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The role of prosocial attitudes and academic achievement in peer networks in higher education

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Abstract

After the transition to university, students need to build a new peer network, which helps them to adapt to university life. This study investigated to what extent students' prosocial attitudes and academic achievement facilitate the embeddedness in friendship and help-seeking networks, while taking structural network characteristics into account. Participants were 95 first-year bachelor's degree students and were part of learning communities consisting of 12 students at a university in the Netherlands. Measures included student-reports of prosocial attitudes, peer nominations of friendship and help-seeking networks, and officially registered grades (GPA). Longitudinal social network analysis, stochastic actor-based modeling with the package RSiena, revealed that both students' own prosocial attitudes and achievement played a role in their friendship formation, whereas only students' own achievement made the formation of their help-seeking relationships more likely. When students were friends, it was more likely that they approached each other for help and vice versa. Similarity in achievement level contributed to relationship formation in friendship and help-seeking networks. Overall, the results underscore the importance of both student' prosocial attitudes and achievement for their social adjustment (i.e., making friends) and only achievement for their academic adjustment (i.e., seeking help) during the first year of university within the context of small-scale teaching.

Keywords Achievement · Friendships · Help-seeking · Higher education · Prosocial attitudes · Social networks

The transition from secondary to higher education implies an entire new educational system and peer context for adolescents. One of the main challenges first-year students face is the academic and social adjustment to this new learning environment and is, therefore, often

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perceived as a stressful period (Christie et al. 2004; Jenert et al. 2017; Rausch and Hamilton 2006; Urquhart and Pooley 2007). In particular, as first-year students are in the so-called developmental stage of emerging adulthood, they may experience several transitions simultaneously, such as moving out from their parental home and starting a new job next to their studies (Arnett 2004). During the first year of university, students need to establish new peer relationships, which can support adaptation to university life, may enhance academic motivation (Noyens et al. 2019), and help students to complete the first year of university successfully (Brouwer et al. 2016; Rausch and Hamilton 2006; Thomas 2000).

Based on research in primary and secondary education, it has been suggested that certain characteristics can help or hamper students in establishing a peer network, such as their degree of prosocial behavior (Chung-Hall and Chen 2010; Farmer and Rodkin 1996; Roussel et al. 2011), specific skills (i.e., reading; Kiuru et al. 2017), or academic achievement (Flashman 2012; Gremmen et al. 2017; Van Rijsewijk et al. 2018). In recent years, academic achievement is increasingly recognized as an important factor in shaping peer networks in the higher education context (Brouwer et al. 2018; Lomi et al. 2011; Stadtfeld et al. 2019). To date, prior research often focused on students in secondary school, leaving questions about how both prosocial attitudes and achievement affect students' peer networks in the context of university students unanswered. To address this research gap, this study adopted a social network approach to investigate the role of students' prosocial attitudes and academic achievement in establishing friendship and help-seeking networks during the first year of university. By doing so, this study provides insights into the role of student' characteristics in facilitating their social adjustment (i.e., making friends) and academic adjustment (i.e., seeking help) during the first year of university, and therefore may help target interventions aimed at improving students' successful completion of university.

Peer networks

Different types of peer networks

Friendships are one type of peer networks that constitute a proximal developmental context for students (Bronfenbrenner and Morris 2006). As students transition from secondary school to higher education, friendships may become one of the most important sources of support (Buote et al. 2007; Wilcox et al. 2005). Friends can provide students with support, make them feel part of the wider peer group, and help to build a social identity which predicts long-term friendships (Bukowski and Sippola 2005; Weisz and Wood 2005; Wilcox et al. 2005). Furthermore, friendships contribute to feelings of belongingness and emotional security (Gorman et al. 2011), which assist the social adjustment to university and obtain social comfort (Brouwer et al. 2019; Buote et al. 2007; Deil-Amen 2016). However, when students are not integrated well in friendship networks, which can be considered as an indicator of maladaptive social adjustment (Mahon et al. 2006), they may be at increased risk of withdrawal from social and academic activities, and eventually dropout of university.

Another important type of peer networks is students' help-seeking networks. Besides friendships and support, peers can function as sources of help and could, thus, promote students' academic adjustment. Helping behaviors include costs and benefits for the help giver, as it not only takes efforts to help peers but it can also result in social or material benefits (Schroeder and Graziano 2015; Spitzmuller and Van Dyne 2013; Wentzel et al. 2007). These

benefits can be focused on others, such as social approval by peers, or on the self, such as avoidance of negative feelings of shame. However, not only giving help but also receiving help is associated with costs and benefits. Accepting help from others entails considerations about whether a student wants to receive help from specific peers and, consequently, to be associated with them (Ackerman and Kenrick 2008).

Theoretical approaches of peer network formation

Via friendship and help-seeking networks, students can get access to valuable resources of peers, such as advice, information, and support (Brouwer et al. 2016; Martin et al. 2020). This is consistent with the social capital theory, which asserts that people invest in a relationship when they expect a valuable return, which might help them to reach their personal goals (Coleman 1990; Lin 1999; Putnam 2000). As such, students' learning processes and their educational outcomes may depend on the availability of different resources in their network (Choudry et al. 2017). Students might use their resources for different goals. Students might have academic goals, such as striving for academic success, but they could also establish relationships with peers to meet their social goals, such as being part of a peer group (Brouwer et al. 2018; Wentzel 2000).

According to social learning theory, students learn specific behaviors from observing and imitating peers, as well as through receiving social rewards or sanctions for showing certain behavior (Bandura 1977). Feelings of emotional security and being socially connected are assumed to facilitate the adoption of goals and interests valued by others, including goals to contribute in positive ways to the overall functioning of the social group (e.g., Ryan and Deci 2002). Furthermore, in line with the social comparison theory (Festinger 1954), students tend to compare themselves to similar others to obtain an accurate self-evaluation for their own abilities. For example, they compare their grades with their peers (Brooks 2007) and may connect to peers who are successful. These successful peers may be attractive in the learning community network.

Based on the "basking in reflected glory" literature (cf. Cialdini et al. 1976, likeable and popular peers are attractive peers to approach for friendship and help (Dijkstra et al. 2010; Dijkstra et al. 2013). Being associated with peers who are well liked and popular among classmates positively influences one's own social standing in the peer group. Consequently, students are more likely to establish friendships and seek help from high-status peers (e.g., Van Rijsewijk et al. 2016). Furthermore, in order to establish relationships within peer networks, students need to be socially attractive for their peers. Based on the goal-framing theory (Lindenberg 2006), students' attractiveness by peers for friendships and help-seeking is, for instance, determined by student' behaviors that are valued within the network, such as behavior related to prosocial attitudes and academic achievement.

The role of prosocial attitudes and academic achievement

Prosocial attitudes refer to attitudes resulting in voluntary behaviors which are beneficial for other individuals and facilitate a peaceful relationship (Dovidio et al. 2006; Eisenberg et al. 1999). In a peer network, prosocial attitudes can facilitate peer relationships as behaviors such as sharing, donating, cooperating, and volunteering are positively valued by others, indicated by liking and popularity nominations (LaFontana and Cillessen 2002; Peters et al. 2010). In other words, prosocial students might be more attractive for friendships or asking for help.

Although research is scarce, significant associations between prosocial attitudes and friendships have been found. For instance, research has shown that students with prosocial characteristics were more likely to be nominated as a friend compared to other students. In turn, students with a higher number of friendships also had more prosocial characteristics than students with a lower number of friendships (Gest et al. 2001). Moreover, friends are similar in the degree to which they display prosocial characteristics (Barry and Wentzel 2006; Wentzel et al. 2004; Wentzel and Caldwell 1997). With respect to help-seeking networks, to our knowledge, prior research did not focus on the role of prosocial attitudes and capabilities, expressed in grades, in selecting students as academic helpers. However, it could be argued that when students are known for their prosocial characteristics, such as sharing, donating, cooperating, and volunteering, and thus are willing to help and cooperate with others, they are also the person where others go to for help (Borgatti and Rob 2003).

Besides students' prosociality, academic achievement is another student characteristic that may promote relationships in a peer network. Students' friendships are often based on similarity or homophily, as similar people tend to understand one another better, which increases trustworthiness, resulting in less effortful communications and shared feelings of understanding (Lazarsfeld and Merton 1954; McPherson et al. 2001; Veenstra et al. 2013). On the one hand, as first-year students need to feel embedded in their peer group (Rivera et al. 2010), they may seek friends with similar academic goals, as these friends can be valuable in terms of their resources and help them succeed academically (Dieterich 2015; Lomi et al. 2011). Prior research has revealed that adolescents in the first year of secondary education tend to select friends with similar grades (Gremmen et al. 2017). However, they found no support for these selection effects in the second year of secondary education, which may suggest that these processes take place predominantly at the start of secondary education, in which students have to establish a new peer network. On the other hand, as first-year students need to achieve well, they might seek for friends who are dissimilar in terms of achievement when this complements their own skills or knowledge (Lazarsfeld and Merton 1954; Rivera et al. 2010). Following social capital theory, it could be argued that well-achieving students are more attractive as helpers due their capabilities and capacities, and consequently, comprise valuable resources for their peers in order to achieve different personal goals (Coleman 1990; Lin 1999; Putnam 2000). Likewise, students may turn to peers who do well in university (Lomi et al. 2011). As academic achievement can be seen as an indicator for general improved cognitive capacities, these smarter peers may be capable of finding solutions for other types of difficulties as well, making them attractive as all-round helpers (Van Rijsewijk et al. 2016). Prior research in secondary school has shown that higher achievers received help less often but failed to find evidence that high-achievers seek more help or that students with similar levels of achievement select each other as helpers (e.g., Van Rijsewijk et al. 2016). In higher education, however, Brouwer et al. (2018) showed indeed that students ask help from their similar achieving friends and prefer to collaborate with them. One might also argue that both prosociality and high-achieving are associated with more friendships, as these characteristics might make a student more attractive as a friend (Lomi et al. 2011). Also, students who are both prosocial and high-achieving could also facilitate students' help-seeking networks, as they might be more capable and willing to help, and consequently have more nominations as helpers.

In addition to prosociality and achievement, several other factors can contribute or hamper the formation of peer relationships. Callister and Plante (2017) showed, for

example, that females and social sciences students are more intended to help others. The learning environment may also have an impact on how student's prosocial attitudes reveal or whether their achievements are more pronounced and consequently, whether students are willing to help each other. Yip and Kelly (2013) showed that when students compare themselves more upwards or downwards, students report lower levels of prosocial behavior and are less intended to help others. In the current educational context, students need to obtain at least three quarter of their credits (i.e., 45 ECTS); otherwise, they are not allowed to continue with their degree after the first year. Although students are assigned to learning communities, this measure might imply that student's achievements are more emphasized than their prosocial attitudes and helping behavior. Therefore, they may be less inclined to help.

The present study

Although the transition from secondary education to higher education implies an entire new educational system and peer context for adolescents, only limited research has been conducted regarding the impact of student' characteristics on their peer network after this transition (Brouwer et al. 2018). Thus far, little is known about the role of prosocial attitudes combined with students' achievement in the selection of friends and academic helpers after the transition to university (see Snijders and Lomi 2019). The present study aims to address this gap by adopting a social network approach when investigating both the role of students' prosocial attitudes and academic achievement in establishing peer friendship and help-seeking networks during the first year of university.

The main research question of this study is to what extent students' prosocial attitudes and academic achievement increase their attractiveness as friends or for help-seeking by peers. Our first hypothesis is that students' prosocial attitudes are associated with more incoming and outgoing friendship nominations, as related prosocial behaviors such as sharing and cooperating are positively valued by themselves and others (LaFontana and Cillessen 2002; Peters et al. 2010). Second, we hypothesized that prosocial attitudes are related to more incoming and outgoing help-seeking nominations, as prosocial students might be known for their willingness to help and cooperate with others. The third hypothesis is that students' achievement is associated with more incoming and outgoing friendship nominations, as well-achieving friends connect to others with valuable resources and may have resources themselves which help them succeed academically (Brouwer et al. 2018; Veenstra et al. 2013). Fourth, as well-achieving students might be more active in approaching others for help and have valuable resources for their peers, they may be more attractive as helpers due their capabilities and capacities (Brouwer et al. 2018; Coleman 1990; Flap and Völker 2004; Lin 1999; Putnam 2000; Wentzel 2000). Therefore, we expected that students' achievement is related to more incoming and outgoing help-seeking nominations. In addition, it might be that especially students who are both prosocial high-achieving have more friends, as these characteristics make the student more attractive as a friend (Dieterich 2015). Also, prosocial and high-achieving students might be more capable and willing to help, and consequently have more nominations as helpers. The current study explored these possibilities and by doing so, the role of achievement and prosociality for friendship and help-seeking relationships. In specific, our models were

specified to explain the observed social network change during the first year of university, such as becoming reciprocal friends or helpers, during the first year of university net of the other effects of network processes in the model.

Method

Educational context: learning communities

First-year students were assigned by the educational office to one of the eight learning communities. This has a fixed group composition of on average 12 students and remains the same during the first semester. The learning communities are centered around one bachelor course with mandatory meetings each week during the full academic year. This core course covers academic, study skills, professionalization, and critical thinking. Students attend lectures and practicals of all the courses together with the members of their own learning community. Students collaborate with their learning community members on group assignments during the courses. During the first semester, they have on average 13 formal contact hours per week. Although students can collaborate and meet beyond the formal contract hours, extracurricular activities are not part of the curriculum. During the second semester, students meet their learning community members only for the central course and for other courses the group composition deviates from the fixed composition of the learning community (see Brouwer et al. 2019).

Sample and procedure

Both relational and individual-level data have been collected among 95 first-year Dutch bachelor's degree social sciences' students (61.1% female) with a mean age of 19.46 years old ($SD = 1.56$). The social sciences degree program consisted only of Dutch students, of which 71% of the students left their parental home. Eighty-six percent of the students is a second-generation student, which means that at least one of their siblings or parents obtained a degree in higher education. Only 20% of the students obtained already another bachelor degree.

We collected computer-based survey and network data across two waves in the 2013/2014 academic year: in the final period of the first semester (January) and in the final period of the second semester (April) at a research university in the Netherlands. The completion time of the questionnaires was on average 20–30 min, and although students were rewarded with credit points, participation was voluntary. Students were informed about the aims, procedure, and ethical aspects of the study. All participants gave active informed consent for the use of their personal details from the central administration and the study data and results. The response rate was 93%, with three students not responding to the survey and four students dropping out of university. The ethical committee of the degree program approved the research project.

Measures

Friendship networks At both waves, students were asked to rate their relationships with their fellow students of their cohort in the study program on a 6-point scale (i.e., 1 = “best friend,” 2 = “friend,” 3 = “friendly relationship,” 4 = “neutral, not much in common,” 5 = “only known from face or name,” or 6 = “I don't know who this is”) (Van de Bunt 1999). As longitudinal

social network analysis with the library package RSiena (Ripley et al. 2020; see also “Statistical analysis”) requires dichotomous network data (0 = absent tie/relationship, 1 = present tie/relationship), these friendship nominations were dichotomized with the categories 1, 2, and 3 were recoded as a friendship (1 = “yes”) and the categories 4, 5, and 6 as no friendship (0 = “no”).

Help-seeking networks At both waves, students were asked to rate each fellow student on how likely it was whether they would ask him or her for help and/or advice (i.e., “I ask [student name] for help when I do not understand the study material”). The rating scale was a 5-point Likert-type scale ranging from 1 to 6 (1 = “strongly disagree,” 5 = “strongly agree,” 6 = “I don’t know”). Again, for the analysis, dichotomization of the variables was needed and therefore we recoded the categories 4 = “agree” and 5 = “strongly agree” as an academic help-seeking relationship (1 = “yes”) and the categories 1, 2, and 3 as no academic help-seeking relationship (0 = “no”).

Prosocial attitudes Students’ prosocial attitudes were measured at both waves with 5 items regarding the willingness to help and listen to fellow students (derived from Boom and Pennink 2012). An example of an item was as follows: “During this study year, I am willing to help my fellow students whenever needed.” Students were asked to respond on a scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). Cronbach’s alpha indicated sufficient internal consistency ($\alpha = 0.75$).

Academic achievement Students’ academic achievement was assessed after the first semester. The Dutch grading system for measuring academic achievement ranges from 1 (i.e., extremely low) to 10 (i.e., excellent), with a 6 or higher indicating a sufficient/passing grade. After the first semester, 3.4% of the students ($n = 3$) had a score of 8 or higher, 56.8% ($n = 50$) had a score between 6 and 8, and 39.8% ($n = 35$) had a score lower than 6. Students’ grades for the first semester were weighted by the obtained credit points for each course and then, divided by the maximum number of credit points in the program during the first semester. For the analysis in RSiena (Ripley et al. 2020), we transformed the continuous weighted grades into ordinal scores and recoded the grades by rounding to the highest grade, e.g., grades between 6 and 7 were recoded as 7.

Statistical analysis

Using stochastic actor-oriented models (SAOM), friendship and help-seeking networks were examined (Snijders 2001; Snijders et al. 2010). Stochastic actor-oriented models can test hypotheses about network change and actor attributes (i.e., personal characteristics, behavior, or attitudes) simultaneously (Snijders et al. 2010). Despite discrete measurement points, stochastic actor-oriented models assume an underlying continuous dynamic process of relational change because of network structures, actor, and dyadic effects (see Snijders 2001; Snijders et al. 2010). To investigate how students select each other over time within their network requires longitudinal complete social network data. This means data that is measured at least at two time points within a certain boundary, i.e., the complete study program. Social network research takes the relational environment into account and goes beyond an individual perspective. Conventional statistical tools, such as ordinary regression analysis, cannot be

used, because the observations in networks are not independent but rather interdependent. For example, a student may nominate another student because they both have the same friend (i.e., transitivity; Wasserman and Faust 1994).

The models are estimated with the R-package Siena for dichotomous social network data (Simulation Investigation for Empirical Network Analysis; Ripley et al. 2020). This means that a connection is either present (one) or absent (zero). We define our models based on theoretical rationale to explain the observed social network changes, e.g., becoming mutually related or to select fellow students in the help-seeking networks based on good grades and prosocial attitude. The model algorithm simulates the relational changes based on different combinations of parameters. The parameters are obtained, with an iterative Monte-Carlo procedure, based on the fit of the simulated and the observed data. This means that convergence is based on the model parameters and model updates based on discrepancies between simulated and observed network changes (Snijders 2001). The parameter estimates can be interpreted as log odds ratio, i.e., the likelihood that a certain relationship exists. Parameters are tested as in conventional statistical techniques with *t*-ratios (parameters/standard errors) and the significance level (Ripley et al. 2020; Snijders 2005; Snijders et al. 2010).

To address our research questions about selection of students based on achievement and prosocial attitudes, friendship and help-seeking networks are dependent and independent variables simultaneously and the actor attributes (e.g., gender, achievement, prosocial attitude) are fixed independent covariates (Snijders et al. 2010; Sweet 2015). We estimated friendships and help-seeking networks separately. We included the general tendency to form relationships (*outdegree/density*), to reciprocate a relationship (*reciprocity*), to form relationships with whom the student shares a common third student they both selected (*transitivity*), to reciprocate a relationship within transitive triplets (*transitive reciprocal triplets*), to receive more nominations if the student has already received more nominations (*indegree popularity*), and the tendency of students to give more nominations if they selected others more often (*outdegree activity*) or are themselves nominated more often (*indegree activity*). Furthermore, we estimated whether students with higher prosocial attitudes and grades tend to nominate more peers (*prosocial and grade ego*), whether these students tend to receive more nominations (*prosocial and grade alter*), whether students' select each other based on their similarity regarding prosocial attitudes and grades as indicator for achievement level (*similar prosocial and grade*) and whether students with higher prosocial attitudes and grades are more likely to form relationships (*higher prosocial and grade*). We estimated the interaction effect of students with higher grades and similar in their prosocial attitudes tend to nominate each other (*interaction prosocial similarity and grade ego*). Moreover, we estimated whether female students are more likely to give (*gender ego*) and receive nominations (*gender alter*), and whether students select each other based on their same gender (*same gender*), and being assigned to the same learning community (*same learning community*). For the friendship network, we included whether students are likely to become friends when they also seek help from each other (*help-seeking*). For the help-seeking networks, we estimated whether students are likely to seek help from each other when they are friends (*friendship*).

Table 1 Descriptive network statistics of friendship and help-seeking networks

Network indicators	Friendships		Help-seeking	
	Sem. 1	Sem. 2	Sem. 1	Sem. 2
Average degree	6.1	5.0	5.2	3.7
<i>SD</i> indegree	3.8	3.7	3.3	3.0
<i>SD</i> outdegree	4.0	4.0	3.6	3.0
Density	7%	5%	6%	4%
Reciprocity	41%	50%	36%	48%
Transitivity	37%	38%	37%	39%
Change	Sem. 1—Sem. 2		Sem. 1—Sem. 2	
Jaccard index	38%		36%	
Hamming distance	473		394	
No. of ties dissolved	290		270	
No. of ties emerged	183		124	
No. of ties maintained	291		225	

Results

Descriptive statistics

The descriptive network statistics are presented in Table 1. Across the semesters of the first academic year, students nominate on average between 5 and 6 peers for friendships, and between 3 and 5 peers for help-seeking within their study program. The density was between 5 and 7% for friendships and between 4 and 6% for help-seeking relationships, indicating that only a small percentage of all possible friendship and help-seeking relationships in the study program were actual relationships (i.e., nominated students divided by all possible nominations). Between 41 and 50% of the friendship relationships and between 36 and 48% of the help-seeking relationships were reciprocated. The relationships that were reciprocated increased across semesters. The transitivity index indicated that there was a tendency for friendships (37–38%) and help-seeking relationships (37–39%) to occur in cohesive subgroups. The Jaccard index revealed that 38% of the friendships and 36% of the help-seeking relationships were stable, denoting sufficient stability in the networks to estimate the parameters with adequate statistical power (Ripley et al. 2020; Snijders et al. 2010). Across semesters, 290 of friendships dissolved, 183 new friendships emerged, and 291 friendships were maintained. For help-seeking, 270 relationships dissolved, 124 new relationships emerged, and 225 help-seeking relationships were maintained.

With conducting a bivariate correlation analysis, we explored the association between the attribute variables, i.e., gender, grades (semester 1 and semester 2), and prosocial attitudes. Table 2 shows a significant association between achievement for the first semester and prosocial attitudes, i.e., $r = 0.27$, $p < .05$. Gender, achievement in both semester, and prosocial attitudes are not significantly related.

RSiena analyses

The results of SAOM in RSiena for friendship and help-seeking networks are presented in Table 3. Friendship and help-seeking network works showed similar structural dynamics, as students tended to be selective in whom they nominate as friend (Est. = -2.57 , SE = 0.34) and helper (Est. = -2.69 , SE = 0.36). Both friendship and help-seeking networks revealed

Table 2 Bivariate correlations and descriptive statistics for the attribute variables

	Gender	Grade semester 1	Grade semester 2	Prosocial attitudes
Gender	-			
Grade semester 1	.13	-		
Grade semester 2	.06	.90**	-	
Prosocial attitudes	.03	.27*	.20	-
Mean		5.97	4.99	4.03
SD		1.97	2.80	0.49

Non-parametric correlation (Spearman's rho) was calculated for the dichotomous variable Gender. Parametric correlation (Pearson correlation) was calculated for the continuous variables grade semester 1, grade semester 2, and prosocial attitudes

** $p \leq .001$; * $p \leq .05$

tendencies toward reciprocation (Est. = 2.78, SE = 0.29 and Est. = 3.14, SE = 0.39, respectively) and tended to cluster in groups (Est. = 0.50, SE = 0.06 and Est. = 0.77, SE = 0.09, respectively). Reciprocation was less likely within transitive triplets (Est. = -0.35, SE = 0.08 and Est. = -0.56, SE = 0.12, respectively). There was a tendency of students with high indegrees to nominate fewer peers as friends and as helpers (Est. = -0.21, SE = 0.07 and Est. = -0.23, SE = 0.09, respectively).

In addition to these structural effects, there was a significant tendency to select same-gender peers as friends (Est. = 0.54, SE = 0.12) and as help-seekers (Est. = 0.63; SE = 0.17).

Table 3 RSiena results on the effects of prosocial attitudes and achievement in friendship and help-seeking networks

	Friendship networks		Help-seeking networks	
	Estimate (Est.)	SE	Estimate (Est.)	SE
Rate parameter	13.76*	1.61	5.78*	0.96
Outdegree	-2.57*	0.34	-2.69*	0.36
Reciprocity	2.78*	0.29	3.14*	0.39
Transitive triplets	0.50*	0.06	0.77*	0.09
Transitive reciprocal triplets	-0.35*	0.08	-0.56*	0.12
Indegree popularity	0.004	0.03	-0.02	0.04
Outdegree activity	0.03	0.02	0.02	0.03
Indegree activity	-0.21*	0.07	-0.23*	0.09
Gender ego (female)	-0.37*	0.13	-0.18	0.20
Gender alter (female)	-0.20	0.12	-0.66*	0.19
Same gender (female)	0.54*	0.12	0.63*	0.17
Grade ego	0.26*	0.09	0.28*	0.14
Grade alter	-0.03	0.08	0.17	0.11
Similar grade	1.62*	0.52	1.93*	0.83
Higher grade	-0.10	0.21	-0.07	0.27
Same learning community	-0.31	0.16	-1.11*	0.28
Prosocial ego	0.77*	0.31	0.74	0.48
Prosocial alter	-0.77*	0.26	-0.72	0.43
Similar prosocial	0.66	0.45	0.30	0.65
Higher prosocial	-0.72	0.37	-0.90	0.63
Help-seeking	1.63*	0.19	-	-
Friendship	-	-	0.94*	0.26

Gender: 0 = male, 1 = female. Convergence t -ratios all < 0.08 ; overall maximum convergence ratio 0.23 -0.24

* $p < .05$ (based on non-rounded estimates)

Compared to males, a tendency appeared for females to nominate fewer peers as friends (Est. = -0.37, SE = 0.13) and receive less help-seeking nominations (Est. = -0.66; SE = 0.19). Across the first two semesters, students were less likely to establish help-seeking relationships (Est. = -1.11, SE = 0.28) in their own learning community. They establish more often help-seeking relationships beyond their own learning community over time. It is more likely that students become friends when they also seek help from each other (Est. = 1.63, SE = 0.19) and vice versa (Est. = 0.94, SE = 0.26).

Prosocial attitudes The results showed that students with higher prosocial attitudes tend to nominate more peers as friends (Est. = 0.77, SE = 0.31) but were less likely to be nominated by peers as friends (Est. = -0.77, SE = 0.26). Yet, we do not find evidence that students with similar levels of prosocial attitudes were more likely to nominate each other as friends (Est. = 0.66, SE = 0.45) or helpers (Est. = 0.30, SE = 0.65). Furthermore, students with higher prosocial attitudes seemed not more likely to have friendship (Est. = -0.72, SE = 0.37) or help-seeking relationships (Est. = -0.90, SE = 0.63). Consequently, the results only partially support hypothesis 1, as prosocial attitudes were associated with more friendship nominations, but not with receiving these nominations. In addition, we found no significant effect of prosocial attitudes on help-seeking relationships, which leads us to reject hypothesis 2, i.e., prosocial attitudes are related to more help-seeking nominations.

Achievement The analysis revealed that the higher the achievement, the more students tended to nominate peers as friends (Est. = 0.26, SE = 0.09) and as helpers (Est. = 0.28, SE = 0.14). Also, students with similar achievement levels were more likely to nominate each other as friends (Est. = 1.62, SE = 0.52) or helpers (Est. = 1.93, SE = 0.83). However, students' achievement level seemed not to affect the number of friendship nominations (Est. = -0.03, SE = 0.08) nor help-seeking nominations received (Est. = 0.17, SE = 0.11). Furthermore, students with higher grades seemed not more likely to have friendship (Est. = -0.10, SE = 0.21) or help-seeking relationships (Est. = -0.07, SE = 0.27). As a result, we found partial support for hypothesis 3 and 4, as students' achievement levels were associated with nominating more peers for friendship and help-seeking, but not with receiving these nominations.

Additionally, we explored whether students with higher grades and similar prosocial attitudes are more likely to nominate each other for friends or as helpers (interaction effect of grades of ego and similarity prosocial attitudes). This effect was neither in the friendship networks (Est. = 0.15; SE = 0.11) nor in the help-seeking networks significant (Est. = 0.27; SE = 0.17). Since including the interaction terms complicated our models and could overrule the main effects of prosociality and achievement, we reported the models for friendships and help-seeking without this interaction effect to get a better understanding of the role of prosociality and achievement.

Discussion

The present study contributes to our understanding of the role of students' prosocial attitudes and academic achievement on relationship formation in small group teaching by investigating longitudinal friendship and help-seeking networks in learning communities in higher education. In line with our first hypothesis, students with higher prosocial attitudes were more likely

to nominate more peers as friends. However, in contrast to our expectations, when the fellow-students had high levels of prosociality, it was less likely that they were nominated by others. This suggests that although behaviors such as sharing and cooperating seemed to be positively valued by others (LaFontana and Cillessen 2002; Peters et al. 2010), prosocial attitudes do not seem to make students more attractive as friends. However, students with prosocial attitudes tend to be more active themselves within the friendship network. Students' prosocial attitudes also seemed to play no role in the formation of help-seeking relationships, which leads us to reject our second hypothesis that prosocial students might be known for their willingness to help and cooperate with others. Regarding the role of achievement, our study revealed that students with higher achievement were more likely to establish friendship and help-seeking relationships and students with similar levels of achievement were more likely to become friends and help each other. Consequently, these findings are partially supportive of the third and fourth hypothesis, since we did not find evidence for the hypothesis that the higher a student achieves, that he or she receives more nominations. Although well-achieving friends could have valuable resources that may benefit fellow students in order to succeed academically (Coleman 1990; Wentzel 2000), our findings suggest that academically successful students are more active themselves in establishing peer relationships, but it seems that these students are not more attractive as friends or helpers.

Students are more likely to establish friendships when they have prosocial attitudes, but a possible explanation for the limited role of prosocial attitudes in being approached for friendship relationships is that attitudes reflect students' way of thinking and feeling about helping others, which is less visible and more internal compared to prosocial behaviors (Dovidio et al. 2006; Eisenberg et al. 1999). Achievement plays a more central role in friendship and help-seeking relationship formation, which can be explained that in learning communities, grades are more visible for others than prosocial attitudes. In the learning community, students will be informed about the grades of their peers. This is in line with Van Duijn et al. (2003), who showed that network formation is based on proximity and opportunity to meet and visible similarities. However, they did not find significant effects for invisible similarity, such as attitudes. It might be that prosocial attitudes would become more visible at a later stage of the academic year when students know each other better, whereas we measured the prosocial attitudes at the beginning of both semesters. Furthermore, in the learning community, it could be that achievement is more valued at odds of prosociality due to the measure that students should obtain a quarter of their study credits after the first year in order to continue with their degree.

As suggested by the small effect size of the relation between achievement and prosocial attitudes (cf., Cohen 1962), it could be that academic-oriented and social oriented goals are less related than we would expect. Students seem to have more academic-oriented goals, when they select their friends and helpers based on achievement similarity rather than on similarity in prosocial attitudes. This means that well-achieving students, who are active in both networks, nominate similar-achieving others as friend and academic helpers. In turn, lower achieving students select also students with the same achievement level. The learning environment might reinforce this effect, since students have on average only 13 formal context hours per week. With a full-time study of 40 h, this means that students are expected to use 27 h for self-study and collaborating with fellow students. In this context, they are free to create their own informal (homogeneous) networks instead of being assigned to mixed-ability groups. Collaborating in mixed groups based on background characteristics could have the advantage that students develop prosocial attitudes and behaviors. As Brandenberger and Bowman (2015)

showed that prosociality can be fostered in a learning environment where student work actively together in diverse small groups. Therefore, we recommend creating learning communities as such that prosocial attitudes become more salient in addition to student's achievement. For professional development, not only academic achievement is important but also prosocial skills.

Limitations and future directions

Several limitations need to be considered when interpreting the results. First, besides prosocial attitudes, achievement, and gender, other characteristics could play a role in the formation of friendship and help-seeking relationships. For instance, students' gender, ethnicity, and personality could impact friendship and help-seeking relationship formation, but also the broader peer context such as the prevailing norms in the peer group and the social status of students (Choudry et al. 2017; Dijkstra et al. 2010, 2013; Thielmann et al. 2020; Van Rijsewijk et al. 2016; Veenstra et al. 2018). Future research should consider investigating these other factors in relation to peer networks in university. Second, the role of prosocial behaviors in friendship networks has been established in prior research, which has shown that students with prosocial characteristics were more likely to be nominated as a friend compared to other students (Gest et al. 2001) and that friends are similar in the degree to which they display prosocial characteristics (Barry and Wentzel 2006; Wentzel et al. 2004; Wentzel and Caldwell 1997). Whether prosocial behavior, as opposed to prosocial attitudes, affects students' help-seeking relationships should be examined in future research. It is likely that when students are known for their helping, sharing, and cooperating behaviors they are more attractive for their peers to turn to when they need help (Borgatti and Rob 2003). Third, when studying help networks, it is important to take the intention and need to seek help into account (Van Rijsewijk 2018). Although this study provided information on the presence or absence of help relationships, we were not able to disentangle the process leading to this type of relationship. As such, absence of a helping relationship could be due to several reasons, such as not needing help or low intention to seek help (e.g., Gulliver et al. 2010; Rickwood and Kinderman 2012; Robinson and Reid 2007; Wilson et al. 2005). Future research could adopt a qualitative approach to get insights into the reasons why students establish relationships, and by doing so, the underlying rationale of network formation. Fourth, the representativeness of the sample was limited to students from the social sciences department at one university. This study program was relatively small, and therefore students tend to know one another well beyond the boundaries of the learning communities. It is expected that in a larger study program, students are more focused on their own group. As a result, it would be useful to replicate the study in different environments to generalize the results.

To conclude, the findings of this study suggest that students' prosocial attitudes play a role in students' friendship networks, whereas students' achievement plays a role in both friendship and help-seeking networks. When students are similar in terms of achievement, it is more likely that they become friends or connect to each other for academic support. Yet, prosocial attitudes were generally more important for students to establish friendships and achievement for establishing friendship and help-seeking relations (i.e., nominate others) rather than being more attractive for peers (i.e., receiving nominations) during the first year of university in the context of small-scale teaching.

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Current themes of research:

The impact of social networks and social capital on academic and professional development within the educational context and at the workplace.

Most relevant publications in the field of Psychology of Education:

- Brouwer, J., Flache, A., Jansen, E., Hofman, A., & Steglich, C. (2018). Emergent achievement segregation in freshmen learning community networks. *Higher Education*, 76(3), 483-500. <https://doi.org/10.1007/s10734-017-0221-2>
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Current themes of research:

The role of peer relationships and teacher-student relationships in shaping students' academic and socio-emotional adjustment.

Most relevant publications in the field of Psychology of Education:

- Engels, M. C., Pakarinen, E., Lerkkanen, M.-K., & Verschueren, K. (2019). Students' academic and emotional adjustment during the transition from primary to secondary school: a cross-lagged study. *Journal of School Psychology*, 76, 140-158. <https://doi.org/10.1016/j.jsp.2019.07.012>
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