

The Interplay Between Adolescents' Friendships and the Exchange of Help: A Longitudinal Multiplex Social Network Study

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The aim of this study was to unravel the interrelatedness of friendship and help, and to examine the characteristics of friendship and help networks. The effects of mutual versus one-sided help relations on friendship initiation and maintenance, and vice versa, were examined. Friendship and help networks were analyzed ($N = 953$ students; 41 classrooms; $M_{\text{age}} = 12.7$). The results illustrate that friendship and help networks show some similarities, but only partly overlap and have distinct characteristics. Longitudinal multiplex social network analyses showed that mutual help was important for the maintenance of friendship, but not for the initiation of friendship. Further, particularly mutual friendships provided a context in which help took place. Implications of these findings are discussed.

In dealing with daily hassles, adolescents not only rely on their own problem-solving capacities, but also seek help from others. Starting in early adolescence, peers take up a central role as helpers (Del Valle, Bravo, & López, 2010). Particularly friends are considered targets and sources of help. Research probing children and early adolescents to describe friends versus nonfriends has established that helping is part of the bundle of expectations tied in with friendship (Fehr, 2004; Hall, 2012). As friends experience similar challenges and care about each other's well-being (Buhrmester & Prager, 1995), friendship is a salient context in which the intricacies of exchanging help are learned and fine-tuned.

Research on friendship and help has highlighted help as part of the definition and expectations of friendship. However, this picture is likely incomplete. First, the interrelatedness of friendship and help is complex. The associations between friendship and help are bidirectional: Not only does friendship give rise to help, but help may also function as a bridge to establish friendships (Wentzel & Erdley, 1993). Moreover, both friendships and help are directional. They can be mutual or one-sided, implying that there are many configurations in which friendship and help may coincide. For example, two individuals might regard each

other as friends (mutual), but only one of them might help the other (one-sided). Furthermore, friendship and help change over time. They emerge and may be maintained, and each can contribute to the emergence and maintenance of the other. In addition, by regarding help as inherent to friendship, previous research overlooked that help and friendship have distinct structures and dynamics.

This study aimed to unravel the interrelatedness of friendship and help, and to examine the characteristics of friendship networks and help networks by adopting a longitudinal social network approach. We asked participants from the Dutch SNARE study at three time points across one school year to nominate youth who helped them with problems as well as who were their best friends. These nominations were used to assess whether and how friendship and help networks differ in structure and dynamics. Longitudinal multiplex social network analyses implemented in RSiena (Snijders, Van de Bunt, & Steglich, 2010) were used to examine the effects of the help network on the friendship network and vice versa, covering bidirectionality, directionality, and initiation and maintenance of friendship and help. Because SNARE followed students from the beginning of secondary education, the development of help and friendship networks could be investi-

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gated, as students form new social networks of peer relations at the transition from elementary to secondary education.

Theoretical Background

Theories of social exchange (Homans, 1958; Laursen & Hartup, 2002) and reciprocity (Gouldner, 1960) assert that relationships with others are worthwhile to initiate or maintain if the exchange of resources in a relationship (e.g., affection, help, or material benefits) is mutual or balanced. Supporting this view, empirical research in adults has shown that unbalanced exchange in social relationships may lead to feelings of exploitation and anger in the giver of resources (Walster, Berscheid, & Walster, 1973), discomfort or embarrassment in the receiver (Uehara, 1995), and feelings of loneliness in both parties (Buunk & Prins, 1998).

Cognitive developmental models contend that this appreciation of reciprocity in social relationships exists already in childhood (Damon, 1977; Youniss, 1980). For example, 7-year-old children expressed awareness of a reciprocity norm when presented with hypothetical helping situations involving their peers, exemplified by a participant explaining that "I helped her, so she should help me" (DeCooke, 1992, pp. 954). Young children are found to strive for an equal allocation of resources in their social relationships: If Jonathan plays with Lisa's toy, Lisa is allowed to play with Jonathan's toy (Piaget, 1965; Sigelman & Waitzman, 1991; Youniss, 1994). However, adolescents develop a more sophisticated understanding of (their role in) relations, including friendships (Berndt, 1982; Hartup & Stevens, 1997; Sullivan, 1953). They are not only focused on the benefits they may gain from friendships, but are also interested in their friends' well-being. As such, befriended adolescents are less inclined to keep track of each other's contributions to a relationship, but respond to each other's needs when necessary (Berndt, 1982; DeCooke, 1997; Sigelman & Waitzman, 1991).

Help and Friendship Maintenance

The ways in which adolescents define friendships and their expectations of friendships suggest that mutual help is important for the maintenance of friendships, and inherent to the definition of friendship. Symmetrical reciprocity, referring to genuine mutual acceptance and mutual regard, has been identified as a salient expectation of friendships (Hall, 2012; Hartup & Stevens, 1997; Youniss,

1980). This mutual orientation produces the intimacy and closeness that distinguishes friends from nonfriends (Berndt, 1982; Hall, 2012; Hartup & Stevens, 1997).

Intimacy and mutuality, two central friendship goals, can be met through the exchange of help. Research demonstrating the positive role of help in friendship showed that the perception of having a supportive friend is associated with higher friendship quality and longer enduring friendships (Bukowski, Hoza, & Boivin, 1994; Cillessen, Jiang, West, & Laszkowski, 2005; Hiatt, Laursen, Mooney, & Rubin, 2015), and greater friendship satisfaction (Parker & Asher, 1993). Whereas these studies did not focus on mutual help explicitly, we argue that friendships may be less likely to dissolve the more satisfied both adolescents in a friendship are with their friendship and the more interconnected friends' lives are. Mutual help is inherent in the concept of symmetrical reciprocity, a relationship principle that most adolescents hold in high regard. For that reason, we expected that *mutual help contributes more strongly to friendship maintenance than one-sided help* (Hypothesis 1).

Help and Friendship Initiation

Help may not only enhance commitment to existing friendships, but also function as a bridge to establish friendships through the signals it sends and the benefits it produces (unless given with disdain or ridicule, which may deepen the asymmetrical nature of this interaction). Helping others signals potential for a rewarding relationship, as the helper presents attractive features (e.g., skills, knowledge) that others may access by becoming friends. Help also communicates affection, as the helper spends time and effort to the receiver's benefit. Moreover, asking for help implies a willingness to self-disclose to peers, which communicates trust and a desire for closeness. These signals and benefits are likely precedents of friendships. The provision of social support is associated with the formation of new friendships (Bowker et al., 2010) and peer acceptance (Dijkstra, Lindenberg, & Veenstra, 2007), and has been described by early adolescents as an appropriate strategy for making new friends (Wentzel & Erdley, 1993).

Expectations of mutual help may be modest within emerging friendships. Nonfriends or recent friends are typically less close and affectionate toward each other, and spend less time together relative to old friends (Bukowski et al., 1994). Moreover, sharing intimate information and supporting each

other are less salient interactions for nonfriends or recent friends (Fehr, 2004). As such, they may be less likely to expect themselves and the other to engage in mutual helping interactions. Following this, we expected that adolescents would be more likely to start new friendships under the condition of a help relationship: *help increases the likelihood for friendship initiation* (Hypothesis 2). We did not distinguish between the condition of one-sided help and mutual help here, as we did not expect an additional contribution of mutual help to the initiation of friendship.

Friendship as Context for Help

Below, we delineate how friendship functions as a context for help. Research into predictors of help-seeking is scarce, but some important social barriers and facilitators to seeking help have been identified. The fear of being rejected or ridiculed by peers hampers adolescent help-seeking in the classroom (Ryan, Pintrich, & Midgley, 2001). Serving as facilitators of help-seeking are the trustworthiness and approachability of informal sources of help (Rickwood & Braithwaite, 1994; Rickwood, Deane, Wilson, & Ciarrochi, 2005). These findings imply that friendships are a favorable context in which adolescent help-seeking may take place. Friends likely take the barriers of embarrassment and fear of rejection away, and are typically approachable and trustworthy peers. Although disclosing information and keeping secrets is one of the social tasks to be learned in friendships (Asher, Parker, & Walker, 1996), friends often care about each other's well-being (Hartup, 1996) and will therefore not reject each other for disclosing potentially embarrassing problems, or pass information on to other peers. Typical friendship characteristics such as security and intimacy (Bukowski et al., 1994; Hartup, 1996; Newcomb & Bagwell, 1995) create an environment in which help can be relatively easily and harmlessly asked for, without fear of social repercussions.

Helping costs time and effort, but the affection felt for friends, as opposed to acquainted peers, may lower the perceived costs of helping (McGuire, 2003). Helping with homework or listening to problems seems less time-consuming or wearing when it is done for the benefit of a friend. Friendships have been found to function as contexts that promote positive support, while lowering the tendency to deny problems or to talk about something distracting (Glick & Rose, 2011). Taken together, we expected that *friendships increase the likelihood of exchanging help* (Hypothesis 3). As the facilitators to seek help and the motivation to give help are likely

more prominent in close, mutual friendships than in one-sided friendships, we also expected that *mutual friendships contribute more strongly to exchanging help than one-sided friendships* (Hypothesis 4).

Present Study

The aim of this study was to examine the characteristics of help networks versus friendship networks and the interplay between these networks. We investigated how one-sided and mutual nominations in the help network were related to nominations in the friendship network, and vice versa. We examined differences in the structures and dynamics of friendship and help networks (e.g., the tendency to nominate a selective set of classmates, as well as tendencies toward reciprocation and group formation). We expected that help would contribute to the initiation of friendship, and that mutual help would contribute more strongly to friendship maintenance than one-sided help. We also expected friendship, in particular mutual friendship, to function as a context in which help takes place.

METHOD

Procedure

Data were drawn from SNARE (*Social Network Analysis of Risk behavior in Early adolescence*), a study aimed at investigating the co-evolution of adolescents' social networks and social development. Two large regional secondary schools were approached, one in the north and one in the middle of the Netherlands. All seventh- and eighth-grade students of these schools (students in the first 2 years of secondary education) were approached for participation in the study in the school year 2011–2012. After 1 year, all new seventh-grade students were also approached for participation, resulting in two participating cohorts. Students completed three questionnaires per school year up until the school year 2014–2015. Prior to the data collection, all eligible students and their parents received an information letter in which they were asked to participate. If students wished to refrain from participation, or if their parents disagreed with their children's participation, they were requested to send a reply card or email within 10 days. We emphasized during every assessment that participation was anonymous and could be terminated at any time. SNARE has been approved by the ethical committee of one of the participating universities. During the assessments,

a teacher and research assistant(s) were present. After a brief introduction, participants filled in the questionnaire on the computer during class. This took place during regular school hours and lasted approximately 45 min. Students who were absent that day were, if possible, assessed within a month.

Participants

We examined the friendship and help networks of all seventh-grade classrooms as assessed in October, December, and April. The study sample was comprised of 41 classrooms and 953 students at wave 1 ($M_{\text{classroom size}} = 23.2$, $M_{\text{age}} = 12.7$, 50.5% boys, 84.5% Dutch). Across the school year, a total of 11 students refused consent to participate in the study. We chose to assess seventh-grade students only, as friendship bonds from primary school are likely to be disrupted because of adolescents going to different types of secondary schools. As such, we were better able to examine relationship initiation. During the assessments in October (6 weeks into the new school year), December, and April, 34, 60, and 56 participants were absent. Their outgoing nominations were therefore missing, and we used a model-based treatment of missing data in Siena-Bayes (Koskinen & Snijders, 2007). Some students named (almost) everyone in their classroom as helper or friend in one assessment, but named hardly anyone at the preceding and/or following assessment. In addition, their help nominations were hardly or not reciprocated (whereas about 45% of the help nominations were mutual; see Table 2). These outliers may have interpreted the question differently from their classmates. We recoded their outgoing nominations as missing. This was the case for 1, 13, and 8 participants at the three respective waves. Their incoming nominations were retained. Similar strategies to handle outliers have been used in previous research (Light, Greenan, Rusby, Nies, & Snijders, 2013).

Measures

Friendship and help networks were assessed using a peer nomination procedure. Participants could nominate an unlimited number of same- or cross-sex classmates in a large set of peer nomination questions. To assess friendship and helping, we used the questions “who are your best friends” and “who helps you with problems (for example, with homework, with repairing a flat [bicycle] tire, or when you are feeling down)?” Sex was included as a control variable and coded as 0 (girls) and 1

(boys). Our measure of help aligned with our aim to capture the general tendency of students to help each other. This broad definition of help, suggesting that everybody needs some help once in a while, aimed to minimize the role that the need for and ability to help may have otherwise played in explaining the structure of the help network.

Analytical Strategy

Descriptive analyses. To describe friendship and help networks and their differences, we calculated basic network statistics. To describe the overlap of friendship and help, we additionally indicated how often each possible configuration between friendship and help nominations was present in our data (e.g., the combination of mutual friendship and one-sided help). Subsequently, we examined whether the configuration resulted in no friendship, one-sided friendship, or mutual friendship, or no help, one-sided help, or mutual help at the next wave.

RSiena. To investigate the co-evolution of friendships and help, we used the Simulation Investigation for Empirical Network Analyses software package in R (RSienaTest version 1.2.5; Ripley, Snijders, Boda, Vörös, & Preciado, 2018); software instantiating stochastic actor-based statistical models of social network dynamics (Snijders, 2001; Snijders, Lomi, & Torló, 2013; Snijders et al., 2010). The model interprets the observed, compound change of friendship and help patterns as the result of a series of unobserved, smallest possible changes taking place between observation moments, where a smallest possible change is either the termination of an existing relation between two participants or the creation of a new one. The probability of network changes is modeled by an objective function, expressing under which conditions participants initiate, maintain, or dissolve a relation. The parameters in the model (see Model specification) express these different conditions.

To achieve high statistical power while sufficiently accounting for between-classroom heterogeneity, a Bayesian random effects model was estimated (Ripley et al., 2018). Parameters corresponding to hypotheses were assumed to be constant across classrooms in order to gain power (the null hypothesis is that they are 0, and therefore constant), whereas control variables were allowed to vary randomly between classrooms. Bayesian inference assigns a prior probability distribution to the parameters, which is updated to a posterior probability in the light of new data. Computations

are made by Markov Chain Monte Carlo algorithms (Koskinen & Snijders, 2007; Ripley et al., 2018).

For randomly varying and fixed parameters, Table 5 presents the estimated mean and across-classroom standard deviation. The parameter estimates we present are log-odds, but we also expressed some of the effects as odds by taking the exponential function of the parameter estimate. Odds indicate the impact of an effect on the probability of a participant nominating a helper or friend, all else being equal. Note, however, that this *ceteris paribus* assumption is strong, given that parameters correlate and co-occur. Therefore, the odds in Table 5 should be interpreted with caution.

Model specification: rate parameters and structural effects. In the stochastic actor-oriented model, parameters can be either rate parameters or parameters in the objective function. *Rate parameters* refer to the rate of change in network relations between time points of observations. The *objective function* determines the probabilities of tie creation and tie maintenance. For hypotheses on the effects of friendship on help, parameters for creation of new ties and maintenance of existing ties are equal, and are called evaluation parameters; for hypotheses on the effects of help on friendship they are distinguished, and called creation and maintenance parameters. For both networks, we included the basic network structure effects in the objective function: outdegree (the general tendency to nominate others as helper or friend); reciprocity (the tendency to help or befriend those who help or befriend you); transitivity (the tendency to nominate helpers-of-helpers or friends-of-friends as your own helper or friend); outdegree activity (the tendency of actors with already high tendencies to nominate others as helper or friend to send extra nominations); indegree popularity (the tendency of actors with an already high number of incoming nominations as helper or friend to attract extra nominations). Finally, we controlled for the tendency to send friendship or help nominations to classmates of the same sex (same-sex effect).

Model specification: multiplex network parameters. Effects of relations in one network on relations in the other network are expressed by multiplex network parameters (Snijders et al., 2013; see Table 1 for all included effects). The first set of parameters models the effects of help on friendship, where ego (*i*) may nominate alter (*j*) as a friend. To test our hypotheses about friendship

initiation and maintenance, we distinguished between the creation of new relations and the maintenance of already existing relations using the *creation* and *maintenance* functions (Ripley et al., 2018). This resulted in four parameters modeling the effects of help on friendship. Parameters 1 and 2 modeled the effect of help versus no help (referring to nominating others as helper or not) on friendship initiation and maintenance, and parameters 3 and 4 modeled the effect of mutual help versus one-sided help on friendship initiation and maintenance. The second set of parameters models the effects of friendship on help, where ego (*i*) may nominate alter (*j*) as helper. Because we had no specific expectations about initiation or maintenance of help relations, we tested the following effects using only the *evaluation* function. Parameter 5 modeled the effect of one-sided friendship versus no friendship on help, and parameter 6 modeled the effect of mutual versus one-sided friendship on help. To aid comprehension, we have also included in the results the contribution of a mutual nomination versus no nomination on the dependent network. Given that the model includes parameters for one-sided and mutual nominations in the “independent” network on the dependent network, the effect of a mutual nomination as compared with no nomination is represented by the sum of these two parameters, as demonstrated in Appendix S1. We tested this sum using *multipleBayesTest* in *RSienaTest* (Ripley et al., 2018). Finally, our sample initially comprised 51 classrooms. The rate parameters of 10 classrooms were very large, as a result of which the model could not reach convergence. Therefore, they were excluded from the analyses.

RESULTS

Descriptive Results

Table 2 presents descriptive statistics of the friendship and help networks. Figures 1 and 2 present sociograms of the friendship and help networks of one classroom at wave 2, in which nodes represent students and arrows the friendship and help nominations between them. This is a typical classroom in the sense that it reflects the average friendship and help network statistics as presented in Table 2, and gives a visual impression of the differences between friendship and help networks.

Table 2 shows that participants mentioned about five friends and two to three helpers, and the density of the friendship and help networks (referring

TABLE 1
Graphical Representation of Multiplex Network Effects Included in the Model, Including Parameter Number and RSiena Effect Name

Parameter	Explanation	Graphical representation	
		Time 1	Time 2
1	Effect of help on friendship initiation	$i \longrightarrow j$	$i \dashrightarrow j$
2	Effect of help on friendship maintenance	$i \dashrightarrow j$	$i \dashrightarrow j$
3	Effect of mutual help on friendship initiation	$i \longleftrightarrow j$	$i \longleftrightarrow j$
4	Effect of mutual help on friendship maintenance	$i \longleftrightarrow j$	$i \longleftrightarrow j$
5	Effect of friendship on help	$i \dashrightarrow j$	$i \dashrightarrow j$
6	Effect of mutual friendship on help	$i \longleftrightarrow j$	$i \longleftrightarrow j$

Note. The solid and dashed lines represent help and friendship nominations.

TABLE 2
Sample Description and Descriptive Statistics of the Friendship and Help Networks

	Wave 1			Wave 2			Wave 3
Sample size	953			956			960
M class size	23.24			23.32			23.41
M age	12.66			12.82			13.16
% Boys	50.48			50.53			50.73
	Friendship			Help			
	Wave 1	Wave 2	Wave 3	Wave 1	Wave 2	Wave 3	
N of ties ^a	5,113	5,577	5,454	2,664	2,751	2,627	
Outdegree	5.14	5.34	5.37	2.45	2.59	2.52	
SD outdegree	3.60	3.70	3.49	2.74	2.95	2.80	
SD indegree	2.63	2.69	2.54	1.64	1.69	1.75	
% Density	24.8	26.0	26.0	11.8	12.1	11.9	
% Reciprocity	63.0	62.4	64.8	45.7	44.2	43.9	
% Transitivity	61.6	64.2	64.6	51.1	49.8	50.2	
% Same sex	83.2	85.1	86.0	83.0	86.4	85.0	
	Changes in friendship			Changes in help			
	Period 1 (wave 1→2)	Period 2 (wave 2→3)		Period 1 (wave 1→2)	Period 2 (wave 2→3)		
Creating tie (0→1)	42	37		28	27		
Dissolving tie (1→0)	35	39		24	30		
Stable tie (1→1)	85	85		34	32		
% Jaccard index	52.2	52.7		39.1	35.8		
% Distance	47.8	47.3		60.9	64.2		

Note. ^aSummed over classrooms (other descriptives are averaged over classrooms).

to the number of actual nominations relative to the number of possible nominations) was about 25% and 12%. About 65% of the friendships and about 45% of the help nominations were mutual. About 61–65% of the friendships and about 50% of the help nominations were transitive (referring to triadic clusters of individuals). About 85% of the friendship and help nominations were same-sex. Finally, the stability over waves was about 50% for

friendship and about 35–40% for help (Jaccard index). Thus, friendship networks were on average twice as dense as help networks, suggesting that there are pairs of individuals who are friends, but not helpers. Relatedly, individuals more often regard each other as friends, but do not necessarily mutually help each other. Both friendship and help networks tend to cluster in groups, and are comparable with regard to their sex segregation.

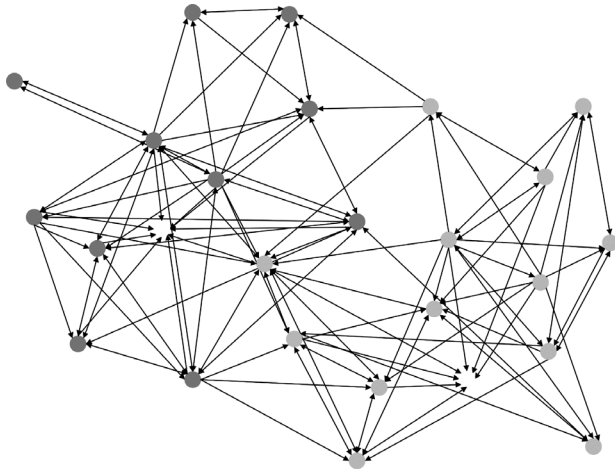


FIGURE 1 Friendship network of one classroom at wave 2. Nodes represent boys (dark gray) and girls (light gray), and arrows represent the friendship nominations between them.

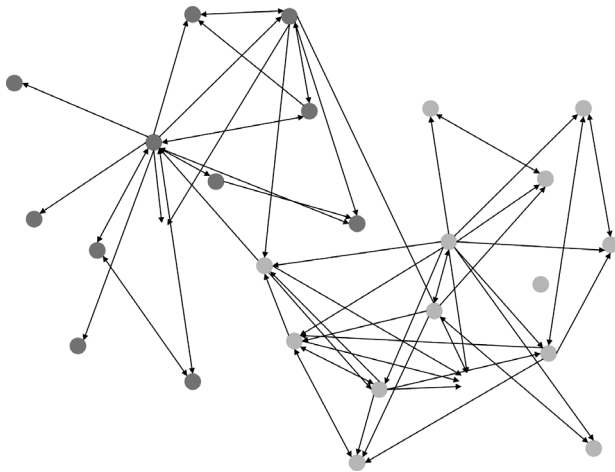


FIGURE 2 Help network of the same classroom at wave 2.

Friendship networks are somewhat more stable than help networks.

To gain insight into the differences between the friendship and help networks within classrooms, Figure 3 presents a scatterplot in which the association between friendship network density and help network density is depicted. Each node represents a classroom. The colors represent high (light gray), medium (dark gray), and low (black) help network reciprocity, and the shapes represent high (diamond), medium (triangle), and low (circle) friend network reciprocity. Figure 3 demonstrates that there is hardly any association between the densities of the two networks; if many students are friends in a classroom, this does not imply that many students in this classroom help each other,

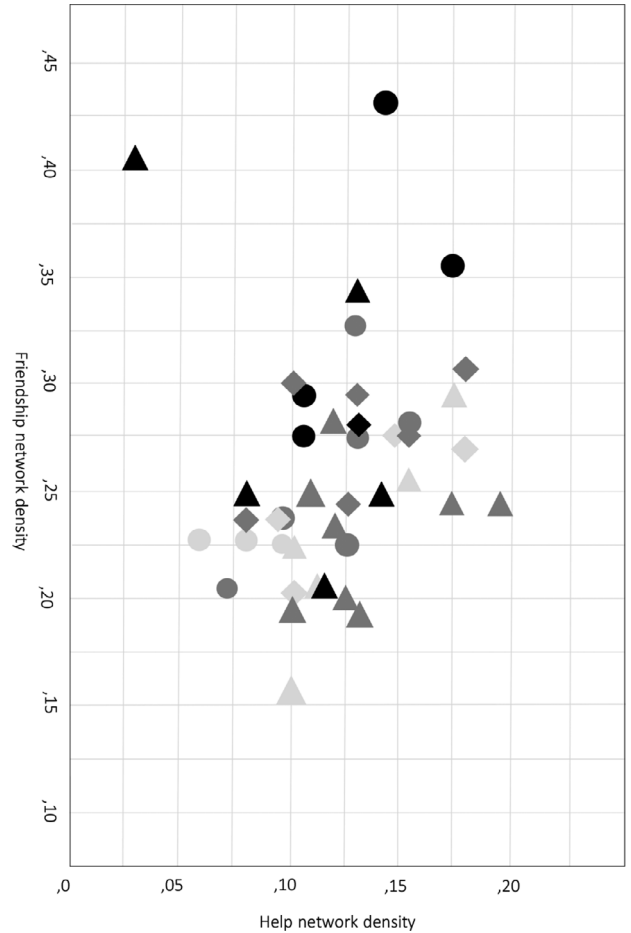


FIGURE 3 Scatterplot of the association between help network density and friendship network density. Each node represents a classroom. Colors represent high (light gray) medium (dark gray) and low (black) help network reciprocity, and the shape represents high (diamond) medium (triangle) and low (circle) friend network reciprocity.

and vice versa. Additionally, there is no clear association between the reciprocity rates of the two networks; low friendship reciprocation is no indication of low help reciprocation. Finally, classrooms vary with respect to these four dimensions. Few classrooms have the same color, shape, and position. Thus, also within classrooms, the friendship and help networks do not necessarily overlap.

Network interplay. Tables 3 and 4 present friendship and help configurations, and the frequency with which these configurations result in no friendship, one-sided friendship, and mutual friendship (or no help, one-sided help, and mutual help) at the next wave. Tables 3 and 4 cover the transition from wave 1 to 2, and from wave 2 to 3. The frequencies in Tables 3 and 4 show that classmates usually either reported only being friends or

TABLE 3

Overlap of the Friendship and Help Networks, Presenting the Numbers of Mutual and One-Sided Help (Friendship) Nominations at Wave 1, and How Many of these Nominations Resulted in a Mutual or One-Sided Friendship (Help) Nomination at Wave 2

<i>Configuration wave 1</i>	<i>Configuration wave 2</i>				
	<i>N</i>	<i>% No friendships</i>	<i>% One-sided friendships</i>	<i>% Mutual friendships</i>	<i>Missing</i>
No help or friendship	14,402	87.6	10.0	2.5	666
Only one-sided help	478	61.9	28.3	9.7	26
One-sided help and one-sided friendship	1,004	24.7	48.8	26.4	66
One-sided help and mutual friendship	1,090	7.7	24.7	67.6	78
Only mutual help	28	50.0	42.0	8.0	4
Mutual help and one-sided friendship	118	16.4	34.5	49.1	8
Mutual help and mutual friendship	964	3.3	15.1	81.6	50
	<i>N</i>	<i>% No help</i>	<i>% One-sided help</i>	<i>% Mutual help</i>	<i>Missing</i>
No friendship or help	14,402	95.0	4.5	0.0	540
Only one-sided friendship	2,522	79.6	17.6	2.8	100
One-sided friendship and one-sided help	1,004	45.0	45.0	10.0	66
One-sided friendship and mutual help	118	22.4	34.5	43.1	2
Only mutual friendship	1,016	66.9	25.5	5.6	52
Mutual friendship and one-sided help	1,090	35.3	41.7	23.0	64
Mutual friendship and mutual help	964	12.1	30.4	57.4	24

TABLE 4

Overlap of the Friendship and Help Networks, Presenting the Numbers of Mutual and One-Sided Help (Friendship) Nominations at Wave 2, and How Many of These Nominations Resulted in a Mutual or One-Sided Friendship (Help) Nomination at Wave 3

<i>Configuration wave 2</i>	<i>Configuration wave 3</i>				
	<i>N</i>	<i>% No friendships</i>	<i>% One-sided friendships</i>	<i>% Mutual friendships</i>	<i>Missing</i>
No help or friendship	13,842	89.4	8.1	2.5	920
Only one-sided help	500	69.0	25.0	6.0	36
One-sided help and one-sided friendship	988	30.2	45.1	24.6	44
One-sided help and mutual friendship	1,234	12.2	22.2	65.6	70
Only mutual help	22	40.0	40.0	20.0	12
Mutual help and one-sided friendship	126	19.0	54.0	27.0	0
Mutual help and mutual friendship	982	7.7	14.9	77.4	42
	<i>N</i>	<i>% No help</i>	<i>% One-sided help</i>	<i>% Mutual help</i>	<i>Missing</i>
No friendship or help	13,842	94.6	4.8	0.7	873
Only one-sided friendship	2,694	84.6	12.5	2.8	158
One-sided friendship and one-sided help	988	56.3	34.4	9.3	40
One-sided friendship and mutual help	126	30.2	39.7	30.2	0
Only mutual friendship	948	69.7	24.4	5.9	64
Mutual friendship and one-sided help	1,234	37.4	42.2	20.3	64
Mutual friendship and mutual help	982	16.1	35.1	47.9	50

a combination of friendship and help. Classmates rarely mutually helped each other when they were not friends at all, but one-sided help among non-friends or one-sided friends occurred quite often. Within mutual friendships, one-sided help was

more common than mutual help, particularly at wave 2.

Friendship initiation. In instances where there was no friendship (only one-sided or mutual help),

there was also no friendship at the next wave in 60–70% (one-sided help) and 40–50% (mutual help) of the cases. Particularly one-sided friendships emerged from one-sided help (about 30%) or mutual help (about 40%). Rarely did mutual friendships arise from help only (6–10%; exception at wave 3: 20%).

Friendship maintenance. Friendships were more frequent in cases where there already was some form of friendship before. Additionally, one-sided and mutual friendships were more frequently maintained if the help at the preceding wave was mutual rather than one-sided.

Help. In cases where there was no help (only one-sided or mutual friendship), there was usually also no help at the next wave in about 80% (one-sided friendship) and 70% (mutual friendship) of the cases. Help was more often maintained in mutual friendship than in one-sided friendships.

In sum, befriending classmates was more common than engaging in mutual help. One-sided help, however, was common, also among nonfriends or one-sided friends. Second, friendships emerged from help only, but these friendships were primarily one-sided. Third, friendships were more frequently maintained if help was mutual rather than one-sided. Finally, help rarely emerged from friendship relations only, but more frequently from mutual friendships than from one-sided friendships.

RSiena Results

Structural network effects. Results with respect to the structural network effects are presented in the top half of Table 5. The tables include the posterior means and standard deviations for the fixed parameters η and the random parameters μ . Significance is indicated by so-called *Bayesian p-values*. For a left-sided hypothesis, a Bayesian *p-value* close to zero is what we count as supportive evidence; we count a Bayesian *p-value* close to one as supportive evidence for right-sided hypotheses.

Friendship and help showed comparable structural dynamics. Students tended to be selective in whom they nominated as friends and helpers, as shown by the negative outdegree parameters ($\mu = -2.23$, $SD = .17$, $p < .01$; $\mu = -3.31$, $SD = .18$, $p < .01$). Both friendship ($\mu = 0.18$, $SD = .17$, $p = .86$; $\mu = 0.95$, $SD = .16$, $p > .99$) and help ($\mu = 0.30$, $SD = .13$, $p = .98$) showed tendencies toward reciprocity, and tended to cluster in groups, as shown by the posterior probabilities for transitivity

($\mu = 0.24$, $SD = .11$, $p = .99$; $\mu = 0.28$, $SD = .11$, $p > .99$). Finally, students tended to nominate same-sex classmates as friends ($\mu = 0.74$, $SD = .14$, $p > .99$) and helpers ($\mu = 0.46$, $SD = .14$, $p > .99$).

Multiplex network parameters. Our first hypothesis posed that mutual help would contribute more strongly to friendship maintenance than one-sided help. Our findings show that friendships were more likely to be maintained under the condition of one-sided help than no help at all (parameter 2 in Table 5; $\eta = 0.92$, $SD = .14$, $p > .99$), and under the condition of mutual help versus no help at all (parameter 2+4; $\eta = 2.05$, $SD = .18$, $p > .99$). In line with our first hypothesis, there was a positive effect of mutual versus one-sided help on friendship maintenance (parameter 4; $\eta = 1.14$, $SD = .22$, $p > .99$).

Our second hypothesis posed that help would increase the likelihood of friendship initiation. In line with this hypothesis, the likelihood of friendship increased under the condition of one-sided help versus no help at all (parameter 1; $\eta = 1.26$, $SD = .18$, $p > .99$). However, mutual help did not contribute to friendship initiation as compared with no help (parameter 1 + 3; $\eta = -0.62$, $SD = .51$, $p = .88$). Surprisingly, there was a negative effect of mutual help versus one-sided help on friendship initiation (parameter 3; $\eta = -1.87$, $SD = .52$, $p < .01$). Note, however, that pairs of students that only had a mutual help relation were exceptional, as there were only about 20 pairs of individuals that mutually helped each other without reporting a friendship. Therefore, this finding should be interpreted with caution.

Our third hypothesis posed that friendship would increase the likelihood of exchanging help. We also expected a stronger contribution to exchanging help of mutual versus one-sided friendship (Hypothesis 4). In line with our expectations, there was a positive effect of one-sided versus no friendship on receipt of help (parameter 5; $\eta = 1.24$, $SD = .09$, $p > .99$), and a positive effect of mutual versus no friendship on receipt of help (parameter 5 + 6; $\eta = 2.15$, $SD = .08$, $p > .99$). In addition, there was a positive effect of mutual versus one-sided friendship on receipt of help (parameter 6; $\eta = 0.92$, $SD = .07$, $p > .99$). These findings were consistent with our third and fourth hypotheses.

DISCUSSION

This study was aimed at unraveling the complex interplay between friendship and help among

TABLE 5
RSiena Results for the Effects of Help on Friendship and Vice Versa (N classrooms = 41; N students = 953)

	Random effects			Fixed effects			
	μ	SD (μ)	p	η	SD (η)	Odds	p
Effects of modeling the friendship network							
Outdegree	-2.23	.17	<.01				
Reciprocity initiation	0.18	.17	.86				
Reciprocity maintenance	0.95	.16	>.99				
Transitive triads	0.24	.11	.99				
Indegree popularity	-0.01	.11	.45				
Outdegree activity	-0.01	.11	.47				
Same sex	0.74	.14	>.99				
1 Effect of help on friendship initiation				1.26	.18	3.53	>.99
2 Effect of help on friendship maintenance				0.92	.14	2.51	>.99
3 Effect of mutual help on friendship initiation				-1.87	.52	0.15	<.01
4 Effect of mutual help on friendship maintenance				1.14	.22	3.13	>.99
Effects of modeling the help network							
Outdegree	-3.31	.18	<.01				
Reciprocity	0.30	.13	.98				
Transitive triads	0.28	.11	>.99				
Indegree popularity	-0.03	.10	.40				
Outdegree activity	0.06	.10	.72				
Same sex	0.46	.14	>.99				
5 Effect of friendship on help				1.24	.09	3.46	>.99
6 Effect of mutual friendship on help				0.92	.07	2.51	>.99

Note. The table presents posterior means and standard deviations for the random parameters m and fixed parameters η , the odds (calculated by taking the exponential of the parameter), and the estimated posterior probability p that the parameter is >0 .

adolescents. We examined how help contributes to the initiation and maintenance of friendship, and vice versa. We expected mutual help to contribute more strongly to the maintenance of friendship than one-sided help, and we expected help to contribute to friendship initiation. Finally, we expected help to result from friendship, particularly mutual friendship.

Help and Friendship Maintenance

A primary aim of this study was to examine how mutual versus one-sided help would contribute to friendship maintenance. On the one hand, it has been argued that mutual exchange in relations, or “book-keeping” of contributions to the relationship, likely does not occur in adolescence, as adolescents tend to consider the needs and well-being of others in social relationships instead of focusing on personal benefits (see Berndt, 1982; Hartup & Stevens, 1997; Sullivan, 1953). On the other hand, “symmetrical reciprocity”, referring to mutual acceptance and mutual regard, has been identified as an important difference between friends and non-friends (Hall, 2012; Hartup & Stevens, 1997). Following the latter strand of research, we argued that the mutual exchange of help is an essential way in

which the desire for symmetrical reciprocity can be met, and that, as such, friendships are more likely to be maintained under the condition of mutual versus one-sided help. In line with our expectation and this latter strand of research, we found that mutual help contributed more strongly to the maintenance of friendship than one-sided help. As such, adolescents may be stimulated to maintain friendships in which mutual help takes place.

An explanation for the beneficial effects of mutual versus one-sided help on friendship maintenance is that adolescents seek egalitarian relations with their peers. Adolescents seek independence from parents and teachers (Allen & Land, 1999). In their relations with such “authority figures”, adolescents typically take up a subordinate position. Adolescents are required to comply with parents’ or teachers’ wishes, and often depend on their knowledge. Therefore, in their peer relations, adolescents may want to ensure that they are not in this subordinate, dependent position. If an adolescent is being helped by friends but is not in a position to help in return, this resembles a nonegalitarian relationship in which the focal adolescent depends on his or her friends, but not vice versa. Mutual help makes friendships more egalitarian, and can be expected to make adolescents feel more

comfortable with their relationships. As such, egalitarian friendships, in which help is mutually exchanged, may be maintained longer.

Although mutual help was more strongly related to friendship maintenance than one-sided help, we nevertheless found that adolescents tended to maintain friendships under the condition of one-sided help, too. However, help-giving may be reciprocated not only with help, but also with material or immaterial signs of appreciation, which may also motivate the giver to maintain a friendship (see also Rubin, Fredstrom, & Bowker, 2008). The positive signals that receivers of help send to help-givers, and that we expected to play a role in the initiation of friendship, may also play a role in the maintenance of friendships. Future network studies on friendship initiation and maintenance may consider including these “alternative” reciprocations, and may also consider when a situation of imbalance (one helps, the other needs help) fails to nurture friendship emergence.

Help and Friendship Initiation

Our second hypothesis concerned the role of help in the initiation of friendship. In short, we expected one-sided help to contribute to friendship initiation, as helping others signals potential for a rewarding relationship and affection, and as asking for help communicates trust and a desire for closeness. In line with this expectation, we found that one-sided help indeed contributed to friendship initiation. However, we also found *mutual* help to negatively contribute to friendship initiation. Whereas we theorized that expectations of mutual help would likely be modest for nonfriends, we did not expect mutual help to hamper adolescents in forming friendships. Note, however, that there were only about 20 pairs of individuals that mutually helped each other without reporting a friendship. This finding thus relates to an exceptional situation. The exceptionality of this situation and the finding that mutual help may possibly hamper friendship initiation suggest that it might be more normative for adolescents to become friends before engaging in mutual help. Becoming friends is a gradual, phased process, in which two peers first like and get to know each other before they feel affection and discuss intimate matters (Hays, 1984; Newcomb & Bagwell, 1995). Engagement in mutual (negative) problem talk without feeling the affection typically felt for friends may distance two adolescents from each other. Mutual help may additionally demonstrate that *both* adolescents are not resourceful, and that they may

therefore not form a successful friendship pair. One-sided help may correspond better with the notion that friendships progress from relatively superficial relationships to more intimate ones.

Friendship as Context for Help

In addition to the contribution of help to friendship initiation and maintenance, we investigated the influence of friendship on help. We expected friendships, in particular mutual friendships, to function as a context encouraging the exchange of help. Our findings were consistent with this expectation. Friendships contributed to help, and this tendency was stronger in mutual versus one-sided friendship. This result replicates previous findings on friendship characteristics (Bukowski et al., 1994; Hiatt et al., 2015), and illustrates how the intimacy within mutual friendships contributes to the willingness to help and the courage to ask for help.

However, descriptive results indicated that there were many students who identified certain classmates as helpers, but not as friends. Thus, remarkably, there was exchange of help between students whose relation was not necessarily marked by high levels of intimacy. We did not look further into the characteristics of these pairs of students in this study. Future studies might further examine what makes nonfriends attractive as helpers (e.g., their positive peer reputation), and what gives early adolescents the courage to ask nonfriends for help.

Network Similarities and Differences

The second aim of this study was to examine the characteristics of friendship and help networks. Help is often investigated as a characteristic of friendship, and not much is known about how these types of networks differ. From the longitudinal analyses, it appeared that friendship and help networks showed similarities in their structural tendencies. Students tended to be selective about which classmates they regarded as friends or helpers, and both networks were characterized by reciprocity. However, looking at both networks descriptively showed that the extent to which these tendencies were expressed differed. Indeed, befriending classmates was twice as common as engaging in help relations. There were thus some friendships in which there was no exchange of help, or one-sided help. Friendships were more often mutual than help relations.

First, given previous research findings on how adolescents define friendship and what adolescents expect from friends (Hall, 2012; Hartup & Stevens,

1997), it was surprising to find that some classmates whom adolescents mentioned as friends were not salient to these adolescents as helpers. This partial overlap may be explained by the fact that not every adolescent is in need of help, and may therefore not mention every friend as a helper. However, about 20% of the students at every wave mentioned no classmate as helper (results available on request). Whereas some of them may indeed not have needed help, some may have needed help but not have had helpers among their friends or classmates. In addition, the help question was general and broad, making it safe to assume that most students were in need of a helper. Thus, the question might be whether help is as normative for friendship as has been suggested. Previous research has noted sex differences in this respect. For example, girls view self-disclosure, intimacy, and support as more important aspects of friendship than do boys (Berndt, 1982; Bukowski, Newcomb, & Hoza, 1987; Hall, 2011). As such, friendships between boys may also thrive without help or with one-sided help. Research even suggests that sharing intimate information and asking for help put adolescent boys in a vulnerable position (Way, 2013). Therefore, boys start to lose the intimate, supportive component of help in adolescence.

In addition, it is possible that adolescents maintain different friendships with different goals; some friends provide an intense and intimate bond, whereas other peers are primarily befriended to hang out with and have fun. Some friends may even be identified as “frenemies”. Such “ambiguous” friendship relations may contain ingredients of friendship, such as companionship and affection, but also of rivalry, such as distrust and competition. Sometimes adolescents have something to gain when they disclose a friend’s secret, especially in the beginning of a new friendship when they are sorting out their relationships and trying to determine who will keep their secrets and who will not. In the context of the classroom, friends may compete over social status or academic success, and may not necessarily be inclined to help each other reach their goals. In line with this, only about 50% of the friendships tended to “survive” between the assessment waves. Finally, our finding may illustrate that help-seekers make an appeal to friends’ knowledge or skills, but that not all friends are suitable to provide help. However, more research is necessary to find out what makes some classmates salient as friends but not as helpers.

Second, the partial overlap of friendship and help networks implies that help is not simply part of friendship, but that it is a unique type of

social relation that also occurs outside of friendships, and has a distinct set of dynamics. More information is necessary to grasp what adolescents mean when they mention a nonfriend as helper or when they do not mention a friend as helper. Our findings that not all friends are salient as helpers, that some helpers are not friends, and that not all help nominations are mutual may indicate that help relations are particularly instrumental. They aid in attaining personal goals (e.g., finishing homework, improving well-being). Help networks are more fluid than friendship networks, but nevertheless quite stable over time (Reid, Landesman, Treder, & Jaccard, 1989; Sullivan, Marshall, & Schonert-Reichl, 2002).

Third, our findings show that friendship and help networks diverge not only at the dyadic level, but also at the classroom level. Looking at how the two networks coincided within classrooms, we saw that in classrooms characterized by mutual help relations, friendships did not necessarily tend to be mutual, and vice versa. The densities of the two networks did not necessarily correspond within classrooms. This may in part be the result of differences in individual preferences in forming or reciprocating help or friendship nominations, but may also reflect a particular classroom atmosphere. For example, in classrooms with an emphasis on academic success, students might be inclined to help each other, but may be less focused on social goals, such as making friends (Shim & Finch, 2014; Wentzel, 1994).

Thus, although friendship and help networks show similarities, they only partly overlap. Further understanding of friendship and help networks is needed to understand which peers and friends adolescents typically target for help and with what purposes, and what underpins classroom differences in tendencies to befriend and help, as research on these topics is scarce.

Limitations and Directions for Future Research

When interpreting the results, it is important to bear in mind the following limitations. First, we examined help in a broad sense (referring to help with homework, with repairing a flat tire, or when feeling down). Our measure of help aligned with our aim to capture the general tendency of students to help each other. Also, our broad definition of help, suggesting that everybody needs some help once in a while, aimed to minimize the role that the need for and ability to help may otherwise have played in explaining the structure of the help network. This also allowed that the period for

exchanging help from a formerly helped friend grows larger in adolescence and that giving help does not have to occur in the same kind or “currency” as receiving help. Although it made sense for our investigation to start with a broad measure of helping, future work may need a more specified measure (e.g., helping with academic work might be quite different in terms of intimacy and bonding than helping with interpersonal conflicts) to advance understanding of help relations. Future research, particularly in relation to school-based status and achievement, may also want to distinguish between help-receiving and help-giving, as we only measured help relations from the perspective of the receiver.

Second, previous researchers have pointed out that help is more salient in girls’ versus boys’ friendships (Berndt, 1982; Bukowski et al., 1987; Hall, 2011). Self-disclosure more often results in friendships among girls than among boys (Von Salisch, Zeman, Luepschen, & Kanevsi, 2014), and befriended girls help each other more often than befriended boys (Rose & Rudolph, 2006). Not surprisingly, girls also report higher levels of support in their friendships than boys (Bukowski et al., 1994; Colarossi, 2001). Further research is needed to reveal whether the effects we found (e.g., the effect of mutual vs. one-sided help on friendship maintenance) differ for boys and girls.

Third, we investigated friendship and help relations in the classroom setting. However, friendship and help might not occur in the same setting. For instance, adolescents might seek help from others outside the school context. In addition, we regarded classroom help as an important driving factor in the initiation and maintenance of friendships, and vice versa. Whereas this is the case, there are many other characteristics, behaviors, and interactions that may facilitate friendship or help relations. For example, friendships are more likely to be initiated or maintained if adolescents share similar interests or characteristics (Veenstra, Dijkstra, Steglich, & Van Zalk, 2013). Further, (socioemotional) help relations may be more likely to be initiated if the quality of the friendship is high, and vice versa: help may be central for high-quality friendships. However, from the perspective that some adolescents see friends as resources to gain status (“basking in reflected glory”), help may be not be relevant to friendships (Dijkstra, Cillessen, Lindenberg, & Veenstra, 2010). There are also other factors than friendship that may contribute to help, such as the ability of the friend to provide help, and also similarity in characteristics (Van Rijsewijk, Dijkstra, Pattiselanno, Steglich, &

Veenstra, 2016). Whereas we controlled for sex as a key friendship and helping selection mechanism (McPherson, Smith-Lovin, & Cook, 2001; Van Rijsewijk et al., 2016), we were not able to take all relationship formation mechanisms into account.

CONCLUSION

This study has moved the field of adolescent positive peer relations forward by conceiving of friendship and help as two independent yet interrelated social relations. We found that mutual help may positively contribute to the maintenance but not initiation of friendship, and that friendship forms a context in which help takes place. We found that help also takes place outside friendships, and that not every friend is regarded as a helper. These findings may encourage researchers to examine which nonfriends are typically targeted as helpers, and which particular friends are suitable as helpers.

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Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Appendix S1. In the appendix, the contribution of a mutual nomination versus no nomination on the dependent network is explained