

Bullying in Classrooms: Participant Roles From a Social Network Perspective

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The aim of this research was to investigate if and how the group process of bullying can be examined using a social network perspective. In two studies, bullying was investigated using a social network version of the participant-role questionnaire. Study 1 explored the social network structure of one classroom in detail. The findings provide evidence that ingroup and outgroup effects are important in explaining the group process of bullying, and shed new light on defending, suggesting that not only victims are defended. In line with Study 1, Study 2, using data from 494 children in 25 elementary school classes (*M* age = 10.5), revealed that victims as well as bullies were defended by their ingroup members. The social network perspective can be integrated in antibullying interventions by using it to inform teachers about the positive and negative relations among students, and the group structure of the classroom. *Aggr. Behav.* 38:494–509, 2012. © 2012 Wiley Periodicals, Inc.

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INTRODUCTION

Although bullying is a repeated, imbalanced (with regard to power), and negative act that occurs between a bully and a victim (Olweus, 1993), it has been emphasized that group processes are important in explaining and understanding bullying (e.g., DeRosier et al., 1994; Espelage et al., 2003; O’Connel et al., 1999; Sentse et al., 2007). Most students are involved in bullying in some way, even if they do not bully themselves (Salmivalli et al., 1996); bystanders can encourage bullies, ignore the situation, or intervene. In the present research, a social network questionnaire was used to examine these so-called participant roles in bullying. The main aim was to investigate if, and how, the group process of bullying can be investigated using a social network perspective. Two studies were conducted. In Study 1, we used a detailed social network perspective in exploring graphically the group structure of one classroom. In addition to allowing us to examine children’s participant role behaviors, the social network data enabled us to investigate to whom behaviors were directed. Some insights from this detailed social network perspective were tested among the larger sample in Study 2 using statistical social network analysis. The implications of the social

network perspective for antibullying interventions are discussed.

Bullying as a Group Process: Participant Roles

In recent years, it has been recognized that bullying is a complex phenomenon with more children involved than just bullies and victims (e.g., Cohen et al., 2006). Bullying can be regarded as a group process (Salmivalli, 2010). This means that one or more “ringleader” bullies initiate the harassment of one or more victims (Sutton and Smith, 1999). These ringleader bullies are often assisted by students who actively help and support them (e.g., catching the victim), and are reinforced by students who provide them with positive feedback (e.g., laughing). These

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followers of bullies can feel manipulated by ringleader bullies and may experience pressure to conform (Burns et al., 2008; Garandeau and Cillessen, 2006). Students can also act as defenders by siding with victims or trying to make others stop bullying (Sainio et al., 2011). It has been shown that victims are more anxious and rejected in classrooms with fewer defenders and more reinforcers, respectively (Kärnä et al., 2010). Moreover, some students act as outsiders; they observe that classmates are being victimized but do not intervene and may pretend that nothing is going on. In this group process, bullying affects the whole classroom, with many children involved or at least aware of the situation.

The participant roles in the group process of bullying have been found to be related to children's sociometric status (Goossens et al., 2006; Olthof and Goossens, 2008; Salmivalli et al., 1996). In general, defenders are accepted by their classmates; victims, bullies, assistants, and reinforcers are rejected, and outsiders are often neglected. Moreover, boys are overrepresented in the bully-related roles (bullying, assisting, reinforcing), whereas girls are overrepresented in the roles of defenders and outsiders.

Goals

The underlying theoretical mechanism of both studies was the goal-framing approach (Lindenberg, 2008), in which it is hypothesized that observations, evaluations, information processing, and acting are influenced by focal goals. It is assumed that people define a situation in terms of aspects that help their goal pursuit (which they like), and aspects that hinder their goal pursuit (which they dislike). Stated differently, people evaluate situations and inspect whether they are helpful or not in reaching their goals. What goals are important?

Status and affection have been found to be essential goals for human beings to achieve (Barkow, 1989; Baumeister and Leary, 1995; Huberman et al., 2004; Ormel et al., 1997). When status is defined as the relative social position, a person has in the peer hierarchy, improving one's status implies a reduction of the status of another person. High status is also referred to as "perceived" popularity (Cillessen and Rose, 2005). Affection can be described as having warm and close relationships with others. Affection is not relative *per se*, because having a close relationship with one person is not necessarily at the expense of another. Both status and affection are important goals in childhood and preadolescence (Buhrmester, 1990; Hawley, 2003; Jarvinen and Nicholls, 1996; Oldehinkel et al., 2007; Sijtsema et al., 2009). Given that both goals are important, it is preferable to realize one without losing

the other (Lindenberg, 2008). The pursuit of both status and affection ties bullies to the reactions of peers. For instrumental bullies (thus, not reactive bullies), this implies that they will strive to achieve status by dominating classmates without losing the affection of significant others (Veenstra et al., 2010). Thus, goals influence the decision of whom to befriend or whom to bully. In Study 1, goal framing was used to guide the explorative social network study; in Study 2, predictions from the goal-framing perspective were tested.

STUDY 1

Researchers into bullying often use the participant role approach to investigate the group process of bullying (Salmivalli, 2010). Most researchers have identified participant roles using reputational peer nominations; children were asked to nominate classmates who "start bullying," "assist the bully," "are victimized," "comfort the victim," and so on (see Salmivalli et al., 1996, for a list of all items). In these studies, peers were used as informants about the behavior of children and their position within the class. Such nominations provide valuable insights into the perceived behavior of children; however, a disadvantage is that no information is acquired about the relational nature of such behaviors. For example, when children are nominated as bullies, it is not known which and how many classmates they bully. In peer nominations for victimization, it is unknown if children are being victimized by a single classmate or by several classmates. This may be an important distinction, as it has been shown that victims with several bullies have on average lower self-esteem and more depressive symptoms (Huitsing et al., *in press*). When it is not known to whom behavior is directed, information about children's behavior may not be sufficient for investigating the process of bullying.

The aim of Study 1 was to examine the participant roles in bullying using a social network approach. Data for the participant roles were obtained using network questions, such as "Who starts when you are victimized?" and "Who defends you when you are victimized?" In this way, information about the so-called dyadic relations between all children in the classroom was obtained. These dyadic nominations can be aggregated to a total score, as is often done with reputational peer nominations (see Veenstra et al., 2005). In previous studies, peer nominations were also aggregated for the participant roles and standardized, labeling children with one "fixed" role (e.g., bully, defender). One advantage of the social network approach is that participant roles no longer

have to be regarded as fixed positions of children (in which children are assumed to behave consistently according to their roles), because it allows investigation of the variation in children's behavior toward different classmates.

Using the relational information, we explored the social network structure of one classroom in detail, focusing on subgroups and the interrelation of participant roles (cf. Salmivalli et al., 1997). This classroom served as a "motivating example" and some of the insights obtained were tested in Study 2. Based on the goals derived from the theoretical framework, we expected that bullies would achieve their desired status by dominating classmates. Because bullies strive for affection from their classmates, we first hypothesized that they would dominate unpopular and possibly rejected classmates. The marginalized classmates dominated by bullies become part of the bullies' outgroup. When bullies and bystanders (assistants and reinforcers) provide each other with (mutual) affection, rejection by victims (and their defenders) probably becomes less important to bullies. These rejected children who are unpopular are not relevant to the affection needs of the popular bullies (Veenstra et al., 2010). Thus, the second hypothesis was that the affection that bullies receive is likely to stem from other bullies, assistants, and reinforcers.

METHOD

Sample

Network questions on participant roles, bullying and victimization, sociometric status, and perceived popularity were collected in middle and late elementary education in the Netherlands. In Dutch elementary classrooms, children are normally together with the same classmates for the first 8 years of their education. Thus, this peer group is important and salient for children. The analyses were performed on one classroom from a larger sample of classrooms (used in Study 2), numbering 19 children (11 boys, eight girls) in grade 6, with a mean age of 10.4 years ($SD = 0.5$). This classroom was chosen for Study 1 because its bullying network had a clear structure graphically (see below).

Procedure

After parental consent was obtained for all children, they filled out a questionnaire in the classroom, under the supervision of a well-trained research assistant. The dyadic peer-nomination assessment took place at school. After brief instructions in which the research assistant emphasized that information would be kept confidential and that children were not al-

lowed to talk to each other during the assessment, a definition of bullying was provided as formulated in the Olweus' Bully/Victim questionnaire (Olweus, 1996), which emphasizes the repetitive and intentional nature of bullying and the power imbalance between the bully and the victim. Several examples covering different forms of bullying were given. Moreover, an explanation of what should not be considered bullying (teasing in a friendly and playful way; fighting between children of equal strength) was also provided.

Questionnaire: Dyadic Peer Nominations

Children received a list of all classmates, and were asked to nominate them for several behavioral dimensions. Both same-sex and other-sex nominations were allowed. The number of nominations the children could make was unlimited but they were told not to nominate all classmates. Following this procedure, information was obtained on the relationship of each pair of children in a classroom (see also Veenstra et al., 2007). In Study 1, we constructed networks based on nominations for initiating bullying ("Who starts when you are victimized?"), assisting ("Which classmates assist the bully when you are victimized?"), reinforcing ("Which classmates are usually present when you are victimized [they watch or start to laugh]"), and defending ("Which classmates defend you when you are victimized?"). Moreover, nominations received for friendships ("Which classmates are your best friends?") and perceived popularity ("Who do others want to be associated with?") were summed per student to construct proportion scores for affection and status, respectively. The proportion scores were calculated relative to the total number of participating classmates to take differences in the number of respondents per classroom into account. This yielded scores from 0 to 1, which were standardized for the whole sample ($M = 0$, $SD = 1$).

Analyses

We examined the classroom in detail using block-modeling analysis (e.g., Doreian et al., 2005; Wasserman and Faust, 1994). Blockmodels are aimed at finding structure in social network data by identifying groups of actors with the same pattern of relationships with actors in and outside the block (i.e., subgroup). We used stochastic blockmodeling (Nowicki and Snijders, 2001). The model assumes that probabilities of relationships, with reciprocated ties distinguished from nonreciprocated ties, depend on the latent group to which an individual belongs. Actors are a posteriori assigned to a group for which their membership probability is maximal, given their pattern of relationships. As in latent class analysis, the number of

groups is unknown and needs to be determined in the analysis. The outcomes of stochastic blockmodeling show which groups of children behave more or less similarly with regard to bully-related behaviors. It is, therefore, a useful analytical method to determine the global network (classroom) structure. We used blockmodeling only for the defending network because its structure was dense and not immediately distinct (for the bullying network, see Results). Stochastic blockmodeling was executed in the BLOCKS program (Snijders and Nowicki, 2004), which is part of the statistical social network analysis package StOCNET (Boer et al., 2006). Figures of the social networks were drawn using the NetDraw 2.41 program (Borgatti, 2002).

RESULTS

Figure 1 shows the bullying network of the classroom for the question, "Who starts when you are victimized?" Almost all bullying nominations were directed at children 8, 16, and 17 (solid circles in the figure). These three children were clearly the initiators of bullying in their classroom. Figure 1 also shows the assistants and reinforcers of the bullies; these are the dashed-circled children (the networks of assisting and reinforcing are not shown here). Children 8, 16, and 17 were also frequently nominated for assisting and reinforcing. It appears that these three children were the ringleader bullies of the classroom, supporting each other and assisted by four other assistants/reinforcers.

Figure 2 graphically presents the results of the stochastic blockmodeling analysis for the defending network with many nominations. The children are in the same positions as in Figure 1, meaning that the network positions are comparable across figures. The "groups" (i.e., the network structure of the classroom) were based on children with equivalent network positions. For the defending network, stochastic blockmodeling had the best model fit with a four-group solution. The groups are depicted in Figure 2: lines are drawn around children belonging to the same group. In the upper left of the figure is a group with mainly boys and one girl. The children in this group had mostly asymmetric defending relations within their group; all of them were also connected to child 10 by an asymmetric or reciprocal defending relation. The average standardized popularity score of the boys' group was -0.64 (scores ranged from -0.88 to -0.16). These children also had below-average scores for friendship nominations received (average -0.28 , range -0.77 to -0.07). The group in the lower left of the figure is a mainly girls' group, with one boy.

The average popularity score of this group was -0.42 (range -0.88 to 0.19), and the average friendship score was 0.07 (range -0.77 to 0.49). The children in this group had largely reciprocal defending relations among each other, and they hardly defended other children in the classroom, except for child 10. This boy was not classified in any of the other groups, because his network position was exceptional and dissimilar compared with the network positions of other classmates. This boy was quite central in the defending network; he had reciprocal and outgoing defending relations with the boys' group as well as the girls' group. Though this boy was nominated as a friend (z -score = 0.49), he was not very popular (z -score = -0.52). Finally, the group on the right of the network contains four boys and one girl. The children in this group were nominated by their classmates for bullying, assisting, and reinforcing. This group was deemed the most popular in the classroom, with an average popularity score of 1.98 (ranging between 0.91 and 3.40). The group members had above average friendship scores (average 0.24 , range -0.35 to 0.91). Hardly any defending relations existed between the children of this subgroup and the other children in the classroom. However, these bullying children clearly defended *within* their subgroup. These defending relations were mostly reciprocal.

DISCUSSION

A social network version of the Participant Role Questionnaire was used in this study. Dyadic information was used to illustrate the bullying and defending networks of one specific classroom, to obtain an impression of its social structure. In the network of initiating bullying, three bullies were clearly identified; almost all bullying nominations were directed at them. Assistants and reinforcers were identified in a similar way. In the network of defending, however, the structure was more complicated. Defending relations can be interpreted in combination with other relations (here: bullying). In addition to showing a boys' and girls' group, some of whose members reported being victimized, stochastic blockmodeling analysis disentangled a group of bullies consisting of four boys and one girl with mostly reciprocal defending relations. One central child was also found who had defending relations with the girls' and boys' group. This central child was even defended by some members of the bullying subgroup.

How was it possible that the boys and girls in the classroom were defended while the bullies remained popular (compared with other classmates) and did not face the risk of losing their affection? Based on

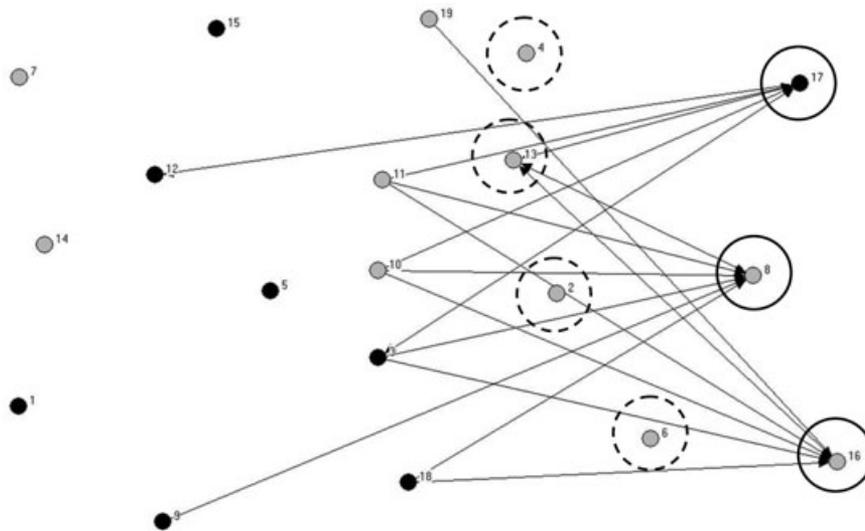


Fig. 1. *Study 1:* “Who starts when you are victimized?” Graphical representation of a bullying network in a classroom.
Note. Grey nodes are boys, black nodes are girls. Solid circles are bullies, dashed circles are assistants and reinforcers of the bullies.

goal-framing theory, we hypothesized that bullies, in their striving for status, would dominate classmates while avoiding the potential loss of status. Bullies target unpopular peers, thereby not losing their popular position in the classroom (Veenstra et al., 2010). Using goal-framing theory, we also hypothesized that bullies would receive affection from other bullies, assistants,

and reinforcers. Victims (and their defenders) are not so important to bullies because they are not part of the bully group. In line with these expectations, we found differences in the popularity scores of the boys’ and girls’ group and the bully group. It appeared that the bully group was by far the most popular in the classroom, and the children in this group also had average

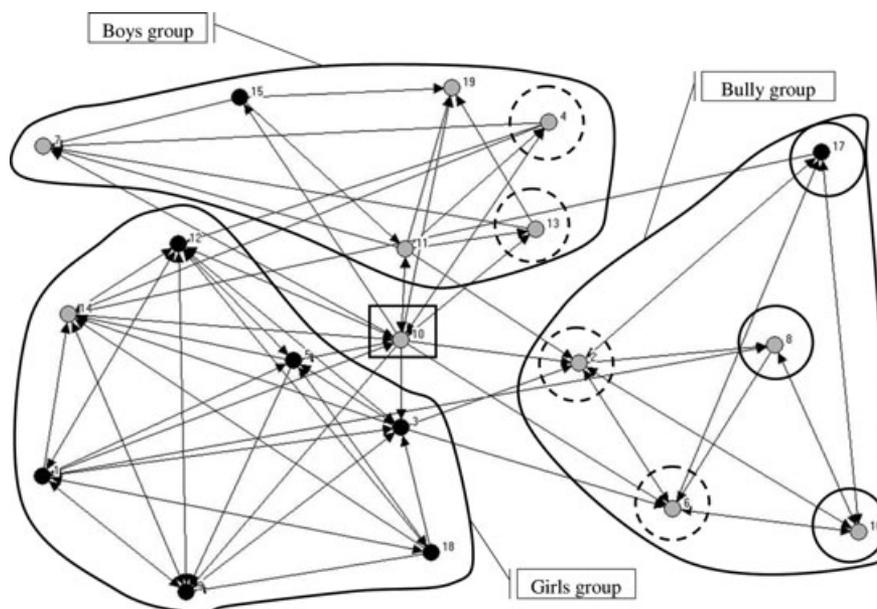


Fig. 2. *Study 1:* “Which classmates defend you when you are victimized?” Graphical representation of a defending network in a classroom.
Note. Grey nodes are boys, black nodes are girls. Lines indicate “groups” based on children with equivalent network positions.

scores for friendships. Through their support for each other, bullies did not lose affection from others, even when their victims were defended.

Others have also found that bullies are cliqued in high-status groups with regard to perceived popularity (Witvliet et al., 2010). Skillful bullies are motivated to obtain a high status and a dominant position in the peer group (Olthof et al., 2011; Salmivalli et al., 2005; Sijtsema et al., 2009). That is also what bullies achieve; bullies are found to be powerful, dominant, popular, and cool (Caravita et al., 2009; Dijkstra et al., 2009; Hawley, 1999; see, for an overview, also Salmivalli, 2010). Witvliet et al. (2010), however, did not find that bullies had high levels of affection (likeability); however, the bullies in the classroom of Study 1 scored average on affection. Such differences may be attributed to bully-related norms in classrooms; particularly bullying by popular adolescents relates social preference to bullying (Dijkstra et al., 2008; Sentse et al., 2007).

The findings of this social network perspective illustrate the possible merits of investigating the network structure of classrooms. Children do not have to be labeled with a fixed role, because we can investigate the variation in children's behavior toward different classmates. For example, regarding the children who were nominated as bullies in the classroom of Study 1, we were also able to account for their behaviors toward other classmates by examining multiplex networks. Besides assisting other bullies, these bullies were also defenders of bullies. New insights can be gained when exploring the social structures of classrooms through using network questions about specific relations between children. The analyses of this classroom were performed for illustrative purposes. The results cannot be generalized, but the findings on the structure of this classroom provided insights into the participant roles in bullying that are beyond the scope of an individual perspective.

The classroom under investigation was structured using subgroups. It was observed that boys cliqued together in defending networks, as did girls (see also Dijkstra et al., 2007). Moreover, the bullying children of the classroom cliqued together (Dishion and Tipsord, 2011; Salmivalli et al., 1997). These illustrative findings may imply that bullying roles are related and that the participant roles are not static, but may change: children's behaviors vary depending on the situation. For example, at one moment, one of the bullies harasses classmates while the other bullies join in; at another moment, this ringleader bully is a follower of the other bullies.

These descriptive results also make the existence of "secondary or hybrid roles" (Goossens et al.,

2006; Sutton and Smith, 1999) more comprehensible. Children with hybrid roles are nominated for different, and sometimes contradictory, participant roles. For example, children are nominated for both bullying and defending. A network approach can explain these mixed findings, because children can vary in their behavior toward different groups of classmates. Some children are defenders or best friends for their own group, but they may bully other children in the classroom. This suggests that we should think in terms of an ingroup and an outgroup (Tajfel and Turner, 1979): some children are nominated by their ingroup for prosocial behavior (defending), whereas other classmates (the outgroup) nominate them for antisocial behavior (bullying, assisting, reinforcing). Experimental studies by Nesdale and colleagues (e.g., Nesdale et al., 2009; Ojala and Nesdale, 2004) demonstrated that ingroup-outgroup processes are important in relation to bullying (see also Gini, 2006, 2007), and it was also experimentally shown that greater identification with a group increases ingroup favoritism (Jones et al., 2009). These findings aid the explanation of the hybrid roles, and given the variation in children's behaviors toward different groups, it might be better to refer to *dynamic roles*.

Finally, the results provide another view on the concept of defending. Defending is usually seen as a prosocial act of empathic children, who side with weaker peers who are victims of peer harassment (Caravita et al., 2010; Gini et al., 2007; Pöyhönen et al., 2010). The findings in this classroom, however, show that not only victims may be defended. In the classroom under investigation, bullies were also defended, but mostly by other bullies from their ingroup. Defending of bullies can be judged as negative behavior because it supports and prolongs the bullying. For an understanding of defending behavior, it might, therefore, be important to know which classmates are defended. To investigate the relation between defending and bullying in more detail, we analyzed the larger sample in Study 2.

STUDY 2

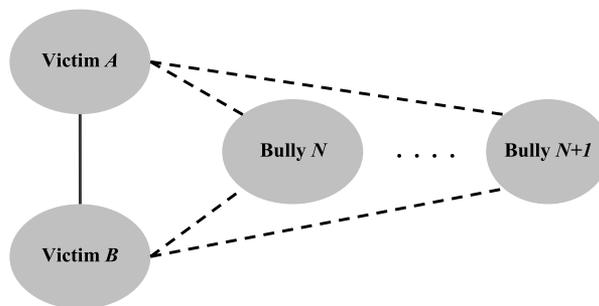
Defending has been found to be a distinct participant role. For example, it has been found that defenders are liked, whereas bullies, assistants, and reinforcers are uniformly rejected by most of their classmates (Goossens et al., 2006; Salmivalli et al., 1996). It has also been found that children often defend same-sex peers (Sainio et al., 2011), which can be seen as a relevant ingroup: same-sex peers are often more important than cross-sex peers (Dijkstra et al., 2007;

Maccoby, 1998). The illustrative findings in the classroom of Study 1 also point toward ingroup defending. Not only boys and girls but also bullies were found to defend the children of their own ingroup. The results of Study 1, however, are based on only one classroom. Does defending also occur among bullies in a larger sample of classrooms? And how does this apply to victims? To answer these questions, we statistically modeled networks of bullying and defending, to investigate how defending and bullying are associated at the relationship level.

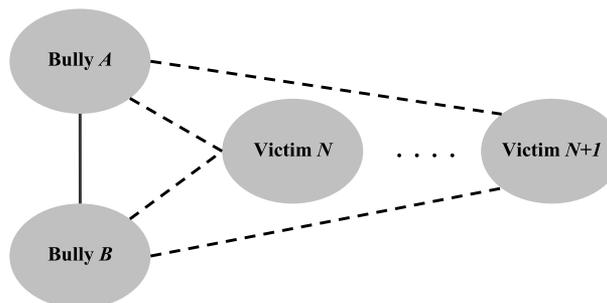
Being nominated by peers as a defender does not necessarily mean that a child defends victims. Part of the nominations might stem from bullies who nominate other bullies as their defenders. In this context, ingroup and outgroup processes imply that bullying and defending are dynamic processes (Adler and Adler, 1995). Animosity between cliques can lead to reciprocal aggressive interactions, in which members of different groups bully each other while being defended by ingroup members. This means that a distinction should be made between defending victims and defending bullies.

Consider the victims in Figure 3.a. Children *A* and *B* report being victimized by several bullies (thus, they can be named as victims). Because *A* and *B* share the same bullies, they might seek each other for comfort and support against the bullies (Fox and Boulton, 2006; Hodges et al., 1999). This can also be deduced from a goal-framing approach. Victims will search for sources of support and affection. However, victims are often rejected (Salmivalli and Isaacs, 2005). Rejection can be seen as a vicious cycle where a lack of fit with the group and being rejected enhance each other, which makes it hard for children to return to the peer group once they have been rejected (Juvonen and Gross, 2005; Mikami et al., 2010). This means that victims often have to search for the support of other (rejected) victims. Thus, as can be seen in Figure 3.a, it is likely that victims *A* and *B* will defend each other (the solid line) to benefit from a bond against their bullies. Thus, we hypothesized that victims with the same bullies would tend to defend each other.

Based on the goal-framing approach, we predicted that bullies would defend each other. In doing so, bullies can benefit from each other's power or status. The support of followers and other bullies gives bullies a stronger position in the classroom and motivates them to continue their negative behaviors. This is illustrated in Figure 3.b. Children *A* and *B* are nominated for bullying by several victims (thus, they can be named as bullies). These bullies defend each other (the solid line), which is a strategy that not only results in a strong position against the victims, but also leads



a. Defending between Victim *A* and Victim *B* for shared out-ties of bullying (being bullied by the same bullies, $N, \dots, N+I$).



b. Defending between Bully *A* and Bully *B* for shared in-ties of bullying (bullying the same victims, $N, \dots, N+I$).

Fig. 3. Study 2: Triangulation in multivariate networks for bullying (“Who starts when you are victimized?”) and defending (“Which classmates defend you when you are victimized?”). Dotted lines indicate bullying nominations, solid lines indicate defending nominations.

to the formation of an outgroup of victims. Recall from Study 1 that these victims, the outgroup, may be less important for the status and affection of the bullies because they are not part of the bullies' ingroup. Thus, we hypothesized that bullies who harassed the same victims would tend to defend each other.

These patterns in two interwoven networks (bullying and defending) were tested using statistical modeling of networks by Exponential Random Graph Models (ERGMs, also called p^* models). These are probability models for complete networks of a given set of actors whose parameters represent graph configurations of dyadic (e.g., reciprocity), triadic (e.g., transitivity), and higher-order level effects (see, e.g., Robins et al., 2007a). Two networks can be investigated simultaneously in bivariate ERGMs (Lazega and Pattison, 1999; Pattison and Wasserman, 1999) with configurations involving both networks. Estimations of separate classrooms were summarized using a meta-analytic procedure, which describes the occurrence of (need for) the various structural parameters and their size in the different networks.

METHOD

Sample and Questionnaire: Dyadic Peer Nominations

The initial sample for Study 2 yielded 523 children from 27 classrooms for grades 5–8. Two classrooms were excluded because no more than two nominations were given for bullying in total, precluding the estimation of a network structure. The remaining 25 classrooms comprised 494 children: 218 girls (44.1%) and 276 boys (55.9%), with a mean age of 10.5 years ($SD = 1.5$). The mean class size was 19.8 children ($SD = 4.3$). Ninety-seven percent of the children in these classrooms participated in the study. The schools were situated in both rural and (sub)urban areas of the Netherlands. The percentage of children whose parents had a low educational level, at maximum a certificate for secondary vocational education, was 16.9%. The percentage of children from ethnic minorities (at least one parent born outside the Netherlands) was 18.7%. Information about the procedure and data collection can be found in the method section of Study 1.

Analytical Strategy

We used social network questions on bullying and defending for each of the classrooms. We tested the bivariate configurations of defending among bullies and victims (described in Fig. 3) along with univariate configurations (i.e., parameters for the network structure of bullying and defending when examined separately). We estimated parameters of dyadic, triadic, and higher-order level effects (see, e.g., Robins et al., 2007a). The parameters in the model represent configurations. These are subsets of actors with specific patterns of ties between them. The combination of the configurations leads to the structure of the observed social network, and the corresponding parameters can be interpreted as the outcome of structural processes in the network. The configurations we used in this study were based on ERGM specifications introduced by Snijders et al. (2006) and Robins et al. (2007a, 2009), which include alternating in- and out-stars and alternating triangles of various forms (Robins et al., 2009), and their multivariate extensions. The univariate configurations of single-tie networks of bullying and defending used in this study were chosen because these have been shown to lead to a good estimation of their single network structures (i.e., when estimated on their own) of positive and negative relations (Huitsing et al., unpublished research).

We used the multivariate *XPNet* program (Wang et al., 2009), available at www.sna.unimelb.edu.au, to estimate ERGMs. The program estimates the pa-

rameters using the Monte Carlo maximum likelihood methods of Snijders (2002). Model estimation uses starting values of parameters that are refined iteratively, such that the simulated networks resemble the observed networks more closely. Each estimated parameter was considered to be converged when the simulated networks differed minimally from the observed networks (Robins et al., 2007b). More information about convergence and Goodness of Fit for the statistical models can be found elsewhere (Robins et al., 2009, 2007b). In all models, we fixed the graph density because this improves model convergence considerably (Lubbers and Snijders, 2007).

The results of the models for the 25 classrooms were combined in a meta-analytic procedure as described in Lubbers and Snijders (2007). This assumes a model in which each network has a true parameter, which is estimated with some estimation error; the true parameters are distributed across networks according to a normal distribution, while the estimation errors are independently and normally distributed, with a mean of 0 and a standard deviation equal to the estimated standard error. Estimation of this model was carried out using the program MLwiN (Rasbash et al., 2000). The obtained estimated mean parameter represents an unstandardized aggregated estimate across classrooms (along with its standard error), and the accompanying standard deviation represents the degree to which estimates vary across classrooms. The statistical significance of the mean parameters was tested by dividing the estimate by its standard error; this was tested using a *t*-ratio, which has approximately a normal distribution. The significance of the parameters for the standard deviations was tested using a chi-square difference test with one degree of freedom.

RESULTS

On average, children nominated one classmate for bullying them (average degree), and about 9% of these nominations were reciprocated (see descriptive statistics in Table I). About one-third of the children (153 in total) were isolated from bullying: they neither indicated being victimized nor were reported as bullies. About 20% of the children were nominated as bullies but did not report being victimized themselves (102 “sinks”), and a comparable percentage of children was not nominated for bullying but reported being victimized by classmates (106 “sources”). This is also partly reflected in the univariate parameters of the ERGMs used to estimate the structure of the bullying networks (see Table II). These parameters represent configurations, subsets of actors with specific patterns of ties between them, for which the

TABLE I. Study 2: Descriptive Statistics for Networks of Bullying and Defending

	Bullying	Defending
Number of classrooms	25	25
Total number of nominations	451	1,798
Total number of possible nominations	9,708	9,708
Average density over all classrooms (standard deviation)	5.0% (2.6%)	19.7% (8.0%)
Minimum density per classroom	1.96%	4.17%
Maximum density per classroom	10.53%	33.97%
Average in/outdegree	0.94	3.77
Standard deviation outdegree (given nominations)	1.47	3.82
Standard deviation indegree (received nominations)	1.51	2.38
Reciprocity over all classrooms (standard deviation)	9.1% (12.9%)	41.2% (15.2%)
Number of students	494	494
Number of sinks ^a	102	81
Number of sources ^a	106	12
Number of isolates ^a	153	11

^aNote. Sinks are actors with zero out-ties and at least one in-tie; Sources are actors with at least one out-tie and zero in-ties; Isolates are actors with zero in-ties and zero out-ties.

combination leads to the relational structure of the bullying network. The estimated isolate parameter (1.19, $P < .01$) was significantly positive. The estimated sinks parameter was also positive (but not significant), and the number of sources was well fitted with the model given in Table II; these were, therefore, not estimated using a separate parameter. A dispersed distribution of the indegrees was found (1.46, $P < .01$), implying that some children were clearly nominated more than others as bullies. The multiple two-path parameter was positive (0.10, $P < .01$). This parameter models the tendency to have (multiple) outgoing as well as incoming ties.

The networks for defending were denser: children nominated on average almost four classmates as their defenders, and 40% of these nominations were reciprocated (see Table I). Few children were isolated, but a considerable number of children were nominated as defenders but did not report having defenders themselves (81 sinks). An important parameter representing the relational structure of the defending network is the reciprocity parameter that was estimated positively (1.52, $P < .01$; see Table II). Children also preferred to have transitive defending relations (0.73, $P < .01$); thus, children were defended by the defenders of their defenders. Moreover, the multiple two-path parameter was negative (-0.27 , $P < .01$). In addition to these effects, we included the shared in-ties parameter (0.17, $P < .01$) for good model convergence.

We included multivariate relations in the same model, which means that we included configurations of both bullying and defending ties. We controlled for degree-level dependencies, which are the nominations received and given at the child level. The number of nominations (indegrees) received by children for bullying was uncorrelated with the number of nominations received for defending (multiplex in-2-stars, see Table II). We found neither multiplex out-2-stars (the number of nominations given for bullying was unrelated to the number of nominations given for defending), nor multiplex mixed-stars (the number of times children were nominated for defending while nominating others for bullying). The other mixed-star parameter was significant (-0.04 , $P < .05$), suggesting that children who were nominated for bullying were less likely to nominate others for defending. The parameters for the multivariate triads show that children who were victimized by the same bullies tended to defend each other (0.25, $P < .01$). It was also found that children who were nominated as bullies tended to defend each other (0.47, $P < .01$).

Extra analyses: victim-reported defending.

In the analyses presented in Table II, we analyzed complete defending networks, meaning that all children were allowed to answer the question “Which classmates defend you when you are victimized?” Also children who were not really victimized (given the power imbalance, the repetition, and the intentional nature) were allowed to nominate their defenders. To examine whether this influenced the results, we constructed new network matrices where defending ties were only taken into account when children reported being victimized by at least one classmate in response to one of eight questions concerning being bullied: the questions for initiating bullying (“Who starts when you are victimized?”) and seven questions about several forms of bullying (“Which classmates victimize you by . . .”), such as verbal, relational, or digital bullying. Using this criterion, the number of defending ties in the total sample was reduced by 19.5%. The average degree of defending was now 3.03 (standard deviation outdegree = 3.75; standard deviation indegree = 2.06). The reciprocity over all classrooms also dropped from 41.2% to 33.6% (standard deviation = 13.4%). When we analyzed the structure of these defending networks using ERGMs, also in relation to bullying networks, the results hardly changed as compared with Table II. In the bivariate parameters using bullying and defending ties, it was found that children who were nominated as bullies tended to defend each other, $\text{DKT-ABA} = 0.48$ (0.11), $P < .01$. The tendency of children to defend each other when

TABLE II. Study 2: “Who Starts When You Are Victimized?” and “Which Classmates Defend You When You Are Victimized?” Multivariate Exponential Random Graph Models for Bullying and Defending

Parameter	Explanation	Graphical representation	Mean parameter		Standard deviation	
			Estimate	Standard error	Estimate	χ^2
<i>Bullying</i>						
In-ties spread (A-in-S)	Spread of in-ties distribution (if positive, the distribution is dispersed: some children receive more nominations for being a bully than others)		1.459**	(0.318)	0.72	2.61
Isolates	Tendency of children to be isolated (zero indegree and zero outdegree)		1.192**	(0.341)	0.91	1.34
Sinks	Tendency of children to have zero outdegree		0.539	(0.318)	0.68	0.49
Multiple two paths (A2P-T)	Tendency to have (multiple) out-ties and in-ties (bully victims)		0.101**	(0.037)	0.00	0.00
Shared in-ties (A2P-D)	In-ties-based structural equivalence (being nominated by the same children)		0.077	(0.087)	0.19	3.79*
Shared out-ties (A2P-U)	Out-ties-based structural equivalence (nominating the same children)		-0.426*	(0.167)	0.40	8.37**
<i>Defending</i>						
Reciprocity	Tendency to mutually defend		1.520**	(0.150)	0.50	2.58
Transitive closure (AT-T)	Closure of two paths (children defend the defenders of their defenders)		0.728**	(0.035)	0.00	0.00
Multiple two paths (A2P-T)	Being linked at distance two: Precondition for transitive closure		-0.271**	(0.033)	0.13	57.25**
Shared in-ties (A2P-D)	In-ties-based structural equivalence (being nominated by the same children)		0.174**	(0.030)	0.12	25.99**
<i>Multivariate parameters</i>						
Multiplex in-2-stars (In-2-star-AB)	Number of nominations received by children for bullying in correlation with the number of nominations they received for defending		-0.034	(0.025)	0.04	0.14
Multiplex out-2-stars (Out-2-star-AB)	General tendency in nominating others (for bullying and defending)		0.015	(0.019)	0.04	3.33

TABLE II. Continued

Parameter	Explanation	Graphical representation	Mean parameter		Standard deviation	
			Estimate	Standard error	Estimate	χ^2
Multiplex mixed-stars bullying-defending (Mixed-2-star-AB)	Number of times children are nominated for bullying and nominate others for defending		-0.036*	(0.018)	0.03	1.14
Multiplex mixed-stars defending-bullying (Mixed-2-star-BA)	Number of times children are nominated for defending and nominate others for bullying		-0.025	(0.023)	0.00	0.00
Defending for shared out-ties of bullying (UKT-ABA)	Tendency of victims to defend other victims who are victimized by the same bullies		0.249**	(0.091)	0.16	1.04
Defending for shared in-ties of bullying (DKT-ABA)	Tendency of bullies to defend other bullies who harass the same victims		0.469**	(0.100)	0.26	2.77

Note. * $P < .05$; ** $P < .01$. The degree of freedom for the χ^2 test is 1. Dotted lines indicate bully-victim relations, solid lines indicate defending relations in the graphical representations of the parameters. Characters between brackets indicate the names of the configurations as they are named in *XPNet*. The mean parameter is an unstandardized aggregated estimate across classrooms. The standard deviation represents the degree to which estimates vary across classrooms.

victimized by the same bullies became marginally significant, UKT-ABA = 0.43 (0.25), $P = .08$, which is not surprising, given that the number of shared out-ties for defending was reduced by diminishing the number of defending ties. The table of these extra analyses is available on request.

DISCUSSION

In a large sample of about 500 children in 25 classrooms, multivariate social network analyses showed that children who nominated the same classmates for bullying (referring to victims) and children who were nominated by the same classmates for bullying (referring to bullies) were defended by children with a similar network position in relation to bullying or victimization (their ingroup). Thus, victims tended to defend each other, and so did bullies. By defending classmates who targeted the same peers, bullies created an ingroup of bullies and an outgroup of victims. These results indicate that victims as well as bullies are embedded in subgroups where they are supported by peers, which is in line with the illustrative findings of Study 1. This is also reflected in the group process of bullying, where more children than bullies and victims become involved when defending occurs.

The findings of the meta-analyses of the ERGMs for 25 classrooms showed also that defending among bullies was estimated to be somewhat stronger than defending among victims. Bullies might use the group to harass others. For example, it has been shown that bullies aggress against the same victims (Card and Hodges, 2006). When bullies are embedded in a subgroup with followers, they might be more inclined to defend each other if victims retaliate. Victims might be less likely to seek each other's support. Victims are often rejected and peers do not easily associate with them (Salmivalli and Isaacs, 2005). It is imaginable to expect that siding with a weak and powerless victim might be even more damaging for one's social position, because it can reinforce the vicious cycle of rejection (Juvonen and Gross, 2005). Given the potential risks that are related to defending a victim, it is good to see that children who report being victimized have defenders on their side.

The results of this study require reflection on the concept of defending. Defending is behavior that is usually seen as being prosocial. For example, studies have shown that defenders have high levels of empathy (Caravita et al., 2010; Gini et al., 2007), which is related to higher levels of defending when children have high social status (Pöyhönen et al., 2010).

Moreover, defending has been positively associated with antibullying norms, whereas bully-related behaviors (initiating bullying, assisting, reinforcing) have been negatively associated with antibullying norms (Salmivalli and Voeten, 2004). On the other hand, it has been found that bullies have even better social cognitive skills than defenders (Sutton et al., 1999), which is the ability to understand others' needs. Bullies and defenders may, therefore, opt for different ways to obtain and maintain their goals of status and affection. Where defenders use prosocial and helping means to achieve their goals, bullies opt for being dominant.

With the dyadic nominations used in this study, it is possible to disentangle defenders of victims from defenders of bullies. When reputational peer nominations are used in asking children to nominate the classmates who comfort and support victims, it is likely that only the prosocial defenders are reported, because they have a reputation for helping classmates. This reputation may be established when children defend classmates with whom they are not directly affiliated, such as being befriended. But when we ask children by whom they themselves are defended, we obtain information about the defenders and the children they defend. In that way, we ask children directly by whom they are defended and we see, using that measure, that bullies are also defended. As suggested by the findings of Study 1, bullies may defend only their ingroup classmates, which does not necessarily lead to a reputation of being a defender at the group level.

Children who were not victimized, however, may have interpreted the dyadic question, "Which classmates defend you when you are victimized?" as "Suppose you were victimized, who would defend you?" These children might have perceived defending hypothetically. To rule out the possibility that hypothetical defending had an impact on the outcomes of this study, we performed extra analyses where defending ties were only taken into account when children reported being victimized by at least one classmate. The results remained largely unchanged, suggesting that children who were nominated as bullies often reported being victimized by at least one classmate. In the analyses presented, we felt justified to ask also children other than pure victims to nominate their defenders in bullying situations, because children do not necessarily have to be victimized in order to be defended (Adler and Adler, 1995). In essence, it can be expected that successful defending prevents victimization or alleviates its consequences (Sainio et al., 2011).

The findings of this study show that knowing who defends whom can lead to new insights. As the re-

sults show, some children who were nominated for defending, defended bullies. This implies that future studies should ideally ask "By which classmates are you defended?" instead of "Which classmates are defenders (of victims)?" In the latter question, there is no information about who is defending whom, so it is not possible to disentangle at the dyadic level defenders of bullies from defenders of victims. This is especially important when investigating characteristics of defenders, because children can have different roles in the group processes in their classroom when defending classmates who are involved in bullying.

GENERAL DISCUSSION

In this study, it was investigated how the group process of bullying can be investigated using a social network perspective. Social network data on the participant roles in bullying were used in two studies. Study 1 illustrated how social network data can be used to gain insight into the social structure of a classroom. Using social network data, the subgroups of defending in the classroom as well as the bully roles were identified. Some of the descriptive insights obtained in this single classroom were used to set up statistical network analyses on the larger sample in Study 2. The bivariate network analyses showed that victims with the same bullies were likely to defend each other. Moreover, as was also indicated by the findings of Study 1, also bullies who harassed the same victims had a tendency to defend each other. An important aspect to address is how a social network perspective can be applied in classroom-based antibullying interventions, and be integrated in existing interventions that are based on the participant-role approach (see Kärnä et al., 2011; Lodge and Frydenberg, 2005; Menesini et al., 2003), but first we will discuss the limitations and strengths.

Limitations and Strengths

To measure defending, we asked all children to name the classmates by whom they were victimized. As some children might have perceived defending hypothetically, we examined also the influence of reports of defending by children who were not victimized, using extra analyses in which defending ties were only taken into account when children reported being victimized by at least one classmate. In other studies, a different criterion was used; children were allowed to nominate defenders when they indicated having been victimized at least once or twice on any of 11 self-reported Olweus bully/victim items concerning several forms of victimization (e.g., Huising et al., unpublished research; Sainio et al., 2011). Such

self-reports on victimization were not available in the data under investigation, so we decided to use reports on being victimized by at least one classmate as an indicator of being victimized. Another limitation is that we also did not measure goals explicitly, but derived hypotheses from the goal-framing approach that were supported by the results. Future research might take goals explicitly into account (see Sijtsema et al., 2009).

Moreover, the results of Study 1 suggest that bullies are defended by children who also support these bullies in bullying situations, that is, assistants and reinforcers of these bullies. However, a limitation is that we do not know whether these defenders who act as followers of bullies really support that particular bully. For example, when a child nominates two or more bullies and additionally some assistants, we do not know which assistants belong with which bullies. Friendship and defending networks can be used as a proxy to identify whether assistants are associated with bullies. Future studies might also use data collection utilizing a computer script, where children can indicate which classmates, in case of two or more bullies, assist bully A, assist bully B, and so on. However, problems of redundancy can appear when children are victimized by a subgroup of bullies, where in some cases, child A starts, supported by child B, and sometimes the converse occurs.

Despite these limitations, the findings of our study show that the social network perspective on bullying goes beyond the individual perspective, and indicates that ingroup and outgroup mechanisms can be important in explaining the group process of bullying. The approach adopted in this study allowed us to take into account children's embeddedness in subgroups, and thereby the influence of classmates on their behavior via a goal frame, as children are tied to reactions of peers. Moreover, by using social network data on two relations, we were able to distinguish between different kinds of defenders, by addressing the question *who defends whom*. The social network perspective of the present study enabled us to identify the participant roles in greater depth, which can be valuable for specific classroom antibullying interventions. In this way, it will hopefully be possible to stop or at least diminish the victimization of children.

Implications of Social Network Approach for Antibullying Interventions

Social network information is suitable for identifying processes in specific classrooms. A descriptive analysis of a classroom such as that performed in Study 1 can shed light on the group structure of the classroom by identifying the children who support bullies, or alternatively, which victims are victimized

by whom. Using social network data, it is also possible to identify central or high-status children in the classroom, such as children who are embedded in several subgroups or who are considered by classmates to be popular or good leaders. These central children can possibly function as "peer supporters" (Cowie et al., 2008), or the information can be used to form a support group applying the *method of shared concern* (Pikas, 2002) or the *no-blame approach* (Robinson and Maines, 2008). Such a support group usually consists of a few bullies and defenders of a victim, and a few prosocial high-status children who are all requested to provide practical support for victims. Social network information can be used to find the students who fit those roles.

Furthermore, social network information can be used to inform teachers about the group structure of their classroom, and to give personal advice on this (for example, this can be supported by pictures similar to Figures 1 and 2 of Study 1). Teachers can be informed about the bullies in the classroom and about the victims of these bullies. It is valuable for teachers to become aware of subgroups, thereby recognizing which children belong to which subgroups (cf. Gest, 2006). Teachers might be aware of the initiators of bullying, but assistants and reinforcers of bullies might be more difficult to detect. Improving teachers' knowledge about the social structure of the classroom can increase their effectiveness in intervening in bullying.

It is important that teachers know how to recognize bullying and how to correct bullying behavior. To this end, the KiVa antibullying program has been developed in Finland (Kärnä et al., 2011; Salmivalli et al., 2010). KiVa is based on two theoretical foundations described in this study: the participant role approach and the strong social position that bullies usually have (see, e.g., Caravita et al., 2009; Cillessen and Rose, 2005; Dijkstra et al., 2009; Witvliet et al., 2010) as a result of reaching their goal of acquiring status without losing affection by dominating marginalized classmates (for goal framing, see also Veenstra et al., 2010). Despite the success of KiVa (Kärnä et al., 2011), only a minority of victims were recognized by school personnel in Finnish KiVa schools (Sainio et al., 2011). It was harder for teachers to recognize bullying of girls, and to detect hidden forms of bullying, such as gossiping, excluding, or cyberbullying. To enable teachers to intervene more adequately, in 2012, our research group will implement and evaluate KiVa and KiVa+ in the Netherlands. KiVa+ is the Finnish KiVa program with one additional component: teachers in KiVa+ will receive a report that is partly based on social network information. Teachers will be informed about the network structure of their

classroom, in order to provide them with a more accurate view of the classroom. We will also test how social network information can be used to tackle bullying. An important question to be answered is, which children in the network should be targeted to diminish bullying? The feedback on social relations will probably make teachers more aware of bullying, and they will hopefully be able to tackle more specific cases of bullying.

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