PEER RELATIONSHIPS IN THE MATHEMATICS CLASSROOM: A SOCIAL NETWORK APPROACH TO UNDERSTANDING ANXIETY AND MOTIVATION (BUC08987)

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Abstract

The influence of the social context on learning and the motivation to learn are neglected areas of educational research (Järvelä & Volet, 2004). Peer relationships, particularly in early adolescence, are an important part of this social context and shape school development (Garner, Bootcheck, Lorr, & Rauch, 2006; Ryan, Kiefer, & Hopkins, 2004; Wentzel & Watkins, 2002). In the present project, a social network approach was adopted to explore peer influences on adolescent students' motivation and anxiety in mathematics. Two types of relationships were investigated – time spent between peers in class and specific help-seeking interactions. Two hundred and twenty-three Year 8 students from two schools completed measures of mathematics anxiety and motivation, and a social network questionnaire. Social Influence Modelling (Robins, Pattison, & Elliott, 2001) demonstrated the complexity of peer influence on the variables measured. Results suggest that peer influence within the classroom operates in complex ways and emphasizes the important role of the social context in the development of motivation and anxiety in mathematics.

The influence of the social context on learning and the motivation to learn are neglected areas of educational research (Järvelä & Volet, 2004). This neglect is concerning considering that peer relationships, particularly in early adolescence, are an important part of this social context and shape school development (Garner et al., 2006; Ryan et al., 2004; Wentzel & Watkins, 2002). Simultaneously, adolescence is also a developmental stage associated with a decline in academic motivation. This is especially the case in mathematics classrooms. Early adolescent students report increased levels of mathematics anxiety (Ma, 1999; Meece, Wigfield, & Eccles, 1990), a phenomenon linked to poor performance and avoidant behaviour (Ashcraft & Ridley, 2005; Beasley, Long, & Natali, 2001; Ho et al., 2000). The aim of the study was to explore the influence of peer interactions, typical in mathematics classrooms, on students' mathematics anxiety and motivation.

Mathematics anxiety is considered one of the most significant attitudinal and emotional problems that faces mathematics educators (Baloglu, 2003; Trujillo & Hadfield, 1999). It is identified as the feelings of tension, helplessness and discomfort that can develop when carrying out mathematical tasks (Ma, 1999; Richardson & Suinn, 1972). It is also a phenomenon that is common within the community - some researchers estimate that 20% of the population are highly anxious about mathematics (Ashcraft & Ridley, 2005) which is troubling in view of the negative association between mathematics anxiety and achievement (Hembree, 1990; Ma, 1999). Wigfield and Meece (1988) commented that previous research on mathematics anxiety had worked primarily with university student samples and ignored the experience of younger, secondary school students. In fact, Meece, Wigfield and Eccles (1990) demonstrated that early adolescence is the developmental stage linked to increased levels of mathematics anxiety, a finding later replicated by Ma (1999). Furthermore, Ma and Xu (2004) examined the development of mathematics anxiety in a sample of students from grade 7 to 12 and reported that anxiety became stable after grade 8.

Mathematics anxiety is commonly studied in combination with mathematics motivation. While there are a variety of concepts that fall under the umbrella term of academic motivation (e.g. see Eccles & Wigfield, 2002), value and competence beliefs are two prominent constructs with well documented effects on learning and achievement. Positive competence beliefs in mathematics - i.e., feeling more confident and estimating moderate to low levels of difficulty - are positively associated with persistence, achievement and problem-solving performance (Chouinard, Karsenti, & Roy, 2006; Dickhauser, Reuter, & Hilling, 2005; Pajares & Miller, 1994). Similarly higher levels of value in mathematics are positively related to engagement, persistence, more efficient learning strategies and performance (Fries, Schmid, & Hofer, 2007; Pintrich & Degroot, 1990; Pokay & Blumenfeld, 1990). Lastly, value and competence beliefs, like mathematics anxiety start to exhibit negative changes in early adolescence (Watt, 2004).

Simultaneous to the observed increase in mathematics anxiety/drop in motivation, early adolescence is also associated with the growing significance of peer relationships to the individual. Moreover, research has demonstrated that within friendship groups students share patterns of motivation, engagement and performance (Kindermann, 2007; Wentzel & Watkins, 2002). Classroom interaction is one of the avenues where peer influence can take place. Wentzel (1996; 2003) suggests that in the classroom students behave according to peer-established standards in order to pursue social goals and develop social skills. Indeed, peer influence underpins learning and surrounds many of the achievement opportunities that students face at school (Eccles & Roeser, 2003; McCaslin & Hickey, 2001). Parr and Townsend (2002) propose that the school setting provides two types of peer learning environments – tutorially configured and ambient contexts. The tutorially configured environment is characterised by more structured peer interactions, like help-seeking, where collaboration is the ultimate goal and teachers can be involved in shaping the situation. The tutorially configured environment occurs within the over-arching ambient context. Unlike communication in the tutorially configured context, interaction in the ambient context can be spontaneous and informal, like that seen within broad friendships or social interactions that occur in the classroom.

Peer relationships have significant implications for educational practice, however their complexity requires sophisticated approaches and analyses. In early research on peer influence the individual was the central unit of analysis (Cairns, Leung, Buchanan, & Cairns, 1995). These studies reported on students' perceptions of peers and the effect of dyadic relationships on academic development. However, the design of this research did not recognise the complexity of social relationships. Burk, Steglich and Sniders (2007) contend that the investigation of dyadic interdependence ignores the dynamic nature of social interactions. In most circumstances a dyadic relationship is embedded within a larger network of relationships and this network is constantly evolving. A social network approach is one that takes into account the influence of close friends as well as the wider and overlapping groups of peers within a school context (Kindermann, McCollam, & Gibson Jnr, 1996). To measure networks individuals are asked to nominate significant others. For example, in order to create a network depicting help-seeking behaviour, students in a class may be invited to nominate who they ask for help when having problems with their work and each student is therefore a member of the network.

Peer network interactions might operate in a number of ways to develop and encourage attitudes, values, and behaviours related to learning. Pattison (1994) argues that social influence can be classified into three categories. Firstly, a social relationship may determine the type of information a person is exposed to. Secondly, typical patterns of social interaction may lead to social influence, i.e., when students develop a shared level of mathematics anxiety to show affinity to their peer group. And thirdly, social influence may occur when people perceive that their social position (e.g. as an active or not-active member of the peer network) has implications for cognition and behaviour. The first two process outlined by Pattison corresponds to what theorists call assimilation or *contagion* mechanisms wherein social influence is the product of the proximity between peers (Friedkin, 1998; Valente, Gallaher, & Mouttapa, 2004). On the other hand, the processes represented in Pattison's third category describe how an individual's level of *activity* within the peer network can have an affect.

Recently there has been a re-orientation in the way data on peer relationships are analysed (Abbott, 1997). The key innovation of these techniques is the recognition that social relationships are interdependent and should be measured and examined as such (Pattison, Wasserman, Robins, & Kanfer, 2000). Robins, Pattison and Elliot (2001) have developed an innovative technique known as Social Influence Modelling. This regression technique makes it possible to conclude whether a student's relationship with peers influences academic attributes (e.g., mathematics anxiety) after taking into account the attributes of other peers and the interdependence of relationships within the network. Specifically, it models parameters that describe social influence processes like contagion and activity mechanisms.

The present study

The aim of the present project was to explore peer influences on adolescent students' motivation and anxiety in mathematics. Two types of peer interaction were investigated. Firstly, the class time students spent with each other was examined. This 'time' network was considered to be social in nature and reflected interactions characteristic of Parr and Townsend's (2002) ambient context. Secondly, help-seeking interactions were explored. This network was representative of more structured relationships (i.e. between the student asking for help and the student with the perceived expertise to provide help) and, therefore, fit in the tutorially configured environment. Investigating both of these relationships provided the opportunity to identify whether different forms of peer interaction have different implications for academic development. To further explore these effects two schools were approached. Year 8 students were invited to participate in line with research trends highlighting early adolescence as the developmental stage associated with detrimental changes in mathematics anxiety and motivation and the increasing significance of peers.

Method

Participants

Year 8 students who participated in the study were from two co-educational schools in Victoria, Australia. After obtaining ethics approval from the University, the Department of Education and Training and the Catholic Education Office, two co-educational schools were approached.

School A

School A was a large regional Catholic coeducational college catering to middle-class, predominantly Anglo-Saxon, families. All students in Year 8 (279 students) were invited to participate in the project. School A used the practice of ability grouping to structure the Year 8 Mathematics program. Mathematics was the only subject which was ability grouped in Year 8. In the year of data collection, the mean score of Year 8 students from School A on the Achievement Improvement Monitor (AIM), a state-wide standardized achievement test, was 4.37. This was just below the state median of 4.7.

There were 78 students who participated from the school, 40 girls and 38 boys. These students were between the ages of 12 and 14 (*M*=13.77, *SD*=.39). Of these 78 students, 50% of students were from high ability classes (27% and 23% were from medium and low ability groups, respectively).

School B

School B was a large inner suburban state high school with a reputation for academic excellence. Students attending the school were generally from middle-class and professional families with Anglo-Saxon, European or Asian backgrounds. School B did not use ability grouping in any subject (mathematics classes include students of varying abilities). Eight Year 8 classes (219 students) were asked to participate in the project. The mean AIM score of Year 8 students from School B was 4.92, just above the state median (4.7). In total there were 145 students who participated from School B, 79 girls and 66 boys. Students were between the ages of 12 and 14 (*M*=13.78, *SD*=.38).

Measures

Mathematics anxiety

Mathematics anxiety was measured with the 11-item Mathematics Anxiety Questionnaire (MAQ) designed by Wigfield and Meece (1988) for high school students. Four additional items, developed from classroom observations and tested with focus groups, were added to the questionnaire. These items were designed to have more behavioural content and to include work with a calculator. Participants were asked to respond to each item on a 7-point scale.

Value and competence beliefs

Value and competence beliefs were assessed using 10 items. These items were from two established measures - 7 items were selected from The Self- and Task-Perception Questionnaire (Eccles & Wigfield, 1995), 2 items were from the Attitudes Towards Mathematics Inventory (Tapia & Marsh, 2004) - and 1 item was added following focus group discussions. Of these 10 items, 6 assessed value beliefs and 4 measured competence-related beliefs[1]. Items were adapted to reflect Australian students' experience of the mathematics classroom (e.g. items were changed so that instead of "math" and "grades", "maths" and "marks", respectively.) All items were also adapted from questions to statements and participants rated their level of agreement with each item on a 5-point Likert scale.

Peer networks

Participants' were asked to nominate other students in their school year level who (a) they "usually [spent] time with in maths class" and; (b) who they asked if they "need help with maths".

Procedure

Data collection

Participants completed all measures in a class setting. Class sizes ranged from 10 to 25 students. During completion of the peer network measures, precautions were taken to ensure the confidentiality of all students. Students at both schools were allocated a random three digit number and lists matching these numbers to student names were created for School A and School B. When participants completed the social network questions, they were instructed to identify students by these randomly generated numbers rather than names.

[1] Competence items assessed both perceptions of confidence and difficulty.

Data analysis

Social influence modelling of participants' peer network data was performed using the program *iPNet*, Version 1.0 (Wang, Robins, & Pattison, 2007). The program is in its early stage of development and data from this study provided an early application. In its current form, *iPNet* is restricted in the type of data it can process. Firstly, the program can only work with individual-level variables (e.g. mathematics anxiety) that are binary. One of these binary variables and one network are the maximum number of variables permissible in a model. Secondly, the program can only work with non-directed networks. For instance, in a non-directed network a tie such as collaboration may exist between two students (or network partners). In a directed network, however, a tie is a property of an ordered pair of individuals, and the tie from *individual a* to *individual b* is distinguished from the tie from *individual b* to *individual a*. *iPNet* can only process non-directed networks. Lastly, *iPNet* is not currently able to accommodate missing data and therefore participants involved in the modelling were required to have non-missing data for all measures. This had the greatest implication for the peer network data. If a student nominated another individual for a particular network relationship and this other student had not given consent to participate, it was necessary to exclude this relationship (or *tie)* from the modelling analysis.

Data was modified to suit the specifications needed by the *iPNet* program.

Results

Preliminary analyses

Mathematics anxiety and motivation

Participants' total score on the 15 items assessing mathematics anxiety was considered representative of their level of mathematics anxiety. The average of the six value items formed the value scale and the average of the 4 competence (confidence and difficulty) items formed the competence beliefs scale. For the value beliefs scale, the more positive the score, the more positively the participant valued mathematics. Likewise for the competence scale, the more positive the score, the more positive was the participant's reported competence beliefs (i.e., the higher the confidence and the lower the reported difficulty).

Descriptive statistics for mathematics anxiety, value and competence beliefs are displayed in Table 1.

[Insert Table 1]

A one-way ANOVA test revealed no significant difference between schools in mathematics anxiety. School differences between other variables could not be tested because of associated assumption of normality violations with the value and competence beliefs scales. However, value and competence beliefs were above the average scale midpoint (3) with participants from School B reporting slightly more positive beliefs in both cases.

Peer networks

After examining participants' responses to measures of mathematics anxiety, value and competence beliefs, the next step was to explore their peer interactions. Table 2 presents descriptive statistics for the information participants provided about who they spent time with in mathematics class (time) and who they sought help from (help-seeking).

[Insert Table 2]

On average, participants nominated more students when asked to identify who they spent time with than who they sought help from. For both networks, participants at School B had higher mean nominations and maximum nominations given and received.

Graphical representations of the networks were explored with the program *Pajek*. A visualization of the set of 'time' interactions between participants from School A is presented in Figures 1.

[Insert Figure 1]

In this diagram, each circle is a participant and each line is a relationship tie between participants. Circles filled in blue are girls and red are boys. Participants shown in the top left corner are those who do not have any ties with anyone in the network (i.e. when asked who they spent time with in mathematics class, they did not nominate any other student in the network). The visualization illustrates that many participants socialized with students of the same gender. Interactions showed a mixture of clustering and dyadic structures.

Figure 2 shows the graphical representation of help-seeking interactions for School A.

[Insert Figure 2]

Help-seeking relationships were more gender-exclusive and there was also less clustering in the structure of these interactions.

School B participants tended to nominate more significant others for the networks, even when it is considered that the number of School B participants was greater. This trend is illustrated in the time network for School B, pictured in Figure 3.

[Insert Figure 3]

Similarly to School A, School B interactions for this network were mainly gender-based. On the other hand, the level of clustering for the School B network was much greater. This was also the case for the help-seeking network. These interactions are represented in Figure 4.

[Insert Figure 4]

While the clustering for this network was greater than its counterpart for School A participants, the same trend was observed across schools wherein the level of clustering was less for help-seeking interactions.

Social Influence Modelling

Data preparation

Social influence modelling was carried out using *iPNet*. To prepare data for the program, scores for mathematics anxiety, value and competence beliefs were transformed into binary variables. Median splits were performed on total mathematics anxiety score and value and competence belief scales in order to make these transformations. Median splits were conducted within each school. For instance, a median split was conducted on the total mathematics anxiety score for all School A participants and a separate median split was performed on the same variable for School B participants. The result for each variable was a group of 'low' and 'high' scores. The number of participants in each of these groups, for each variable, is displayed in Table 3.

[Insert Table 3]

The time and help-seeking networks were changed into their non-directed forms to be compatible with the *iPNet* program. The minimum requirements for a tie were accepted; that is, if one student nominated another student for a particular relationship then this was considered evidence that the relationship existed. In other words, a tie did not have to be reciprocated in order to exist in the non-directed form of the network.

Model parameters

iPNet examines social influence processes by modelling typical social influence parameters and seeing how well these structures fit the network in question. The models included in this study examined four parameters. These are represented in Table 4.

[Insert Table 4]

Parameters in Table 4 represent a variety of social influence mechanisms. These parameters can be broadly divided into activity and contagion parameters. Activity parameters (activity, 2-star and 3-star) illustrate the process by which characteristics of the student change in proportion to how actively a student participates in the network. On the other hand, the contagion parameter describes how a network partnership, or network proximity, can influence attributes of the individuals engaged in the interaction.

Modelling results

The influence of peer interactions on mathematics anxiety was investigated first. This involved completing four modelling analyses – analyses were performed per school (School A and B) and per network (time and help-seeking). The results are presented in Table 5.

[Insert Table 5]

When considering the significant parameter, it is important to note the direction of the value (i.e. positive or negative) rather than the value itself[2]. Across both schools, there was a significant, positive contagion effect although this effect was situated within a different type of peer interaction for each school. School A participants were more likely to be highly anxious about mathematics if the student they sought help from was also highly anxious. This is an interesting finding when it is remembered that School A participants' help-seeking interactions were between students of the same ability (this school employed ability grouping in the Year 8 mathematics curriculum). School B participants were more likely to be highly mathematics anxious if the student they spent time with in mathematics class was also highly anxious.

[2] Note: All models presented also showed acceptable goodness of fit.

Next, the focus turned to the effect of peer interactions on value beliefs. For this construct, help-seeking interactions were not significant for participants at either school. However, interactions in the time network were important. Results are presented in Table 6.

[Insert Table 6]

Activity parameters were significant revealing that participants' level of activity in the network had a significant effect on their value beliefs. Interestingly, the level of activity had different implications for the two schools. For School A, participants were less likely to value mathematics if they had ties in the network. The results for School B were more complex. The combination of a positive 2-star and a negative 3-star parameter indicates that School B participants were more likely to value mathematics if they had a small number of network ties. Yet, if the number of ties was too many then, participants were less likely to value the subject.

Finally, the influence of time and help-seeking interaction was examined in relation to competence beliefs. The results are displayed in Table 7.

[Insert Table 7]

Only one model was significant. School A participants were less likely to have positive competence beliefs if they had a few help-seeking ties but more likely if they had many ties. This is a complex finding. It is logical to think that students' competence beliefs will be positively influenced if they feel they can approach their peers for help. However, these results suggest that participants from School A had to be able to give many help-seeking ties for this to occur. If participants could only nominate a few ties, then they were less likely to feel competent.

Across variables, networks and schools, these modelling results demonstrate the complexity of peer influence on the motivation variables measured and suggest that peer influence within the classroom operates in complex ways.

Discussion

Many researchers assert that the social context is a vital part of educational research (Järvelä & Volet, 2004; Ryan et al., 2004; Walker, Pressick-Kilborn, Arnold, & Sainsbury, 2004). Nonetheless, it is often ignored when investigating processes involved in learning. Results from this study demonstrate that the influence of the social context (i.e. peer relationships) in mathematics is not only important but complex. These findings were made possible due to the network approach adopted and the use of innovative analytic techniques. Parr and Townsend (2002) separate peer learning environments into the ambient and tutorially configured contexts. In line with this model, results from this study revealed that peer influence effects varied depending on the type of relationship considered. For instance, help-seeking interactions had no significant bearing on the mathematics anxiety and motivation of participants from School B. Participants social relationships with classmates were the ties that had implications for anxiety and motivation.

Another facet of the results was the finding that different variables were associated with different social influence mechanisms. Pattison (1994), Friedkin (1998) and Valente et al., (2004) discuss social influence and broadly discriminate between contagion (linked to network proximity) and activity processes (related to level of network activity). Findings from this study support the distinction between these processes and illustrated that each influence mechanism had a unique relationship with the variables assessed. Across both schools, mathematics anxiety was linked to the contagion parameter, while value and competence beliefs were associated with the activity mechanism.

Social influence effects also fluctuated between the two schools involved in the study. This was evident in the social influence modelling results but also in the graphical representations of the peer relationships assessed. Networks from School B included more clustered interactions than School A networks. This could be the result of a number of factors. Firstly, it could be due to the particular participants from each school. Half of the participants from School A were from high-ability classes. Some of the data also had to be discarded because the program *iPNet* could not process missing data. Thus sample bias may have had an effect on the results. Between school differences may also have been a product of the specific curriculum practices implemented by the two schools – School A used ability-grouping in mathematics and School B did not. There are many other factors that could have contributed to the specific model findings for each school. However it is important to note that school context has an impact on motivational processes and should be investigated.

There are several limitations associated with this study. Some of these revolve around the type of data that was modelled. Non-directed networks were examined and, therefore, the reciprocity of relationships was not taken into account. Additionally, social influence modelling included binary variables, which do not allow as much variability between participants. Both the use of non-directed networks and binary variables was required by the program used to perform social influence modelling. As the program becomes more advanced it will be possible to focus on directed networks and continuous variables. Furthermore there will be the potential to simultaneously model covariate information for participants. Thus, it will be feasible to investigate peer influence effects on mathematics anxiety and motivation while also taking into account the role of gender. Future research should investigate these relationships.

Another limitation of the study is associated with its cross-sectional design. Without a longitudinal data set, it cannot be determined whether social influence or social selection effects have been observed. For instance, participants may have developed similar levels of mathematics anxiety because their own characteristics were modified as a result of a peer relationship (a social *influence* process) or participants may have chosen to spend time with one another because they shared the same level of mathematics anxiety (a social *selection* process). The current study is part of a larger project which has a second wave of data from School A and B participants. Using both sets of data (wave 1 and 2) it will be possible to investigate whether social influence or selection effects are at play.

Findings of this study emphasize the importance of peer interactions in mathematical learning. The advantages of modelling techniques which focus on the *influence* of these peer networks on academic attributes are also illustrated. Different types of peer networks can have varying effects on students' affect in mathematics. These results encourage further investigation of the social context in adolescent educational research and support theoretical perspectives which highlight the social context in the development of students' motivation and emotion in mathematics.

Table 1

Descriptive statistics for mathematics anxiety, value and competence beliefs

	Minimum	Maximum	Mean (standard deviation)	
			School A	School B
MA	17.00	93.00	48.90 (16.00)	49.06 (14.50)
Value	1.67	5.00	3.48 (.62)	3.68 (.58)
Competence	1.00	5.00	3.25 (.88)	3.54 (.82)

Note: MA=total score for all mathematics anxiety items; Value=average score for items forming Value beliefs scale (the higher the score, the more positive the belief); Competence=average score for items forming Competence beliefs scale (the higher the score, the more positive the belief).

Table 2

Descriptive statistics for the time and help-seeking networks for each school

		Mean nominations	Maximum nominations given	Maximum nominations received
School A	Time	1.50	5	5
	Help-seeking	0.69	5	4
School B	Time	2.65	9	8
	Help-seeking	1.38	6	11

Table 3

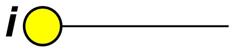
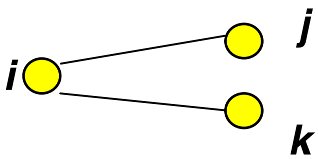
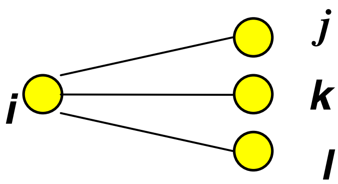
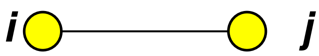
Frequency of participants in binary score groups (low and high) for mathematics anxiety, value and competence variables

	School A		School B	
	Low	High	Low	High
MA	41	37	77	68
Value	41	37	88	57
Competence	37	41	66	77

Note: MA= mathematics anxiety.

Table 4

Social influence parameters modelled using the iPNet program

Parameter	Configuration	Description
Activity		A student (*i*) is more likely to have an attribute if he/she has ties in the network.
2-star		A student (*i*) is more likely to have an attribute if he/she has a few network partners (*j*, *k*).
3-star		A student (*i*) is more likely to have an attribute if he/she has many network partners (*j*, *k*, *l*).
Contagion		A student (*i*) is more likely to have an attribute if his/her network partner (*j*) also has the attribute.

Note: In the configuration diagrams, each circle represents a student, each line represents a tie or relationship between students and the colour yellow represents the presence of an attribute (e.g. high mathematics anxiety).

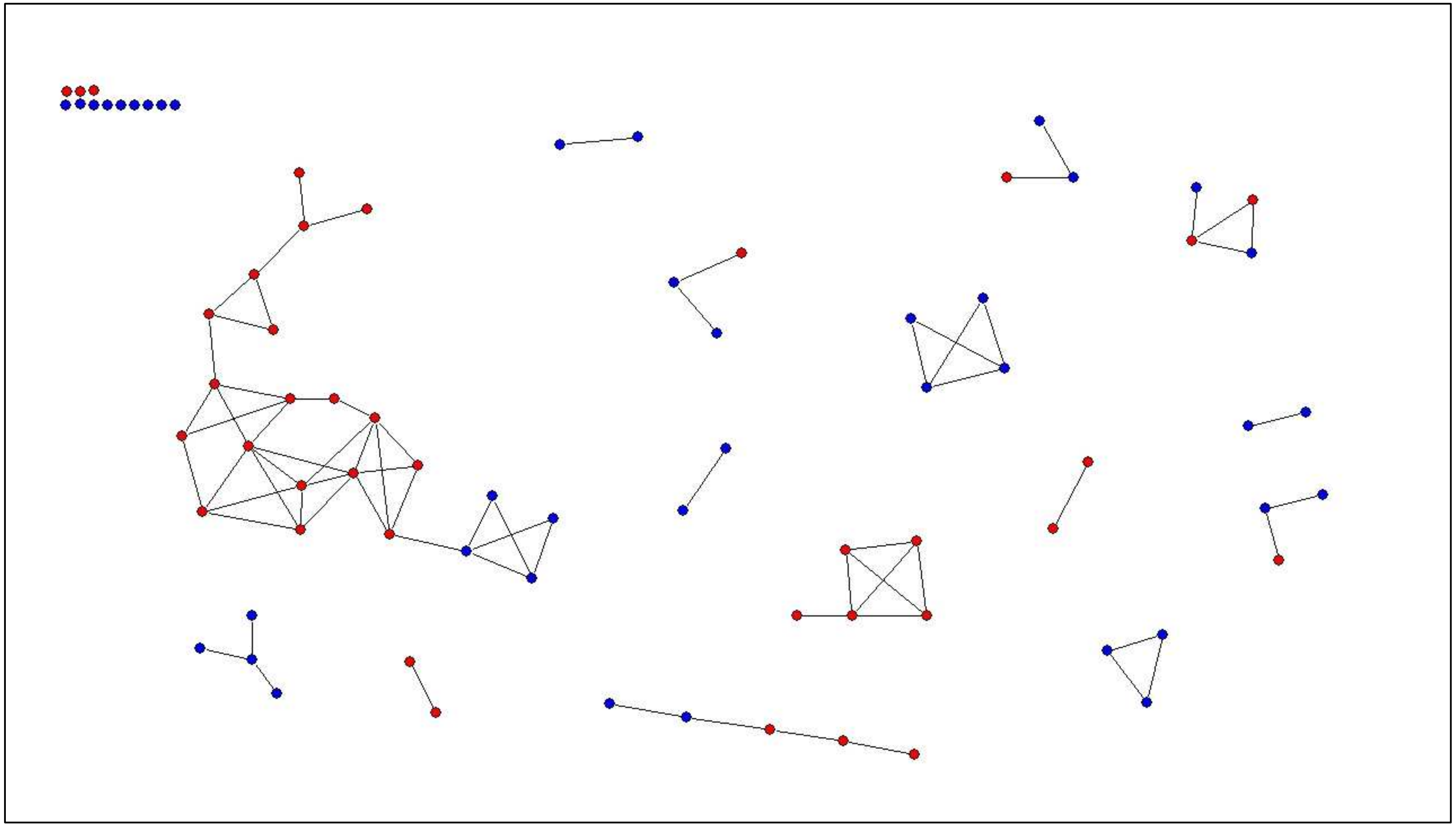


Figure 1. The ‘time’ network for participants at School A (blue=girls; red=boys)

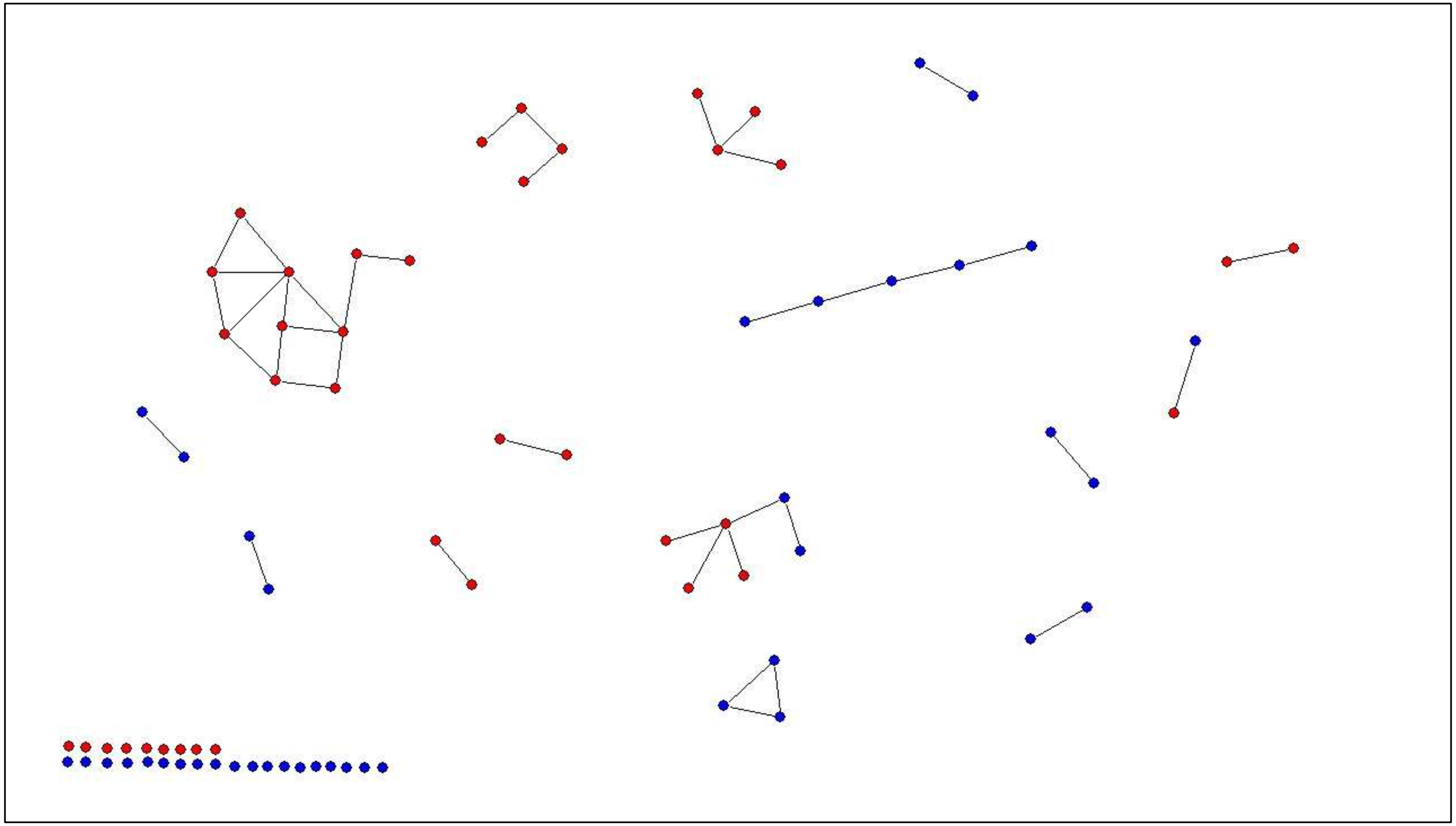


Figure 2. The help-seeking network for participants at School A (blue=girls; red=boys)

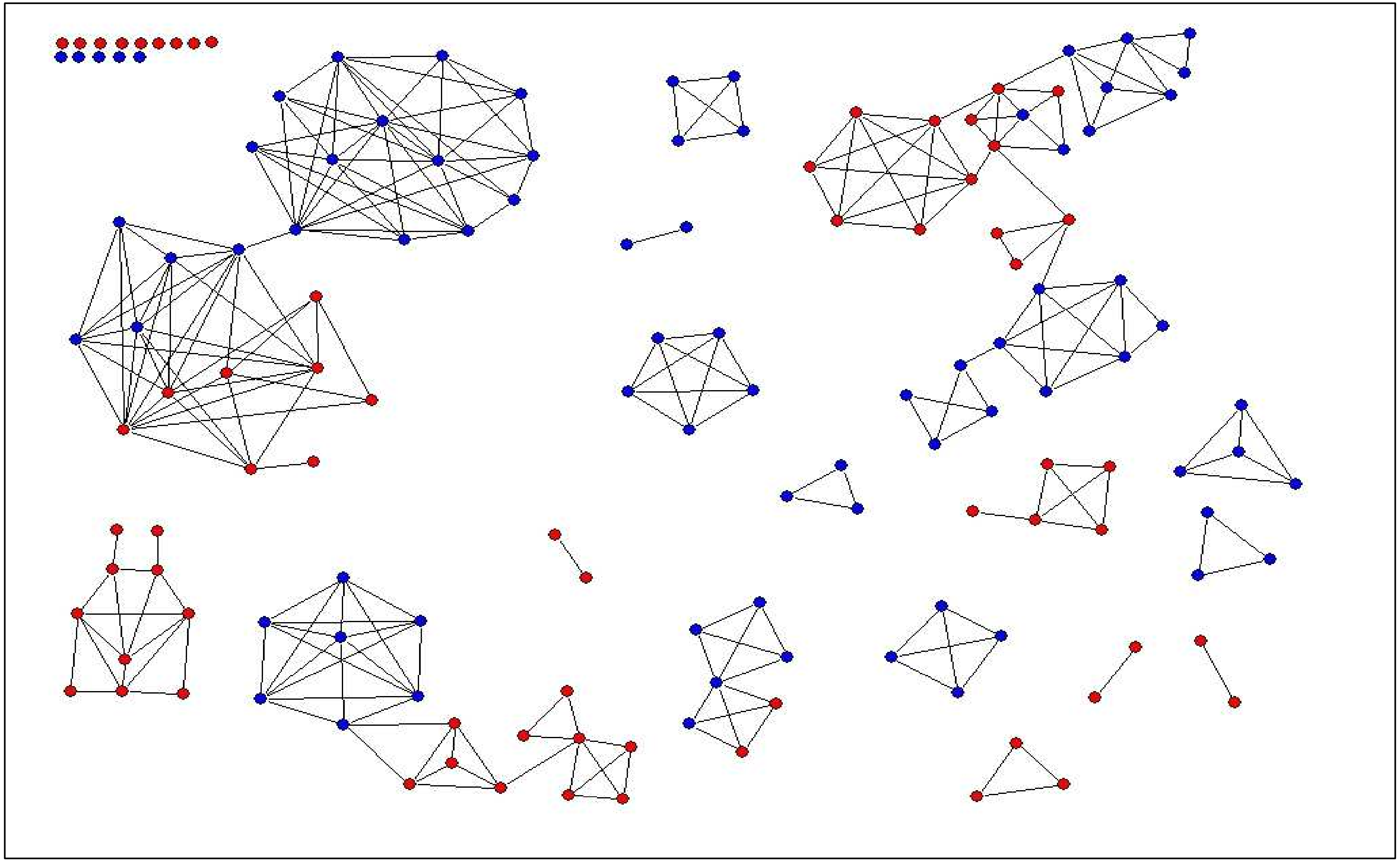


Figure 3. The ‘time’ network for participants at School B (blue=girls; red=boys)

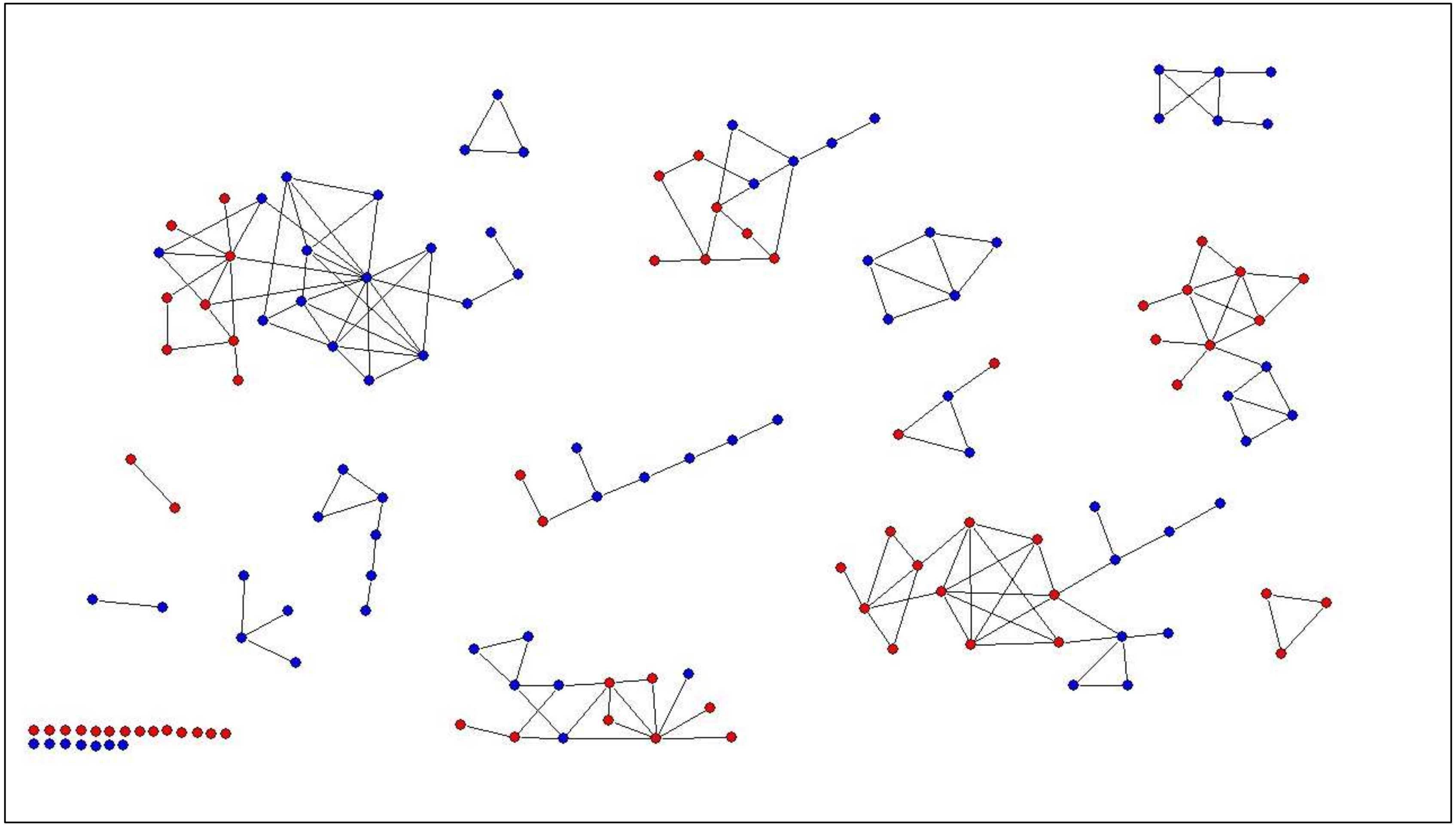


Figure 4. The help-seeking network for participants at School B (blue=girls; red=boys)

Table 5

Parameter values describing the influence of time/help-seeking interactions on mathematics anxiety

		School A	School B
Time	Activity	ns	ns
	2-star	ns	ns
	3-star	ns	ns
	Contagion	ns	0.46*
Help-seeking	Activity	ns	ns
	2-star	ns	ns
	3-star	ns	ns
	Contagion	1.52*	ns

*p<.05

Table 6

Parameter values describing the influence of time/help-seeking interactions on value beliefs

		School A	School B
Time	Activity	-1.57*	ns
	2-star	ns	0.47*
	3-star	ns	-0.15*
	Contagion	ns	ns
Help-seeking	Activity	ns	ns
	2-star	ns	ns
	3-star	ns	ns
	Contagion	ns	ns

*p<.05

Table 7

Parameter values describing the influence of time/help-seeking interactions on competence beliefs

		School A	School B
Time	Activity	ns	ns
	2-star	ns	ns
	3-star	ns	ns
	Contagion	ns	ns
Help-seeking	Activity	ns	ns
	2-star	-2.72*	ns
	3-star	4.39*	ns
	Contagion	ns	ns

*p<.05

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