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Be a buddy, not a bully?

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Document Version

Publisher's PDF, also known as Version of record

Publication date:

2016

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

van der Ploeg, R. (2016). *Be a buddy, not a bully? Four studies on emotional and social processes related to bullying, defending, and victimization*. [Groningen]: Rijksuniversiteit Groningen.

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The complex interplay between bullying and perceived popularity in the classroom

A social network investigation*

*This chapter is co-authored with Christian Steglich and René Veenstra. A slightly different version is currently under review by an international peer-reviewed journal



School bullying is a persistent problem in schools that affects all who are involved. It is characterized by an imbalance of power and a continuous intention to harm or discomfort peers (Olweus, 1993). In the past, bullying was often considered an impulsive, uncontrolled outburst of aggression toward a victim (Olweus, 1978). Nowadays, most scientists and practitioners agree that bullying is a complex group phenomenon (Salmivalli et al., 1996) that predominantly involves strategic, goal-directed behavior (Olthof, Goossens, Vermande, Aleva, & Van der Meulen, 2011; Reijntjes, Vermande, Goossens, et al., 2013; Salmivalli & Peets, 2009; Volk et al., 2014). Specifically, bullies are thought to bully to achieve dominance and high social status in the peer group.

Previous studies reveal that bullies have indeed higher social status goals than non-bullies (Cillessen & Mayeux, 2004; Sijtsema et al., 2009) and that they are often dominant and powerful (Vaillancourt et al., 2003). Research demonstrates that bullies strategically pick on easy victims, that is, the physically weak or those who are rejected by other classmates (Salmivalli & Peets, 2009; Sijtsema et al., 2009; Veenstra et al., 2007). This strategy seems effective because bullying is repeatedly found to be associated with perceived popularity among peers both cross-sectionally (e.g., Caravita et al., 2009; De Bruyn et al., 2010) and longitudinally (Cillessen & Borch, 2006; Reijntjes, Vermande, Olthof, et al., 2013; Sentse et al., 2015).

Although it has been acknowledged that the association between involvement in bullying and perceived popularity is bi-directional (Reijntjes, Vermande, Olthof, et al., 2013), little is known about the interplay between bullying and perceived popularity over time. Sentse and colleagues (2015) examined the longitudinal interplay between bullying, victimization, and social status. However, their study did not account for the fact that both bullying and popularity take place in dyadic relations and strongly depend on the group context. Previous studies mainly investigated whether a person bullied or was perceived as popular and did not consider who was bullied or by whom a person was perceived as popular. In other words: it remains unclear how bullying and perceived popularity interact within the peer group in which the bullying occurs. The aim of this study is therefore to unravel the relational patterns of bullying and social status.

To do this, we investigated the longitudinal interplay of bullying nominations and perceived popularity nominations in the classroom, based on the peer nomination questions “Who in your class always starts bullying you?” and “Who is popular in your class?”. Using longitudinal multivariate social network analysis in

RSiena, we analyzed the simultaneous evolution of multiple networks and their interplay in the group context (for examples see Huitsing et al., 2014; Rambaran, Dijkstra, Munniksma, & Cillessen, 2015). Based on the existing body of knowledge, we expected that bullying would result in higher social status *and* that having high social status would lead to involvement in bullying behavior (e.g., Cillessen & Mayeux, 2004b; Reijntjes, Vermande, Olthof, et al., 2013; Sentse et al., 2015). In addition, we sought to expand the understanding of processes that would explain how bullying and popularity are intertwined. Specifically, we focused on the maintenance of existing bullying and popularity nominations and formation of previously non-existing nominations.

The importance of social status

A goal-framing approach helps us to understand why bullies bully and clarifies how this behavior is related to high social status in the peer group. Goal-framing theory argues that human behavior is affected by the pursuit of goals: people act in ways that help to accomplish their goals and refrain from behaviors that hinder goal attainment (Lindenberg, 2008). In late childhood and early adolescence, obtaining high social status in the peer group becomes an important goal (e.g., Adler & Adler, 1998; Cillessen & Rose, 2005; LaFontana & Cillessen, 2010). After all, those with high social status are considered more attractive to spend time with, have greatest access to (social) resources and a higher (emotional) well-being (Dijkstra et al., 2009; Huberman, Loch, & Öncüler, 2004; Volk et al., 2015).

Usually two types of social status are distinguished: social preference and perceived popularity. Social preference refers to the degree to which someone is liked or disliked by peers. Popularity reflects dominance, prestige, and visibility in the peer group (Cillessen & Rose, 2005; Lease et al., 2002; Parkhurst & Hopmeyer, 1998). Peer popularity is an important reason why students engage in bullying behavior (Cillessen & Mayeux, 2004; Sijtsema et al., 2009). Dominance and visibility play an important role especially in schools: during late elementary and middle school years, discussion about who is popular or 'cool' are widespread (Lease et al., 2002; Shoulberg, Sijtsema, & Murray-Close, 2011).

Popular students turn to be highly influential and often serve as role models: by imitating their behaviors, less popular classmates try to gain higher status in the peer group and increase the chance of affiliation with popular peers to bask in reflected glory (Dijkstra, Cillessen, & Borch, 2013; Dijkstra, Cillessen, Lindenberg, & Veenstra, 2010b; Garandeau, Lee, et al., 2014). For this reason, many anti-bullying

interventions focus on diminishing the social status of bullies by targeting group norms (Salmivalli et al., 2012; Wölfer & Scheithauer, 2014). Yet, these interventions do not always work, as especially the popular bullies persist in their bullying behavior (Garandeau, Lee, et al., 2014). To better understand why bullying is a successful strategy for popular students, it is essential to examine the interplay between bullying and perceived popularity more thoroughly.

Bullying results in a popular status

In many (early) adolescent groups, antisocial and ‘tough’ behavior, such as physical and verbal bullying, are perceived as ‘cool’ (Reijntjes, Vermande, Goossens, et al., 2013; Rodkin, Farmer, Pearl, & Van Acker, 2006; Salmivalli & Peets, 2009). Bullies can increase their visibility and reputation in the peer group by harassing others, resulting in greater perceived popularity among their peers (Reijntjes, Vermande, Goossens, et al., 2013). Group norms and social power are factors that can explain when bullying leads to a popular status in the peer group. In almost all bullying situations witnesses are present (e.g., Salmivalli, 2010) and as such, group norms are important given that the peer group assigns status to its members. Put differently, bullies depend on their classmates to gain popularity.

Next to group processes, social power can play a role in the association between bullying and popularity. Especially indirect types of bullying, such as relational bullying (i.e., exclusion, ignoring, gossiping) or cyber bullying, can be used to manipulate group relationships in such a way that bullies possess a central position in the peer group. The peer group is repeatedly confronted with the bullies' power over others, by their systematically lowering the status of victims, which may reinforce the bullies' popularity (Peets & Hodges, 2014; Reijntjes, Vermande, Goossens, et al., 2013; Sutton, Smith, & Swettenham, 1999). Moreover, given that popularity in any group is relative, any loss of status for victims is balanced by small status gains for everyone else, including bullies (Faris, 2012).

In sum, bullying can increase students' visibility and power in the peer group. We hypothesize that engagement in bullying behavior will lead to higher popular status in the classroom (*Hypothesis 1*).

Popular status encourages bullying

High social status stimulates bullying for two reasons. First, those high in the social hierarchy may feel competition to maintain their position and resort to bullying to do so (Cillessen & Rose, 2005; Dijkstra et al., 2009; Garandeau, Lee, et al., 2014;

Reijntjes, Vermande, Goossens, et al., 2013; Sentse et al., 2015; Volk et al., 2015). Social competition often takes the form of bullying (Volk et al., 2015). For instance, popular students may use verbal or physical bullying to intimidate ‘fellow competitors’ who threaten their social standing (Cillessen & Rose, 2005) or manipulate to overtly demonstrate their superiority over others (Kolbert & Crothers, 2003).

Second, popular students who challenge high status peers are likely to get (even) higher access to desired social resources, including influence and power (Peets & Hodges, 2014; Volk et al., 2015). Being socially powerful or influential in the peer group can foster relational bullying as highly central (popular) students are in an ideal position to exclude peers and spread information (Faris, 2012; Garandeau, Lee, et al., 2014; Reijntjes, Vermande, Goossens, et al., 2013).

Hence, we hypothesize that having higher popular status will lead to engagement in bullying (*Hypothesis 2*).

Mechanisms underlying the interplay between bullying and popularity

We argued that bullying is strategic, goal-directed behavior either to obtain high social status in the classroom or to avoid losing this high social position. The interaction between bullying and perceived popularity plays an important role in both goals. However, the relational processes are different. The interplay between bullying and perceived popularity in the classroom can develop according to several mechanisms, that is, ties can be created, dissolved or maintained (Ripley, Snijders, Boda, Vörös, & Preciado, 2015).

With regard to bullying as a way to gain popularity, it can be argued that bullying makes students more visibly perceived as dominant among all classmates. As such, we expect that the popularity of students who start bullying will increase among those classmates who did not perceive them as popular before (creation popularity tie, *Hypothesis 3*). Moreover, it is likely that those who already perceived the ‘new bully’ as popular will not reconsider their opinion, as his/her visibility and social power in the peer group increases. Hence, we hypothesize that bullying stabilizes popularity (maintenance popularity tie, *Hypothesis 4*).

Once high social status is attained, it can be expected that popular students will start bullying classmates who threaten their high social standing, rather than maintaining their existing bullying relations with – most probably – low status peers. Not only because low status peers are less threatening to their popular position, but also because for high status students harassing other high status peers is more

effective (Peets & Hodges, 2014). Those who attempt to dominate highly popular others are often perceived as courageous and highly visible in the peer group, which makes it more likely that their popularity gets consolidated. We therefore hypothesize that being perceived as popular will lead to the formation of new bullying relations over time (creation bullying tie, *Hypothesis 5*) and the dissolution of existing bullying relations (dissolved bullying tie, *Hypothesis 6*).

METHOD

Data and sample

Data stem from the evaluation of the Dutch implementation of the KiVa anti-bullying program and were collected at three time points: May 2012 (pre-intervention), October 2012, and May 2013 in grades 2-5 in 99 Dutch primary schools. Prior to the pre-assessment in May 2012 – and for new students prior to the other assessments – schools sent information on the study and permission forms to parents. Observational research using data does not fall within the ambit of the Dutch Act on research on human subjects and so passive consent was used. Parents who did not want their child to participate in the assessment were asked to return the form. Students were informed at school about the research and gave oral consent. Both parents and students could withdraw from participation at any time.

When the pre-assessment was finished, schools were randomly assigned by the Netherlands Bureau for Economic Policy Analysis (CPB) to the control condition (33 schools) or either one of the intervention conditions (66 schools). Control schools were asked to continue their “care as usual” anti-bullying approach until their participation in the KiVa program began in June 2014.

In the Netherlands, especially in large schools, it is common to change the classroom composition each year. However, our aim was to longitudinally investigate developments in relatively stable peer groups. We therefore used data only from relatively homogenous classrooms. Moreover, we needed classrooms networks present at all three waves with less than 20% missing cases to perform social network analyses (Ripley et al., 2015). There were 82 classrooms from 15 schools suitable for the analyses. The total number of students was 2055 ($M_{age} = 9.71$ in wave 1; 50% boys). All students were included, despite the possibility of having missing values for the variables at one of the waves, for instance caused by

absence during the assessment (wave 1: 1%, wave 2: 1%, wave 3: 3%). These absent students could still be nominated by others and were thus included in the networks.

Procedure

Students completed online questionnaires on the schools' computers during regular school hours, under supervision of their classroom teachers who were supplied with detailed instructions before the data collection started. Teachers were present to answer questions and, if needed, help students in such a way that it would not affect their answers (e.g., by asking them questions such as "Which words are unclear to you?"). The order of questions, items, and scales used in this study were extensively randomized to prevent any systematic order effects.

Difficult topics were explained in several instructional videos. In one video, students were told that their answers would remain confidential but that their teacher might be given general feedback to improve the classroom climate. In another video, the term *bullying* was defined as formulated in Olweus' Bully/Victim questionnaire (Olweus, 1996). Several examples covering different forms of bullying were given, followed by an explanation emphasizing the intentional and repetitive nature of bullying and the power imbalance between bullies and victims.

Measures

Students were first asked to indicate whether they were being victimized, using 11 bully/victims items covering the various types of bullying (Bully/Victims Questionnaire, Olweus, 1996). Those who indicated that they were victimized at least once on any of the items were asked to nominate the classmates who were victimizing them ("Who in your class always starts bullying you?"). A roster with the names of all the children in class was presented on the computer screen. Bully nominations were coded 1 and non-nominations 0. As our study aimed to investigate active *bullying behavior* and not being nominated as a bully, the network was transposed so that the presence of a relation indicates a bully-victim relation instead of a victim-bully relation.

Students could nominate an unlimited number of classmates they perceived as popular ("Who is popular in your class?"). Similar to the bullying network, popularity nominations were coded 1 and non-nominations 0, resulting in status attribution networks consisting of directed popularity nominations for each classroom.

Analytical strategy

Our hypotheses were tested using longitudinal social network modeling with SIENA (Simulation Investigation for Empirical Network Analyses) in R. SIENA is a stochastic actor-based model to examine the development of (multiple) social networks, which can take individual characteristics or behaviors into account (Ripley et al., 2015; Snijders, van de Bunt, & Steglich, 2010; Snijders, Lomi, & Torló, 2013). Social networks change over time. These changes can occur between observation moments and are as such unobserved. SIENA simulates data between two time-points by interpreting the observed social networks as the cumulating outcome of an unobserved series of changes (i.e., micro steps) based on decisions (maintaining, dissolving or creating ties) individuals in the network make (Huitsing et al., 2014; Rambaran et al., 2015; Veenstra & Steglich, 2012). The reliability of the estimates in the simulation process is assessed using good convergence statistics, that is, *t*-ratios close to zero (Ripley et al., 2015).

Model specification

There are two main model parts, one for each dependent network variable. Because our hypotheses are about the effect of the two networks on each other, we will first describe how these hypotheses are operationalized. We then give a detailed description of the other effects used for modeling the dynamics of status attribution, and finish with a sketch of the corresponding model for bullying dynamics.

Stochastic actor-based models of a single network distinguish between effects modeling the speed of the change process (*rate effects*) and effects modeling the nature of the network changes (jointly contributing to the *objective function*). In our case of two co-evolving networks, there are rate and objective function effects for the status attribution network on the one hand, and for the bullying network on the other hand. We used an intercept model for the rate functions and will not discuss these any further. To test our hypotheses about popularity (i.e., status attribution indegree) going together with bullying, in Model 1 we estimated two effects. The *bullying to status* effect indicates whether a higher outdegree in the bullying network (i.e., bullying more others) implied a higher indegree in the status attribution network (i.e., being considered popular by more others). Conversely, the *status to bullying* effect indicates whether high indegree in status attribution implied high outdegree in bullying. In Model 2, these two effects are further nuanced according to whether they explain the creation of new ties or

the maintenance of existing ties. Furthermore we tested, as a second type of network-crossing effects, whether a high indegree in bullying (i.e., being a victim) implied a lower indegree in status attribution (*victimization to status* effect), or whether the converse was the case (*status to victimization* effect).

Besides these cross-network effects, we included univariate, structural effects of network change for both networks, which capture the tendencies of individuals to form and maintain relationships under specific network-structural conditions. These effects also serve to optimize the goodness of fit of the model (Huitsing et al., 2014; Rambaran et al., 2015; Snijders et al., 2010).

The following univariate, structural effects were added to explain the dynamics of status attribution. The *outdegree* effect expresses the overall tendency of individuals i to attribute status to other individuals j in the network (notation: $i \rightarrow j$). The *reciprocity* effect models the tendency to reciprocate a status nomination ($j \rightarrow i$ implied $j \rightarrow i$). This effect acts against the differentiation of a status hierarchy in the school class. Two effects of triangular closure (i.e., group formation) were included. The first is the *transitive triplets* effect, which reflects the tendency of individual i to attribute status to those peers k who received status nominations from peers j that i also attributes status to (transitive closure: $i \rightarrow j$ and $j \rightarrow k$ together imply $i \rightarrow k$). This group formation effect is in line with the assumption of a status hierarchy inside the group, which can be seen from a simple tie count: k receives two ties but sends none (high status), i sends two ties but receives none (low status), and j sends and receives one tie (middle rank; Snijders & Steglich, 2015). The second group formation effect is the *three cycles* effect, which investigates the tendency of individuals i , j , and k to form a non-hierarchical group (cyclical closure: $i \rightarrow j$ and $j \rightarrow k$ together imply $k \rightarrow i$).

In order to differentiate between individuals who received or sent many ties, three degree-related effects were included. The degree-related effects were all measured with the square roots of the degrees instead of the raw degrees (Huitsing et al., 2014; Snijders et al., 2010). *Indegree popularity* reflects the tendency for those who receive many status attributions to receive even more over time – known as the *Matthew effect* on status reputation (Merton, 1968). This effect expresses status differences that are (exclusively) captured in the standardized popularity measures discussed above (Cillessen & Rose, 2005), and accordingly we expect it to be very strong in the data. *Outdegree activity* is about the tendency for those who attribute status to many others to send even more attributions over

time. Finally, *indegree activity* models the tendency to attribute status to others when being attributed status often oneself.

One more effect we included was *gender similarity*, accounting for whether individuals were more likely to attribute status to others of the same sex than to others of the opposite sex.

The effects used to explain bullying dynamics are generally the same as those used for status attribution dynamics. However, instead of the *indegree activity* effect, we included the *outdegree popularity* effect which reflects the tendency to being victimized for those who bully others (we expect a negative effect). Moreover, due to the low density of the bullying network, the effects of *reciprocity*, *transitive triplets*, and *three cycles* could not be identified in most classrooms. The group formation effects therefore were entirely dropped from the model specification, while the reciprocity effect was not estimated but score tested (we tested whether the model lacked fit, compared to an enriched model including the effect). Also the direct tie-level effects that examine the main effects of perceived popularity on bullying, and vice versa, were included in the score tests.

Model building

The co-evolution of the status attribution and bullying networks was analyzed in two steps. The first model included the main effects as described above to test our hypotheses 1 and 2. We added endowment and creation parameters in the second model so that the effects for the maintenance and formation of ties could be distinguished (hypotheses 3-6). The two models were estimated separately for each classroom, using all three time points. Subsequently, each model's results were combined in a meta-analysis in RSiena (Siena08, see Snijders & Baerveldt, 2003).

RESULTS

Descriptive results

Table 5.1 presents descriptive statistics of the status attribution and bullying networks. The average degree shows that students nominated on average around three classmates as popular and bullied on average one to two classmates. Status attributions tend to rise somewhat over time, whereas bullying nominations slightly decrease. For both status attribution and bullying, reciprocation tends to increase in one year and there was evidence for transitive closure and hierarchical network

structures (see reciprocity and transitivity indices). Same gender nominations were the majority (57-68%).

The Jaccard index indicates the proportion of stable relations among the total number of new, lost, and stable ties between observed time-points. For the status attribution networks the Jaccard indices were good, but the proportion of stable relations was low for bullying (see Snijders et al., 2010; Veenstra, Dijkstra, Steglich, & Van Zalk, 2013). Yet, this had no severe consequences for the analyses as all models converged.

Table 5.1

Class-level descriptive statistics for status attribution and bullying networks per wave

	Status attribution network			Bullying network		
	Wave 1 <i>M (SD)</i>	Wave 2 <i>M (SD)</i>	Wave 3 <i>M (SD)</i>	Wave 1 <i>M (SD)</i>	Wave 2 <i>M (SD)</i>	Wave 3 <i>M (SD)</i>
Average degree	3.11 (1.25)	3.16 (1.39)	3.37 (1.69)	1.94 (1.06)	1.38 (0.79)	1.17 (0.80)
SD indegree	3.51 (1.64)	3.73 (1.67)	4.00 (1.76)	3.06 (1.24)	2.48 (1.11)	2.23 (1.22)
SD outdegree	3.16 (1.23)	3.18 (1.19)	3.27 (1.51)	1.96 (0.78)	1.58 (0.71)	1.41 (0.75)
Reciprocity	0.19 (0.08)	0.19 (0.09)	0.21 (0.15)	0.16 (0.10)	0.17 (0.10)	0.19 (0.17)
Same sex nominations	0.69 (0.12)	0.68 (0.10)	0.66 (0.11)	0.57 (0.14)	0.62 (0.17)	0.68 (0.19)
Transitivity	0.53 (0.14)	0.55 (0.14)	0.57 (0.14)	0.52 (0.18)	0.47 (0.22)	0.58 (0.23)
Average class size	25.2 (4.2)	25.1 (4.4)	25.0 (4.4)	25.2 (4.2)	25.1 (4.4)	25.0 (4.4)
Non-respondents	1%	1%	3%	1%	1%	3%
		<i>Wave 1→2</i>	<i>Wave 2→3</i>	<i>Wave 1→2</i>	<i>Wave 2→3</i>	
Hamming distance ^a		77.3	77.6	53.6	43.4	
Jaccard index ^b		0.32 (0.12)	0.34 (0.12)	0.19 (0.10)	0.18 (0.12)	

Note ^a Hamming distance is the number of tie changes

^b Jaccard index is the fraction of stable ties relative to all new, lost, and stable ties
N = 82 classrooms in 15 schools

Structural network effects

Table 5.2 presents the outcomes of the SIENA meta-analyses for all schools. Model 1 shows that students tended to be selective in attributing status to classmates (*outdegree*, $B = -5.34$, $p < .001$) and in nominating classmates as a bully (*outdegree*, $B = -6.02$, $p < .001$). The positive reciprocity parameter in the status attribution network ($B = .24$, $p < .001$) indicated that status nominations were likely to be reciprocated. In other words: students called popular tend to call each other popular too. Additionally, when students attributed status to one of their classmates and this classmate attributed status to a third classmate, students were inclined to attribute status to this third classmate over time (*transitive triplets*, $B = .08$, $p < .001$). The *three cycles* effect was negative ($B = -.10$, $p < .001$), which implied that local hierarchies exist in triplets. Hence, the group formation effects indicated that some students were perceived as popular more often than others.

The positive *indegree popularity* effects for both status attribution ($B = .90$, $p < .001$) and bullying ($B = 1.27$, $p < .001$) showed that popular students attracted more popularity nominations over time and that often-bullied students attracted more bullying nominations over time. Moreover, students who attributed status to many others or who bullied many others, tended to increase this tendency further (*outdegree activity*, $B = .57$ for status attribution; $B = .69$ for bullying, $p < .001$).

Lastly, the positive *gender similarity* effects in both networks indicated that status nominations and bullying relationships were more likely to occur between students of the same gender ($B = .61$ for status attribution; $B = .39$ for bullying, $p < .001$).

The interplay between bullying and perceived popularity

The between network effects in Model 1 revealed that a high outdegree in bullying resulted in receiving more status attributions over time (*bullying to status*, $B = .09$, $p = .004$). In other words: being a bully makes you popular. This outcome is consistent with our hypothesis which expected that bullying was a way to gain popularity (*Hypothesis 1*). Moreover, it was shown that a high indegree in status attribution increased the likelihood of a high outdegree in bullying over time (*status to bullying*, $B = .24$, $p < .001$). This is in line with our hypothesis that having higher popular status will lead to engagement in bullying over time (*Hypothesis 2*).

Table 5.2

Meta-analyses of multivariate network analysis: status attribution and bullying

	Model 1		Model 2	
	Est.	SE	Est.	SE
Status attribution network				
<i>Structural network effects</i>				
Outdegree (density)	-5.34	0.16**		
maintenance			-2.89	0.18**
creation			-7.25	0.15**
Reciprocity	0.24	0.05**	0.25	0.04**
Transitive triplets	0.08	0.02**	0.07	0.01**
Three cycles	-0.10	0.03**	-0.06	0.01**
Indegree popularity	0.90	0.03**	0.88	0.02**
Indegree activity	0.03	0.03	0.04	0.03
Outdegree activity	0.57	0.03**	0.57	0.03**
<i>Individual effects</i>				
Gender similarity	0.61	0.04**	0.60	0.03**
<i>Between networks effects</i>				
Victimization → status	-0.02	0.02	-0.03	0.02
Bullying → status	0.09	0.03*		
maintenance status			0.13	0.07
creation status			0.25	0.07**
Bullying network				
<i>Structural network effects</i>				
Outdegree (density)	-6.02	0.19**		
maintenance			-4.12	0.31**
creation			-7.50	0.29**
Indegree popularity	1.27	0.05**	1.19	0.04**
Outdegree popularity	0.16	0.14	-0.11	0.09
Outdegree activity	0.69	0.06**	0.57	0.05**
<i>Individual effects</i>				
Gender similarity	0.39	0.09**	0.35	0.06**
<i>Between networks effects</i>				
Status → victimization	-0.09	0.06	-0.10	0.07
Status → bullying	0.24	0.04**		
maintenance bullying			-0.41	0.15~
creation bullying			0.82	0.19**

Note. Rate of change effects were omitted from the table.
 All effects, except for status attribution reciprocity, show significant variation over classrooms
 ~ $p < .05$; * $p < .01$; ** $p < .001$ (two-tailed tests)

Model 2 unraveled the interplay between bullying and popularity by distinguishing effects for the dissolution, maintenance, and formation of ties. For the status attribution network it turned out that bullying results in new status attributions over time (*creation status*, $B = .25$, $p < .001$). Put differently, bullying makes you popular among certain classmates who did not consider you popular before. This finding is consistent with what we expected (*Hypothesis 3*). The *maintenance status* effect was positive but not statistically significant ($B = .13$, $p = 0.065$), which implies that there is no significant change in the stability of existing status attributions under the conditions of (initiating) bullying. Hence, among classmates who already considered you popular, your bullying will not make them reconsider. This is in line with our expectations (*Hypothesis 4*).

The outcomes concerning the development of bullying relations (i.e., bullying network) demonstrated that students with high status discontinue bullying their former victims (*maintenance bullying*, $B = -.41$, $p = .006$) and start bullying classmates whom they did not bully before (*creation bullying*, $B = .82$, $p < .001$). Hence, the results are in line with our expectations that being perceived as popular will lead to the formation of new bully relations over time (*Hypothesis 5*) and the dissolution of existing ties (*Hypothesis 6*).

The mean values of the score tests were significant for bullying reciprocity ($M = .61$, $p = .013$) and the direct tie-level effect of bullying on popularity ($M = -.15$, $p < .001$). However, we consider it unlikely that inclusion of these effects to the models will change our main results.

DISCUSSION

The present study focused on bullying as strategic, goal-directed behavior linked to high social status in the peer group. The aim was to unravel the complex interplay between bullying and one's popularity in the classroom over time. In the existing body of literature, the bi-directionality of bullying and social status as well as their longitudinal interplay were understudied (see for exceptions Reijntjes, Vermande, Olthof, et al., 2013; Sentse et al., 2015). Moreover, to our knowledge, perceived popularity was rarely analyzed relationally. We argued that bullying and perceived popularity reinforce each other, and we used longitudinal multivariate network analysis to get more insights into the relational patterns of bullying and perceived popularity. Our study is the first that investigated how bullying affects the creation, dissolution, and maintenance of popularity ties and vice versa.

In line with previous studies (Cillessen & Mayeux, 2004; Cillessen & Borch, 2006; Reijntjes, Vermande, Olthof, et al., 2013; Sentse et al., 2015) we found that bullying makes students popular among classmates *and* that being perceived as popular leads to bullying. In addition to these general findings, we aimed to distinguish between the creation and maintenance of a popular status among bullies on the one hand, and the formation and termination of bullying relations among popular students on the other hand. We hypothesized that bullying would make students popular among classmates who did not consider them popular before. Our findings demonstrated that bullies indeed received “new” popularity nominations over time. This implies that some classmates reward bullying behavior with a popular status. In addition to attaining a popular status among new peers, it is shown that bullying leads to a stabilized high social standing among those classmates who already perceived the bully as popular. These findings contribute to the perspective that bullying is a complex group phenomenon in which obtaining and maintaining high social standing in the peer group plays an important role (Olthof et al., 2011; Salmivalli et al., 2012; Volk et al., 2014).

Bullying might not only be a way to fulfill the goal of obtaining high status, it can also be necessitated by having to maintain the obtained high status. We argued that bullying not merely results in increased popularity over time, but that having popular status may also lead to engagement in bullying. Specifically, we proposed that being perceived as popular would lead to the formation of new bully relations and dissolve former ones. In line with our expectations and previous social network analyses on bullying (Huising et al., 2014), we found that, on the relational level, bullying is not stable over time. On the contrary, our findings indicate that popular students discontinue bullying their former victims and start bullying classmates whom they did not bully before. Changes in bullying patterns can thus occur even when bullying and victimization appear stable on the individual level. Longitudinal social network analyses are therefore essential to understand the development of bullying relations in the classroom.

The current study provides important novel insights into how bullying and perceived popularity are intertwined. It can be seen a starting point in using social network analysis to unravel the relational patterns between bullying and social status. In future studies it would be interesting to investigate whether popular students do indeed start bullying those victims who threaten their high social status in the peer group (i.e., other high status peers) and stop bullying low status classmates.

The bullying and popularity networks in our study were examined in stable classrooms only. In most countries, classroom composition is homogenous and remains the same during the students' entire elementary school career. In the Netherlands, multi-grade classrooms are common and the composition of the classroom is likely to change between school years (Veenman, 1995). Now that we have developed a framework to investigate the relational processes behind bullying and popularity, it would be interesting to examine whether these processes differ in heterogeneous, unstable classrooms. In addition, it might be fruitful to move beyond the own classroom, seeing that a substantial share of the bullying and victimization takes place outside it (Huitsing et al., 2014; Van der Ploeg, Steglich, Salmivalli, & Veenstra, 2015).

Another important question is to what extent the classroom context influences the interplay between bullying and perceived popularity, as bullying and popularity both depend on peer context (Salmivalli et al., 1996; Salmivalli, 2010). Several anti-bullying interventions aim to change classroom norms such that bullies are less supported by bystanders and that their antisocial behavior is less rewarded among peers (Kärnä, Voeten, Little, Poskiparta, Kaljonen, et al., 2011; Salmivalli, 2014; Wölfer & Scheithauer, 2014). Future researchers should examine whether the interplay between bullying and popularity is different in classrooms with strong anti-bullying norms and investigate among which students these differences occur.

The focus of our study was on bullying in general. Nevertheless, bullying behavior can occur in several forms (Salmivalli, Kärnä, & Poskiparta, 2011), physical (hitting, kicking), verbal (calling names, insulting), material (stealing or damaging things), relational (ignoring, gossiping), and cyber bullying (via email or mobile phone). Some types are more visible within the peer group or more rewarded than others, which makes it likely that the different types of bullying are also differently related to perceived popularity. Now that we can investigate the complex interplay between these two networks, the longitudinal interplay of the various forms of bullying with perceived popularity may be studied separately in future research.

Practical implications

The results illustrate that popularity plays an essential role in involvement in bullying behavior. The use of longitudinal social network data helps to better understand the relational patterns of bullying and social status. The findings imply that bullying is an effective strategy to obtain and maintain popular status in the

classroom. Teaching bullies prosocial ways to gain or maintain high status is probably essential to effectively intervene in school bullying (Ellis, Volk, Gonzalez, & Embry, 2015). Moreover, an important finding for anti-bullying interventions is that bully-victim relations seem to be unstable over time. Reactive anti-bullying interventions that aim to solve existing bullying situations should thus acknowledge that bullies tend to switch victims.