

Assessment and detection of peer-bullying through analysis of the group context

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Abstract

Background: The assessment of bullying requires an analysis both of the main profiles involved in this phenomenon and of the social context in which it occurs. By considering both aspects, this study develops a scale that, in addition to individual information, incorporates a representation of the group structure of the classroom. **Method:** A large sample composed of 11,561 students (mean age = 11.12 years, girls = 49.2%) from 108 schools completed the Sociescuela Scale by peer reports. An analysis of the internal structure and reliability of the scale was performed, as well as of the students' social networks. **Results:** Factor analysis yielded five factors: Victimization, Acceptance, Prosociality, Withdrawal, and Aggressiveness. Boys showed more victimization and aggressiveness than girls. The results obtained enable us to: (a) evaluate a series of individual profiles associated with involvement in bullying and their sociometric status, and (b) position them on a social map of each classroom. **Conclusions:** The data suggested that the scale is reliable and valid for use in the detection of bullying and its applied nature facilitates the design of school interventions.

Keywords: Sociometry, bullying, social network analysis, scale.

Resumen

Evaluación y detección del acoso escolar a través del análisis del contexto grupal. Antecedentes: la evaluación del acoso escolar requiere tanto de un análisis de los principales perfiles involucrados como del contexto social en el que se produce. Considerando ambos aspectos, este estudio desarrolla una escala en la que además de la información individual, se incorpora una representación de la estructura grupal del aula. **Método:** una amplia muestra compuesta por 11.561 estudiantes (edad media = 11,12, chicas = 49,2%) de 108 centros educativos completaron la escala Sociescuela a través de heteroinforme. Se analizaron la estructura interna y la fiabilidad de la escala, así como las redes sociales del grupo. **Resultados:** el análisis factorial distinguió cinco factores: Prosocialidad, Retraimiento, Agresividad, Victimización y Aceptación. Los chicos mostraron un mayor nivel de victimización y de agresividad. Los resultados obtenidos permiten: (1) evaluar una serie de perfiles individuales asociados a la participación en el acoso escolar, así como su estatus sociométrico, y (2) situarlos en un mapa social de cada clase. **Conclusiones:** los análisis sugieren que la escala es fiable y válida para ser utilizada en la detección del acoso escolar. Su carácter aplicado facilita el diseño de intervenciones en los centros educativos.

Palabras clave: sociometría, acoso escolar, análisis de redes sociales, escala.

Bullying is a subtype of aggression that can adopt many forms (physical, verbal, and relational) and that includes among its main features an imbalance of power, intentionality and persistence over time (Olweus, 1993). Its prevalence varies between different countries and studies, ranging from 4% (Díaz-Aguado, Martínez-Arias, & Martín-Babarro, 2010) to 28% (Rivers & Smith, 1994), with some authors placing it at approximately 15% (Smith & Shu, 2000). Most of these studies have used self-reports as their data collection methodology. However, the use of questionnaires based on peer reports reduces measurement errors and increases reliability because they provide scores that are based on multiple informants (Jimerson, Swearer, & Espelage, 2009). Correlations

between self- and peer reports are generally very low, between .14 and .42 (Achenbach, McConaughy, & Howell, 1987; Juvonen, Nishina, & Graham, 2001). Furthermore, due to peer reports, respondents tend to overcome the secrecy and silence code about bullying that often exists in the classroom.

The evidence consistently points to the fact that boys are more prone to adopt both the role of bully and of victim than are girls (Cerezo, 2000; Lucas-Molina, Pulido-Valero, & Solbes-Canales, 2011). During bullying episodes, there are different roles and degrees of participation, from active students supporting the main aggressors to others who oppose and are annoyed with such behavior, as well as students with neutral and/or indifferent attitudes (Salmivalli, Lagerspetz, Björkqvist, Österman, & Kaukiainen, 1996). Isolation and the lack of friends in the group increase the risk of victimization (Huttunen, Salmivalli, & Lagerspetz, 1996); rejected students are also more frequently bullied (Lucas-Molina et al., 2011; Salmivalli et al., 1996). This relationship between victimization and rejection by the peer group has led to the incorporation of sociometry as a tool to assess bullying.

With this in mind, several authors have proposed increasingly elaborate instruments based on peer reports, analyzing participant roles in bullying (Salmivalli et al., 1996; Lucas-Molina et al., 2011) or collecting information on victimization behaviors and perceptual attributes associated with major bullying profiles (Björkqvist & Österman, 1995). The most complete scales have also incorporated information on social preferences (Díaz-Aguado, 1986; Cerezo, 2000). However, despite the variety of scales published to date, all of them are based on the analysis of individual profiles, but none of them analyzes the structure of the group in which episodes of bullying occur. Social preferences, friendships among students, and the main bullying-related profiles are elements included within a larger framework, such as the social networks of the classroom (Gifford-Smith & Brownell, 2003). Additionally, over 80% of cases originate in the class group (Salmivalli & Peets, 2008). Hence, evaluating these networks is essential to understand this phenomenon. Another relevant aspect is that the existing scales (Cerezo, 2000; Díaz-Aguado, 1986) base their sociometric information on social preference, which does not represent a real tie among students as do friendship groups.

The need to analyze more specifically the group context surrounding bullying motivated the elaboration of this instrument. Thus, this study develops the Socioscuola Scale in order to identify the main individual profiles associated with bullying and to observe these profiles embedded in a social map of the classroom. The main advantage of this instrument is that, for the first time, a technique borrowed from social network analysis for developing social maps (NEGOPY, Social Cognitive Mapping) is applied to a scale of bullying in order to analyze class groups. Items about real ties among students thus provide information about the cliques formed. A second advantage compared with previously published scales is that it offers more comprehensive information on the sociometric profile by using widely adopted correction procedures such as nominations (Coie, Dodge, & Coppotelli, 1982; Newcomb & Bukowski, 1983) and ratings (Maassen, Akkermans, & van der Linden, 1996).

Method

Participants

The sample was obtained through a non-random sampling ($N = 11,561$ students) and using a cross-sectional design within a wider assessment effort conducted in 108 schools in four regions of Spain (Madrid, Castile and Leon, Andalusia and Castile-La Mancha). The mean age was 11.32 ($SD = 1.44$) years and 49.2% ($n = 5,688$) were girls. In the sample, 29.3% ($n = 3,387$) were in the fifth grade and 24.5% ($n = 2,832$) were in the sixth grade of primary education. In addition, 21.3% ($n = 2,462$) were in the first year and 24.9% ($n = 2,878$) were in the second year of secondary education.

Instrument

The instrument is divided into three subscales the items of which were collected through peer nominations. The first group of questions regarding bullying victimization was created from items adapted from questionnaires obtained by self-reports of victimization (Defensor del Pueblo [Public Ombudsman], 2000). The second group contained sociometric questions using items

adapted from Díaz-Aguado (1986). Finally, a set of questions was based on the method of perceived attributes, using items from Sutton and Smith (1999).

In the first phase, an initial validation of the 34-item questionnaire was performed on a sample of 3,160 adolescents from 25 schools (Martín-Babarro, 2011). The initial scale based on peer reports was then compared with other scales obtained by self-reports of victimization (Defensor del Pueblo, 2000). The findings showed correlations of .22 for physical victimization, .31 for verbal victimization, and .39 for relational victimization. These results are similar to those found by other authors (Achenbach et al., 1987; Juvonen et al., 2001). The scale was also compared with a scale of behavioral disorders, ESPERI (Parellada, San-Sebastián, & Martínez-Arias, 2009), finding correlations between the bully role and the factors of impulsivity-inattention (.25), dissocial (.35) and hyperactivity (.31) as pointed out in prior studies (Valdivia-Peralta, Fonseca-Pedrero, González-Bravo, & Lemos-Giráldez, 2014). Subsequently, in a second phase, which comprises the present study, the questionnaire was reduced to 20 items and a software application was developed in the PHP language version 5.3.14, with an Apache server and a MySQL database.

Regarding the number of nominations, some authors have found questionnaires to be more reliable and valid when an unlimited number of nominations is applied (Terry, 2000). In our research, after a first phase in which an unlimited number of nominations was applied to all items, we decided to maintain a high number of nominations in the sociometric questions (up to 12 nominations). This is because the vast majority of students tended to show a sharp decline in their responses as of the eighth nomination. The scores of each question were weighted by the order of each nomination and compared with unweighted scores, but the results showed no significant differences.

Victimization. A group of three items was proposed to evaluate victimization: one aimed at measuring physical victimization, another for verbal victimization and a third for relational victimization. A proportional score was then calculated for each item by dividing the number of nominations received for each student by the number of classmates who answered the item. Finally, an average score using all three questions was calculated, obtaining a range between 0 and 1 ($.00 \leq E \leq .33$, $M = .01$, $SD = .03$).

Acceptance. This subscale consists of five items based on sociometry. First, through a nominations method, two items were used, one for obtaining positive nominations and another for negative nominations, with a maximum of 12 nominations. Second, a rating method was applied in which all student were required to rate all of their classmates ("Which of your classmates do you like or dislike?"). For this assessment, a 7-point Likert scale was used. The correction method proposed by Asher and Dodge (1986) was used, through which positive ratings were computed as positive nominations and the lowest ratings as negative nominations. Social preferences (SP) in the ratings procedure were calculated from the scores of elections (E) and rejections (R) ($SP = E - R$). Finally, two items for measuring friendship groups ("Which classmates are your friends?") and frequent interaction groups ("Which classmates do you hang out with?"), with a maximum of 12 nominations per item, were used. Proportional scores were then calculated for each item as in the previous subscale and a final average score using all five elements was obtained ($-.29 \leq E \leq .67$, $M = .13$, $SD = .11$).

Results

Additionally, the software calculates the categories of sociometric status (popular, rejected, isolated, controversial, average) with three methods. For the nominations procedure, a method based on standard scores (Coie et al., 1982) and a second method based on probabilistic scores (Newcomb & Bukowski, 1983) were applied. The latter is the more conservative in allocations, forming smaller, more homogeneous and extreme groups. For the ratings procedure, a method based on probability criteria with a two-dimensional classification (Maassen et al., 1996) was applied.

Social map. Using items to measure friendship or frequent interaction groups and techniques based on social network analysis (e.g., NEGOPY, Social Cognitive Mapping), a graphical representation of the group structure was created. By means of binary data (0 = no choice, 1 = choice), a logarithm was applied, based on the following guidelines: (a) a dyad is formed by reciprocal nominations among its members, (b) a group is identified when at least three children have reciprocal nominations with other members of the same group and are all linked by ties of friendship throughout the group, and (c) a student who has not answered the test, but has received two or more nominations from members of a group, is incorporated into that group. This creates various situations and enables us to detect participants who are members of a social group and participants who are not members of any group. In turn, the latter are divided into isolated students and students who are liaisons between groups.

Perceived attributes. This subscale consists of 12 items regarding various perceived attributes with a maximum of three nominations per item. The items are related to the key roles that typically appear in episodes of bullying: (a) a profile of withdrawal is often associated with a victimization role, (b) an aggressive profile is often associated with a bully role, and (c) a prosocial profile is usually present in most cooperative students with high social status in the group (Díaz-Aguado, 1986; Lucas-Molina et al., 2011). Each factor consisted of four items. Proportional scores were calculated for each item, and a mean score ranging from 0 to 1 was obtained for Withdrawal ($.00 \leq E \leq .93$, $M = .07$, $SD = .11$), Aggressiveness ($.00 \leq E \leq .86$, $M = .05$, $SD = 0.10$), and Prosociality ($.00 \leq E \leq .91$, $M = .11$, $SD = .12$).

Procedure

Students participated voluntarily, and parental consent was requested. The test lasted 20 to 25 minutes. It can be implemented individually; however, for this research it was conducted collectively, by classroom groups and in the computer rooms in each school. Students responded to questions that appeared on an array of photographs and names of classmates.

Data analysis

Data analysis was conducted with SPSS 20.0 (SPSS Inc., 2011) and Factor (Lorenzo-Seva & Ferrando, 2006). Descriptive statistics of items were calculated, followed by exploratory factor analysis using Promax rotation to extract the scale factors. Subsequently, the internal consistency of each factor obtained was calculated with Cronbach's alpha coefficient. Student's *t*-test analysis of the differences in factors by gender was performed. Finally, Pearson correlations between the factors obtained were calculated.

Item analysis

Table 1 shows the descriptive statistics for the items. Mean scores tended to be lower for Items 1, 2, and 3 about victimization, with respective values of .02, .01 and .01. Items 4 and 6, involving positive peer nominations, showed the highest mean values (.32 and .75, respectively). The items were highly and positively skewed, except for Item 6, which was negatively skewed. Kurtosis showed high values and a leptokurtic distribution for most items, except for Item 4, which was platykurtic.

Exploratory factor analysis

Because the distributional properties of items are more likely to be skewed than continuous and normally distributed, the questionnaire was analyzed based on polychoric correlations through exploratory factor analysis, using the weighted least squares estimation method. The Promax oblique rotation was also applied because of the relationship among some of the factors. The findings revealed a five-factor solution (Victimization, Acceptance, Prosociality, Withdrawal, and Aggressiveness), with high loadings of these items on all of the factors (Table 2). A measure of sampling adequacy, Kaiser-Meyer-Olkin ($KMO = .80$), and Bartlett's sphericity test ($\chi^2[91] = 5441.4$, $p < .001$) indicated the appropriateness of factor analysis. Subsequently, the reliability

Table 1
Composition of Sociescuela and the descriptive statistics of the items

Items	Mean	SD	Skewness	Kurtosis
1. Which classmate is hit or physically mistreated because of his/her weakness in the group? (1)	.02	.06	5.7	43.7
2. Which classmate is insulted or humiliated by others? (1)	.01	.04	4.7	30.5
3. Which classmate is isolated or ignored by others? (1)	.01	.04	4.2	27.1
4. Who do you like to sit next to? (2)	.32	.18	.47	-.38
5. Who do you dislike to sit next to? (2)*	.21	.18	1.12	1.01
6. Who do you like or dislike? (2)	.75	.18	-1.29	2.07
7. Who do you hang out with? (2)	.23	.13	.66	1.08
8. Who are your friends? (2)	.21	.13	.78	1.17
9. Who has a good relationship with teachers? (3)	.09	.11	1.68	4.34
10. Who treats others well? (3)	.11	.12	1.79	4.5
11. Who helps others? (3)	.11	.13	1.9	4.9
12. Who is polite and respectful? (3)	.10	.12	1.73	4.2
13. Who is bossy? (4)	.05	.10	2.8	10.71
14. Who has a bad relationship with teachers? (4)	.06	.14	3.2	11.04
15. Who disturbs others? (4)	.05	.13	3.30	12.39
16. Who is more aggressive? (4)	.04	.11	3.77	16.85
17. Who is often sad? (5)	.06	.12	3.05	11.23
18. Who is fearful? (5)	.08	.10	3.21	12.39
19. Who is shy? (5)	.05	.13	3.60	14.24
20. Who has problems communicating? (5)	.10	.17	2.28	5.33

(1) Victimization (up to 12 nominations), (2) Acceptance (up to 12 nominations), (3) Prosociality (up to three nominations), (4) Aggressiveness (up to three nominations), (5) Withdrawal (up to three nominations)
* Note: item is reverse scored

coefficients of these factors were calculated with Cronbach's alpha coefficient (Table 3). As the purpose of the scale was to provide a series of profiles and a level of victimization in order to locate them on a social map of the class, we did not calculate a second-order factor analysis.

Sex differences in the factors were analyzed with Student's *t*-test (Table 4). In all cases, the variables presented homogeneous variances and therefore, contrast with equal variances was applied (*df* = 11,561) to the responses of all participants. All the analyses yielded significant differences. Boys obtained higher levels of Victimization and Aggressiveness than girls (Victimization: .07 and .03; Aggressiveness: .32 and .12, for boys and girls, respectively), both with a medium effect size (Cohen's *d* = .53 and .50, respectively). In turn, girls obtained higher scores on Acceptance and Prosociality than boys (Acceptance: .85 and .79; Prosociality: .57 and .35, for girls and boys, respectively), with a low effect size (Cohen's *d* = .42 and .43, respectively). Girls also showed a higher level of Withdrawal than boys (.33 vs. .24) with a lack of an effect size. Subsequently, ANOVA was conducted to determine the differences in each factor according to grade level, finding no significant differences.

Table 2
Rotated factor matrix

	F1	F2	F3	F4	F5
Item 1	.701				
Item 2	.750				
Item 3	.696				
Item 4		.865			
Item 5		.754			
Item 6		.740			
Item 7		.864			
Item 8		.891			
Item 9			.801		
Item 10		.392	.640		
Item 11		.334	.727		
Item 12			.703		
Item 13				.753	
Item 14				.809	
Item 15				.853	
Item 16				.872	
Item 17					.624
Item 18					.739
Item 19					.792
Item 20					.651

Note: Items with loadings between -.30 and .30 were not considered

Table 3
Reliability coefficients of the subscales

	Cronbach's alpha
Victimization	.73
Acceptance	.86
Prosociality	.84
Withdrawal	.78
Aggressiveness	.89

Table 4
Descriptive statistics for each subscale

	Sex				Total M (SD)
	Boys M (SD)	Girls M (SD)	T	Cohen's d	
Victimization	.02(.04)	.01(.03)	12.38***	.53	.01(.03)
Acceptance	.79(.71)	.85(.68)	-5.32***	.42	.82(.69)
Prosociality	.09(.10)	.14(.13)	-24.29***	.43	.11(.12)
Withdrawal	.06(.10)	.08(.12)	-10.57***	.18	.07(.11)
Aggressiveness	.08(.13)	.03(.06)	25.51***	.50	.05(.10)

* *p*<.05; ** *p*<.01; *** *p*<.001

Correlations

Pearson's correlation analysis between the factors obtained was also carried out (Table 5). Statistically significant relationships between all factors were found, highlighting the positive relationships between Victimization and Withdrawal and between Prosociality and Acceptance. A moderately negative relationship between Aggressiveness and Acceptance was observed, and negative correlations between Acceptance and Victimization and between Acceptance and Withdrawal were also found.

Social map

The software application displays a visual representation of three profiles associated with bullying: Withdrawal, Aggressiveness, and Prosociality. This highlights students with scores above the 80th percentile in each factor, marking them with different frames (Figure 1).

A social network analysis allows us to build a social map through questions about friendship or frequent interaction groups. The above-mentioned individual profiles related to bullying and sociometric information were incorporated into this social map (Figure 2).

Discussion

This study analyzes a tool for the assessment of bullying based on previous tests (Defensor del Pueblo, 2000; Díaz-Aguado, 1986; Sutton & Smith, 1999) and on the consideration that this phenomenon is conditioned by social context and not exclusively by the bully-victim interaction. Scales for measuring bullying

Table 5
Correlations between the factors obtained

	Victimization	Prosociality	Aggressiveness	Withdrawal	Acceptance
Victimization	-				
Prosociality	-.117**	-			
Aggressiveness	.062**	-.246**	-		
Withdrawal	.225**	.076**	-.170**	-	
Acceptance	-.352**	.454**	-.269**	-.291**	-

* *p*<.05; ** *p*<.01

have gradually evolved, going from lists based on victimization and aggressive behaviors obtained from self-reports to increasingly complex questionnaires obtained from peer-reports that assess both victimization and the main bullying-related profiles and social context information. The tool presented herein aims to improve the existing scales in the area of social context information.

The analysis of individual variables showed adequate psychometric properties of the instrument, with a solid internal consistency in the different subscales. The test showed three profiles associated with the main roles involved in bullying. First, we found a Prosocial profile with characteristics such as having good relationships with teachers, treating others well, or being willing to help others, which had a high level of Acceptance in the group, concurring with previous results (Salmivalli et al., 1996; Lucas-Molina et al., 2011; Sutton & Smith, 1999). Second, the analysis revealed an Aggressive profile related to features such as being dominant and disruptive as well as having poor relationships with teachers, which showed a low level of Acceptance, in line with the findings of previous research (Díaz-Aguado, 1986; Lucas-Molina et al., 2011). Third, a profile of Withdrawal was related to characteristics such as shyness and introversion in peer relationships as well as low self-esteem. This factor also seemed to be associated with higher levels of Victimization and lower Acceptance, which could be classified as the passive victim type corresponding with the results found in previous research (Cerezo, 2000; Díaz-Aguado, 1986). The results also revealed a significant influence of sex, with boys showing higher levels of Aggressiveness and Victimization, and girls presenting more Prosociality and Acceptance, which parallels prior national (Díaz-Aguado & Martínez-Arias, 2013; Lucas-Molina et al., 2011) and international research (Olweus, 1993).

This study aimed to develop a tool for practical application in schools in order to detect cases of bullying and to facilitate intervention through the analysis of social context variables. Therefore, in addition to the analysis of the previous variables, the most relevant aspect is that it creates a social map of each classroom on which are placed the individual profiles associated with bullying and sociometry. This allows us to carry out a qualitative analysis of each case, which cannot be conducted only with scales

based on individual profiles. Details of a case of victimization, such as knowing the groups of friends in the classroom, the peer group's support of the bullies, or whether the rejection of the victim can be generalized to the entire classroom, are central issues to understand the social dynamics. This information helps us to intervene more effectively, for instance, by identifying the appropriate classmates to participate in a peer-helper program or by organizing the class groups from one academic year to the next in order to reduce the level of bullying. The scale also permits the interpretation of social status by showing rejection and popularity as categorical instead of quantitative variables, as in other scales (Díaz-Aguado, 1986). Moreover, it uses more extensively adopted correction procedures (Coie et al., 1982; Newcomb & Bukowski, 1983; Maassen et al., 1996) for the sociometric information, which allows us to obtain a more complex categorization of social status compared with previous scales (Cerezo, 2000), for example, the controversial status. In addition, Sociescuela incorporates a rating method that provides more comprehensive information about the social affinity among all group members in comparison with items based on nominations.

Nevertheless, some limitations should be noted for future lines of research. First, despite the large number of participants, the sample is not representative, which means that the findings cannot be generalized to the entire Spanish population. Another weakness is the lack of items about cyberbullying, which represents an important bullying subtype. The inclusion of this information would allow us to compare bullying occurring in the classroom with that occurring outside the classroom through new technologies. It is necessary to study the stability of the measure through a longitudinal study, and, owing to the relevance of the social context, it would also be important to observe its influence on the stability through multilevel analysis.

As a general conclusion, the instrument presented herein can be considered to be a useful tool for the detection of bullying, and it could be a first step in the development of instruments that incorporate an analysis of the group structure in which this phenomenon occurs. However, a study with a representative sample should be carried out. The applicability and social utility of this scale and software, which has been used in 348 schools, are also noteworthy.

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