A Comparison of Classification Approaches for Cyberbullying and Traditional Bullying Using Data From Six European Countries

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Abstract

In recently published studies on cyberbullying, students are frequently categorized into distinct (cyber-)bully, and (cyber-)victim clusters based on theoretical assumptions and arbitrary cutoff scores adapted from traditional bullying research. The present study identified involvement classes empirically using latent class analysis (LCA), to compare the classification of cyber- and traditional bullying and to compare LCA and the conventional approach. Participants were 6,260 students (M = 14.8 years, SD = 1.6; 49.1% male) from six European countries. LCA resulted in three classes for cyberbullying and four classes for traditional bullying. Cyber- and traditional bullying differed from each other, as did LCA and the conventional approach. Country, age and gender differences were found. Implications for the field of traditional and cyberbullying research are discussed.

KEYWORDS cybervictimization, cyberbullying, bullying, latent class analysis, cross-national data, classification

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Introduction

The body of literature on cyberbullying has increased very rapidly over the last decade. Cyberbullying is conceived as a form of aggression using electronic or digital media for repeated hostile communications to intentionally harm others (cf. Tokunaga, 2010). Prevalence rates range from 6% to 72% for victimization and from 4% to 36% for perpetration (cf. Suzuki, Asaga, Sourander, Hoven, & Mandell, 2012). Reviews of international studies found mean prevalence rates of 24% for victimization and 16-18% for perpetration (Patchin & Hinduja, 2012; Suzuki et al., 2012). These or similar (e.g., national) rates often provide the basis for demands for action, intervention, and prevention approaches.

Cyberbullying research developed from traditional bullying research, which already provided decades of findings when cyberbullying research first emerged in the early 2000s (cf. Smith, 2010). Thus, research questions were often inspired by what was already known about traditional bullying which is commonly defined as repeated, intentional aggressive behavior by a group or individual against a victim who cannot easily defend him- or herself (Olweus, 1993). Recently, there has been debate about whether cyberbullying is just a subtype of traditional bullying, and distinctive features have been highlighted repeatedly (for specific features see e.g., Li, Smith, and Cross [2012]). Besides, studies have shown that cyberbullying instruments do not show the same factor structure as instruments for traditional bullying. A measure specifically designed for the cyber context by Law, Shapka, Hymel, Olson, and Waterhouse (2012) found that the traditional bullying items loaded on two distinct factors (one for bullying and one for victimization), while all the cyberbullying and cybervictimization items loaded on one factor, a single “cyberbullying/victimization” factor. Further analyses revealed that this factor could be subdivided into “aggressive messaging”

and “embarrassing pictures,” but that perpetration and victimization were still inextricably linked. Menesini, Nocentini, and Calussi (2011) obtained similar results and found cyberbullying (including cybervictimization) to be unidimensional and continuous regarding severity. Nonetheless, the conventional classification approach for traditional bullying has often been transferred to cyberbullying resulting in the common classes of “victim,” “bully,” “bully-victim,” and “noninvolved.” In this approach, a cutoff score is set either if at least one item fulfills a predefined frequency (e.g., “2-3 times a month”) or when a total score exceeds a group-based standardized magnitude such as one standard deviation above a school class’s mean (cf. Nylund, Bellmore, Nishina, & Graham, 2007).

There are no previous studies using latent class analysis (LCA) to examine subtypes of cyberbullying involvement and only a few on peer harassment and peer victimization in general. LCA is a person-centered and model-based method assigning individuals to similar patterns across a set of responses while keeping the distinction between groups high. Wang, Iannotti, Luk, and Nansel (2010) included cybervictimization as one possible form of peer victimization along with forms of traditional peer victimization to identify subtypes of peer victimization in general and found the classes “nonvictims,” “all-type victims” (including cybervictimization), and “verbal/relational victims” (not including cybervictimization). However, victimization through cyberbullying was assessed using two global items, which were then collapsed into one dichotomous indicator. Another study including a global cyberbullying item as just one indicator of more comprehensive peer victimization found the classes “low victimization/normative,” “high verbal, physical and relational victimization” (including cybervictimization), “verbal and physical” (not including cybervictimization), and “verbal and relational” victimization (not including cybervictimization) for middle school students (Bradshaw, Waasdorp, & O’Brennan, 2013). The reported studies focused on victimization and therefore did not examine the validity of the common four conventional

involvement groups. Regarding these, results from the few existing studies integrating both victimization and perpetration of general peer harassment are inconsistent and are only able to partly replicate the four conventional classes (e.g., Lovegrove, Henry, & Slater, 2012). Others found either a five-class solution, which differentiated bully-victims further (Giang & Graham, 2008), or a three-class solution with no exclusive bully class (Williford, Brisson, Bender, Jenson, & Forrest-Bank, 2011). So the ecological validity of the theoretical conventional classes is still unclear and the transferability of this predominant classification approach to cyberbullying data also lacks empirical support.

Apart from examining classes of cyberbullying involvement, the present study included the demographic variables age, gender, and country. Previous studies have shown cyberbullying to peak in middle school (e.g., Ortega, Elipe, Mora-Merchán, Calmaestra, & Vega, 2009) and then to constantly increase through high school (Patchin & Hinduja, 2012) or to just constantly increase across grade (Görzig & Ólafsson, 2013; Wolak, Mitchell, & Finkelhor, 2007). Results on gender differences are mixed, but a review of international empirical studies showed girls more likely to be victims and boys more likely to be perpetrators (Patchin & Hinduja, 2012). Country differences have rarely been reported because very few cross-national studies have been conducted so far. Ortega and colleagues (2012) as well as Genta et al. (2012) reported differences in the involvement classes between Spain, Italy, and the United Kingdom (using the same study sample). Specifically, Genta et al. (2012) included 5,862 12- to 16-year-olds from Spain, Italy, and the UK, which were about evenly distributed across gender and year groups. They found Italian adolescents to be victims of cell phone bullying significantly more often than Spanish youths and girls more likely to be victims than boys. In contrast, they found more boys to perpetrate bullying by both cell phone and Internet, Italian participants to do so more than the Spanish adolescents, and these more than the UK students. Potential between-country gender differences were not

reported. Further, the authors did not find age differences between Grades 8, 10, and 12. Lobe, Livingstone, Ólafsson, and Vodeb (2011) found country differences in victimization rates across 25 European countries in the EU Kids Online study, which used a stratified sample of 1,000 9- to 16 year-olds from a more comprehensive sample of over 25,000 children. The rates of six of the 25 countries are of special interest because they are also represented in the present study: 8% of UK participants reported being cybervictims, which is above the average of 6% across all 25 countries, while Poland (6%), Germany (5%), Spain (4%), Greece (4%), and Italy (2%) showed average or well below average rates of cyberbullying victimization. Among these six European countries, gender of the participant was a significant predictor only in Spain, where girls were more likely to be victims of cyberbullying. The authors found no age differences.

The Current Study

In this article we examined whether the reported previous arbitrary classifications can be replicated empirically and whether there are differences in classification groups between cyberbullying and traditional bullying. The research objectives were therefore (a) to identify classes of cyberbullying involvement with empirical methods (more specifically with LCA), (b) to replicate the conventional classes of traditional bullying, (c) to compare extracted classes between cyber- and traditional bullying, (d) to compare the LCA and the conventional approach, and (e) to investigate the influence of the demographic variables gender, age and country on class membership.

Based on the findings from general peer harassment literature, we expected four classes for traditional bullying: (a) noninvolved students; (b) victims who are solely targets of bullying incidents; (c) bullies who are solely perpetrators of bullying incidents; and (d) bully-victims who experience, but also perpetrate bullying. Following the arguments of some researchers who claim cyberbullying to be a subtype or an extension of traditional bullying

(e.g., Olweus, 2012) we would expect these same classes to also emerge for cyberbullying. However, as mentioned before, the structure of cyberbullying behavior may differ. Therefore, the examination of cyberbullying classes is exploratory and we do not have specific hypotheses regarding the number and meaning of classes.

Method

Procedure

The present data were collected as part of the European Cyberbullying Intervention Project (for more information see also www.bullyingandcyber.net/en/ecip/project). Only cross-sectional data from the first measurement wave (collected between January and March 2011) before interventions were implemented on the national level were used for the present analyses. In line with national regulations, passive or active parents' consent as well as active students' consent was obtained before data collections, which were conducted by trained test instructors using paper questionnaires during regular school lessons. Prior to questionnaire administration students were informed that the questionnaire was anonymous, the participation in the study was voluntary and that they could withdraw at any time without any foreseeable consequences.

Participants

In total, 6,328 students from six European countries took part in the present data collection wave. Sixty-eight students (1.1%) were excluded from the sample due to missing values on all items of at least one of the subscales, because these could not be estimated by full information maximum likelihood. This left a final sample of n = 6,260 participants for the subsequent analyses. Participants were distributed across the different countries as follows: 16.0% (n = 1,002) from Poland, 14.2% (n = 892) from Spain, 27.1% (n = 1,697) from Italy, 12.3% (n = 771) from the United Kingdom, 14.3% (n = 895) from Germany, and 16.0% (n = 1,003) from Greece. Forty-nine percent of participants were male, 49.9% were

female and 1.1% did not indicate their gender. The students' age ranged from 11 to 23 years (M = 14.8, SD = 1.6). All students attended the national equivalent of high school, secondary school, or vocational school. The specific sample characteristics for each country can be found in Table 1.

[TABLE 1]

Measures

Apart from demographic background variables such as gender and age, cyberbullying and cybervictimization as well as traditional bullying and traditional victimization were assessed across all countries using the European Cyberbullying Intervention Project Questionnaire (ECIPQ; Brighi et al., 2012). This questionnaire used 12 items each to measure cyberbullying and cybervictimization. Due to ambiguity one item was deleted from each of these scales leaving 11 items each to measure perpetration of and victimization through cyberbullying. Students were asked to answer on a five-point scale (1 = *no* to 5 = *yes, more than once a week*) whether they had experienced or taken part in any of the listed behaviors during the previous two months either online or through cell phones (see Table 1).

Traditional bullying and victimization was also assessed using the ECIPQ, which operationalized each of these scales through seven items (see Table 2). Corresponding to cyberbullying, students were again asked to answer on a five-point scale (1 = *no* to 5 = *yes, more than once a week*) whether they had experienced or taken part in any of the listed behaviors during the previous two months.

For the present analyses, answers were trichotomized into *no/not at all* (coded as 0), *only once or twice* (coded as 1), and *at least 2-3 times a month* (coded as 2 in the subsequent LCA). The rationale for this approach was to provide results comparable to as large a number of studies as possible as the cutoff scores for classification across studies vary between *only once or twice* and *at least 2-3 times a month.* Also, it is still under debate, whether some

behaviors can already be understood as cyberbullying although they only happen once (e.g., Langos, 2012).

[TABLE 2]

Data Analysis Plan

A Latent Class Analysis (LCA) was conducted using Mplus 7.1 statistical package (Muthén & Muthén, 1998-2012) to identity patterns of victimization and bullying behavior.

The three-step approach was applied as the model included covariates. This stepwise approach starts with the model building process using a set of items, then it assigns individuals to the latent classes and finally estimates a multinomial logistic regression model (for more information see Vermunt, 2010).

In a series of analyses, successive LCA models with ascending number of classes were examined and then model selection was determined by evaluating underlying statistical evidence in cooperation with theoretical assumptions (Nylund et al., 2007). Subsequently, the appropriate number of latent classes was based on statistical criteria, which included log-likelihood value, Akaike information criterion (AIC), Bayesian information criterion (BIC), the sample size-adjusted Bayesian criterion (aBIC), and Bootstrap Likelihood Ratio Test (BLRT). Furthermore, the entropy and posterior probabilities for each model were examined. For models with similar levels of goodness of fit, the conceptual evidence and class interpretability were considered and the simpler model was chosen (Nylund et al., 2007; Waasdorp & Bradshaw, 2011). LCA was run separately for cyberbullying and traditional bullying to determine the number of latent classes for each of those concepts. This approach was chosen because a comparison between the structures of the two phenomena was of interest while conclusions about the co-occurrence of traditional and cyberbullying were not an objective of the present study. Another reason was the model fit: when including all items of all four constructs (cyberbullying perpetration, cyberbullying victimization, traditional

bullying perpetration, and traditional bullying victimization) the statistics program was not able to replicate the model sufficiently often indicating a lack of stability and too many parameters. Nevertheless, an exploratory factor analysis with all items has shown the constructs to be distinct except for two out of 36 items. After the best-fitted model was found, demographic differences between latent classes were examined using multinomial logistic regression. Specifically, we investigated whether country, age, or gender were associated with class membership.

For all analyses, a sandwich estimator was utilized to adjust for standard errors to account for the nesting of students within schools. Cases with missing at random (MAR) on some bullying items were included through estimation by full information maximum likelihood. Missing data for cyberbullying ranged from a low of 1.7% for victims of insults (for traditional bullying 1.7% for victims of physical bullying) to a high 3.3% for Photoshop perpetrators (for traditional bullying 4.8% for perpetrator of spreading rumors)

Results

The results are presented in three parts. First, the LCA results are provided, highlighting the structure and the number of classes for each bullying concept. Second, latent classes for cyberbullying are compared to the conventional method of assigning individuals. Finally, covariates (i.e., gender, age, country) are explored and tested for differences between latent classes.

Model Selection and Number of Classes

Table 3 provides details on fit information (i.e., AIC, BIC, aBIC, log-likelihood values) with an increasing number of classes for cyber- and traditional bullying. Inspection of the fit indices suggests a three-class model for cyberbullying and a four-class model for traditional bullying best fit the data as fit indices began to level off after the optional classes. The entropy of the three-class cyberbullying and the four-class traditional bullying model was

.87 and .81, respectively. Average posterior probabilities for the membership in each latent class were high (> .85). The Bootstrap Likelihood Ratio Test provided a significant *p*-value indicating a good fit. In addition, interpretation of classes was demonstrated to be meaningful and congruent with theoretical deliberations.

[TABLE 3]

The item probability distribution for each latent class of cyberbullying is shown in Figure 1. For cyberbullying, *noninvolved* individuals comprised 70.1% of the sample (Figure 1a). Further, two more classes were extracted (see Figures 1b and 1c): *Bully-victims* were present with 26.1% and showed a high probability of endorsing the verbal cybervictimization and cyberbullying items and relational cyberbullying items. About 4% of participants belonged to the *perpetrator with mild victimization* class. Participants endorsed high levels of cyberbullying, specifically verbal attacks, threats, stealing, and altering personal information. Cybervictimization was only mildly pronounced compared to cyberbullying.

For traditional bullying, *noninvolved* individuals, the biggest class of participants, comprised 43%. Thirty-four percent of participants belonged to a *mild bully-victim* class. Participants in this class endorsed high levels of verbal victimization (e.g., insults, speak ill, rumors) and relational bullying (e.g., exclusion). Members of the third class for traditional bullying (12.3%) had a relatively high probability of endorsing bullying items. This *mainly perpetrator* class showed high levels of physical bullying, verbal, and relational bullying. Perpetrators experienced comparatively lower levels of victimization. Eleven percent of participants showed *bully-victim behavior with a focus on victimization*. Members of this class had high probabilities of endorsing verbal, relational, and physical victimization items.

[FIGURES 1a, b, c]

Comparison of Classification Approaches

In the next step, the results of the typical classification method was compared to the

LCA models by assigning students to one of four groups using the raw score. Students with a minimum of a one-time incident for any (cyber-)victimization item were labelled as *victim*, students with a minimum of a one-time incident for any (cyber-)bullying item were labelled as *bully*, students with a minimum of a one-time incident for any victimization and any bullying item were labelled as *bully-victim* and students with no incidents were labeled as *noninvolved*.

Students labeled as *noninvolved* were comprised of 41.0% of participants. The *bully-victim* and the *victim* group was comprised of 24.2% and 26.8%, respectively, and the *bullies* group was the smallest with 8.1%.

Finally, latent classes and the conventional groups were examined for overlapping classifications. Table 4 shows the percentage of overlap between classifications for cyberbullying. Of those classified as *bully-victims* by LCA, 67.2% were also classified as such by the conventional approach. However, the other 32.8% of LCA-classified *bully-victims* were categorized as *victims* and *bullies* by the conventional method. About 90% of *perpetrators with mild victimization* classified by the LCA were *bully-victim* with the conventional approach. In turn, none of the students classified as *noninvolved* by the conventional approach was classified otherwise by the LCA. Looking at the classes of the conventional approach, large proportions of involved students were classified as *noninvolved* by the LCA (75.0% of conventional *victims*, 17.3% of conventional *bully-victims*, and 77.6% of conventional *bullies*).

[TABLE 4]

Relation Between Class Membership and Demographics

Gender, age and country were included as covariates to investigate the presence of differences among LCA classes.

We examined if boys or girls were more likely to be in a certain cyberbullying class.

The *noninvolved* class was used as the reference group. The analysis of cyberbullying indicates that there were significant gender differences between the *noninvolved* and the other two classes. The odds of belonging to the *bully-victim* class compared to the *noninvolved* class was lower for boys (OR = 0.47), but for belonging to the *perpetrator* class compared to the *noninvolved* class was higher for boys compared to girls (OR = 1.19).

An investigation of age differences indicated that compared to the *noninvolved* classes, students in all other classes were significantly older.

Differences in country of data origin were visible. The between-country differences for cyberbullying were as follows: In Greece, the odds of belonging to the *perpetrator with mild victimization class* compared to the *noninvolved* class were higher compared to all other countries except Poland. Students from Germany were significantly less likely to belong to the *perpetrator with mild victimization* class compared to the *noninvolved* class in comparison to all other countries (OR = 0.26 in reference to Greece). In Italy, the odds of belonging to the *bully-victim* class compared to the *noninvolved* class were higher compared to all other countries and especially the UK (OR = 0.36).

Discussion

To date, the present study is the first to conduct a latent class analysis on cyberbullying and cybervictimization data with multiple behavioral items. The goals were to apply the LCA method to classify students into classes based on their endorsement in an array of cyberbullying behaviors. Additionally, the results of the LCA are used to illustrate an alternative method to classify individuals into groups. The specific research objectives were to (a) identify classes of cyberbullying involvement using empirical data and statistical methods, (b) to examine whether the conventional theoretical classes of traditional bullying involvement can be empirically replicated, (c) to compare the LCA-based classifications of cyber- and traditional bullying, and (d) to compare the LCA-based classifications with the

conventional classification. To this end, European data from six different countries was used and the association between class membership and the demographic covariates gender, age and country of data origin were examined.

Classification of Cyberbullying Involvement

Contrary to previous beliefs that cyberbullying is a subtype of traditional bullying (Olweus, 2012) and in line with studies showing structural differences to traditional bullying (Law et al., 2012; Menesini et al., 2011) we did not find a four-class solution with *bullies*, *victims*, *bully-victims*, and *noninvolved* individuals. Instead, a model with three classes *noninvolved*, *bully-victims*, and *perpetrators with mild victimization* exhibited the

This lack of an exclusive victim class was surprising, but might be explained with specific characteristics of the cyber context. For example, the online disinhibition effect which describes the phenomena of people sharing more information online or acting out more intensely than they would in real life (Suler, 2004) is facilitated by anonymity, invisibility and status equalization, among others. Possibly, victimized individuals lash back at their aggressors more easily than in real life where there is an actual status and strength difference between the involved parties. The lack of a clear “victim” class is further in line with numerous studies, which found substantial overlap between perpetration and victimization in cyberbullying (c.f. Kowalski, Guimetti, Schroeder, & Lattanner, 2014). At the same time, the *perpetrator with mild victimization* class indicates that perpetrators are not free of victimization experiences themselves as has been found also for traditional peer harassment (Giang & Graham, 2008). A distinct conventional perpetrator class might underestimate the psychosocial strain of cyberbullying perpetrators or misattribute indications of such strain to their perpetrator status instead of to their (albeit low-level) victimization experiences. Ignoring these experiences under the conventional classification approach may ignore important indications for theoretical assumptions regarding the etiology of cyberbullying

perpetration. In this line, it is noteworthy that in the *perpetrator* class the probabilities are much higher to perpetrate and experience frequent acts than in the *bully-victim* class, which predominantly shows medium probabilities of verbal (e.g., insults, speak ill) and relational (e.g., exclusion) acts. This has important practical implications.

Classification of Traditional Bullying Involvement and Comparison with Cyberbullying Classes

For traditional bullying, the LCA identified four classes. A five-class solution would also have been fitting, but was rejected because of very low proportions and interpretation difficulties. Based on statistical indicators and theoretical deliberations the simpler four-class model was favored. The four classes identified were: *noninvolved*, *mild bully-victims*, *bully-victims*, and *mainly perpetrators*. There was a lack of a clear *victim* class and the two *bully-victim* classes seem a mixture of behavior-oriented and severity-oriented classes such as the classes found by Wang and colleagues (2010) and Nylund and colleagues (2007).

A comparison of the results of the LCA for cyberbullying and traditional bullying must be met with caution due to methodological differences such as the different number of items as well as differences in their content. Nonetheless, a prominent difference is the number of extracted classes. More important differences, however, concern the interpretation of the classes as well as the proportions. *Perpetrators* in cyberbullying are less common (about 4%), but commonly report victimization experiences at least to a low-frequency extent, while there are three times more *perpetrators* in traditional bullying who report low probabilities of being victimized themselves. The *mild bully-victim* class in traditional bullying and the *bully-victim* class in cyberbullying are to some extent comparable, especially regarding the types of behaviors reported (verbal and excluding behaviors); with proportions of 33.5% and 26.1%, respectively, they are the most common classes of involved individuals. The remaining results of the LCA, however, indicate structural differences and lead to the

assumption that there might also be differences in motivation for the behaviors (e.g., retaliation in cyberbullying).

Comparison with Conventional Classification

The cross-tabulations of class memberships according to the two different approaches (LCA vs. conventional cutoff score classification) show a good detection of noninvolved students. None of the conventional uninvolved individuals was classified as involved by LCA. Conversely, partly high proportions of involved students according to the conventional approach were classified as noninvolved by LCA. This might be due to the relatively low threshold we used for the conventional approach. However, both approaches were comparable as the LCA also included a low-frequency response category. Classification as *bully-victims* showed high consistency across both approaches and the majority of those classified as *perpetrators* by LCA belonged to the conventional *bully-victim* class. Nevertheless, compared to conventional classification, LCA produced lower rates of involvement, indicating that conventional classification overestimates involvement (only 57% of *noninvolved* in LCA were also *noninvolved* according to conventional classification). The conventional approach is too sensitive regarding single items, especially in the way it was used in this study insofar that single items lead to a classification as involved, while for LCA this was insufficient.

The decision about which approach to use in future studies needs to be informed by sound theoretical assumptions and solid arguments, bearing in mind the respective research objectives. In light of the present results, it does not seem advisable to hold on to classes neglecting that, for example, *perpetrators* also experience (infrequent) victimization.

Association of Class Membership with Covariates

Analyses of demographic covariates showed gender, age, and country differences. In line with the findings of Patchin and Hinduja (2012), girls were more likely to belong to the

bully-victim class of cyberbullying. Looking at the predominant behaviors in this class it is not surprising, as members are mainly victimized through and perpetrate by saying nasty things to the victim's face or behind the victim's back as well as excluding the victim. These behaviors have previously been proposed (Crick & Grotpeter, 1995)—but in part already disproved (Scheithauer, Haag, Mahlke, & Ittel, 2008)—to be typical female forms of aggression. Also consistent with Patchin and Hinduja (2012), boys were *perpetrators* more often. This replicates often reported gender differences and numerous theories that boys are generally more aggressive. However, the result could possibly also be ascribed to gender stereotypes or social desirability where boys simply report less victimization, because it does not fit into their gender identity; for example, in a study on the impact of cyberbullying boys more often claimed to not be affected by it (Ortega et al., 2009).

Age differences indicate greater cyberbullying involvement with increasing age. This is also in line with research reported earlier. Reasons might be improved media-related skills, higher probabilities of being equipped with the respective technology, but also less parental monitoring of media-related activities with increasing age.

Membership in one of the two involvement groups of cyberbullying is also associated with the country where the respective data were collected. Greece and Poland had the highest odds for involvement as a *perpetrator* while Italy showed the highest and Germany the lowest odds for an individual being a *bully-victim*. The reasons for these differences can be manifold. The EU Kids Online study (Livingstone, Haddon, Görzig, & Ólafsson, 2011), for example, showed that adolescents in Poland have Internet access in their own bedroom at home considerably more often than in Germany. Descriptive analyses of the present data also showed that adolescents from Poland report the highest daily Internet use and German adolescents report the lowest. Another possibility is an age x country interaction, as the mean age of participants differed among the participating countries and age could function as a

confounding variable in the present country differences.

Limitations and Outlook

As mentioned before, the present study is the first to analyze classes of cyberbullying using LCA and no knowledge existed in this field to build on; it was necessary to draw from traditional bullying and peer harassment research where studies using LCA are also still scarce and even fewer include both victimization and perpetration.

As cross-national comparisons are always difficult, one limitation is the different mean ages of the various European samples. Also, the different sample sizes might have influenced the results through different weights. In the future, latent classes should be compared across countries in the way we have compared the results of LCA between cyber- and traditional bullying. Possibly, the class structure differs across countries, although the satisfactorily fitting model in the present study suggests otherwise. We were also not able to include country x media use interactions as a statistical term in the present study due to parameter constraints.

Some limitations pertain to the general method of LCA. For example, it is noteworthy that LCA classified some individuals as *bully-victims* who were not identified as such by the more sensitive conventional approach. Theoretically, any individual with a positive answer on both victimization and perpetration would automatically have been classified as a conventional *bully-victim*. This phenomenon can be ascribed to the statistical specificities of the LCA method, which is based on probability values and not absolute scores. Further, if a victim's profile on the victimization items is similar to a bully-victim's, he or she will be assigned to the respective class. Interpretation of this is difficult and needs further investigation. For example, this might be an indicator of social desirability effects on the perpetration scale. Also, this might indicate whether this individual has been or will become a perpetrator later on. Allocation to a specific class based on probabilities might then possibly

have predictive value for cyberbullying careers. Another interpretation might be that this effect can be solely attributed to statistical reasons. Moreover, classes that emerge in LCA might be dependent on the specific items and the number of items so that extracted classes could differ between samples. For adequate representations of the characteristics of involved individuals it is still advisable to use this method of post-hoc classification (Giang & Graham, 2008) rather than possibly misclassifying individuals.

We have not reported on the discriminatory power of the single items here. However, these analyses might be helpful in reducing the length and optimizing the discriminatory power of existing assessment instruments. Preliminary views of these data suggest some items were irrelevant for discriminating between the extracted classes. Removing such items from future analyses might enable the inclusion of further covariates by raising the degrees of freedom and loosening the parameter constraints.

Also, the present classes should now be examined regarding meaningful adjustment problems and other outcomes. Longitudinal data should be collected to assess the stability of the extracted classes over time and developmental stages.

Nonetheless, the present study is the first of its kind to analyze the specific structure of the cyberbullying concept. It used a statistical method based on answer patterns and probabilities rather than predefined cutoff scores. We were able to show that traditional and cyber bullying differed in their structure and that the conventional classification approach using cutoff scores overestimates the prevalence of cyberbullying. Our study provides first insights into the profiles of involvement groups based on a large sample with students from six different European countries that can inform future intervention and prevention efforts.

Competing Interests

The authors report no known competing interests.

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Table 1

Sample Characteristics for Each Country

Country	*N* of schools	*N* of pupils	Age Mean	% Female
Poland	8	1,002	14.1	49.3
Spain	3	892	13.8	45.7
Italy	15	1,697	16.4	54.5
UK	5	771	15.1	41.8
Germany	5	895	13.5	51.4
Greece	13	1003	14.9	50.8
Total	49	6,260	14.8	49.9

Table 2

Behaviors Assessed for the Measurement Cyberbullying and Traditional Bullying (and Their Respective Number for Later Reference in the Diagrams)

Cybervictimization / Cyberbullying	Traditional victimization / Traditional bullying
Say nasty things or call someone names using texts or online messages (Insults)	Hit, kick or push (Physical)
Say nasty things about someone to others either online or through text messages (Speak ill)	Say nasty things or call someone names (Insults)
Threaten through texts or online messages (Threats)	Say nasty things about someone to others (Speak ill)
Hack into someone's account and steal personal information (Data theft)	Threaten (Threats)
Hack into someone's account and pretend to be that person (Impersonation)	Steal or damage others' belongings (Theft / Damage)
Create a fake account pretending to be that person (Fake account)	Exclude or ignore others (Exclusion)
Post personal information of others online (Exposure secrets)	Spread rumors about others (Rumors)
Post embarrassing videos or pictures of others online (Exposure pictures)	
Alter pictures or videos of others they had posted online (Photoshop)	
Exclude or ignore others in a social networking site or internet chat room (Exclusion)	
Spread rumors about others on the Internet (Rumors)	

Note. Key terms in parentheses indicates reference key term in Figure 1.

Table 3

Latent Class Analyses Fit Indices for Cyber- and Traditional Bullying (N = 6,260)

No. of classes	AIC	BIC	aBIC	Log-likelihood
		Cyberbullying		
2 classes	80134.368	80734.400	80451.582	-39978.184
3 classes	**76863.859**	**77767.385**	**77341.568**	**-38297.929**
4 classes	75904.588	77111.395	76542.580	-37773.294
5 classes	75231.573	76741.767	76029.954	-37391.787
		Traditional bullying		
2 classes	108130.457	108514.748	108333.617	-54008.229
3 classes	104879.994	105459.801	105186.515	-52353.997
4 classes	**103000.936**	**103776.350**	**103410.911**	**-51385.468**
5 classes	101873.754	102844.592	102386.999	-50792.877

Note. AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; aBIC = Adjusted BIC. Bolded classes indicate the best-fitting model.

Table 4

Comparison of the LCA Approach to the Conventional Classification Method for Cyberbullying (N = 6,260)

Conventional classification method (%)	Latent classes for cyberbullying (%)		
	Noninvolved	Bully-victims	Perpetrators with mild victimization
Noninvolved	57.4	0.0	0.0
Victims	28.1	26.4	3.8
Bully-victims	5.8	67.2	90.2
Bullies	8.7	6.4	6.0

Latent classes for cyberbullying (%)	Conventional classification method (%)			
	Noninvolved	Victims	Bully-victims	Bullies
Noninvolved	100.0	75.0	17.3	77.6
Bully-victims	0.0	24.4	68.8	19.8
Perpetrators	0.0	0.5	13.9	2.8

Figure Caption

Figures 1a-c. Item probability profile plots for each class of cyberbullying. Plots contain three response categories: never, once or twice, and more than 2-3 times a month (corresponding to dark to light shading) (N = 6,260).