

Primary school students' attitudes towards peers displaying hyperactivity: Examining impacts of homophily and inter-group contact on students' social inclusion

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Abstract

Earlier research has indicated that students displaying hyperactivity struggle with their social inclusion. To foster social inclusion, students' attitudes as well as inter-group contact have been identified as possible key factors. In this study, the social inclusion of students who display hyperactivity in general and classmates' attitudes towards such peers have been investigated. Data of 314 students (aged 9–11) and estimated dynamic social network models for the co-evolution of friendships and attitudes are relied on. Results reveal that students displaying hyperactivity are at risk of lower social inclusion. Results do not indicate that having friends or classmates who display hyperactivity is significantly associated with one's attitudes towards such peers in either causal direction.

KEYWORDS

class composition, friendship, hyperactivity, social inclusion, social network analysis

1 | INTRODUCTION

Many studies have been conducted on what inclusive education is and how it should be applied. Watkins (2017) describes inclusive education as a systematic approach aiming to offer high-quality educational opportunities to all

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students. With this understanding, schools have the responsibility to provide a supportive environment and apply different strategies that foster the academic progress as well as the social inclusion of all students. The latter plays a major role since it has been shown that students develop their social-emotional skills through peer interaction (Pepler and Biermann, 2018). Social inclusion in school is, however, viewed and described in various ways. In the current paper it is understood as enabling and providing various opportunities, which foster the involvement and active participation of especially those students who struggle to interact in socially expected ways (Little, 2017). For research purposes, the concept of social inclusion has been reviewed by Koster et al. (2009), who indicate four main dimensions, namely: *friendships/relationships*, *interactions/contacts*, *perception of the student* (self-perception of acceptance, social skills, etc.) and *acceptance by classmates* (see also Bossaert et al., 2009, 2013). Peer relationships and friendships therefore play an important role in children's lives and are thus a crucial dimension of social inclusion to focus on.

Among others, students with social-emotional and/or behavioral difficulties (SEBD) have been shown to lack relationships with their peers and are therefore less often nominated as friends in mainstream school settings (see e.g., Zweers et al., 2021). Children displaying hyperactivity form a subgroup within the group of students with SEBD (Carroll & Hurry, 2018). These students face difficulties with impulse control, maintaining attention and fidgeting (American Psychiatric Association, 2013). Studies have shown that students with hyperactivity symptoms are among those students who are rejected by their peers (see e.g., Hoza, 2007). Lee et al. (2021) showed that students with elevated hyperactivity symptoms were more likely to have no or unreciprocated friendships. Diamantopoulou et al. (2005) also found a correlation between teacher rated hyperactivity symptoms and peer dislike. Furthermore, Mikami et al. (2015) showed that students displaying hyperactivity were less accepted by their peers without hyperactivity symptoms by using sociometric nominations. The rejection of students displaying hyperactivity by their peers can be explained in different ways. Previous research, for example, highlighted that a part of students displaying hyperactivity also have social and/or emotional problems (see e.g., Bunford et al., 2018; Gardener et al., 2015; Han et al., 2020). Therefore reduced social skills and/or emotional competences may be an explanation for difficulties in peer-relationships and thus friendships (see e.g., Murray-Close et al., 2010). However, friendships require at least two people. Hence, another explanation could be that less positive peer attitudes (see e.g., De Boer et al., 2012; Schwab, 2018a) may explain the lack of friendships with students displaying hyperactivity. In this context Krischler and Pit-ten Cate (2020) point out, that peers' attitudes towards students with behavioral problems in particular are understudied despite peer attitudes playing a crucial role in their social inclusion (De Boer & Pijl, 2016; Schwab, 2017).

1.1 | Aim of the study

Against this background the current study aims to contribute to closing the above-mentioned gap by addressing the group of students displaying hyperactivity. The focus lies on the social inclusion, and especially on the dimension of friendships. An appropriate social network methodology will be applied that accounts for dependencies between observations (that is, friendship ties) which traditional, regression-based methods are unable to; for instance, the notions that people tend to choose those as friends who also choose them (reciprocity) or tend to select friends-of-friends (transitivity). While such methods are essential for the unbiased estimation of individual friendship preferences, they are rarely applied in studies exploring friendship networks of students.

2 | THEORETICAL BACKGROUND

2.1 | Friendships and friendship networks

The concept of friendship, one of the main pillars of social inclusion, has no consensual definition in the literature (Marsden & Campbell, 1984). Friendships are characterized by positive affection and require time spent together that is primarily social (Block, 2018; Vörös et al., 2019). Further definitions highlight the mutual dyadic construct (Bukowski et al., 1996) and voluntary character (Rubin et al., 2011). While friendships are often defined as reciprocal,

it is important to note that empirical studies usually collect data on friendship perceptions (as opposed to the actual friendship), which may be one-sided if one person perceives the relationship as a friendship, while the other does not. This may be due to differences in peoples' understanding of what friendships mean (Vörös et al., 2019).

Friendships are, however, crucial for the well-being, self-worth and social-emotional development of students (e.g., Mitic et al., 2021; Maunder et al., 2019; Kidger et al., 2012). In this context, it has been highlighted, that students with behaviour difficulties and hyperactivity have less sense of school belonging (see e.g., Dimitrellou & Hurry, 2019). In addition, research indicates that this group of students has more peer difficulties (see e.g., Gardener et al., 2015) and difficulties maintaining friendships (Marton et al., 2015) compared to their peers without such symptoms. These peer problems in turn mediate a higher risk for mental health problems (Humphreys et al., 2013; Rajendran et al., 2013; Roy et al., 2015). A possible explanation for why students with hyperactivity symptoms are less likely to be friends and stay friends with peers without these symptoms is the preference in choosing friendships. In this context, the theory of homophily may be useful. This theory proposes that people tend to have social relationships with people who are similar to themselves (Lazarsfeld & Merton, 1954). These similarities can be related to gender, age, academic achievement, etc. and are referred to as 'status homophily', or can be based on shared beliefs and ideals, called 'value homophily'. Currently, there is a lack of publications that address the mechanisms of homophily among students in inclusive classroom settings. In the existing cases, however, the results are divergent. For example for students with special educational needs (SEN) Avramides and Wilde (2009) conducted a mixed method study using sociometric nomination tools as well as qualitative data and could not find proof that friendships between students with SEN occur more frequently due to their SEN status, whereas Schwab (2018) and, in a more recent publication, Hoffmann et al. (2020) could show that mutual friendships between students with SEN were more likely than between a student with SEN and a student without SEN. The same tendency is also shown for students without SEN. A further recent study (Tannoia & Lease, 2020) using peer-nominations, reported that students displaying hyperactivity and/or inattentiveness were more likely to receive more dislike nominations. However, peer-reported liking was not linked to such behaviours. The authors assume, that the latter may be due to homophily effects, that is to say, that those students displaying hyperactivity may have nominated peers with similar behavioural patterns.

2.2 | Attitudes and contact

The aforesaid findings emphasize the need for various strategies which promote friendships among students. In this context the attitudes of classmates are considered important (Nowicki & Sandieson, 2002). Attitudes are defined as 'a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour' and consist of an affective (feelings), behavioral (intentions) and cognitive (beliefs) component (Eagly & Chaiken, 1998). It can, therefore, be assumed that an increase in positive attitudes may lead to more relationships among students with and without elevated hyperactivity symptoms, making friendships more likely. This is proposed for example by the inter-group contact theory (Allport, 1954). The theory suggests a decrease of bias and change in negative attitudes as a result of inter-group contact, thus promoting positive relationships. Allport states that four special conditions are necessary to achieve this change, namely: *equal status between majority and minority groups, common goals, inter-group cooperation as well as institutional support*.

Studies showed that students' attitudes towards their peers with social-emotional and/or behavioural difficulties, are more negative compared to their attitudes towards students with a learning or physical disability (De Boer et al., 2012; Schwab, 2018b). Pérez-Jorge et al. (2020) furthermore conducted a study with students aged between eight and thirteen (grade 3–6) and reported that boys had a better awareness of the behaviour of students with attention deficit hyperactivity disorder and girls had more positive feelings towards them. However, the authors also found that positive attitudes as well as positive feelings were more likely in younger students while they decreased for older students. Pérez-Jorge et al. (2020) conclude that mere contact may increase prejudices towards students displaying hyperactivity while having relationship skills to interact with this group of students fosters more positive feelings towards them. In terms of the role of attitudes in social inclusion, Petry (2018) examined the link between average class attitudes

towards students with SEN and the social inclusion of these students but could not find evidence for the inter-group contact theory, since negative attitudes were still found in some classes even though the class score was neutral. The above mentioned studies are in line with Schwab (2017) as well as Keith et al. (2015), who point out that it is not the contact (e.g., by attending the same class) per se or its quantity, but rather its quality that matters, which can be increased through cooperative group activities, for example. However, there is no extensive and reliable data to indicate whether students have negative attitudes towards students displaying hyperactivity due to the lack of contact, or whether they have less contact with them due to negative attitudes towards this group of students. In this sense, the investigation of friendships in relation to attitudes may be especially useful, as friendships by nature provide high-quality contact between students.

2.3 | OBJECTIVES OF THE CURRENT STUDY

Due to the need for more evidence on social inclusion this study will focus on friendship networks of students displaying hyperactivity. Collecting sociometric data is an efficient way of gaining information about friendships, as relatively few questions are required usually: Such efficiency is particularly important when the study participants are students who struggle with reading or attention, (Mamas et al., 2019). However, a limitation in past research is that sociometric network data were mainly used without applying appropriate social network methodology. Such methodology is necessary to account for the fact that observations (i.e., friendship ties) are not independent from each other, which violates the assumptions of traditional statistical methods. By applying social network models, dependencies between social ties can be considered and parameters for individual hyperactivity-status-based friendship preferences can be estimated while controlling for reciprocity or transitivity (becoming friends with friends of friends). In this paper, Stochastic Actor-Oriented models developed for the analysis of social network dynamics are applied. By modelling networks and individual attributes (here attitudes) together over time, it is possible to separate the effects of social selection and social influence: that is, the effect of friendships on attitudes (influence), and the effect of attitudes on friendships (selection).

Therefore, the following hypotheses are addressed in this study:

1. Students displaying higher levels of hyperactivity are less often selected as friends by their classmates than their peers with lower levels of hyperactivity (*selection: attractiveness of hyperactivity*).
2. Students select friends who have levels of hyperactivity similar to their own (*selection: hyperactivity homophily*).
3. Students with more positive attitudes towards peers with hyperactivity are more likely to select friends with higher levels of hyperactivity (*selection: attitudes and attractiveness of hyperactivity*).
4. Students whose friends display higher levels of hyperactivity develop more positive attitudes towards peers with hyperactivity, compared to students whose friends display lower levels of hyperactivity (*influence: friends*).
5. Students whose classmates display higher levels of hyperactivity develop more positive attitudes towards peers with hyperactivity, compared to students whose classmates display lower levels of hyperactivity (*influence: classmates*).

3 | METHOD

3.1 | Study design

The current study is part of the ATIS-STEP project (Attitudes Towards Inclusive Schooling–Students, Teachers and Parents; see Schwab, 2018b). The data were collected in the winter 2016/17 and in the summer 2017. In this project, a total of 48 classes from grade 4 from rural and city areas of Styria (a federal state in Austria) participated in T1, and 38

classes in T2. Grade 4 in primary school was chosen since students have already spent around 3 years together in the same class and therefore know each other well. Only classes with at least one student with an official diagnosis of SEN were asked to complete the paper-pencil survey. Ethical approval was given by the local school authority of Styria. For all students legal guardians gave written consent. Some individual dropouts occurred, as not all legal guardians returned the consent form. In some analyses, passive data from students were also included (e.g., if a student was ill on the day of data collection, peers were still allowed to nominate him/her).

For the current study, data from 17 classes were included. Classes were excluded due to two reasons. First, analyses could not be conducted for classes that lacked of information on hyperactivity scores. Second, the method applied in the current paper (Stochastic Actor-Oriented Models–SAOMs) is particularly sensitive to high participation rates ((Ripley et al., 2020), therefore, following Boda (2018, 2019), classes where less than 75% of the students participated in the survey were also excluded.

3.2 | Participants

A total of 314 students (around 54.5% male and 45.5% female; aged 9–11¹) completed the students' questionnaire. Out of this sample, 58 students had an official diagnosis of SEN. According to teacher ratings, 36 students were displaying hyperactivity symptoms above the average range (see also measures of hyperactivity) of whom 13 had an official SEN diagnosis; data regarding hyperactivity scores were missing for 15 students with an official SEN diagnosis. For the following calculations, models were applied with respect to these 36 students.

3.3 | Measures

3.3.1 | Hyperactivity

In the current study, the teacher-perspective version for 4 to 17-year-old children of the Strengths and Difficulties Questionnaire (SDQ; Goodman & Goodman, 2011) was used. This instrument is widely applied in the national as well as international context as a screening instrument for behavioural problems. Several studies have already provided information about the psychometric quality of the SDQ (for the German version, see e.g., Klasen et al., 2000). Van den Heuvel et al. (2017) for example demonstrated that the teachers' version of the SDQ is reliable and appropriate for obtaining information about emotional and behavioural problems. Further, the authors provided evidence for its validity. For the current study, only the teachers' ratings of the SDQ subscale 'hyperactivity/inattention' (e.g., 'Restless, overactive, cannot stay still for long', 'Constantly fidgeting or squirming', 'Sees tasks through to the end, good attention span'²) were considered. The subscale consists of five items that had to be rated on a Likert scale (0 = 'not true', 1 = 'somewhat true', 2 'certainly true'). Cut-off values for students with normal, borderline, and abnormal scores have been provided (Goodman & Goodman, 2011) and more recent cut-offs are provided on the SDQ website on the differentiation of the four-band categorization. In the current study, students in the range of 'high' and 'very high' were coded as displaying hyperactivity. The reliability of the present sample on this subscale was high (Cronbach's Alpha = .84).

3.3.2 | Friendships

The sociometric peer nomination method (Coie et al., 1982) is an international technique, widely used to assess students' friendship. In this study, students had to nominate a maximum of five of their best friends (Frostad et al., 2011). To avoid including students whose legal guardians did not give informed consent in the sociometric nomination data,

students were given a list of their peers' names, from which to nominate. Students on average nominated 3.6 peers as friends in the first wave (s.d. = 1.6) and 3.7 peers in the second wave (s.d. = 1.7). 4% of the students did not name friends in the first wave and 2% in the second wave, whereas 9% of the students were not named by anyone in the first wave and 8% in the second wave. In terms of density (the number of friendships in a classroom compared to the number of potential friendships, if everyone nominated everyone else), the average first-wave value is .20 (s.d. = .05) with a minimum density of .12, and a maximum density of .30 across all classrooms, and an average second-wave value is .21 (s.d. = .06) with a minimum density of .15, and a maximum density of .35 across all classrooms. The Jaccard index, which expresses change in the networks over time (by the number of friendships that exist in both waves compared to the number of friendships that exist at least in one of the waves), is 48 on average (s.d. = 11), with a minimum Jaccard index of .29, and a maximum of .71 across the classrooms. These values are ideal for applying Stochastic Actor-Oriented Models (Ripley et al., 2020).

3.3.3 | Students' attitudes towards peers with hyperactivity

Students' attitudes towards peers with hyperactivity were measured using a short version of the Chedoke-McMaster Attitudes towards Children with Handicaps Scale (CATCH; see also Rosenbaum et al., 1986). While the original version focuses on students with SEN as peers, in the current study a case vignette, representing a student with hyperactivity, was used. The case description was based on the work of De Boer et al. (2014; see also Schwab, 2018b). In the description (girls received a version with a female name and boys a version with a male name), a new student was introduced, who had newly moved to the city and was attending the same class. The student was described as often restless, fidgety, and easily distracted in class, who often did not follow the teachers' instructions. Further, while the original version comprised 36 items in total, in this study, only a four-item version was used. Two of the four items addressed the behavioural component of attitudes (e.g., 'I would stick up for [name of the vignette] who was being teased') while the other two items belonged to the affective component (e.g., "I would be happy to have [name] for a friend.'). Students answered the four items on a four-point Likert scale. Previous researchers have already demonstrated that this instrument (or at least a short version of it) can be used for students with and without SEN (Schwab, 2015). The reliability of the scale was Cronbach's Alpha = .91 for T1 and .9 for T2. Results of the four items were aggregated into a continuous scale ranging from 1 to 4. In line with the recommendations for Stochastic Actor-Oriented models (Ripley et al., 2020), the number of categories of attitudes included in these models was reduced to four, by rounding the values to the closest integer. For the descriptive results, the original (non-rounded) version of the scale was used to retain as much information as possible.

3.4 | Stochastic actor-oriented models

In the current study, Stochastic Actor-Oriented models (SAOMs, Snijders et al., 2010) are applied. SAOMs have been developed for modelling the evolution of network panel data, as well as the co-evolution of network and individual panel data. SAOMs estimate parameters for changes in networks and in individual attributes, which allows the joint investigation of selection and influence processes. Changes in networks (here friendship) and changes in individual attributes (here attitudes) are represented as parallel sequences of small changes. In each step of this sequence, a randomly selected actor has a chance to create or terminate an outgoing tie, or to increase or decrease his/her level of attitudes. In the case of two data waves, the first wave serves as a starting point, and the second wave is modelled on the first wave.

Changes in friendships and attitudes are modelled as a result of actors' choices about their outgoing friendship ties and about the level of their attitudes. Friendship choices are explained by independent variables related to the characteristics of the decision-making actor called Ego, characteristics of the actor with whom Ego considers creating,

maintaining, or terminating a tie called Alter, and the match of Ego and Alter. To express whether those with higher hyperactivity scores are named as friends less frequently (Hypothesis 1), hyperactivity of Alter is included. To test hyperactivity homophily (Hypothesis 2), Ego's and Alter's similarity in hyperactivity is additionally included, as well as hyperactivity of Alter. To see whether Ego's attitudes modify the effect of Alter's hyperactivity (Hypothesis 3), an interaction between Ego's attitudes and Alter's hyperactivity is added, as well as Ego's attitudes. To control for gender homophily, a crucial friendship determinant in childhood and adolescence (De Boer et al., 2013), a variable expressing whether Ego and Alter has the same gender is included.

Friendship choices can be additionally explained by network structure dependencies, therefore variables to capture these also enter the model in line with Ripley et al. (2020). Reciprocity models capture that individuals tend to form and maintain mutual ties, whereas transitive triplets models capture that they tend to choose friends of friends as friends; transitive reciprocated triplets expresses the interaction of the two. Indegree and outdegree of Alter express, respectively, whether those who name more friends or named more as friends are more likely to receive additional friendship nominations, whereas outdegree of Ego expresses whether those who already name many friends have a tendency to name additional people.

Attitude changes are modelled based on independent variables including characteristics of Ego, Ego's friends, and the whole group. Two different model specifications are used with two different ways of expressing peers' hyperactivity (these are tested separately to ensure enough statistical power). Model A includes average hyperactivity score of Ego's friends as well as of classmates (Hypothesis 4), and Model B includes the maximum hyperactivity score among friends and all classmates (Hypothesis 5). Ego's own hyperactivity and gender are included in both Models A and B as control variables. Parameter interpretation of SAOMs is similar to that of logistic regression models.

In this article, the Bayesian random-coefficient multilevel version of SAOMs is applied, which allows the joint analysis of several classrooms (Ripley et al., 2020, Koskinen & Snijders (in preparation); for an empirical application, see Boda, 2018). Following Ripley et al. (2020), independent variables are specified as randomly varying, except for those that express the hypotheses: Those are treated as fixed across groups. For choosing prior distributions and assessing convergence, this study also relies on Ripley et al. (2020).

4 | RESULTS

4.1 | Descriptive results

To see whether students displaying high levels of hyperactivity are less attractive as friends, the indegree of students was calculated based on their hyperactivity scores. Students with high hyperactivity (> 1.4) ($n = 36$) have, on average, 2.18 friends in the first wave (s.d. = 2.09) and 2.88 friends in the second wave (s.d. = 1.14). Other students have, on average, 3.81 friends in the first wave (s.d. = 1.97), and 3.97 friends in the second wave (s.d. = 2.03). Therefore, students with hyperactivity appear to be less attractive as friends than their peers. Further, it was examined whether those with high hyperactivity scores have more positive attitudes towards other students with hyperactivity. Results indicate that own hyperactivity in the first wave has a weak negative correlation with first-wave attitudes, with a coefficient of $-.025$ ($p = .68$), and with second-wave attitudes, with a coefficient of $-.029$ ($p = .63$).

It was also investigated whether there is a relationship between friends' hyperactivity at T1 and students' own attitudes towards peers displaying hyperactivity at T1 and T2. Figure 1 shows students' attitudes (x-axis) in relation to the mean of their friends' hyperactivity scores (y-axis). Orange dots and the fitted orange line represent attitudes at the first wave, while blue dots and lines represent attitudes at the second wave, based on friends' hyperactivity at the first wave. Both lines are almost horizontal, showing no visible relationship between the two variables. The Spearman correlation coefficients between friends' hyperactivity in the first wave and own attitudes in the first and second waves are $-.0004$ ($p = .996$) and $.002$ ($p = .97$), respectively, showing no significant relationships between the two concepts, either cross-sectionally or over time. Figure 2 shows the same relationship, but here the maximum

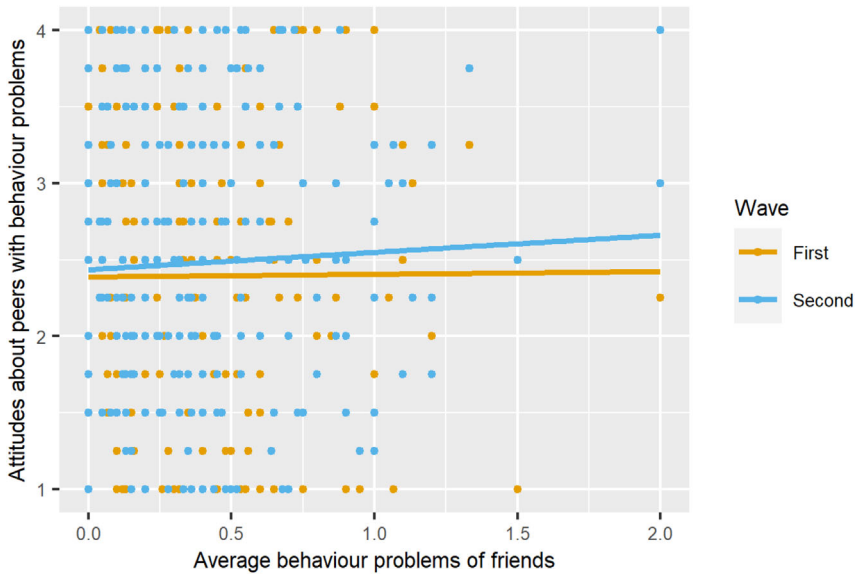


FIGURE 1 The association between attitudes and average behavioural problems of friends

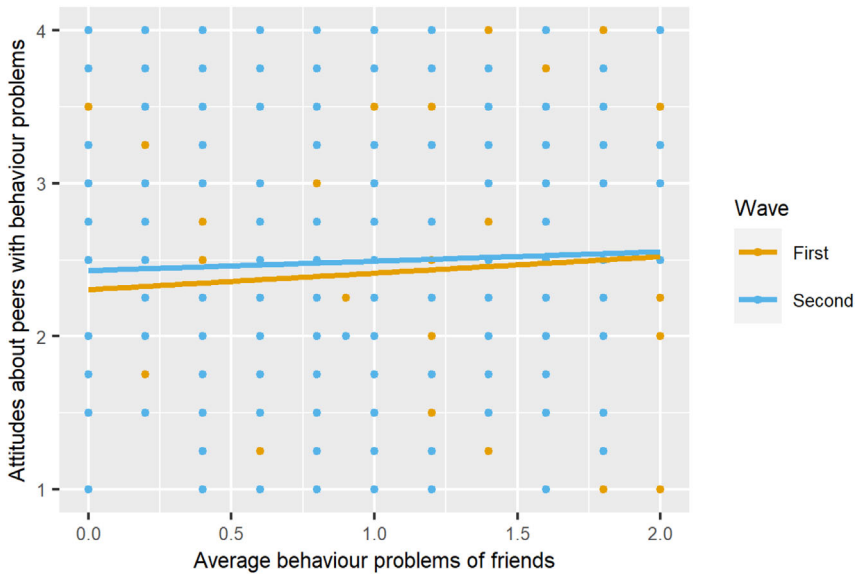


FIGURE 2 The association between attitudes and maximum behavioural problems of friends

hyperactivity scores of one's friends were plotted, instead of the mean. Figure 2 shows also very little relationship between maximum hyperactivity of friends and own attitudes. The respective correlation coefficients are .06 ($p = .37$) and .03 ($p = .65$), demonstrating a non-significant association between friends' hyperactivity and own attitudes both cross-sectionally and over time. To sum up, descriptive results suggest that having friends with hyperactivity is not significantly associated with one's attitudes towards such peers.

TABLE 1 Results of Bayesian random-coefficient multilevel stochastic actor-oriented models

	Model A		Model B	
	Estimate	p	Estimate	p
Part 1: Social selection				
Dependent variable: friendship				
Outdegree (intercept)	1.286*	.027	1.296*	.027
Individual characteristics				
Hyperactivity of Alter	-.234	.227	-.232	.229
Hyperactivity of Ego	-.127	.362	-.127	.366
Similar hyperactivity	-.119	.390	-.108	.400
Attitude of Ego	.144	.351	.226	.272
Hyperactivity of Alter × attitude of Ego	-.029	.393	.014	.455
Same gender	.806**	.008	.812**	.010
Structural characteristics				
Reciprocity	1.521***	.000	1.510***	.000
Transitive triplets	.609*	.015	.605*	.015
Transitive reciprocated triplets	-.181	.261	-.175	.267
Indegree-popularity	-.066	.401	-.067	.401
Outdegree-popularity	-.172	.269	-.163	.277
Outdegree-activity	-.435	.052	-.436	.053
Part 2: Social influence				
Dependent variable: attitudes				
Linear shape	-.551	.294	.220	.449
Quadratic shape	-.611*	.036	-.623*	.034
Own characteristics				
Own hyperactivity	-.054	.458	-.003	.498
Own gender	.295	.290	.161	.367
Friend characteristics				
Average hyperactivity of friends	-.655	.251		
Maximum hyperactivity of friends			-.793*	.043
Classmate characteristics				
Average hyperactivity of classmates	1.838	.158		
Maximum hyperactivity of classmates			.341	.352

4.2 | Results from stochastic actor-oriented models

All hypotheses were assessed in multivariate statistical models, controlling for other processes of friendship and attitude formation (described in detail in the section Stochastic Actor-Oriented Models). Table 1 shows the results, where part 1 focuses on social selection processes, and part 2 on social influence processes. Here, parameters and significance levels are presented: The complete results including standard errors and credible intervals are furnished in the Appendix (Table A1). In Model A, average hyperactivity scores of friends and classmates were included, and in Model B, maximum scores were included in part 2. Selection processes are modelled using the same variables in both models;

as expected, results in part 1 are almost identical in Models A and B. Friendship influence was modelled as the effect of friends named by the student: This way, students are assumed to be affected by those they themselves consider as friends.

In the selection part, the variable 'hyperactivity of Alter' does not indicate that those with higher levels of hyperactivity receive significantly fewer friendship nominations, providing no support for hypothesis 1. Further, the 'hyperactivity similarity' variable does not indicate that students chose friends whose hyperactivity scores are similar to their own, showing no evidence for hypothesis 2. Finally, the interaction between 'attitudes of Ego' and 'hyperactivity of Alter', showing whether those with more positive attitudes towards peers with hyperactivity are more likely to select such peers as friends, is not significant and therefore provides no support for hypothesis 3.

Regarding the influence part, Model A shows that the average hyperactivity scores of neither friends nor classmates are significantly related to attitudes, providing no evidence for hypotheses 4 and 5. In Model B, no significant effect of the maximum score of classmates can be found, which again does not support hypothesis 4. However, there is a significant *negative* effect of maximum score of friends on students' attitudes, which is the opposite of the expectation based on hypothesis 5.

In terms of other variables that have effects on attitudes (influence part), results indicate in both models that girls tend to have more positive attitudes towards peers with hyperactivity than boys (see own gender variable)—this is significant in both Model A and Model B. In terms of structural processes in friendship evolution (selection part), significant positive tendencies for reciprocity and transitivity ('transitive triplets') are found.

5 | DISCUSSION

The present study investigated the social inclusion of students displaying hyperactivity by examining their friendship networks, as well as their attitudes and those of their peers using Stochastic Actor-Oriented Models. These models, specifically developed for dynamic social network analysis, consider dependencies in friendship nominations and can disentangle selection and influence processes. Using this state of art methodology, the current study provides more robust results than previous research that students displaying hyperactivity are at risk of social exclusion.

5.1 | Friendships of students displaying higher levels of hyperactivity

By considering the friendship nominations received, descriptive results show that students displaying higher levels of hyperactivity have fewer friends in class compared to their peers with lower levels of hyperactivity. This finding is in line with many studies showing that students with hyperactivity symptoms have fewer friends (Zweers et al., 2021; Lee et al., 2021; Mikami et al., 2015). Interestingly, no significant evidence for this was found in the multivariate statistical models that control for other variables. This suggests that the social exclusion of students with higher levels of hyperactivity is at least partly due to other mechanisms. For instance, the model shows that students tend to befriend (and remain friends) with the friends of their friends. This process is known to be able to reinforce mild tendencies of segregation (Grund & Densley, 2015; Stadtfeld, 2018; Boda et al., 2020), and can therefore conserve the relative social exclusion of students with higher level of hyperactivity. Namely, when students with higher levels of hyperactivity have fewer friends to begin with, they will also have fewer friends-of-friends and will therefore be chosen as friends less often. This finding confirms the ongoing need and demand for an inclusive environment where friendships can be cultivated, since these play a crucial role in terms of developmental as well as emotional support (Bagwell & Bukowski, 2018; Maunder & Monks, 2019). This is especially important for students displaying hyperactivity since their social-emotional well-being often remains below that of their peers without such symptoms (e.g., Mitic et al., 2021; Maunder et al., 2019).

5.2 | Homophily effect

A homophily effect (Lazarsfeld & Merton, 1954), assuming that people prefer others who are more similar to themselves, could not be supported as students did not select friends whose hyperactivity scores were similar to theirs. One reason could be that students could not link the hypothetical vignettes to the actual students displaying hyperactivity, for example, to their true friends (see also Schwab, 2018b). This is supported by the result that even students displaying higher levels of hyperactivity did not develop more positive attitudes towards peers with hyperactivity. A further explanation could be that contact does not always have a positive effect, but rather a negative one, for example, due to negative experiences during the time spent together (Pérez-Jorge et al., 2020; Keith et al., 2015). Yet another explanation may be that students with hyperactivity are those who are less liked—by their peers without SEN as well as by their peers with SEN (see e.g., Hoza, 2007; Zweepers et al., 2021; Lee et al., 2021; Mikami et al., 2015; Bear et al., 2015; De Boer & Pijl, 2016; Schwab, 2018b). Some studies have shown that for example students with SEN often tend to be friends with other students with SEN. For example, Hoffmann et al. (2020) could find evidence of homophily effects in their study, where most of the students with SEN had a learning disability, as did Schwab et al. (2019) for students with hearing impairments. This seems not to be the case for students with hyperactivity as the current finding shows a non-significant relationship between own hyperactivity and attitudes towards peers with hyperactivity in line with Pérez-Jorge et al. (2020). Yet, there is still a lack of studies in this area and future research should address the topic of homophily in students displaying hyperactivity.

A further need which should be addressed in the future is the quality of friendships. The current study measured the presence or absence of friendships, using the sociometric nomination method but did not investigate the friendship quality of students with elevated hyperactivity scores.

5.3 | Attitudes towards peers with hyperactivity

A further outcome of this study is that not even those students who hold more positive attitudes nominated their peers with hyperactivity as friends. This implies that within this study, attitudes could not be shown to be the basis for friendships. It could be rather shown that students selected as friends those of the same gender, those who also selected them, or those they had common friends with. This is in line with the vast majority of research findings on the structure of student social networks (Snijders et al., 2010; Veenstra et al., 2013; Block, 2018; Boda et al., 2020). Contrarily, studies in the context of students with a SEN diagnosis (e.g., Boda et al., 2020) found evidence for homophily. A possible explanation why this effect was found for students with SEN could be that in Austria, like in some other countries, students with SEN are often excluded within inclusive education due to hidden mechanisms. While high inclusion does not simply imply attending mainstream classes it would also require inclusive practices. However, while those students with an official SEN diagnosis are sometimes pulled-out of classes (for small group support) students displaying hyperactivity (without an official SEN diagnosis) are not.

In terms of attitudes as an outcome, a significant negative relationship was shown between friends' hyperactivity and own attitudes, when the friends' hyperactivity was defined as the highest level of hyperactivity one is exposed to within the friendship group. This result, again, points towards an explanation that contact can have not only a positive but also a negative effect on attitudes, due to negative experiences during time spent together (Pérez-Jorge et al., 2020; Keith et al., 2015). It must be noted that no similar results could be shown when taking the average of all friends' hyperactivity into account, suggesting that it is the exposure to an especially high level of hyperactivity that can have a negative effect on attitudes. When observing the effect of all classroom peers (not just friends), it can be concluded that students' attitudes are not significantly influenced by the mean or maximum hyperactivity of their classmates (beyond those of their friends). The lack of significant results for such compositional effects is consistent with Petry (2018), who showed this for students with Autism and sensory and/or motor limitations. The difference between

classmates and friends shown in the current study may be due to the circumstance that friends play a more important role in students' lives than other classmates and suggests that future research should also focus on friends instead of looking at compositional (classroom-level) effects only. Additionally, as in several studies (Pérez-Jorge et al., 2020; De Boer et al., 2012; Siperstein et al., 2007), a significant gender effect was shown in the model, with girls tending to have more positive attitudes towards their peers displaying hyperactivity (though this was only significant in one of the two models).

5.4 | Limitations

First, the results must be understood in their specific context. This means that the country in which the study took place, the school type as well as the age of the participants have to be taken into account when interpreting the data. Second, hyperactivity was assessed based only on teacher ratings, which means that there is no information as to whether students really score high or whether this is due to the rating bias of the teacher. It is possible that other teachers may rate students differently and that students display more hyperactivity during class, but not during their free time or in other environments. Students' perception of peers' hyperactivity might also be totally different. This limitation has implications for the class composition effect.

Based on the methodological limitations of the study only one specific characteristic of students–hyperactivity symptoms–has been considered for the analyses. Children's scores in other domains (e.g., learning outcomes, other behavioural aspects, social competences) have not been considered. Moreover, the variance of students within a group (e.g., those showing hyperactivity symptoms according to their teachers or those having SEN) can often be bigger compared with the variance of different group members. Due to the small sample the intersectionality between different students' characteristics (e.g., hyperactivity symptoms and, e.g., SEN) could not be addressed adequately within this paper.

Another limitation which is the case vignette used. Students may have understood it differently as it also allows for further interpretation and not merely the recognition of a child displaying hyperactivity (see, e.g., also Schwab, 2018a).

A further limitation is related to the modelling approach. Multilevel Stochastic Actor-Oriented models cannot model individual attributes with a high number of values; therefore, the number of categories had to be reduced to four. This way, some information about attitudes were lost. It is reassuring, nevertheless, that results from the model were in line with the descriptive results for which the original attitudes scale was used.

5.5 | Practical implications of the current study

Taking into account the current research, it can be stated that social inclusion can be fostered at the levels of both students and teacher. Henke et al. (2017), for example, conducted a multi-level network analysis for students with and without SEN and could show that various variables may influence friendships in class. Social behaviour of students with SEN (variable on the individual level) was the most essential variable explaining friendship nominations. This finding may also explain some outcomes of the current study, as hyperactive behaviour could have a negative impact on peer relationships and thus resulting in less friendships being developed. However, as Henke et al. (2017) also point out, the whole class is responsible for its functioning. At the teacher level, it is already known that teacher behaviour and feedback play a crucial role in the social acceptance (e.g., Huber et al., 2018). This was also shown by Henke et al. (2017), who found that the average quality of student-teacher relationship (classroom level) had an impact on the social relationships in the classrooms. Thus, it was calculated that in the case where standard deviation was one above the sample average for the quality of student-teacher interaction, the likelihood of being nominated was equal for students with and without SEN. Teachers should therefore be aware of the impact they have in the classroom regarding their interaction with diverse classrooms and how this affects their students' relationships (Lanphen & Wiedenbauer, 2016).

It can be concluded that the social inclusion of students displaying hyperactivity will continue to pose a major challenge in the future. This has to be addressed by using different strategies at both levels, teachers and students, if the goal is to achieve that all students are included in school.

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DECLARATIONS OF INTEREST

None.

DATA AVAILABILITY STATEMENT

Upon request

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ENDNOTES

¹ The exact date of birth was not assessed to ensure students' anonymity.

² www.sdqinfo.org

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APPENDIX A: COMPLETE SET OF RESULTS

	Model A					Model B						
	Estimate	SD	Credible interval		p	Random	Estimate	SD	Credible interval		p	Random
			From	To					From	To		
Part 1: Social selection (dependent variable: friendship)												
Outdegree (intercept)	1.286	.721	-.016	2.842	.027		1.296	.709	-.027	2.79	.027	
Hyperactivity of Alter	-.234	.322	-.872	.398	.227	yes	-.232	.321	-.865	.399	.229	yes
Hyperactivity of Ego	-.127	.377	-.872	.621	.362	yes	-.127	.379	-.873	.619	.366	yes
Similar hyperactivity	-.119	.433	-.982	.718	.390	yes	-.108	.432	-.963	.738	.400	yes
Attitude of Ego	.144	.394	-.638	.914	.351	yes	.226	.397	-.559	1.018	.272	yes
Hyperactivity of Alter x attitude of ego	-.029	.122	-.269	.212	.393	no	.014	.121	-.225	.251	.455	no
Same gender	.806	.34	.142	1.489	.008	yes	.812	.348	.129	1.509	.010	yes
Reciprocity	1.521	.394	.752	2.315	.000	yes	1.510	.392	.743	2.289	.000	yes
Transitive triplets	.609	.274	.061	1.141	.015	yes	.605	.273	.067	1.145	.015	yes
Transitive reciprocated triplets	-.181	.292	-.758	.406	.261	yes	-.175	.292	-.753	.401	.267	yes
Indegree-popularity	-.066	.266	-.591	.468	.401	yes	-.067	.268	-.599	.458	.401	yes
Outdegree-popularity	-.172	.286	-.737	.388	.269	yes	-.163	.288	-.729	.411	.277	yes
Outdegree-activity	-.435	.268	-.974	.098	.052	yes	-.436	.272	-.972	.103	.053	yes
Part 2: Social influence (dependent variable: attitudes)												
Linear shape	-.551	1.073	-2.803	1.634	.294	yes	.220	1.409	-2.482	3.045	.449	yes
Quadratic shape	-.611	.343	-1.311	.05	.036	yes	-.623	.346	-1.324	.048	.034	yes
Own hyperactivity	-.054	.482	-1.017	.881	.458	yes	-.003	.496	-.979	.980	.498	yes
Own gender	.295	.542	-.791	1.358	.29	yes	.161	.507	-.852	1.148	.367	yes
Average hyperactivity of friends	-.655	.975	-2.753	1.173	.251	no	-.793	.507	-1.903	.11	.043	no
Maximum hyperactivity of friends												
Average hyperactivity of classmates	1.838	1.988	-2.158	6.082	.158	no						
Maximum hyperactivity of classmates							.341	.925	-1.511	2.153	.352	no