-victim profile again showed the lowest levels. Mean scores for composite family support were 5.51, 5.31, and 4.62 across the traditional-only, cyber-involved, and multiple bully-victim profiles, respectively ($\chi^2(2) = 197.86$, p < .001), with a d = − .49 difference between the multiple bully-victim and traditional-only profiles. Similarly, differences approaching a moderate magnitude were observed for family help (d = − .46), emotional support from family (d = − .47), ability to discuss problems with family (d = − .41), and family help with decision-making (d = − .43).

The BCH estimates examining whether peer relationships differed across three profiles (Table S5 in Additional file 1) revealed statistically significant differences across profiles for all peer relationship indicators among both boys and girls (p < .001). The findings indicated that, in both genders, the multiple bully-victim profile was characterized by the lowest levels of peer and social support, whereas the traditional-only profile exhibited the most favorable peer relationship pattern.

Among boys, the estimated composite peer support scores were 5.07, 5.01, and 4.13 for the traditional-only, cyber-involved, and multiple bully-victim profiles, respectively ($\chi^2(2) = 374.73$, p < .001). The difference between the multiple bully-victim and traditional-only profiles was d = − .53, representing a moderate effect. Similarly, moderate differences were observed for friends try to help (d = − .49), being able to count on friends in difficult times (d = − .50), and having friends with whom feelings can be shared (d = − .48). The difference in the ability to talk about problems with friends was somewhat smaller but remained statistically significant (d = − .38).

A similar pattern was observed among girls. Estimated composite peer support scores were 5.31, 5.27, and 4.41 for the traditional-only, cyber-involved, and multiple bully-victim profiles, respectively ($\chi^2(2) = 191.52$, p < .001). The difference between the multiple bully-victim and traditional-only profiles was d = − .51. Similar moderate differences were observed for friends try to help, being able to count on friends in difficult times, and having friends with whom feelings can be shared (d = − .47, − .47, and − .48, respectively). The difference in the ability to talk about problems with friends was d = − .39.

The BCH estimates examining whether school relationships differed across three profiles (Table S6 in Additional file 1) revealed statistically significant differences across profiles for all school relationship indicators among both boys and girls (p < .001). The overall pattern indicated that the multiple bully-victim profile was more disadvantaged in terms of school belonging, peer support, and teacher support, whereas the traditional-only profile was characterized by more favorable school-related experiences.

Among boys, estimated scores for liking school were 2.76, 2.71, and 2.55 for the traditional-only, cyber-involved, and multiple bully-victim profiles, respectively ($\chi^2(2) = 77.57$, p < .001). The difference between the multiple bully-victim and traditional-only profiles was small (d = − .23). School pressure was highest in the multiple bully-victim profile (2.47; $\chi^2(2) = 56.55$, p < .001). Differences between the multiple bully-victim and traditional-only profiles were also observed for classmate support (d = − .36) and acceptance by other students (d = − .47). The multiple bully-victim profile also showed lower levels of teacher support and acceptance by teachers, with effect sizes of d = − .26 and − .29, respectively.

A similar, but more pronounced, pattern was observed among girls for some indicators. Estimated liking school scores were 2.89, 2.79, and 2.58, respectively, with a statistically significant profile difference ($\chi^2(2) = 114.86$, p < .001). The difference between the multiple bully-victim and traditional-only profiles was d = − .34. School pressure was also highest in the multiple bully-victim profile (2.63; $\chi^2(2) = 59.38$, p < .001), with a difference of d = .25.

Differences in classmate relationships were more pronounced among girls. Classmate support was lowest in the multiple bully-victim profile (3.15), differing from the traditional-only profile by d = − .55. The largest difference was observed for acceptance by other students, with an effect size of d = − .65 between the multiple bully-victim and traditional-only profiles. Classmates' helpfulness (d = − .40) and liking being together with classmates (d = − .25) also differed in the same direction. Across all indicators of teacher support, acceptance by teachers, feeling valued by teachers, and trust in teachers, the multiple bully-victim profile showed lower levels, with differences ranging from small to moderate in magnitude (d = − .25 to − .37).

Sensitivity analyses

The researchers tested seven alternative specifications (18 models in total) of sample composition, weighting, measurement, and age-group structure. The structure of the classes was largely preserved between S1–S4 and S6, with class similarity values from r = .979 to 1.000. Furthermore, the largest change in class shares was 3.9 percentage points (S6). Robustness of the main solution was supported by excluding cases with questionable data quality (S1), applying the original HBSC sampling weights (S2), using unweighted estimation (S3), keeping the original five-category indicators (S4), and estimating models separately by age group (S6).

In the cleaned sample (S1) the analyses were re-run using BCH without re-estimating the measurement model in S7. Statistical significance decisions ($p < .05$) matched those of the main analysis for all 34 omnibus tests and all 102 pairwise comparisons (17 key distal variables, comprising composite scores and selected indicators, × 2 genders), which suggested that this was mainly a test of sensitivity of distal outcomes to sample cleaning and not measurement model specification. In contrast, in S5, the more stringent operationalization of bullying ("2–3 times per month or more") resulted in low similarity (r = .015 at minimum), and large differences in class proportions (up to 7.6 percentage points). The least similar profile was the cyber-involved profile (boys: r = .095; girls: r = .015), and the most similar was the multiple bully-victim profile (boys: r = .87; girls: r = .76). In general, the three-class solution was highly robust to alternative specifications of sample composition, weighting, indicator coding, and age-group structure, but not robust to the stricter definition of bullying, under which the cyber-involved profile was not recovered. The procedures conducted as part of the sensitivity analyses are summarized in Table S1 (Additional file 1).

Discussion

The purpose of this study is to reveal sub-profiles of adolescents who exhibit bullying behavior based on their bullying and victimization experiences and to determine how these profiles differ in terms of personal and psychological health, family relationships, peer relationships, school relationships, and risky behaviors. When the bullying literature is examined, it is seen that individuals are categorized as those who exhibit bullying behavior, those who are subjected to bullying behavior, and those who both exhibit bullying behavior and are subjected to bullying [1]. Individuals who engage in bullying behavior are further divided into those who exhibit bullying behavior and those who both exhibit bullying behavior and are subjected to bullying. The traditional-only bully and multiple bully-victim profiles that emerged in this study largely overlap with this classic classification and show that bullying behavior differentiates in a manner consistent with existing theoretical roles.

With the development of the bullying literature, the widespread use of digital environments has brought cyberbullying to the agenda as a new manifestation of bullying and a new area of participation [75, 76]. However, research shows that traditional and cyberbullying are not completely independent behaviors; a significant portion of young people who engage in cyberbullying also participate in traditional bullying [77–79]. Therefore, the emergence of cyberbullying can be considered a dimension that expands the forms of participation in bullying, rather than a completely separate structure that replaces traditional bullying roles.

Viewed from this perspective, the three-profile structure obtained in this research presents a meaningful pattern. The traditional-only bully represents the bully role in the classic sense; the cyber-involved bully represents adolescents whose involvement is characterized primarily by cyberbullying perpetration, with or without traditional bullying; and the multiple bully-victim represents adolescents who engage in both traditional and cyberbullying and simultaneously experience victimization in both forms. The findings of this research show that experiences of traditional bullying, cyberbullying, and victimization are integrated into different patterns rather than being independent dimensions, and that adolescents who exhibit bullying behavior form heterogeneous subgroups based on these patterns.

In this study, the profiling of all three groups in terms of individual health and psychosocial development was primarily examined. The fundamental differentiation in individual health and psychosocial characteristics emerged in the multiple bully-victim profile. Both in males and females, this profile exhibited lower perceived health and life satisfaction and higher psychosomatic complaints. This finding is consistent with meta-analytic findings showing that involvement in bullying is associated with psychosomatic problems [22] and that, in particular, the bully-victim role is associated with a higher risk for depressive symptoms [11]. In profile studies, it has also been reported that bully-victims exhibit lower peer and teacher support, lower social self-perception, and problems associated with more anger [80]. Furthermore, it has been shown that the bully-victim group itself can exhibit emotional, behavioral, and social problems concentrated in different patterns [81].

In terms of life satisfaction, the lowest level was found in the multiple bully-victim profile. When the relevant literature is examined, it is seen that being subjected to bullying is associated with lower life satisfaction and subjective well-being [27]. However, it is noteworthy that in this study, the traditional-only and cyber-involved profiles were largely close to each other in health and psychosocial indicators. Research showing that cyberbullying often overlaps with traditional bullying [82, 83] indicates that these two forms of bullying should not be considered as completely independent phenomena. In this study, it is noteworthy that the main differentiation in terms of physical health and psychological well-being emerged in the multiple bully-victim profile. This result demonstrates the importance of focusing not only on the presence of bullying but also on the profile formed by bullying and victimization experiences in understanding the well-being of adolescents.

Although adolescence is a developmental period during which the orientation toward new experiences and the tendency to take risks increase, the systematic differentiation of risky behaviors according to bullying profiles in our study shows that these behaviors should be evaluated together with bullying and victimization experiences [28]. In both males and females, the multiple bully-victim profile exhibited the highest levels in risky behaviors such as smoking, alcohol, drunkenness, cannabis, and physical fighting, while the traditional-only profile remained at the lowest level. This finding is consistent with research showing that bullying behavior is associated with substance use and other risky behaviors [29]. However, it has been reported in the literature that the bully-victim group carries a higher risk, especially in terms of substance use; while passive victims may not show the same level of risk [84, 85]. Therefore, the high-risk behaviors observed in the multiple bully-victim profile in our study can be evaluated as a more comprehensive disadvantage pattern formed not only by bullying behavior but by the intersection of bullying and victimization experiences in the same individuals.

It was also observed that problematic social media use differed according to bullying profiles. In both genders, problematic social media use was found to be at the lowest level in the traditional-only profile, higher in the cyber-involved profile, and at the highest level in the multiple bully-victim profile. The rise of problematic social media use from the traditional-only profile to the cyber-involved profile and to the multiple bully-victim profile can be evaluated as cyberbullying and victimization being observable together with problematic digital usage patterns. Especially considering that the multiple bully-victim profile encompasses both the bully and victim groups in terms of both traditional and cyberbullying, this group is expected to be more at risk than other groups in terms of problematic internet use. It has been found that cyberbullying victimization is associated with problematic internet use and that bully-victims can exhibit higher problematic internet use compared to those who are only victims [86]. In this study, the fact that the highest level of problematic social media use was seen in the multiple bully-victim profile, which includes both cyberbullying and cyber-victimization experiences, shows that this profile also carries a more intense risk pattern in the digital context.

Evaluated in general, the high-risk behaviors in the multiple bully-victim profile can be explained through the intersection of risks associated with bullying and vulnerabilities associated with victimization. Previous findings also show that the bully-victim group can carry a higher risk, especially in terms of multiple substance use [85]. Therefore, the emergence of the most disadvantaged pattern in this study not only in adolescents who bully or are involved in cyberbullying but in the multiple bully-victim profile who experience traditional and cyber victimization alongside traditional and cyber bullying indicates that risk behaviors should be evaluated based on the intersection of bullying and victimization experiences.

Family constitutes an important social context in the shaping of adolescents' bullying and victimization experiences; parental support, communication, and the quality of domestic relationships appear to be associated with both bullying and victimization [37, 87]. In this study, the most distinct differentiation in terms of family characteristics emerged in the multiple bully-victim

profile; this profile exhibited lower family affluence, living with parents, family support, help and emotional support from the family, and lower ease of communication with the mother in both males and females. In contrast, while the traditional-only profile exhibited more positive family characteristics, the cyber-involved profile mostly fell between these two profiles. In the relevant literature, it is seen that different bullying and victimization patterns differ in terms of family and social support resources [80, 88]. Additionally, it has been reported that parental support and positive parenting characteristics are protective in terms of both bullying and victimization, and that the bully-victim group, in particular, can experience more negative parenting [37, 87, 89]. In line with this, the more limited family resources observed in the multiple bully-victim profile point to a more comprehensive disadvantage pattern where risks associated with bullying and vulnerabilities associated with victimization intersect in the same individuals.

It is noteworthy that the traditional-only and cyber-involved profiles exhibit a more advantageous appearance in our study in terms of peer relationships than the multiple bully-victim profile. It has been shown in the literature that adolescents who bully are not always rejected by their peers, and some bullies can gain high popularity and social visibility [43, 90]. However, popularity does not mean social acceptance; bullies can also encounter peer rejection and lower social preference [90, 91]. In contrast, the accompaniment of victimization to bullying makes the fragility in peer relationships more pronounced. It has been reported that victims and especially bully-victims exhibit lower social preference and peer support [80, 91]. Furthermore, in their person-centered study, Turunen et al. [15] found that high-status bullies and bully-victims were differentiated from each other and that the bully-victim group exhibited the most negative adjustment pattern.

In line with this, the fact that the multiple bully-victim profile exhibited the lowest levels in terms of receiving help and support from friends, trusting friends in difficult times, and sharing emotions in both males and females in our study indicates that the intersection of bullying and victimization experiences in the same individuals can increase social fragility in peer relationships. Therefore, it can be thought that the fundamental differentiation in terms of peer relationships stems not only from bullying behavior but from a more complex pattern where victimization accompanies bullying. The fact that the traditional-only bully group exhibits better peer relationships than the multiple bully-victim group does not mean that this group is not at risk in terms of psychosocial aspects. Individuals who exhibit bullying behavior are generally classified as individuals who engage in bullying behavior in the social groups they are in, and this situation can hinder their development of peer relationships and their psychosocial development [92].

In the school context, it was observed that the multiple bully-victim profile exhibited a more disadvantaged pattern. It has been shown that victimization profiles are associated with lower school belonging [93]; and it has been found that bully-victims report lower teacher support [80]. In line with this, the fact that the multiple bully-victim profile in our study liked school less, perceived higher school pressure, and received less support and acceptance from classmates suggests that this group experiences lower belonging and social integration in school life.

Similarly, it has been shown that teacher and peer support are important social resources for adolescents who experience victimization to exhibit more positive adjustment [94]. The fact that the multiple bully-victim profile in our study also exhibited lower levels in terms of teacher support, being accepted by teachers, being valued by teachers, and trusting teachers shows that this profile has more limited social resources in terms of both peer and teacher relationships at school. Therefore, the disadvantage in the multiple bully-victim profile is not limited to bullying and victimization experiences but also reflects on the student's relationships within the school and their experiences regarding school.

Evaluated in general, the findings of the research show that adolescents who exhibit bullying behavior are not a homogeneous group; that traditional and cyber bullying and victimization experiences intersect in different forms, and that these patterns differ in terms of individual well-being, family, peer, and school relationships, and risky behaviors. Another noteworthy finding is that the cyber-involved bully profile is situated between the traditional-only bully and multiple bully-victim profiles in many indicators. This pattern suggests that cyberbullying can be seen together with more negative adjustment indicators in cases where victimization experiences accompany bullying, rather than cyberbullying forming a distinct disadvantage pattern on its own. Especially the fact that the multiple bully-victim profile, which includes victimization experience in both fields alongside traditional and cyber bullying, exhibits the most disadvantaged pattern in many indicators points to the fact that bullying behaviors should not be evaluated independently of victimization experiences. Indeed, Nansel et al. [25] reported that bully-victims exhibit the most

negative psychosocial adjustment pattern and the highest risk level compared to other bullying roles. In this direction, it is important for bullying prevention and intervention studies to take into account the specific characteristics of different bullying profiles and to develop holistic interventions, especially for the multiple bully-victim group where bullying and victimization experiences are seen together, targeting their accumulated psychosocial and social risks.

Several limitations should be kept in mind when interpreting these findings. First and foremost, because the study relied on a cross-sectional design, we cannot draw conclusions about the direction of the associations between the profiles and the psychosocial variables. For instance, the lower life satisfaction observed in the multiple bully-victim profile may be a consequence of bullying experiences, but it may equally be a factor that sets the stage for them. Nor can these data tell us whether adolescents move from one profile to another over time. Because the analyses were restricted to adolescents from 42 countries who reported bullying perpetration in the 2017/18 HBSC survey, the results should not be generalized directly to adolescents who are not involved in bullying or to countries that were excluded from the analyses. It is also worth noting that the data were collected before the COVID-19 pandemic; adolescents' online interactions changed considerably during the pandemic, and these changes may have altered cyberbullying patterns in particular. All measures were based on self-reports, which leaves room for recall errors and social desirability bias. Bullying and victimization were assessed with global items that do not distinguish between physical, verbal, and relational forms. Collapsing the response categories into three levels may also have obscured some nuances in frequency, although the class structure was largely preserved when the analyses were repeated with the original five-category indicators, suggesting that this decision did not substantially alter the results. Findings on cannabis use warrant additional caution: these items were mandatory only for 15-year-olds in the HBSC protocol and were not administered at all in three countries, so the corresponding estimates rest on a different subsample. The latent class solution also depends on how the indicators were defined and on the modeling decisions made. When bullying was defined more strictly ("two to three times a month or more"), similarity between the profiles decreased markedly and the cyber-involved profile did not re-emerge, indicating that this profile in particular is sensitive to the operational definition. Similarly, full measurement invariance across genders was not supported. Although the profiles looked qualitatively similar for girls and boys, the quantitative differences in item-response probabilities call for caution when comparing genders. Future studies could use longitudinal designs to examine the stability of the profiles and transitions between them. Drawing on multiple informants and measuring forms of bullying separately would allow the profiles to be characterized in greater detail, and replications with subsequent HBSC cycles could show the extent to which this structure holds in the post-pandemic period.

Conclusions

The purpose of this study was to examine distinct profiles of traditional and cyberbullying among adolescents and compare these profiles in terms of individual, family, peer, school, and risk-behavior characteristics. The ecological perspective was utilized as an underlying rationale for this study because it holds that adolescents' behavior cannot be understood apart from the social contexts in which they live and the interrelations among these contexts. Three profiles of traditional and cyberbullying were detected: traditional-only, cyber-involved, and multiple bully-victim with a combination of traditional and cyber perpetration and victimization.

The results revealed differences between the three profiles in both genders. Namely, the multiple bully-victim profile was associated with lower perceived health and life satisfaction, higher levels of psychosomatic complaints and risk behaviors, less family and peer support, and more negative school experiences. The traditional-only profile generally showed a more favorable pattern. On most variables, the cyber-involved profile fell between the other two profiles. These findings highlight the importance of multilevel approaches to bullying prevention and intervention that consider not only the different bullying profiles but also individual characteristics, family and peer support, and the school context.

Abbreviations

aBIC
Sample-size-adjusted Bayesian information criterion
AIC
Akaike information criterion

AvePP
Average posterior class probability
AWE
Approximate weight of evidence
BCH
Bolck–Croon–Hagenaars
BIC
Bayesian information criterion
BLRT
Bootstrap likelihood ratio test
CAIC
Consistent Akaike information criterion
FAS III
Family Affluence Scale III
HBSC
Health Behaviour in School-aged Children
LCA
Latent class analysis
LMR
Lo–Mendell–Rubin adjusted likelihood ratio test
MG-LCA
Multiple-group latent class analysis
MLR
Robust maximum likelihood
MSPSS
Multidimensional Scale of Perceived Social Support
OECD
Organisation for Economic Co-operation and Development
SD
Standard deviation
WHO/EURO
World Health Organization Regional Office for Europe

Declarations

Ethics approval and consent to participate

This study is a secondary analysis of anonymized data from the 2017/18 HBSC survey. Data collection was conducted by the national HBSC research teams; under the HBSC study protocol, each participating country was required to ensure ethical review of the study through the relevant ethics committee or review board, or to follow national ethical guidelines for research with children where no such committee existed [51]. Because all participants belonged to the 11-, 13- and 15-year-old age groups and were thus below the age of legal consent, the protocol specifies that consent is sought from parents or legal guardians as well as from the pupils themselves, typically through an opt-out (passive) procedure with the option to withdraw, implemented according to national requirements [51]. The authors accessed only fully anonymized data through the HBSC Data Management Centre, University of Bergen [95]; no new data were collected, and no additional ethical approval was sought for the present secondary analysis.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Author Contribution

E.Ç.Ç. and I.Ç. jointly conceptualized the study, developed the methodology, interpreted the results, wrote the original draft, and reviewed and edited the manuscript. E.Ç.Ç. performed the data analysis. All authors reviewed and approved the final manuscript.

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Data Availability

The data that support the findings of this study are available from the HBSC Data Management Centre (University of Bergen, Norway), but restrictions apply to the availability of these data, which were used under licence for the current study, and so are not publicly available. Data are, however, available from the authors upon reasonable request and with permission of the HBSC Data Management Centre. The analysis code is available from the corresponding author upon reasonable request.

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Figures

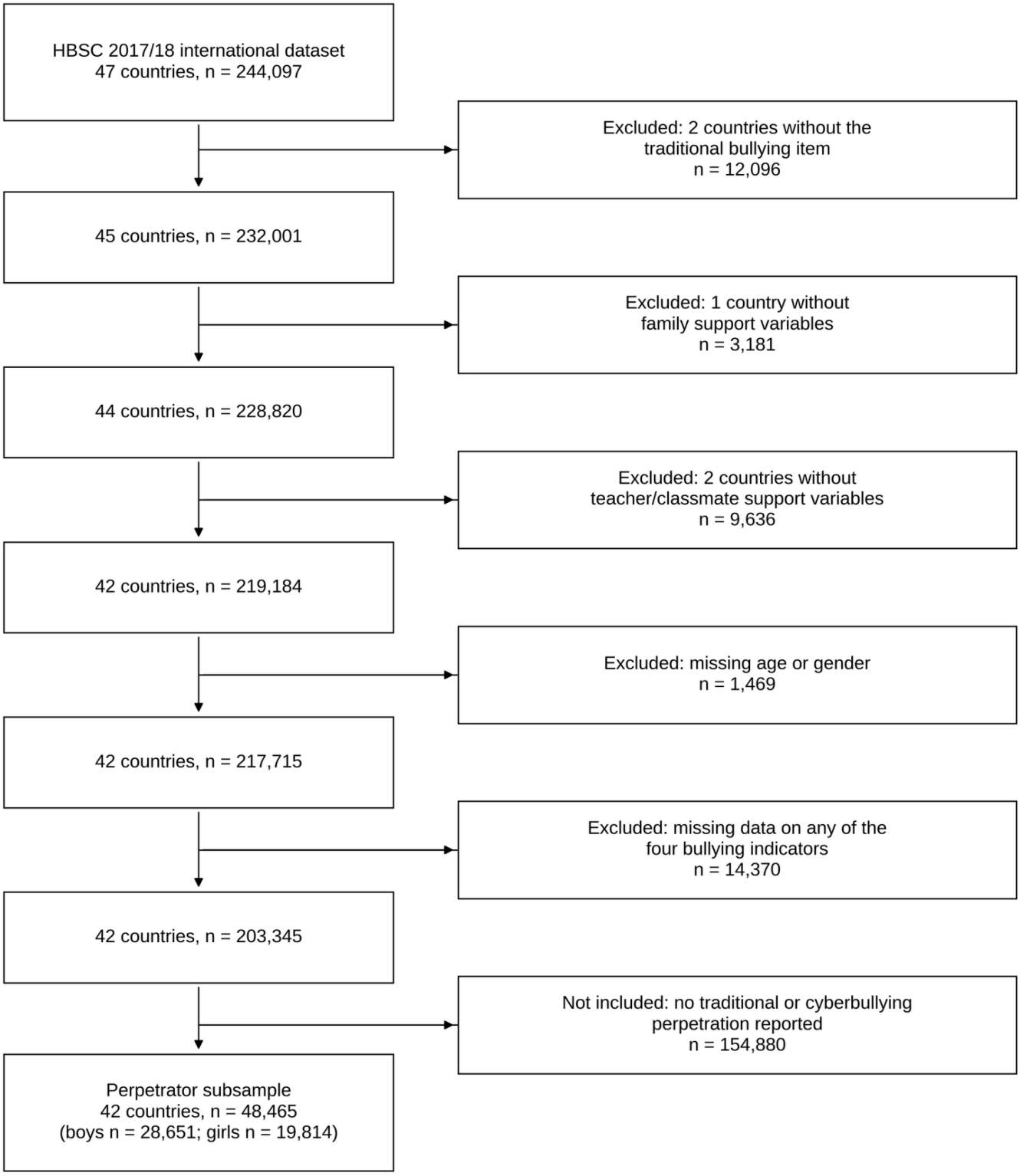


Figure 1

Sample Flow of the Study

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