

## ORIGINAL ARTICLE

# How dislike and bullying co-develop: A longitudinal study of negative relationships among children

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## Abstract

This study investigates the network mechanisms underlying the co-development of two types of negative relationships: dislike relationships, and victim-bully relationships among children. Longitudinal data on school-level networks of 15 Dutch primary schools ( $N = 2175$ ;  $M_{\text{age}}(T1) = 10$ ; 51% male) were analyzed with stochastic actor-oriented models. Evidence was found for mutual reinforcement between dislike and bullying/victimization. Disliked children were more likely to bully those or be victimized by those who previously disliked them. Over and above these effects at the relationship level, children who were previously disliked by more schoolmates were more likely to bully or to be victimized by other schoolmates. Victims were more likely to be disliked over time by those who bullied them, but not by other schoolmates, whereas bullies were more likely to be disliked over time by not only those they bully but also other schoolmates. Contrary to expectations, no support was found for hypotheses that sex-based in-group favoritism affects children's dislike for bullies or their tendency to bully disliked others. The findings show how children's negative feelings and bullying behavior toward schoolmates mutually influence and reinforce each other over time.

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## KEYWORDS

bullying, childhood, dislike, RSiena, social networks, victimization

## 1 | INTRODUCTION

Negative relationships such as dislike and bullying strongly influence children's social, psychological, and academic development (Arseneault, 2018; Kretschmer et al., 2018; Newcomb et al., 1993). Being disliked or bullied by peers has been associated with negative consequences such as externalizing and internalizing problems (Hodges & Perry, 1999; van Lier et al., 2012), physical and mental health problems (Arseneault, 2018), low self-regard (Egan & Perry, 1998), and academic maladjustment (Buhs et al., 2006; Ladd et al., 1997). For designing effective interventions against the harmful consequences of negative relationships, it is essential to understand the mechanisms through which different types of negative relationships influence and reinforce each other over time.

This article examines the dynamics of negative relationships among children and aims to foster understanding of how children's negative emotional and behavioral relationships co-develop over time. We define *dislike* as negative feelings and attitudes toward another person (Buhs et al., 2006; Card & Hodges, 2007; Knack et al., 2012; Lopez & DuBois, 2005), whereas *bullying* is goal-directed, harmful, repeated aggressive behavior toward victims who possess less power than their bullies (Olweus, 1993; Volk et al., 2014). These negative relationships are entangled with children's relationships within their social networks: Whom children dislike and bully depends on who are disliked and bullied by others (Huitsing & Monks, 2018; Huitsing et al., 2012; Oldenburg et al., 2018; Wittek et al., 2020). That is, the existence of a negative relationship between two children depends on the existence of negative relationships between other children. For instance, children might dislike and bully those who are already disliked or bullied by other peers in general, or by their in-group peers in particular, or they might reciprocate a negative relationship (e.g., being disliked by someone) with another type of negative relationship (e.g., bullying the peer who provides the dislike nomination).

Although several studies have concentrated on the reciprocal association between dislike, bullying, and victimization at the individual level (e.g., Buhs et al., 2006; Veenstra et al., 2010), the network mechanisms underlying these associations have not been well investigated (Neal & Veenstra, 2021). A recent study that focused on network mechanisms provided no evidence that one type of negative relationship (avoidance, antipathy, or aggression) makes it more likely that another type of negative relationship will be formed between the same individuals (Kros et al., 2021). However, the latter study used a relatively small sample (228 students from two high schools) and did not control for more complex cross-network mechanisms, such as whether adolescents who gave or received many nominations for one negative relationship were more or less likely to give and receive many nominations for another negative relationship over time. We aim to fill this gap and model the co-development of dislike and bullying networks of children with longitudinal social network models (Snijders et al., 2010) to shed light on the network mechanisms through which these relationships mutually influence each other over time. In formulating our hypotheses, we differentiate between dyadic effects (the *a* versions of the hypotheses), and degree-related effects (the *b* versions of the hypotheses). Dyadic network effects capture the association between a dislike and a bullying relationship between two children at the relationship level (the so-called *dyad* in network terminology); that is, whether one type of negative relationship between two children makes it more or less likely that another type of negative relationship is also formed between these two children. Degree-related effects capture whether children who give or receive many nominations in one network (which is measured using the *degree* in network terminology) are more or less likely to give or receive many nominations in the other network.

### 1.1 | The effect of dislike on bullying and victimization

Being disliked by peers may lead to aggressive behavior (Twenge, 2005; Twenge et al., 2001) because it causes frustration, social pain, and lessens self-esteem (Leary et al., 2006). Dislike can cause aggression if disliked individuals try

to regain power and control (Gerber & Wheeler, 2009; Leary et al., 2006). Thus, bullying as a form of aggression can be a response to being disliked by peers. We therefore hypothesized that over time, *disliked children would be likely to bully others (Hypothesis 1)*. We expected two separate mechanisms behind this association: first, *disliked children would be likely to bully those who dislike them (Hypothesis 1a)* and second, over and above this tendency, *disliked children would be more likely to bully other peers as well (Hypothesis 1b)*.

Disliked children who lack supportive peer relationships are also more likely to be victimized because they have low status in the peer group and may not be able to defend themselves (Buhs & Ladd, 2001; Buhs et al., 2006; Faris & Felmlee, 2014; Knack et al., 2012; Veenstra et al., 2010). Moreover, disliked children are more likely to remain more persistently victimized, even in the case of an anti-bullying intervention, than non-disliked children (Huitsing et al., 2019; Juvonen & Graham, 2014; Kaufman et al., 2018). Their marginalized status makes them unattractive to associate with, which makes them ideal targets for bullies. We thus hypothesized that *disliked children would be likely to be victimized over time (Hypothesis 2)*. We expected two separate mechanisms behind this association: first, *disliked children would be likely to be victimized by those who dislike them (Hypothesis 2a)* and second, over and above this tendency, *disliked children would be more likely to be victimized by other peers as well (Hypothesis 2b)*.

Negative relationships play an important role in establishing and maintaining status in peer groups (Card, 2010; Faris & Felmlee, 2011; Pál et al., 2016; Sijtsema et al., 2009). Several researchers have shown that bullying can be used instrumentally to achieve higher status (e.g., Faris & Ennett, 2012; Faris & Felmlee, 2014; Sijtsema et al., 2009), as bullies are often perceived as popular (Boulton, 1999; Cillessen & Mayeux, 2004; Rodkin & Berger, 2008; van der Ploeg et al., 2020). In addition to gaining status, however, bullies also aim to avoid loss of affection among peers (Veenstra et al., 2010, 2013). Bullies can minimize the risk of losing affection while gaining status in the peer group if they strategically select victims who are disliked by significant others. For children, significant others are likely to be same-sex peers, because sex is a salient characteristic in childhood and early adolescence, making it an important factor in peer group segregation (Maccoby, 1998; Mehta & Strough, 2009). Same-sex schoolmates are therefore considered as significant others, and we expected that *bullies would be more likely to target specific victims if the latter are already disliked by the bullies' same-sex peers (Hypothesis 3)*.

## 1.2 | The effect of bullying and victimization on dislike

Previous research has shown that children are likely to dislike victims of bullying (Bouman et al., 2012; Pouwels et al., 2016; Salmivalli et al., 1996). Children who have positive relationships with victims are at risk of becoming victimized themselves (Huitsing et al., 2014). To avoid this threat, children might distance themselves actively from victimized students by disliking them. We thus hypothesized that *victimized children would be likely to be more disliked over time (Hypothesis 4)*. We expected two separate mechanisms behind this association: first, that *victims would be more disliked by their bullies over time (Hypothesis 4a)* and second, that *victimized children would be more disliked over time by other children as well (Hypothesis 4b)*.

Although bullies often have high status in their peer group in terms of perceived popularity (Cillessen & Mayeux, 2004; Estell et al., 2007), they are less likely to be liked and more likely to be disliked by their schoolmates than other children (Juvonen & Gross, 2005; Ray et al., 1997; Rodkin & Berger, 2008; Sentse et al., 2014). Whereas low-status children might dislike bullies because they are themselves potential targets of bullying, high-status children might dislike bullies because they threaten their social position in the peer group. In line with the positive association between bullying and dislike (Boulton, 1999; Cillessen & Mayeux, 2004; Rodkin & Berger, 2008) we hypothesized that *bullies would be likely to be more disliked over time (Hypothesis 5)*. We expected two separate mechanisms behind this association: first, that *bullies would be likely to be more disliked by their victims (Hypothesis 5a)* and second, that over and above this tendency, *bullies would be likely to be more disliked by other peers as well (Hypothesis 5b)*.

In line with predictions from in-group favoritism (Susskind & Hodges, 2007; Tajfel, 1982; Tajfel & Turner, 1979), children might react differently if bullies target same-sex peers than if they target cross-sex peers. Bullying might be perceived as especially threatening if it is directed at same-sex peers. Research suggests that bullies are indeed more likely to be disliked by students to whom they pose a potential threat (Veenstra et al., 2010, 2013). Therefore, children

are more likely to punish bullying with dislike if it is targeted toward their same-sex peers than if it is targeted toward cross-sex peers (Veenstra et al., 2010). We thus expected that *bullies would be more likely to be disliked by others if they bully the latter's same-sex peers (Hypothesis 6)*.

## 2 | METHOD

### 2.1 | Procedure

Data stem from control schools that participated in a randomized control trial in the first three waves of the Dutch KiVa program. The first wave of data collection took place in May 2012, when students were enrolled in grades 4 to 7 in the Dutch education system. The second wave of data collection was organized in October 2012, and the third wave took place in May 2013 (so T2 and T3 were in the same academic year). The first wave was a pre-assessment, after which schools were randomly assigned to either the intervention condition (66 schools) or the control condition (33 schools). We selected the 33 control schools to avoid investigating effects of the intervention (for a detailed description of the anti-bullying intervention, see Huitsing et al., 2020). Control schools were asked to take care of bullying as usual, thus we were able to examine the natural dynamics of dislike and bullying which were not affected by the intervention program.

Passive parental consent was requested. Children themselves also had the possibility to refuse to fill in the questionnaire. Universities in The Netherlands did not require institutional review-board permission for this type of research at the start of data collection (2012). All procedures undertaken in our study were in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Students who agreed to participate and had been granted parental permission (98%) filled in a self-administered internet-based questionnaire during regular school lessons. Their teachers were present during the process of data collection and answered questions and assisted students if they needed help. Research assistants were available through phone and email during the process. The order of the scales and questions was randomized to avoid systematic question-order effects on the results. If students were missing on the day of the data collection, they had the opportunity to fill in the questionnaire on another day within 1 month.

### 2.2 | Participants

As suggested in relation to social network analysis, 11 schools in which more than 20% of students did not respond to the network questions about bullying and dislike in all three waves were excluded from the analysis (Huisman, 2009). Thus, in total, 22 control schools were included in which at least 80% of the children answered the network questions in at least one of the three waves. For seven schools, the models did not converge (see details about model convergence in Ripley et al., 2021). The average size of these seven schools was significantly smaller than the average size of the schools that were included (57 vs. 145 students,  $t = -5.01$ ,  $p < .001$ ), potentially explaining why our complex network models could not be estimated for these schools. The final sample consisted of 15 schools with 2175 students in grades 4 to 7 in the Dutch education system at T1 and in grades 5 to 8 at T2 and T3 (mean age = 10 years at T1,  $SD = 14$  months; 51% of the students were boys). The sample was composed of 82.0% Dutch, 3.0% Surinamese, 1.8% Moroccan, 1.5% Turkish, and .6% Dutch Antillean students, with 5.7% of the students belonging to another Western, and 5.5% to another non-Western ethnic group based on the country of birth of parents.

### 2.3 | Measures

#### 2.3.1 | Bullying

Bullying relationships were measured from the victims' perspective by asking children first whether they were victimized in line with any of the 11 items in the Olweus' (1993) bully/victim questionnaire. If they reported at least one

bullying incident, they were asked whether the bully was a classmate, a schoolmate, or someone outside their school. If they were victimized by classmates, they were asked to indicate who initiated the bullying (“Who starts when you are victimized?”). Children were provided with a list of names of their classmates to choose from. If they were victimized by schoolmates, they were asked “By which students are you victimized?” and asked to type and select the names of schoolmates. The number of nominations was unlimited for classmates as well as schoolmates.

Using both the within-classroom and within-school nominations, adjacency matrices were created for each school in which nominations from student  $i$  to  $j$  were coded as 1, and non-nominations were coded as 0. To be in line with the actor-oriented nature of the statistical method that was employed, the transpose of these matrices was used in our analyses. The direction of the relationship (referring to the network tie) goes from the bully to the victim. This means that the analysis takes a child who bullies to be the sender of a nomination, and a child who is victimized to be the nominated child.

### 2.3.2 | Dislike

Children were asked to nominate classmates and schoolmates they dislike (“Who do you dislike?”). A roster was used for classmates, but children had to type and select the names of schoolmates they wanted to nominate. The number of nominations was unlimited. Using both the within-classroom and within-school nominations, adjacency matrices were created for each school in which nominations from student  $i$  to  $j$  were coded as 1, and non-nominations were coded as 0.

### 2.3.3 | Sex and age

Boys were coded as 1. Children were asked to report their date of birth. This date was extracted from the date of the data collection to measure children’s age in months.

## 2.4 | Analytical strategy

We examined the dynamic interplay between dislike and bullying by applying stochastic actor-oriented models (SAOMs, Snijders et al., 2010), which are able to model the co-evolution of multiple networks over time. Through a simulation process, SAOMs investigate the mechanisms that explain children’s decisions about creating, terminating, and maintaining their network ties (i.e., the nominations they provided on the questionnaire). The statistical software RSiena 1.2-13 (Ripley et al., 2021) was used, which allowed us to estimate the effects of individual (e.g., sex, age) and relationship (dyadic) characteristics (e.g., same sex, same class, age similarity) and endogenous network processes on the creation and maintenance of relationships in the separate networks on the one hand, and the cross-network effects between dislike and bullying on the other. First, we estimated the models for each school separately, using the same model specification. Then, we performed a meta-analysis to examine whether there were general tendencies across the schools.

Missing data for individual characteristics (13.7% for the variable age) were treated as non-informative in the RSiena estimation process (Huisman & Steglich, 2008). Actors who were not part of the network at a given moment in the observation were treated as structurally missing. For a few schools, the inclusion of some control effects caused convergence problems. In these cases, these parameters were fixed and tested using a score-type test, which permits the testing of the significance of a parameter without estimating it (for a detailed description, see Ripley et al., 2021, p. 96). The final models for all included schools converged based on the common convergence criteria (Ripley et al., 2021).

## 2.5 | Model specification

The model consists of two simultaneously estimated parts: the first part explains the development of the bullying network, and the second part explains the development of the dislike network. Several types of structural and individual attribute-based effects were included in the analysis to model the dynamics of bullying and dislike networks separately. The so-called uniplex structural effects capture how the relationship between two individuals (e.g., a disliking tie) depends on other relationships in the same (e.g., disliking) network. The so-called actor-covariate effects capture how the relationship between two individuals depends on the attributes (e.g., sex, age) of these individuals. Appendix A1 in the online Supporting Information provides a detailed description of these effects (uniplex structural effects and actor-covariate effects).

Longitudinal interdependencies between the dislike and bullying networks were modeled with a number of cross-network effects which tested our hypotheses and controlled for other potentially relevant processes. So-called multiplex or cross-network effects capture how the relationship between two individuals (e.g., a disliking tie) depends on relationships in the other (e.g., bullying) network. At the dyadic level, we examined whether a relationship between two children in one network was more likely to occur if there had been a relationship between these children in the other network before. At the degree level, we examined whether children who had (gave) many relationships of one type were likely to have (give) many relationships of another type over time. Table 1 presents the descriptions and graphical representations of the hypotheses, whereas Appendix Table A1 in the online Supporting Information presents the descriptions and graphical representations of all cross-network effects (dyadic and degree-related multiplex effects). Mathematical formulas for the parameters can be found in Ripley et al. (2021).

We estimated two models. Model 1 estimated the main effects of the co-evolution of bullying and dislike to provide a test of H1, H2, H4, and H5, whereas Model 2 was used to test the moderating role of in-group membership based on sex (H3 and H6).

## 3 | RESULTS

### 3.1 | Descriptive results

Table 2 presents descriptive statistics for the fifteen school-level networks. On average, children nominated one schoolmate who bullies them and four schoolmates whom they dislike. The proportion of stable relationships between the consecutive waves was relatively small for dislike (Jaccard indices of .14 and .21) and bullying (Jaccard indices of .14). More than half of the bullying nominations and around 40% of the dislike nominations occurred between same-sex peers. On average, 27% of bullying and 25% of dislike occurred between children from different classes.

### 3.2 | Stochastic actor-oriented models

The discussion of the results of the meta-analysis is limited to the effects as shown in Table 3. Appendix A2 in the online Supporting Information displays the complete table. Appendix A3 in the online Supporting Information provides the sender-receiver selection effects for sex, which is a combination of the *sender*, *receiver*, and *same* effects. Appendix A4 in the online Supporting Information provides details about the goodness of fit of the models.

#### 3.2.1 | The effect of dislike on bullying and victimization

In line with Hypothesis 1a, disliked children were more likely to bully schoolmates who previously disliked them (*incoming dislike* → *outgoing bullying*, .93,  $p < .001$ , Model 1). Over and above this tendency at the dyadic level, children who

**TABLE 1** Description and graphical representation of the parameters testing the hypotheses

	Hypothesis	Graphical representation
<i>Dyadic multiplex effects</i>		
H1a	Disliked children are likely to bully those who dislike them over time	
H2a	Disliked children are likely to be victimized by those who dislike them over time	
H4a	Victims are likely to be more disliked by their bullies over time	
H5a	Bullies are likely to be more disliked by their victims over time	
<i>Degree-related multiplex effects</i>		
H1b	Disliked children are likely to bully others over time	
H2b	Disliked children are likely to be victimized by others over time	
H4b	Victimized children are likely to be more disliked by others over time	
H5b	Bullies are likely to be more disliked by others over time	
<i>Moderating in-group membership effects</i>		
H3	Bullies are more likely to victimize children if they are disliked by the bullies' same-sex peers	
H6	Bullies are more likely to be disliked by others if they bully these others' same-sex peers	

Note: Solid lines indicate dislike relationships, dashed lines indicate bullying relationships; white circles indicate that the actor's sex is unspecified, black circles indicate same-sex.

were previously disliked by more schoolmates were more likely to bully other schoolmates (*dislike indegree* → *bullying outdegree*, .20,  $p = .02$ , Model 1). This finding is in line with Hypothesis 1b. As expected in Hypothesis 2a, disliked children were more likely to be victimized by those who previously disliked them (*outgoing dislike* → *outgoing bullying*, .34,  $p < .001$ , Model 1). Over and above this tendency at the dyadic level, disliked children were likely to become victimized by other schoolmates over time as well, as hypothesized in H2b (*dislike indegree* → *bullying indegree*, .08,  $p = .01$ , Model 1). Our findings were not in line with Hypothesis 3: Children who were disliked by bullies' same-sex peers were not

**TABLE 2** Descriptive statistics of dislike and bullying networks across all 15 schools ( $N_{\text{total}} = 2175$  students)

	Bullying networks			Dislike networks		
	Wave 1	Wave 2	Wave 3	Wave 1	Wave 2	Wave 3
Density <sup>a</sup>	.01 (.01)	.01 (.00)	.01 (.00)	.03 (.02)	.04 (.02)	.04 (.02)
Average degree	1.36 (.51)	1.12 (.34)	0.97 (.44)	3.96 (.87)	4.52 (.75)	4.59 (1.08)
Number of ties	193 (100.1)	160 (90.0)	135 (76.9)	561 (236.4)	637 (268.3)	621 (252.8)
% ties outside the classroom	23% (10.0)	29% (11.0)	28% (8.6)	21% (6.9)	24% (5.3)	29% (5.2)
% same-sex ties	53% (8.8)	55% (12.6)	55% (11.0)	39% (3.9)	40% (3.1)	41% (3.6)
Jaccard index <sup>b</sup>		.14 (.03)	.14 (.04)		.14 (.03)	.21 (.05)

Note: Standard deviations in parentheses.

<sup>a</sup>The density is the proportion of actual nominations among all possible dyadic relationships.

<sup>b</sup>The Jaccard-index is the proportion of stable nominations among the total number of created, dissolved, and stable ties.

**TABLE 3** The results of the meta-analysis of the stochastic actor-oriented models for the co-evolution of dislike and bullying

Parameter	Model 1					Model 2				
	Est.	(SE)	P	SD	p	Est.	(SE)	p	SD	p
<b>Bullying</b>										
Dyadic multiplex effects										
Incoming dislike → outgoing bullying (H1a)	.93	.21	<.001	.80	.001	.88	.21	<.001	.80	.002
Outgoing dislike → outgoing bullying (H2a)	.34	.08	<.001	.30	.774	.38	.09	.001	.36	.462
Degree-related multiplex effects										
Dislike indegree → bullying outdegree (H1b)	.20	.07	.018	.29	.008	.20	.07	.008	.25	.146
Dislike indegree → bullying indegree (H2b)	.08	.02	.006	.09	.398	.13	.07	.075	.27	.062
Dislike indegree from the bully's same-sex peers → bullying indegree (H3)						-.01	.03	.634	.12	.014
Dislike outdegree → bullying indegree	-.08	.04	.046	.15	.080	-.08	.04	.042	.14	.129
<b>Dislike</b>										
Dyadic multiplex effects										
Outgoing bullying → outgoing dislike (H4a)	.45	.15	.007	.56	.140	.46	.14	.006	.54	.164
Incoming bullying → outgoing dislike (H5a)	.97	.14	<.001	.56	.271	.96	.13	<.001	.52	.362
Degree-related multiplex effects										
Bullying indegree → dislike indegree (H4b)	.02	.02	.318	.09	.023	.02	.02	.388	.09	.024
Bullying outdegree → dislike indegree (H5b)	.14	.03	.001	.13	.322	.17	.06	.017	.25	.109
Bullying outdegree toward ego's same-sex peers → dislike indegree (H6)						.01	.03	.662	.12	.002
Bullying indegree → dislike outdegree	-.07	.02	.005	.08	.062	-.07	.02	.004	.08	.173

Note: Estimated parameters, estimated standard errors,  $p$  values for the parameters, estimated standard deviations, and  $p$  values for the standard deviations are presented. The models also account for the univariate network dynamics of dislike and bullying; see Appendix A2 in the online Supporting Information for the complete models.  $N = 15$  schools.



more likely to be victimized by those bullies than children who were disliked by bullies' cross-sex peers (*dislike indegree from the bully's same-sex peers* → *bullying indegree*,  $-.01$ ,  $p = .63$ , Model 2). The analysis also showed a minor effect that children who disliked others were less likely to be bullied over time (*dislike outdegree* → *bullying indegree*,  $-.08$ ,  $p = .05$ , Model 1).

### 3.2.2 | The effect of bullying and victimization on dislike

At the dyadic level, in line with Hypothesis 4a, victims were more likely to be disliked by their bullies over time (*outgoing bullying* → *outgoing dislike*,  $.45$ ,  $p = .01$ , Model 1). In contrast to Hypothesis 4b, however, victimized children were not more likely to be disliked by others than their own bullies were over time (*bullying indegree* → *dislike indegree*,  $.02$ ,  $p = .32$ , Model 1). In line with Hypothesis 5a, bullies were more likely to be disliked by their victims over time (*incoming bullying* → *outgoing dislike*,  $.97$ ,  $p < .001$ , Model 1). Over and above this tendency at the dyadic level, bullies were more likely to be disliked by other children too (*bullying outdegree* → *dislike indegree*,  $.14$ ,  $p = .001$ , Model 1). This is consistent with Hypothesis 5b. In contrast to Hypothesis 6, children were not more likely to dislike peers who bullied their same-sex peers compared with peers who bullied cross-sex peers (*bullying outdegree toward ego's same-sex peers* → *dislike indegree*,  $.01$ ,  $p = .66$ , Model 2). The analysis also showed that students who were bullied by a higher number of peers were less likely to dislike others over time than students who were bullied by a lower number of peers (*bullying indegree* → *dislike outdegree*,  $-.07$ ,  $p = .01$ , Model 1).

## 4 | DISCUSSION

This study was designed to identify the network mechanisms behind the co-development of dislike and bullying networks among primary school children. In contrast to the findings of a small study among adolescents at two secondary schools (Kros et al., 2021), we found significant cross-network effects between dislike and bullying both at the dyadic level and the degree-level. We used a sample of 2175 children in 15 school networks and therefore had more statistical power to estimate effects. Most dyadic effects were, however, in the same direction in both studies, which suggests that there might be few differences in the network mechanisms behind the bi-directional relation between dislike and bullying in late childhood (our study) and early adolescence (Kros et al., 2021).

At the dyadic level, we found that children were likely to bully schoolmates who previously disliked them. Over and above this effect, we found that disliked children were likely to bully others over time. These findings are in line with the first hypothesis and with previous research that suggests that dislike might induce reactive aggression because of frustration (Leary et al., 2006; Twenge, 2005; Twenge et al., 2001) or an attempt to regain control over relationships (Gerber & Wheeler, 2009; Leary et al., 2006).

At the dyadic level, disliked children were likely to be victimized by those who previously disliked them. Over and above this tendency, disliked children were likely to be victimized by other schoolmates as well. Consistent with previous research (Buhs & Ladd, 2001; Buhs et al., 2006; Faris & Felmlee, 2014; Knack et al., 2012; Veenstra et al., 2010), our findings showed that dislike is a significant risk factor for victimization: disliked children were likely to be victimized over time.

Victims were likely to be more disliked by their bullies over time. Over and above this dyadic effect, however, victims were not found to become more disliked by others than their own bullies. Given children's tendency to initiate bullying of disliked children, our findings suggest that the association between dislike and victimization may be attributable to the link from dislike toward victimization rather than vice versa.

At the dyadic level, children were likely to dislike their own bullies over time. Over and above this tendency, bullies became more disliked by other children as well. These findings are in line with previous research that found that bullies are likely to be disliked by peers (e.g., Juvonen & Gross, 2005; Ray et al., 1997; Rodkin & Berger, 2008;

Sentse et al., 2014) and that they are especially disliked by victims (Hafen et al., 2013). The psychological distress caused by victimization may induce negative feelings in victims toward bullies. Moreover, negative relationships are often mutual (Card, 2010). Because of the power imbalance between bullies and the victims, victims may reciprocate bullying with negative feelings and dislike instead of reciprocating the negative behavior they are the target of.

In addition, we also found that victims were less likely to nominate others to dislike over time, whereas those who were more likely to dislike others were less likely to be victimized over time. These findings suggest that victims' dislike of bullies does not generalize to other schoolmates. At the same time, (openly) disliking others may signal dominance and protect against future victimization.

Our findings were not in line with our proposed hypotheses about the moderating role of in-group membership. Children were not more likely to bully peers who were disliked by the bullies' same-sex peers than peers who were disliked by the bullies' cross-sex peers. This finding contradicts previous cross-sectional research that showed that victims of male bullies were disliked by boys only, whereas victims of female bullies were disliked by girls only (Veenstra et al., 2010, 2013). Moreover, children were not more likely to dislike peers who bullied their same-sex peers compared with peers who bullied cross-sex peers. This finding contradicts previous research findings that children who bullied girls were disliked by girls and children who bullied boys were disliked by boys (Veenstra et al., 2010, 2013). However, as our longitudinal social network models estimate the likelihood of creating new relationships and maintaining existing relationships over time, our findings do not rule out the possibility that there was an initial tendency for bullies to bully peers who were disliked by their same-sex peers. Similarly, there might have been an initial tendency for children to dislike peers who bullied their same-sex peers. The findings may also imply that girls and boys are likely to agree about whom to dislike and whom to bully. Future research may investigate the moderating role of other important in-group memberships on these network dynamics such as race or ethnicity. Furthermore, future research may also take into account the fact that significant others may consist of popular peers in the classroom (Witvliet et al., 2010).

#### 4.1 | Strength and limitations

We have made two main contributions to the current literature. First, we investigated the associations between dislike and bullying while taking into account the situation that these relationships are embedded in children's social networks. Endogenous network processes that can modify these associations were thus controlled for in the statistical models. Second, we modeled the co-evolution of two negative networks, dislike and bullying, with longitudinal social network models (Snijders et al., 2010). This way we could disentangle the bidirectional link between dislike and bullying and examine the network mechanisms behind the associations between dislike, bullying, and victimization among children.

One limitation is that we were not able to test our hypotheses on the small schools in our sample. The number of negative relationships in small schools was too low, and did not provide enough information to estimate our complex statistical models. Therefore, future research is needed to test the proposed hypotheses in smaller communities, which would be possible by using recently developed multilevel network models (Ripley et al., 2021; van Rijsewijk et al., 2020). There are, however, no theoretical reasons to expect that these mechanisms work differently in small schools. Another avenue for further research is investigating how contextual factors such as school culture or school socioeconomic status may moderate the associations we found.

A second limitation is that we used a liberal criterion to ask children by whom they were bullied (they were asked to answer these network questions as soon as they had responded to at least one item from the Olweus instrument with a rating of at least 2). However, our aim was not to identify bullies and victims as individuals, but to model the development of relationships over time. Our approach is suitable for modeling the interdependent nature of children's nominations over time.

To conclude, we found that children's negative feelings and behavior toward their schoolmates mutually influence and reinforce each other over time. Lower levels of dislike and rejection might foster a reduction in bullying which

should be taken into account when designing effective interventions against bullying. In bullying interventions, it might not only be necessary to improve the relationship between the bully and the victim, but also between children who are not yet bullying each other. This article shows that reducing negative feelings toward peers is able to prevent bullying situations. Lower levels of both disliking and bullying might consequently contribute to more cohesive communities in schools.

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## CONFLICTS OF INTEREST

We have no conflicts of interest to disclose.

## DATA AVAILABILITY STATEMENT

The codebook of the KiVa NL data is available at <https://hdl.handle.net/10411/0UVVNDN>. Requests to make use of the KiVa NL data can be sent to R.V.

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