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Preliminary Psychometric Evidence for Evaluating Bullying Behavior in School Environments

Abstract

This work reports a preliminary psychometric evidence done through an exploratory factor analysis (EFA) whose main objective is to study and better comprehend psychometric qualities underlying the bullying behavior in school environments. We define bullying as recurring aggressive behavior of a person or a group to harm, disturb and trigger stress to a victim who is frequently physically, mentally or socially more fragile in comparison with the bully. We also coin here a term “school-based bullying” to designate bullying by school staff (for instance, teachers and school administrators) towards students and by students towards the school staff. Even though school-based bullying might not seem as prominent as peer-bullying or cyber-bullying, its effect is twofold: 1) considering students, it has great effect on the development of their academic success, their mental health, and can lead to educational disruption and early drop-outs from schools; 2) regarding the bullying effect of students on teachers (and other school staff members), it can also be devastating, given that these staff members frequently suffer from increased stress and depression, reduced motivation and expectations, and low self-esteem. Therefore, school-based bullying is an important problem that can not only have a great effect on our junior population (by suffering direct bullying from school staff members and indirectly, as a consequence of inability/lack of motivation of teachers to play the right educational role in their lives), but also on school staff members (such as verbal, psychological, physical, and even sexual violence), that unfortunately receives inadequate attention in our society. Hence, this work proposes an instrument to adequately study the school-based bullying problem. The construction validity of the developed instrument was examined via EFA for a sample of 456 participants. Results of

this analysis supported a two-factor solution consisting of 20 items which accounted for 46.4% of the variance. The instrument exhibited an excellent overall internal consistency both for the entire instrument (McDonald's $\omega = 0.92$) and all sub-scales (Cronbach's $\alpha > 0.87$). The performed study adds to the evidence that the developed instrument is an appropriate evaluation tool allowing the rigorous assessment of school-based bullying.

Keywords: Exploratory factor analysis; preliminary psychometric evidence; scale development; school-based bullying; student-teacher bullying.

Introduction

Bullying is defined as recurring aggressive behavior of a person or a group to harm, disturb and trigger stress to a victim who is frequently physically, mentally or socially more fragile in comparison with the bully, and has progressively become a pertinent issue in past years (Pells et al., 2016, p. 1; Maunder and Crafter, 2018, p. 13; Hoff and Mitchell, 2009, p. 654; Morrison, 2002, p. 1; Salmivalli, 2020, p. 112; Kaluarachchi et al., 2020, p. 1). Even though preceding analyses and prevention programs commonly centre on peer and/or cyberbullying, bullying can also be exhibited in numerous additional forms. The kind of bullying that we refer to as school-based bullying, that occurs amongst students and school staff members has not been satisfactorily addresses nor was it paid enough consideration in the literature; thus, it is the main focus of this work, since this type of bullying can harm significantly the school environment. In terms of students, the project KA220-SCH-D362F8ED, entitled Preventing School-Based Bullying by Creating Early Prevention Programme (PProtoTYPE), tackles bullying issues and strives towards creating a nonviolent school atmosphere by supporting pupils throughout their instruction. To achieve this goal, the project tends to involve its first priority within the scope of the Erasmus+ Programme Guide and establish distinctive toolsets to deal with school absence and premature school drop outs. According to the Organization for Economic Co-operation and Development's (OECD's) 2017 document based on 2015 the Program for International Student Assessment's (PISA's) results, in Poland 10.7 of students provided that they have been regularly and frequently bullied in schools and 21% state that they have been bullied at least once. These rates were 8.8 and 18.8% in Turkey, 6.8 and 14.7 in Ireland, 7.2 and 18.5% in Belgium, and 5.7 and 11.8% in Portugal, respectively. According to a new OECD report, on the other hand, these rates have an increase of approximately 4 points overall across Europe (Schleicher, 2020, p. 5).

Furthermore, a study by the European Commission in Eurydice Reports shows the rate of absenteeism is 32.7% in high schools, 25% in secondary schools, and 18% in elementary schools. Considering the student population in partner countries (Italy, Poland and Turkey), these rates refer to enormous numbers of student absence in their schools.

Compared to figures from 2009, early leaving from education and training (ELET) rates have declined in the majority of countries. In more than half of European countries, ELET ratios are presently under the Europe 2020 lead goal of 10%. Nevertheless, in Hungary, Sweden, Poland, Croatia, Romania, and Slovakia, ELET rates have marginally raised as of 2009; still, the rates in Poland, Croatia, Sweden, and Slovakia stayed inferior to 10% in 2013. Additional 15 countries have ELET ratios below 10%. Some countries, regardless of experiencing ratios superior to 10%, have made major advances as of 2009. These countries include Portugal, Malta and Spain, where a reduction greater than 6% can be observed in terms of ELET rates (Eurydice, 2014, p. 7). These data show how vital is to tackle school absenteeism and early drop-outs and to create a safe school environment for students. Thus, the PRotoTYPe project has been created to develop tools to prevent school-based bullying from happening.

Towards the end of 2018s, numerous analyses testified that bullying in schools is present not only between students, but among students and teachers, reporting that sometimes target their teachers, even though teachers are adults. According to a questionnaire conducted in Turkey (Özkılıç and Kartal, 2012, p. 3435), 67.4% of teachers were exposed to verbal violence, 19.6% were exposed to physical violence, 12.9% were exposed to psychological violence and 0.1% were exposed to sexual violence and bullying. Moreover, based on the findings of the needs analysis carried out on 104 students for the purposes of this project, it was determined that the students were bullied by their teachers. The needs analysis from our partner schools and cooperation on the stage of preparing the project (gathering and sharing data, exchanging opinions and ideas between partners) revealed that there is an urgent need to tackle the growing problem of bullying, which during the pandemic period remains crucial (cyber- bullying, peer aggression, bullying during online learning, etc.). Hence, the bullying problem has evolved to an online form, even during the phase of remote education due to Covid19.

This work reports a preliminary psychometric evidence carried out via an exploratory factor analysis (EFA) with the intention to study and better comprehend psychometric qualities underlying the bullying in school-based environments. The proposed tool is developed such that it incorporates different types of bullying, such as physical-, verbal- and cyber-bullying, and was applied to the students of four secondary schools in three European countries: Italy, Poland and Turkey (two schools). Hence, intuitively, the items of the proposed scale were expected to load on a four factor-structure (comprehending four categories of questions considered in the applied questionnaire), due to their strong interrelationship. Even though there are some existing works on the topic of interest, most of them are related to peer bullying, and the new scale is introduced due to the necessity to further understand the actual reasons underlying the bullying behavior by students to school staff and vice versa. In total, 456 responses to the questionnaire were obtained and served as catalyst for the performed EFA.

Materials and Method

Study Design

The applied instrument comprised 26 items, responded using a 5-point Likert scale, a format considered appropriate for the considered age group (students between 14 to 19 years); we refer the reader to see Table 1. The answer format in the questionnaire ranged from 0 (never) to 4 (four or more times) and it consisted of four distinct parts. The first part was dedicated to student victimization, comprising 9 items that measured respondents' direct victimization suffered from teachers, i.e., the case where teachers act as bullies. The second part contained 9 items and it sought to evaluate student aggression towards teachers, i.e., the case where students act as bullies. The last two parts were designed to study cyber-bullying in school environments. Both parts were composed of 4 items whose aim was to analyze cyber-bullying (from both victimization and aggression points of view) towards/from students from/towards teachers, respectively.

Study Implementation

Participants in this study included 456 students ranging from the 1st up to 5th grades of secondary schools, in mixed schools located in three European countries: Italy, Poland, and Turkey. All considered schools are of urban-school type and their students mostly belong to the respective native-born population. The students' age group was between

14 to 19 years and they were inquired about bullying from teachers towards students and from students towards teachers. Even though some participants were under the age of 18 and since the questionnaire was answered voluntarily and anonymously, and considering that the study did not contain information that jeopardized any physical nor intimate integrity of the participants so that it did not deprive the participants of their protection in the eyes of the community, based on the assessment of the Ethics Committee of the Lusófona University, the research was carried out without needing a written informed consent from participants' parents/guardians. All four considered schools are of urban-school type and their students mostly belong to the respective native-born population.

The designed instrument was applied during the 2022/2023 school year in four schools: Istituto Tecnico Trasporti e Logistica "Euclide Caracciolo", Bari, Italy, Liceum Ogólnokształcące im. Wojska, Nowy Dwór Mazowiecki, Poland, Hasan Ali Yücel Anatolian School, Bursa, Turkey, and Bursa hürriyet Anadolu lisesi, Bursa, Turkey. The application was made through an online form, previously approved by the school administrations, with the support of teachers in each school. Before applying it, the form was first translated into the respective native language of each country. Moreover, questionnaire items were randomized before application, to control possible biases arising from sequential responses to items of the same competence.

Data Preparation and Statistical Analysis

Initially, descriptive statistics of the 26 items of the developed school-based bullying scale were performed: mean, standard deviation, minimum, maximum, skewness and kurtosis. Prior to the EFA the number of extracted factors was based on the parallel analysis (PA) method with data permutation (Timmerman and Lorenzo-Seva, 2011, p. 209). Afterwards, the EFA was performed with the minimum residual (MinRes) estimation method using a bivariate Pearson correlation matrix. The MinRes estimation method was chosen because it is suited best for slight multivariate normality violation, since it minimizes the complete residual matrix via an ordinary least squares (OLS) technique (the only difference between the two is that OLS employs the empirical first derivative, which produces slight latency) (psych, 2020, p. 1). The applied rotation method was oblique "geominQ", given our initial assumption that two or more factors (latent variables) are correlated (Bolt et al., 2016, p. 51). EFA factor loadings below 0.4 were

considered non-substantive and loadings ≥ 0.4 were considered substantive (Volker et al., 2016, p. 1). Items with low commonalities ($h^2 < 0.3$), non-substantive factor loadings or item ambiguity (factor loadings > 0.4 on at least two factors) were eliminated (Field, 2019, p. 33).

Regarding reliability, the internal consistency was analyzed based on Cronbach's alpha (α) and McDonald's omega (ω). Cronbach's alpha and McDonald's omega values > 0.7 are indicators of adequate consistency. A significance level of 5% was established for each statistical procedure. The analysis was conducted via JASP (Jeffreys Amazing Statistics Program) version 0.17.1 (JASP, 2023, p. 1). The main reasons for using JASP (over some other existing statistical software packages used for data analysis, such as SAS, STATA, R, M-PLUS, or SPSS) are that JASP is an open-source software designed with a user-friendly interface that is easy to navigate, and because it offers a wide range of interactive and publication-quality visualizations, which can help users better understand their data and present results effectively.

Results

Descriptive Statistics

Table 2 provides the descriptive statistics (mean, standard deviation (SD), minimum (Min), maximum (Max), skewness (Sk) and kurtosis (Kurt)) of the 26 items regarding school-based bullying for students from 1st to 5th year of Secondary Education in the considered three countries.

One can observe that the answers to items 2, 3, 4 and 24 presented an average value above 0.3, being item 2 ("A teacher has verbally insulted me.") and 4 ("A teacher called me mean names, made fun of me or teased me in a hurtful way.") those with the highest average response ($M = 0.519$ and $M = 0.363$, respectively). The lowest average response value was verified for item 25 ("I have threatened a teacher through instant messenger or Internet messages."). Items 2 and 24 were the two that showed the greatest dispersion in responses (respectively $SD = 0.894$ and $SD = 0.853$), while items 25 and 19 ("A teacher has said bad words to me or has insulted me using email or instant messenger (such as WhatsApp) or other electronic platforms.") presented the lowest dispersion ($SD = 0.364$ and $SD = 0.380$, respectively). All items presented responses with similar range of values. Regarding skewness and kurtosis, the values of the items vary significantly, showing

results between 2.035 and 9.416 for skewness, and 3.972 and 94.824 for kurtosis, indicating that the data set has heavy tails and outliers (Field, 2009, p. 33).

Construction Validity

Following the recommendations of (Hair et al., 2009, p. 50), the participant-to-item ratio was close to 20:1, hence EFA performance analysis was guaranteed. Note that this limited the study to the whole sample; splitting the sample into parts (for instance, by countries or gender) would severely reduce the participant-to-item ratio and was thus omitted here. Moreover, no multicollinearity problems arose, with all scale items having a variance inflation factor (VIF) below 10.

Table 1. *Composition of the instrument administered at the international level*

Item	
Victimization	1. A teacher has hit, kicked, or pushed me.
	2. A teacher has verbally insulted me.
	3. A teacher has threatened me.
	4. A teacher called me mean names, made fun of me or teased me in a hurtful way.
	5. A teacher told lies or spread rumors about me and tried to make others dislike me
	6. I had money or other personal belongings taken away from me or damaged by a teacher.
	7. I was bullied with mean names or comments about my race or color or any other diversity aspect (nationality, sexual orientation, etc.) by a teacher.
	8. I was bullied with mean names, comments, or gestures with a sexual intent by a teacher
	9. I was bullied in other forms, by a teacher, that were not mentioned here.

Aggression	<p>10. I have hit, kicked, or pushed a teacher.</p> <p>11. I have verbally insulted or said words to a teacher because I wanted to hurt him/her.</p> <p>12. I have threatened a teacher.</p> <p>13. I called another teacher(s) mean names, made fun of, or teased him/her in a hurtful way.</p> <p>14. I spread false rumors about a teacher and tried to make others dislike him/her.</p> <p>15. I took money or other personal belongings from a teacher or damaged his/her belongings.</p> <p>16. I bullied a teacher with mean names or comments about his/her race or color or any other diversity aspect (nationality, sexual orientation, etc).</p> <p>17. I bullied a teacher with mean names, comments, or gestures with sexual intent.</p> <p>18. I bullied teacher(s) using other forms that were not mentioned here.</p>
Cybervictimization	<p>19. A teacher has said bad words to me or has insulted me using email or instant messenger (such as WhatsApp) or other electronic platforms.</p> <p>20. A teacher has said bad words about me to others using the internet or instant messenger.</p> <p>21. A teacher has threatened me through Internet messages or instant messenger.</p> <p>22. A teacher has spread false rumors and lies about me on social networks.</p>

Cyberaggression	23. I have said bad words to a teacher or have insulted him/her using instant messenger (such as WhatsApp) or Internet messages or other electronic platforms.
	24. I have said bad words about a teacher to other people through Internet messages or instant messenger.
	25. I have threatened a teacher through instant messenger or Internet messages.
	26. I have used a social network to spread false rumors and lies about a teacher.

Table 2. Descriptive Statistics of the Considered Items (N = 456)

Nº	Item	Mean	SD	Min - Max	Sk	Kurt
1	A teacher has hit, kicked, or pushed me.	0.128	0.589	0-4	5.591	32.513
2	A teacher has verbally insulted me.	0.519	0.894	0-4	2.035	3.972
3	A teacher has threatened me.	0.314	0.758	0-4	3.051	10.071
4	A teacher called me mean names, made fun of me or teased me in a hurtful way.	0.363	0.774	0-4	2.864	9.249
5	A teacher told lies or spread rumors about me and tried to make others dislike me.	0.188	0.623	0-4	4.213	19.382
6	I had money or other personal belongings taken away from me or damaged by a teacher.	0.194	0.633	0-4	4.189	19.339
7	I was bullied with mean names or comments about my race or color or any other	0.123	0.546	0-4	5.625	34.350
8	diversity aspect (nationality, sexual orientation, etc.) by a teacher.	0.155	0.619	0-4	5.004	26.437

9	I was bullied with mean names, comments, or gestures with a sexual intent by a teacher.	0.200	0.596	0-4	3.867	17.014
10	I was bullied in other forms, by a teacher, that were not mentioned here.	0.049	0.396	0-4	8.780	78.849
11	I have hit, kicked, or pushed a teacher.	0.144	0.617	0-4	5.023	26.000
12	I have verbally insulted or said words to a teacher because I wanted to hurt him/her.	0.075	0.460	0-4	7.418	58.250
13	I have threatened a teacher.	0.247	0.782	0-4	3.665	13.235
14	I called another teacher(s) mean names, made fun of, or teased him/her in a hurtful way.	0.179	0.663	0-4	4.504	21.022
15	I spread false rumors about a teacher and tried to make others dislike him/her.	0.055	0.404	0-4	8.737	80.335
16	I took money or other personal belongings from a teacher or damaged his/her belongings.	0.075	0.435	0-4	7.369	59.667
17	I bullied a teacher with mean names or comments about his/her race or color or any other	0.064	0.402	0-4	7.675	65.097
18	diversity aspect (nationality, sexual orientation, etc).	0.106	0.535	0-4	5.683	33.408
19	I bullied a teacher with mean names, comments, or gestures with sexual intent.	0.059	0.380	0-4	7.893	68.595
20	I bullied teacher(s) using other forms that were not mentioned here.	0.060	0.397	0-4	8.147	71.807
21	A teacher has said bad words to me or has insulted me using email or instant	0.066	0.415	0-4	7.520	61.376
22	messenger (such as WhatsApp) or other electronic platforms.	0.059	0.380	0-4	7.893	68.595

23	A teacher has said bad words about me to others using the internet or instant messenger.	0.126	0.571	0-4	5.285	29.022
24	A teacher has threatened me through Internet messages or instant messenger.	0.315	0.853	0-4	3.007	8.566
25	A teacher has spread false rumors and lies about me on social networks.	0.046	0.364	0-4	9.416	94.824
26	I have said bad words to a teacher or have insulted him/her using instant messenger.	0.066	0.436	0-4	7.739	63.078

The Kaiser-Meyer-Olkin (KMO) test returned a value of 0.89, which supports the sample adequacy. The significance of Bartlett's sphericity test ($\chi^2(192) = 4950.97$ and $p < 0.001$) exhibited that correlations among items are satisfactory to perform an EFA.

The preliminary results of the Parallel Analysis (PA) pointed to a three-factor solution, as shown in Fig. 1. Only three eigenvalues were above the threshold, $\tau = 1$, which is the measure of importance (Crawford et al., 2010, p. 885). Therefore, a three-factor solution was initially adopted, forcing the EFA to restructure the solution to three factors, as illustrated in the figure.

Table 3. Factor Loadings - Phase 1

Nº	Item	Factor 1	Factor 2	Factor 3	h^2
05	A teacher told lies or spread rumors about me and tried to make others dislike me	0.737			0.575
09	I was bullied in other forms, by a teacher, that were not mentioned here.	0.733			0.572
03	A teacher has threatened me.	0.686			0.540
07	I was bullied with mean names or comments about my race or color or any other diversity aspect (nationality, sexual orientation, etc.) by a teacher.	0.683			0.512
02	A teacher has verbally insulted me.	0.683			0.496

04	A teacher called me mean names, made fun of me or teased me in a hurtful way.	0.682			0.486
08	I was bullied with mean names, comments, or gestures with a sexual intent by a teacher	0.625			0.532
01	A teacher has hit, kicked, or pushed me.	0.581			0.523
19	A teacher has said bad words to me or has insulted me using email or instant messenger (such as WhatsApp) or other electronic platforms.	0.554		0.409	0.690
06	I had money or other personal belongings taken away from me or damaged by a teacher.	0.529			0.316
22	A teacher has spread false rumors and lies about me on social networks.	0.446			0.548
24	I have said bad words about a teacher to other people through Internet messages or instant messenger.		0.702		0.447
25	I have threatened a teacher through instant messenger or Internet messages.		0.670		0.566
18	I bullied teacher(s) using other forms that were not mentioned here.		0.669		0.508
23	I have said bad words to a teacher or have insulted him/her using instant messenger (such as WhatsApp) or Internet messages or other electronic platforms.		0.653		0.406
17	I bullied a teacher with mean names, comments, or gestures with sexual intent.		0.653		0.614
26	I have used a social network to spread false rumors and lies about a teacher.		0.614		0.509
13	I called another teacher(s) mean names, made fun of, or teased him/her in a hurtful way.		0.570		0.393
14	I spread false rumors about a teacher and tried to make others dislike him/her.		0.554		0.371
12	I have threatened a teacher.		0.488		0.450

11	I have verbally insulted or said words to a teacher because I wanted to hurt him/her.		0.413		0.321
21	A teacher has threatened me through Internet messages or instant messenger.			0.655	0.770
20	A teacher has said bad words about me to others using the internet or instant messenger.			0.650	0.659
10	I have hit, kicked, or pushed a teacher.			0.649	0.776
15	I took money or other personal belongings from a teacher or damaged his/her belongings.			0.538	0.612

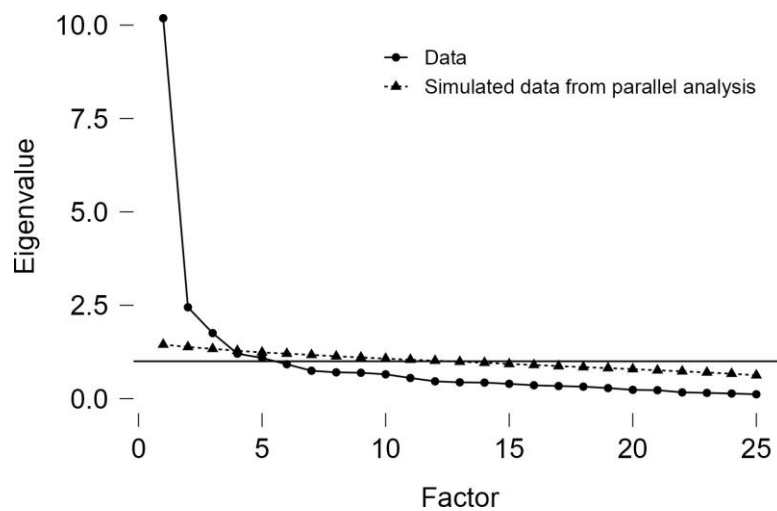


Figure 1. Initially obtained scree plot for parallel analysis.

Table 4. Factor Loadings - Phase 2

Nº	Item	Factor	Factor	Factor	h^2
		1	2	3	
24	I have said bad words about a teacher to other people through Internet messages or instant messenger.	0.705			0.450
25	I have threatened a teacher through instant messenger or Internet messages.	0.677			0.564
18	I bullied teacher(s) using other forms that were not mentioned here.	0.675			0.509
16	I bullied a teacher with mean names or comments	0.673			0.513

	about his/her race or color or any other diversity aspect (nationality, sexual orientation, etc).				
23	I have said bad words to a teacher or have insulted him/her using instant messenger (such as WhatsApp) or Internet messages or other electronic platforms.	0.663			0412
17	I bullied a teacher with mean names, comments, or gestures with sexual intent.	0.661			0.613
26	I have used a social network to spread false rumors and lies about a teacher.	0.617			0.517
13	I called another teacher(s) mean names, made fun of, or teased him/her in a hurtful way.	0.574			0.394
14	I spread false rumors about a teacher and tried to make others dislike him/her.	0.555			0.370
12	I have threatened a teacher.	0.490			0.449
11	I have verbally insulted or said words to a teacher because I wanted to hurt him/her.	0.402			0.325
05	A teacher told lies or spread rumors about me and tried to make others dislike me.		0.720		0.576
09	I was bullied in other forms, by a teacher, that were not mentioned here.		0.711		0.565
02	A teacher has verbally insulted me.		0.678		0.497
03	A teacher has threatened me.		0.676		0.540
04	A teacher called me mean names, made fun of me or teased me in a hurtful way.		0.674		0.493
07	I was bullied with mean names or comments about my race or color or any other diversity aspect (nationality, sexual orientation, etc.) by a teacher.		0.659		0.501
08	I was bullied with mean names, comments, or gestures with a sexual intent by a teacher.		0.614		0.543
01	A teacher has hit, kicked, or pushed me.		0.567		0.527
06	I had money or other personal belongings taken		0.517		0.317

	away from me or damaged by a teacher.				
22	A teacher has spread false rumors and lies about me on social networks.		0.416		0.520
15	I took money or other personal belongings from a teacher or damaged his/her belongings.			0.672	0.798
21	A teacher has threatened me through Internet messages or instant messenger.			0.655	0.756
20	A teacher has said bad words about me to others using the internet or instant messenger.			0.655	0.648
10	I have hit, kicked, or pushed a teacher.			0.559	0.628

The initial EFA revealed the presence of a cross-loading item (item 19 and therefore excluded from scale and a new EFA was performed, resulting in a stable three-factor structure, as illustrated in Table 3. Furthermore, even though the resulting three-factor solution was stable, the third resulting factor withheld a mixture of the remaining two and was therefore considered inappropriate for further theoretical analysis, as it is shown in Table 4. This resulted in the elimination of the items from the resulting third factor, i.e., items 10, 15, 20 and 21. That led to an almost-stable two-factor solution, except for the item 11 that had an insignificant factor loading; we refer the reader to see Table 5. Therefore, item 11 was eliminated and that led to a final two-factor solution, as illustrated in Fig. 2 and Table 6, which summarizes the final two-factor structure with 20 items.

Focused on the student/teacher bullying, the names of the factors were assigned and validated by a panel of 2 bullying experts. Factor 1 was entitled “Teacher bullying towards the student” and is composed of items 5, 7, 8, 9, 4, 1, 3, 6, 22, 2, explaining 24.2% of the scale variance. Factor 2 was designated “Student bullying towards the teacher” and comprises items 24, 25, 18, 23, 16, 17, 26, 13, 14, 12 that explained 22.2% of the scale variance. The values of the commonalities were high (all $h^2 > 0.3$) indicating that the variance of the items is properly explained by the factors; we refer the reader to see Table 6.

Table 5. *Factor Loadings - Phase 3*

Nº	Item	Factor 1	Factor 2	<i>h</i>²
05	A teacher told lies or spread rumors about me and tried to make others dislike me	0.803		0.585
07	I was bullied with mean names or comments about my race or color or any other diversity aspect (nationality, sexual orientation, etc.) by a teacher.	0.740		0.518
08	I was bullied with mean names, comments, or gestures with a sexual intent by a teacher.	0.733		0.501
09	I was bullied in other forms, by a teacher, that were not mentioned here.	0.712		0.553
04	A teacher called me mean names, made fun of me or teased me in a hurtful way.	0.688		0.491
01	A teacher has hit, kicked, or pushed me.	0.686		0.529
03	A teacher has threatened me.	0.584		0.476
06	I had money or other personal belongings taken away from me or damaged by a teacher.	0.564		0.321
22	A teacher has spread false rumors and lies about me on social networks.	0.552		0.461
02	A teacher has verbally insulted me.	0.504		0.358
24	I have said bad words about a teacher to other people through Internet messages or instant messenger.		0.711	0.404
25	I have threatened a teacher through instant messenger or Internet messages.		0.711	0.491
18	I bullied teacher(s) using other forms that were not mentioned here.		0.692	0.504
16	I bullied a teacher with mean names or comments about his/her race or color or any other diversity aspect (nationality, sexual orientation, etc).		0.671	0.520
23	I have said bad words to a teacher or have insulted him/her using instant messenger (such as WhatsApp) or Internet messages or other electronic platforms.		0.669	0.394

17	I bullied a teacher with mean names, comments, or gestures with sexual intent.		0.665	0.618
26	I have used a social network to spread false rumors and lies about a teacher.		0.650	0.412
13	I called another teacher(s) mean names, made fun of, or teased him/her in a hurtful way.		0.562	0.343
14	I spread false rumors about a teacher and tried to make others dislike him/her.		0.552	0.364
12	I have threatened a teacher.		0.484	0.435
11	I have verbally insulted or said words to a teacher because I wanted to hurt him/her.			0.319

Table 6. Final Factor Loadings

Nº	Item	Factor 1	Factor 2	<i>h</i> ²
05	A teacher told lies or spread rumors about me and tried to make others dislike me	0.803		0.589
07	I was bullied with mean names or comments about my race or color or any other diversity aspect (nationality, sexual orientation, etc.) by a teacher.	0.740		0.522
08	I was bullied with mean names, comments, or gestures with a sexual intent by a teacher.	0.733		0.502
09	I was bullied in other forms, by a teacher, that were not mentioned here.	0.713		0.561
04	A teacher called me mean names, made fun of me or teased me in a hurtful way.	0.690		0.489
01	A teacher has hit, kicked, or pushed me.	0.687		0.521
03	A teacher has threatened me.	0.586		0.475
06	I had money or other personal belongings taken away from me or damaged by a teacher.	0.564		0.317
22	A teacher has spread false rumors and lies about me on social networks.	0.556		0.468

02	A teacher has verbally insulted me.	0.504		0.354
24	I have said bad words about a teacher to other people through Internet messages or instant messenger.		0.715	0.412
25	I have threatened a teacher through instant messenger or Internet messages.		0.706	0.491
18	I bullied teacher(s) using other forms that were not mentioned here.		0.691	0.508
23	I have said bad words to a teacher or have insulted him/her using instant messenger (such as WhatsApp) or Internet messages or other electronic platforms.		0.681	0.410
16	I bullied a teacher with mean names or comments about his/her race or color or any other diversity aspect (nationality, sexual orientation, etc).		0.672	0.526
17	I bullied a teacher with mean names, comments, or gestures with sexual intent.		0.647	0.601
26	I have used a social network to spread false rumors and lies about a teacher.		0.642	0.407
13	I called another teacher(s) mean names, made fun of, or teased him/her in a hurtful way.		0.567	0.351
14	I spread false rumors about a teacher and tried to make others dislike him/her.		0.546	0.361
12	I have threatened a teacher.		0.463	0.416

As shown in Table 7, the inter-factor correlation was positive and high, reinforcing our choice of the rotation method (oblique-geominQ). More detailed, the table shows that the Factor 1 has a correlation of 53.7% with the Factor 2.

Table 7. Factor Correlations

	Factor 1	Factor 2
Factor 1	—	—0.537
Factor 2	0.537	—

With respect to reliability, the internal consistency of the “Teacher bullying towards the student” factor was good (Cronbach’s $\alpha = 0.892$, McDonald’s omega $\omega = 0.894$) and the “Student bullying towards the teacher” factor presented a Cronbach’s $\alpha = 0.863$ and McDonald’s omega $\omega = 0.861$, being equally good, as shown in Table 8. Lastly, the consistency of the entire scale was excellent ($\omega = 0.911$) (Katz, 2011, p. 23).

Table 8. *Frequentist Scale Reliability Statistics*

Estimate	McDonald’s ω	Cronbach’s α
Teacher bullying toward the student	0.870	0.871
Student bullying toward the teacher	0.894	0.892
Total Scale:	0.927	-

Discussion

The primary objective of this work aimed at the construction and validation of an instrument that would enable us to better comprehend and prevent bullying behavior in school environments in different European countries, with a sample of students from 1st to 5th year of Secondary Education in Italy, Poland, and Turkey.

According to the results of the performed EFA, together with the scrutiny of two specialists in the area, we were able to sustain a factorial structure constituted by two factors: “Teacher bullying towards the student” and “Student bullying towards the teacher”. The “Student bullying towards the teacher” sub-scale concerns student aggression in the context of verbal and physical aggression exercised by students towards a teacher, as well as online abuse. The “Teacher bullying towards the student”, on the other hand, refers to student victimization in the context of name calling, racial and physical molesting, and rumor spreading about students by the teachers in the school environment.

Based on the developed instrument and from the acquired data sample, the following findings can be extracted:

- The average scores of Factors 1 and 2 were 0.22% and 0.13, respectively;
- The scores per factor in different intervals with unit increment are summarized in Table 9 that reveals that the majority of students ($\approx 95\%$) do not participate or participate lightly in bullying events, while a small portion of them (0.88% act as victims and 0.44% act as aggressors) experience extreme bullying behavior;
- The average scores per item in Factor 1 indicate that most students were verbally insulted by a teacher (Item 2) or were called mean names, made fun of or were teased in a hurtful way (Item 4);
- The average scores per item in Factor 2 suggest that most students said bad words about a teacher to other people through the Internet messages or instant messenger (Item 24) or called mean names, made fun of or teased a teacher in a hurtful way (Item 13).

These results indicate that school-based bullying might not be as frequent as the peer-bullying. This is expected to a certain extent, given that teachers are power-holders in student/teacher relationship in general and that they usually pass some pedagogical/psychological courses before they start exercising their profession. Nevertheless, one should also have in mind possible fear that certain students might have when responding the questionnaire.

Table 9. *Average scores per factor.*

	Factor 1	Factor 2
[0, 1[95.61%	96.27%
[1, 2[3.29%	2.85%
[2, 3[0.22%	0.44%
[3, 4]	0.88%	0.44%

Conclusions

This work presented a preliminary exploratory factor analysis with the intention to study and better comprehend psychometric qualities that lead to bullying in school-based environments. The inquiry was built in such a way that it incorporates different types of bullying, such as physical-, verbal- and cyber-bullying, and was applied to the students

from 1st to 5th year of secondary school in three European countries: Italy, Poland and Turkey. In total, 456 responses to the questionnaire were obtained and served as a fuel for the performed exploratory factor analysis. The study was focused on the student's perspective in the student-teacher relationship, both in the context of student victimization and aggression. The results supported a two-factor solution consisting of 20 items which accounted for 46.4% of the variance. The instrument was also found reliable, showing an excellent internal consistency. This study adds to the evidence that the developed instrument is an appropriate evaluation tool allowing rigorous assessment of school-based bullying.

Even though these preliminary results show promise, they should be confirmed in a subsequent confirmatory factorial analysis, which is left for future work. Moreover, in order to explore the stability of the scale, it should be validated on large samples from other countries with possibly different characteristics.

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