OSLOMET

Master's Thesis

Master's Programme in Learning in Complex Systems

November 2021

Peer Interaction Networks in Classroom Settings: An Analytical Focus on Structure of Investigating School-based Interventions.

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Course code: MALKS5000

Word count OR points (check your program requirements): 30 points

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Sammendrag

Prososiale ferdigheter er en viktig faktor for å samhandle med andre mennesker. For de fleste barn er skolen en slik arena hvor sosialisering foregår og hvor det å lære seg prososial atferd er viktig for å kunne utvikle vennskap og tilegne seg akademiske ferdigheter i samarbeid med andre medelever. En mye brukt intervensjon for å lære ønsket atferd blant barn i skolen er Good Behavior Game (GBG). Denne masteroppgaven er todelt. Den første artikkelen er en scope review av fagfellevurderte artikler fra årene 2011 til 2021 om GBG og hvilken rolle medelever har i utviklingen av prososial atferd når programmet brukes i skolen. Resultatene viste at det ikke var mange studier om tok for seg emnet. Den andre artikkelen utforsker hvordan sosial nettverksanalyse kan bidra til å avdekke nettverksstrukturer blant elever i en barneskole klasse. 19 elever ble intervjuet ved to tidspunkt i løpet av ett skole semester, og deres svar ble plottet inn i nettverksanalyseprogrammet UCINET 6 og analysert i et sosialt nettverksanalyserammeverk. Resultatene viste at nettverkene dannet blant elevene var fragmenterte. Disse nettverksstrukturene kan bidra til forståelsen av hvilken rolle medlever har i formingen av sosiale ferdigheter, og det diskuteres hvordan kunnskap skaffet ved å bruke sosial nettverksanalyse kan bidra til å gjøre det atferdsanalytiske arbeidet som gjøres i Good Behavior Game enda mer målrettet og effektivt.

Nøkkelord: Good Behavior Game, sosial nettverksanalyse, prososial atferd, barneskole, rollen til medelever,

Abstract

Prosocial skills are an important factor in interacting with other people. For most children, school is such an arena where socialization takes place and where learning prosocial behavior is important to develop friendships and acquire academic skills in collaboration with other classmates. A widely used intervention to teach desired behaviors among children in school is the Good Behavior Game (GBG). The first article is a scope review of peer-reviewed articles from the years 2011 to 2021 on the topic of the GBG and the stated role of peers in the program's effects on prosocial behavior. Results showed that the topic did not appear in a clear way in many studies, prevailing an individual-level analysis of behavior change. The second article explores how social network analysis can help uncover network structures among students in an elementary school class. 19 pupils were interviewed at to time points during a school semester, and their answers were plotted in the network analysis software UCINET 6 and analyzed in a Social Network framework. The results showed fragmented structures in the networks analyzed. These network structures can contribute to the understanding of the role of peers in the development of social skills. It is discussed how knowledge gained by using Social Network Analysis can contribute to making the behavioral analytic work done in the Good Behavior Game even more targeted and effective.

Keywords: Good Behavior Game, Social Network Analysis, prosocial behavior, elementary school, role of peers

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Article 1

The role of peers in the Good Behavior Game literature regarding prosocial behavior: a

scoping review

Abstract

The Good Behavior Game (GBG) is a behavior analytic program with the goal of reducing early aggressive, disruptive behavior and improving prosocial behavior mainly in classrooms, but also in families and organizations to name a few. The GBG is recognized as one of few universal preventive interventions delivered in elementary school that has been shown to promote prosocial behavior through an interdependent group-oriented contingency. Even though the GBG is group-oriented in its execution, the effect of the program has been measured by looking at the change in behavior of individual students. This paper is a scope review of peer-reviewed articles from the years 2011 to 2021 on the topic of the GBG and the stated role of peers in the program's effects on prosocial behavior. Results showed that the topic did not appear in a clear way in many studies, prevailing an individual-level analysis of behavior change.

Keywords: The Good Behavior Game, role of peers, prosocial behavior

Maybe one of the most famous quotes from B.F. Skinner is "man act upon the world and change it, and are in turn changed by the consequences if his actions" (Skinner, 1957). This correlates well with what we know about how learning histories and environmental events influence the development of behavior and the resilience of that behavior and how it is maintained (Baum, 2005). The groundwork for most of the learning histories happen early in the lifespan of humans, and an arena that almost all of humans go through is attending school form an early age. Schools provide both formal education, e.g., reading, writing, math, and so forth. It also provides unformal education through the interactions of pupils. The education of how to be a peer, how to be a friend, how to meet others, in other words how to act upon the world. This acting upon the world will give the child a learning history that can lead to prosocial development of behavior. Behavior that can encourage and maintain strong social ties and good academic performance (Caprara et al., 2020).

An intervention that has been used for decades to do just that, to encourage prosocial behavior, reduce maladaptive behavior, improve on-task behavior etc., is the Good Behavior Game(Bowman-Perrott et al., 2016). The Good Behavior Game (GBG) setts certain classroom rules that pupils must follow(Groves & Austin, 2019). It was originally an intervention that focused on reducing behaviors that were seen as disruptive in classroom settings through group-oriented consequences. The students were divided into two teams, and they competed for what was considered natural reinforcers in the classroom, in this case privileges. Disruptive behavior shown by one or more members of the team resulted in loss of privileges (Barrish et al., 1969; Bowman-Perrott et al., 2016). In the years since Barrish's study in 1969 there have been conducted GBG studies that have modified the game to among others focusing on reinforcing appropriate behaviors, promoting academic work, and giving points to individual pupils (Bowman-Perrott et al., 2016). Patrick et al. (1998) is an example where they focused on prosocial behaviors by awarding points to teams who displayed

behavior deemed appropriate during elementary school physical education. Their anecdotal results showed that the GBG increased prosocial behaviors.

The Good Behavior Game is a mutually dependent group contingency program. The points earned are team based and makes the participating pupils dependent on each other to win the game (Groves & Austin, 2019). Therefor this article asks the following research question: To what degree explore the literature on the Good Behavior Game from the last ten years, the role of peers as a source of reinforcers in connection with the Good Behavior Game, for the development and maintenance of prosocial behaviors in pupils attending elementary education?

Method

A scope review is a relative new way of bringing together evidence from several sources (Munn et al., 2018). It fits the purpose when it comes to identifying gaps in knowledge, identifying available evidence on a given topic, explaining definitions in the literature, examining how research is steered on a topic of filed, identifying primary characteristics related to a concept, or an antecedent for a systematic review (Munn et al., 2018). This article is a scope review that intends to give an overview of the available evidence and identifying possible gaps in knowledge, in the existing peer reviewed publications from the last ten years, on the topic of the good behavior game in connection with the role of peers when it comes to prosocial behavior in children from age six and through adolescence. The literature search for this study was conducted on 20 July and 21 July 2021. The search engine EBSCO Discovery Service, access provided by Oslo Metropolitan University (OsloMet) through their website www.oslomet.no were used to conduct searches. Through EBSCO Discovery Service one can access among others a vast collection of peer reviewed articles from several acknowledged databases e.g., ERIC and Academic Search Ultimate.

Inclusion and Exclusion Criteria

Search words used as standalone and in combinations are the Good Behavior Game, prosocial behavior, and role of peer*(by using the asterisk both peer and peers are included in the search). In EBSCO there is possible to narrow the search by choosing certain limitations that the articles must include. The following limitations were chosen, elementary education, elementary secondary education, middle school, elementary school, peer reviewed journals, timeframe between 2011 and 2021, and written in English. Articles that do not include the Good Behavior Game are not included in the pick of articles, duplicates of articles from the databases are excluded. The search results are sorted by standalone searches of the keyword Good Behavior Game, and the combination of the Good Behavior Game and the role of peers, the Good Behavior Game and role of peer*, the Good Behavior Game and prosocial behavior, the Good Behavior Game and peer* interaction, and the Good Behavior Game and peer* interaction and prosocial behavior. These search words were chosen because they were thought narrow the searches to fit the interest of the study, and because there was a strict time limitation for completion.

Results

The search for articles by using the keywords through the EBSCO database with the criteria as mentioned gave different hits based on the combinations as shown in Table 1.

Based on the spread in hits from the searches with keyword combinations there were conducted a read through of the abstracts of the 55 articles from search steps 3-6. The abstracts were read to look for the following: the education level elementary school and/or elementary secondary school, peer or peers, and prosocial and/or maladaptive/non prosocial behavior, in addition to the Good Behavior Game. The result was 7 articles (See table 2). Of these 7 articles two are studies where they use a positive variation of the Good Behavior Game (Bohan et al., 2021; Sewell, 2020). One is a theoretical article that addresses why the

Good Behavior Game is used for unwanted behavior and gives advice for using GBG to promote preferred behavior (Maag, 2019). There is also a meta-analysis of encouraging positive behavior using the Good Behavior Game (Bowman-Perrott et al., 2016). A mixed-method study by Ashworth et al. (2020) looks at intervention effect changers in the Good Behavior Game. The remaining are two single-case studies that addresses the use of the Good Behavior game with the focus on behavior defined as problematic (Groves & Austin, 2019; G. Leflot, . et al., 2013).

Ashworth et al. (2020) is a mixed-methods study that investigates two moderators – the execution of the program, the vulnerability of the participants, and their interactivity – of the Good Behavior Game where they use data from their randomized trial. The data are comprised of quantitative data from 38 primary schools. The data were gathered at baseline and at completion after 2 years of implementation. Their focus is on the shift from evaluating interventions by what work to evaluating interventions by looking at what works for whom. And under what kind of conditions it works, and the interaction between the two key moderators to address the gap in the knowledge about it. Using the Teacher Observation of Classroom Adaptation Checklist (TOCA-C; Koth, Bradshaw & Leaf, 2019; as cited in Ashworth et al. 2020) they assessed disruptive behavior, prosocial behavior, and concentration problems. They also assessed the pupils' reading skills, and pupils' vulnerability status. The results showed that the quality of the implementation of the GBG from both the 1st and 2nd year were associated with pupils improved reading scores. They did not find an overall link between quality of GBG implementation and teacher perceptions of disruptive behavior, prosocial behavior, and concentration problems. Although they did find a correlation between quality and worsening of the scores of disruptive behaviors for high-vulnerable pupils. There were no differential effects reported for prosocial behavior or problems with concentration (Ashworth et al., 2020). Summarized their data support that the

GBG has a positive effect on among others on-task behavior, they do mention prosocial behavior/social skills, but they do not mention peers' influence/role in any way.

The Caught Being Good Game (CBGG) is a variation of the GBG that promotes positive behavior and is the subject in the study by Bohan et al. (2021). In this study they are evaluating the use of CBGG with pupils that are adolescent. When playing this positive adaptation, the teams of pupils get points for taking part in behaviors considered desirable. In contrast to the regular rules in the GBG where they get marks for engaging in undesirable behavior, the goal in CBGG is to get most points. The purpose of the study was twofold, first to investigate the use of the Caught Being Good Game in what the authors called mainstream school settings, and second was to compare how effective the game was with delayed feedback and immediate visual feedback. The study was a N=21 single-case withdrawal design (Bohan et al., 2021). The results showed a substantial improvement in behavior upon the iteration of the CBGG, and with each withdrawal phase the behavior returned to or approached baseline levels. The CBGG with delayed feedback showed substantial effect sizes on both academically engaged behavior and disruptive behavior. The increases in the former and the decrease in the latter where immediate and stable when CBGG was put in place. The CBGG with delayed feedback appeared somewhat more effective than the CBGG with immediate visual feedback. The social validity among both teachers and pupils was reported as high. The social validity questioner does not however investigate peer role. It only focusses on the individual without including how or if classmates helped or disrupted in any way. Both teacher and pupils where asked (Bohan et al., 2021).

Bowman-Perrott et al. (2016) wrote a meta-analysis where they looked at single-case research on prompting positive behavior using the Good Behavior Game. The study incorporated single-case research from 21 studies. There were 1580 pupils participating spanning form pre-kindergarten through 12th grade. This study quantitively examined the

Good Behaviors Game's impact (1) on pupils that have or are susceptible for emotional and behavioral disorders (EBD), (2) on the frequency of reinforcement, (3) on the behaviors measured, (4) on the format of the program, (5) the grades included (Bowman-Perrott et al., 2016, p. 182). They had two research questions where they wanted to find out (1) what effect the Good Behavior Game had in the studies, and (2) the effects possible moderators had on pupils' behavior. Most of the 21 the single-case research studies, 17 in total, were focused on elementary school pupils. Two studies focused on secondary school pupils, and two studies includes both elementary and secondary school pupils. They found out that the overall effect of the Good Behavior Game was a reduction of problem behavior. The also saw overall results indicating an increase in desirable behaviors. The analysis of the moderators showed a statistically significant difference between the two variables, target behavior and the risk status of emotional and behavioral disorders. More specific it showed that GBG benefited pupils that had or was susceptible of EBD more than peers that was not at risk. Those who benefited most were pupils engaging in unruly behaviors and off-task behaviors. The overall results also revealed that the GBG had better effect on reduction of disruptive behavior and off-task behavior, than increasing on-task behaviors (Bowman-Perrott et al., 2016). Regarding reinforcement frequency it showed a correlation with reduction of problem behaviors, especially for pupils having or susceptible for EBD (Bowman-Perrott et al., 2016). When covering 21 studies one would hope that the subject of peer role would come up, but this does not seem to be the case. The authors do ask the question of the effects of potential moderators on pupils' behavior, but the moderators they mention does not include classmate's role.

The study by Groves and Austin (2019) aimed to assess both positive and negative peer interaction while playing the Good Behavior Game in periods where there were no specific contingencies arranged for these behaviors. They also wanted to find out what the teachers and pupils thought about the game's fairness. Participants where five pupils ages

between 15-16 years old who had emotional and behavioral disorders attending a secondary classroom, and eight pupils ages 9-10 years old with mild developmental disabilities attending a primary classroom (Groves & Austin, 2019). The study used a ABAB withdrawal design to measure the effects. In both classrooms the results exhibited considerable reductions in both off-task and disruptive behavior. The result showed a rise in positive peer interaction and a reduction in negative interactions when the program was in action. Regarding the social validity most pupils reported that the game was fair, and some said their peer relationships was better. The authors reported that of the observed positive peer interactions, most where supportive or encouraging comments. They also point out that the GBG can elicit opportunities to practice on social skills and for those skills to encounter natural contingencies of reinforcement (Groves & Austin, 2019, p. 14). Even though they reported that there was a reduction in negative interaction, they did not view the peer interaction as a mediator for the reduction. The GBG was what were the reason for the reduction. Their result is based on their small number of participants and might be viewed as anecdotal. But it shows that one should investigate peer roles as moderators for the behavioral results emerging during the GBG (Groves & Austin, 2019).

In Belgium, G. Leflot, . et al. (2013) executed a randomized controlled study of the Good Behavior Game. They studied elementary school pupils' on-task behavior and what role it had in the prevention of developing aggressive behavior and rejecting peers. The authors evaluated this among 570 children across second- to third-grade elementary school. They addressed two questions that focused on pupils' baseline levels of on-task behavior as a variable that affect the Good Behavior Game's effect, 1) on the development of aggressive behavior, and 2) what processes pupils with low baseline-levels of on-task behavior went through when they received the Good Behavior Game and reduced aggressive behavior (G. Leflot, . et al., 2013). Regarding baseline levels of on-task behavior as a moderator the

authors pointed out that when studying this it was important to control for if it was individual variations in levels in on-task behavior that moderated GBG's impact when controlling for classroom level variation. If that was the case it would imply that changes at individual level, despite classroom level, could predict improvements. In the study they examined individual on-task behavior as moderator while checking for avarage classroom levels of initial on-task behavior (Leflot et al., 2013, p.188). When it comes to the question about which processes the pupils went through when receiving the GBG, they focus on two directions the GBG may follow to reduce aggressive behavior. The first were through improving on-task behavior, and the second were through improving classmates' peer relations. Two trained observers evaluated on-task behaviors. Pupils who met the description of the target behavior "sometimes hit children" was nominated by peers (Leflot et al., 2013, p.191). Peer rejection was evaluated through interviews where the pupils were asked to nominate classmates they liked least. The level of rejection was indicated by the higher the score, the more the pupil was rejected by peers. The study got results that showed the effect that the GBG had on aggression differed based on fluctuations in on-task behavior. Initially it was found an effect on low on-task pupils but not for those with moderate to high on-task behavior. In the control condition pupils who displayed low on-task behavior had high and increasing levels of aggressive behavior over time. Pupils who at baseline showed low on-task behavior had a decrease in aggression over 2nd and 3rd grade when receiving GBG. The results after two years of GBG showed pupils who at baseline were considered low on-task had aggression levels same as those having moderate and high on-task baselines. The findings also showed a decrease in peer rejection of the low on-task pupils after receiving GBG, which in turn mediated the effect GBG had on their development of aggressive behavior (Leflot et al., 2013, p 196). G. Leflot, . et al. (2013) puts the role of peers in the spotlight, they tested for individual level mediation, but not on group level. It is the on-task behavior that they consider

as the main moderator for the impact of the GBG on development of aggression. They also point to peer behavior, in this case peer rejection when they say that there is a statistically significant and negative link between GBG and peer rejection. When GBG was in play they saw a slope in aggression, this, they say support the findings by van Lier et al. and Witvlit et al. that by making peer relations better using the GBG the program was able to improve the children's behavior (van Lier et al., 2005; Witvlit et al., 2009; as cited in Leflot et al., 2013).

John W. Maag (2019) addresses how the Good Behavior Game is recognized in empirical literature as an effective intervention for reducing unwanted behavior, and how the game developed by Barrish et al. (1969) uses differential reinforcement to reduce unwanted behavior. The differential reinforcement in the GBG is described by Maag (2019) either as being a differential reinforcement of other behavior (DRO) or differential reinforcement of lower levels of behavior (DRL). Both target the reduction of the targeted unwanted behavior which opens for reinforcing other unwanted but not targeted behavior. Maag (2019) points this out as a problem with the game because the pupils can engage in these other behaviors and still help their team to win the game. The author also points to the fact that the GBG also may work on the principle of punishment, specifically as a response cost. A principal where the teams lose something they find reinforcing because one or more team members engaged in the targeted unwanted behavior(s). Instead of using the principles of either differential reinforcement or punishment, Maag (2019) suggest using the principle of positive reinforcement of what one regards as positive or desired behavior. Positive reinforcement is the presentation of a stimulus right after a behavior has occurred and the behavior frequency increases in in the future (Cooper et al., 2007). Maag (2019, p. 170) supports his theory of using GBG to promote positive behavior by briefly summarizing four studies (the four studies were Galbraith and Normand (2017), Wahl, Hawkins, Haydon, Marsico, and Morrison (2016), Wright and McCurdy (2011), and Tanol, Johnson, McComas, and Cote (2010)) that

addresses the use of positive reinforcement, all four showed increases in the targeted behaviors (Maag, 2019). In the article Maag looks at how the GBG can benefit the teacher, and list seven implications steps for using GBG that the teacher can use with the focus on positive behavior. According to Maag (2019) the benefits are many, among others it gives attention to specific wanted behaviors from pupils, the opportunities for more and better interactions among pupils are promoted, and the intragroup cooperation is actively encouraged (p. 170).

Alexandra Sewell looked at The Good Behavior Game as a social skill intervention to promote positive social behavior amongst pupils (Sewell, 2020). Her study took place in a 5th grade classroom in a primary school in a major city in the UK. There were 27 children, ages 8 – 10, 58% girls and 42% boys, and predominantly British Caucasian. The aim of her study was to evaluate the adaptation of the Good Behavior Game as a social skills program to develop social skills by motivating full class participation in pro-social behavior. Sewell based her adaptation on the original Good Behavior Game by Barrish et al. (1969). Her version rewarded following the rules rather than deliver punitive consequences for rule infraction, and the class was not divided into teams but played the game as one team. The Good Behavior sessions was conducted in the same classroom throughout the study and was played at the same time each day, for a mean of 31 minutes. The study used a ABAB single-case reversal design to analyze the efficacy (Sewell, 2020).

Sewell (2020) operationalized the target behaviors as:

1) Positive socializing with a peer, defined as a pupil socialized with a peer for three seconds or more using a proper tone of voice at medium audible volume and looked towards the peer keeping a reasonable distance, showing an open body language and had a facial expression that seemed relaxed and approachable, 2) working as a team, defined as the pupils working together on a joint assignment for at least three seconds, and 3)

supporting peers, defined as a pupil making an encouraging or praising comment to a peer.

(p. 98)

The results (Sewell, 2020) showed baseline observations for the first target behavior, positive social interactions, on the whole stable variability of low to moderate level and no trend. During the Good Behavior Game (GBG) intervention phase there were a change in level, and it went from having no trend to a rise in trend. In the reversal phase there was an immediate change to low levels. In the second GBG intervention phase the data showed a significant change to a stable level of data demonstrating increasing trend. For the second target behavior teamwork, the data showed baseline at average to low level with low to no trend. The GBG intervention data showed initially a decreasing level but was followed by a steep stable increasing trend. Removal of the GBG resulted in an instant change to low level and stable decreasing trend. Reducing the GBG had a noticeable change in level with rising trend and an inconsiderable variability. The third target behavior, supporting peers, had a baseline showing low level and no trend. Introducing the GBG intervention led to a very slight level increase with no trend. The reversal phase returned to baseline level. Reintroduction of the GBG got initially the same result as the initial implementation, followed by a reduction in trend, and no variability (Sewell, 2020). Overall, the results can be said to have been partially successful in terms of increasing social skills behavior, partially because they were not successful when it came to the target behavior supporting peers. Sewell discusses the reason for why supporting peers did not show any positive change. She points to the fact that at baseline the two other target behaviors showed that the pupils had the skills. But that there was a lack of performance when it came to supporting peers, and this could represent that this skill was not a part of their collective behaviors (Sewell, 2020, p. 104).

Discussion

This article set out to find available evidence, and possible gaps in knowledge on the topic of the good behavior game, in connection with the role of peers as a moderator for the development and maintenance of prosocial behaviors in pupils attending elementary education. The search was narrowed down to fit certain criteria with the purpose to find studies that most likely would give insight regarding the research question. The results from the searches uncovered that in the last 10 years there has been written several articles on the use of the Good Behavior Game. But as far as the findings covered in this article the topic of peer role being a moderator for the development and maintenance prosocial behavior are sparse. A recurring fact about the GBG in all the articles is that the focus for the game is to reduce unwanted behavior. Often labeled as off-task behavior, this is because the GBG is originally uses the principles of differential reinforcement of other behaviors (DRO), it can also be viewed as a response-cost procedure as pointed out by Maag (2019). Maag (2019) put the focus on why is it that GBG is used for bad behavior, and he comes with insight on how to change the use for promoting good behavior. He takes the view on how this shift can benefit teachers, and how this can improve peer interactions. Although his arguments are more towards the teachers, how the improved peer interaction can benefit towards more positive target behavior is not mentioned. The fact that the GBG most often is run as a DRO, or response-cost procedure might be a reason for the lack of interest to investigate peer role in conduction with development of prosocial behavior. The use of The Good Behavior Game have also been directed at positive academic behaviors alongside reducing disruptive behaviors, and Bohan et al. (2021) clearly shows how an adaption of the Good Behavior Game, the Caught Being Good Game (CBGG) can increase academic engaged behavior and reduce disruptive behavior. In this instance there is not any focus on the peer role. One would think that a pupil's behavior is affected by other peers behavior since they are part of the

environment, as Skinner (1957) points out that we change our environment with our behavior and in turn our behavior is changed by the environment. There is hope for the investigation Good behavior Game in conjunction with how peers influence each other's behaviors when reading for example Sewell (2020). Here the focus is on using the Good Behavior Game to promote collective/whole-class social skills behavior. Sewell (2020) does not explicitly discuss how peers can moderate behaviors. But if the whole class as a team would succeed, they were dependent om each other. Based on what we know about how the environment affects our behavior (Cooper et al., 2007) there is basis to say that the results show that peers play a role in developing and maintaining prosocial behavior. From reading Sewell (2020) there is evident though that for the Good Behavior Game to succeed that it is important that the target behavior or behaviors are in the collective behavior skills repertoire.

A search on the Good Behavior Game results in numerous studies. One will find solid and good support for the implementation of the game as a universal interdependent group intervention. To find studies that investigates the role of peers in development of prosocial behavior, and maintenance of prosocial behaviors in pupils in elementary school when using the Good Behavior Game does not seem to produce as much search results. As shown in this article there are not many that even mention peer involvement in studies from the last decade, and non or few that focus on peer role.

To get good search result one needs search criteria that fit the bill and use the right search databases. Based on a strict time limitation, narrow search words and strict inclusion/exclusion criteria in this article it is likely that not all possible studies out there that might involve peer role in conjunction with the GBG where found. Nevertheless, the topic of peer role should be investigated more and broader, and not only on an individual level, but also more on a group level. One potential useful method for exploring the role peers play in the development of prosocial behavior and to understand how behavior emerge and are

maintained is using social network analysis. This lets the researcher collect data about how

people interact and analyze social structures (Grunspan et al., 2014). By analyzing the social

structures of the network one can get information about how behavior spread through which

channels in the network and find out how well the individuals are connected to each other. It

can shed light on the effect of among others social discounting (Bento et al., 2020; Rachlin,

2015). It can give useful insight when developing how the Good Behavior Game should be

played to target wanted behavior. Also using social network analysis can be parsimonious

when it comes to resource use in comparison with applied behavior analysis where

observations over time is a standard way of collecting data. The benefit with Social Network

Analysis in data collection is that one does not need to observer the subjects, just run

interviews or questioners at selected periods in time.

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Table 1

Search Steps, Keywords, and Combinations, and Search Results

Search step	Keyword and combinations of keywords,	Results
1	The Good Behavior Game.	234 hits
2	The Good Behavior Game and the role of peers.	0 hits
3	The Good Behavior Game and the role of peer*.	36 hits
4	The Good Behavior Game and prosocial behavior.	6 hits
5	The Good Behavior Game and peer* interaction.	13 hits
6	The Good Behavior Game and peer* interaction and prosocial behavior.	3 hits

Note. The searches were conducted using EBSCO Discovery Service database on 20 July and 21 July 2021.

Table 2

Overview of the General Information, Reported Results and the Portraited Role of Peers in the Included Articles

	Author(s), Year	Country	Topic	Reported results	Role attributed to peers
1	Ashworth et al., 2020	United Kingdom	Gap in knowledge about the moderators that influence the effect of the GBG	Positive effects regarding on-task behavior. No notable effect from teachers on the effect on social skills	Peer role not investigated
2	Bohan et al., 2021	Ireland USA	Evaluation of the Caught Being Good Game	Substantial effect on academic and disruptive behavior.	Peer role not investigated
3	Bowman-Perrott et al., 2016	USA	Meta-analysis of the GBG in promoting positive behavior	Reduction of problem behavior and increase in desirable behavior.	Peer role not investigated
4	Groves & Austin, 2019	United Kingdom	The GBG evoking positive and negative peer interaction behavior	Reduction of off-task and disruptive behavior. Increase in positive peer interaction and reduction in negative interactions.	Peer role not investigated.
5	Leflot et al., 2013	Belgium	The GBG preventing the development of aggressive behavior and peer rejection	Reduction in aggressive behavior and peer rejection.	Peer role looked at an individual level
6	Maag, 2019	USA	Empirical recognition of the GBG and its use of differential reinforcement.	Benefits on wanted behaviors, better interactions among pupils and intragroup interaction.	Peer role not investigated
7	Sewell, 2020	United Kingdom	The GBG as a social skills intervention for whole-class peer interaction.	Promotion of positive social interaction with a peer and working as a team, but not regarding supporting peers.	Peer role indirectly investigated

Note. Good Behavior Game (GBG)

Article 2

Mapping Social Distance and Connectedness Between Pupils: A Social Network Analysis Contribution for Investigating Change in Classroom Settings

Abstract

Social Network Analysis gives the opportunity to explore the dynamics between actors in a social network. This article looks at how Social Network Analysis can be used to study interactions between pupils from an elementary school. They were interviewed at two timepoints and their answers analyzed using a social network analysis framework. The main aim was to look for how social distance and connectedness evolve over time in a school semester among the pupils in a classroom. The results showed among others that the classroom network was fragmented and got more fragmented at the second timepoint. The study also wanted to examen from a behavior analytic perspective in what way Social Network and Behavior Analysis could complement each other in the analysis of behavior. One area worth mentioning is how the structural network analysis from Social Network Analysis and the functional analysis form Behavior Analysis can utilize each other's strengths. There are indications that both fields can benefit. From a behavior analytic perspective there is suggestions that the functional analysis can contribute to explaining how behavior emerge and spread in a network. Another and broader aim were to discuss how mapping and analyzing social networks could contribute to future investigations of the effects of the Good Behavior Game on prosocial behavior.

Keywords: Social Network Analysis, social distance, connectedness, Good Behavior Game, behavior analysis

Adolescence is a transitional period in life between childhood and adulthood, and it spans from the age of 10 to the age of 19 (Pereira et al., 2014). During adolescence, the development of social behavior undergoes an increase in complexity. There are changes when it comes to identity formation, autonomy regarding decision-making, intimacy, and sexuality (Hoorn et al., 2014). Adolescence also brings on changes in peer and family relationships.

According to Brechwald and Prinstein (2011) peer influence inhabits the presence of both socialization and choice, especially a dynamic reciprocal association between the two in relations among adolescent peers. To understand acceptable and desired behaviors adolescents rely on their peers. This is likely a successful individuation from values carried by adults and is a healthy development of identity.

Social learning theories and identity-based theories in sum suggest that adolescents look to peers to get social and emotional support, and uses the feedback and acceptance form their peers to develop their sense of self (Brechwald & Prinstein, 2011). When adolescents conform to their peers' behavior, they 1) get associated with high peer status, 2) they follow the social norms of what they recon as a desired group to belong, 3) it leads to social reinforcement, and 4) the sense of a positive self-identity is reinforced. Social network analysis is one of many tools that have made it possible to investigate these networks and if and how peer influence occurs particularly from a structural standpoint (Brechwald & Prinstein, 2011).

Prosocial Behavior and Altruistic Behavior

Prosocial behavior includes a vast specter of behaviors, it can among others be behaviors that benefits others (Schreuders et al., 2018). These behaviors are often described as helping, sharing and cooperating with others (Hoorn et al., 2014). It is also worth motioning the definition put by Biglan and Glenn (2013), referring to David Sloan Wilson who defined prosocial behavior, as "any belief, attitude, or behavior that contributes positively to others, to

society as a whole, or both" (p.257). Within the context of school, prosocial behaviors can also include on-task behaviors, task completion, and acceptance of authority (Bowman-Perrott et al., 2016). From the perspective of Behavior Analysis prosocial behaviors are best learned through incidental social interactions in natural environments where the behaviors are reinforced by social reinforcement (Cashwell et al., 2001). The prosocial behaviors are best shaped and reinforced within this natural interaction. The behaviors are then more likely to continue to be reinforced in the new natural settings because of the naturally access to social reinforcers in the environment (Cashwell et al., 2001).

Altruistic behavior is linked to motivation in the sense that one emits a response that has the purpose of increasing another person's welfare (Batson & Powell, 2003). It is important to note that even though there are similarities between prosocial behavior and altruism one cannot say there is a one-to-one correspondence (Batson & Powell, 2003). Looking towards evolutionary theory and behavior analysis the act of true altruism where there is no chance for a long-term gain cannot occur (Baum, 2005). Biologists assert that self-sacrifice is most often directed to one's own flesh and blood, and that altruistic behavior can be selected because they share genes. According to biologists, self-sacrifice towards strangers only happen if there is a likelihood for getting something in return. Behavior analysts suggest that altruistic behavior occur because of reinforcement (Baum, 2005).

According to Skinner (1971) acting altruistic occurs because of social reinforcement, and even though the receiver benefits more there and then, the one that acted altruistic will benefit with time. According to Locey and Rachlin (2015) it is irrational that anyone would engage in altruistic behavior for its own value. What they do consider rational is that the behavior is part of a pattern. How does this valuable pattern come to be when each part of the behavior pattern holds less value than the alternative?(Rachlin, 2015) The answer from a behavioral stand is that valuable and complex behavioral patterns emit from less complicated

ones over a lifetime and that through reinforcement the environment selects individual

responses (Rachlin, 2015). Behavioral patterns undergo the same process of selection as

groups of individual organisms are selected in evolution. While a single act may not hold

much value, a pattern of altruistic behaviors can. The value is defined by social discounting

where the value is hyperbolic, losing value as the social distance increases (Locey & Rachlin,

2015).

The social distance is defined by how close one feels to the other person or people in

the group (Rachlin, 2015). It is more likely that one will cooperate with someone close than

others more distant. The space is thus defined in terms of who the individual includes into

their social space where it maximizes reward. It is important to note that the social space vary

from person to person, it can extend to many or just a few (Rachlin, 2015). The hyperbolic

discount function one can use to measure social discounting is $V = \frac{A}{1+kN}$ (Rachlin, 2015).

While A is the undiscounted value of the reward, V represents the value of the reward A to

oneself when the reward A is given to another. N represents the social distance between

oneself and the other person or group, and k is constant (Rachlin, 2015, p. 255). An increasing

N value indicates that one is socially further from the other person or group. The N value also

tells the story of tolerance regarding how long one can wait for one' s reward rather than

giving it to someone else; low value indicates a low tolerance, but a larger value indicates that

one can wait longer instead of giving it away. The larger the k constant is for a given

individual, more abrupt the individual discount function is, and the individual evaluate the

reward less to others. The abruptness of social discounting predicts the degree of selfishness

(Rachlin, 2015).

Maladaptive Behavior

Experiencing support and company is important for most of people, and they seek

them through social interactions with people they like to be around, often defined as friends

(Schreuders et al., 2018). Social interactions however can also include relationships that are rooted in dislike, relationships where aggression, attempts to inflict harm, and avoidance are known characteristics. It is no surprise then that people tend to show more prosocial behavior among friends than among peers they dislike. In addition, if they want to form and maintain friendships their prosocial behavior needs to maximize outcomes also for our peers (Schreuders et al., 2018). If people conduct in non-prosocial behavior, like selfish behaviors that seek to maximize outcomes only for them self, they will more likely weaken their friendship or even end up with a relationship based on dislike (Schreuders et al., 2018). Behaviors that lead to peer relationships based on dislike, are often seen as maladaptive social behaviors (Nesdale & Lambert, 2007), social behaviors are recognized as behaviors that hinder the individual to establish and maintain nurturing relationships. Social maladaptation can include disruptive behavior, acting aggressive, interfering with what other peers are doing, and disobeying authority to name a few (Nesdale & Lambert, 2007).

Social Network Analysis

Social network analysis (SNA) is a tool to try to understand how relationships come to be, and the parts that form the system called actors or nodes (Borgatti et al., 2018). Using SNA, one also tries to understand what are the relational structures that form these relationships between pairs of actors, and what are the consequences of this relationship for these actors. Nodes or actors can be individuals, organizations, or any other thing that can be connected to other things, but when it comes to social networks, usually the nodes are active agents (Grunspan et al., 2014). The group of nodes and the connections between them makes up the network (Borgatti et al., 2018; Grunspan et al., 2014).

Networks can either be directed or undirected, depending on whether the connections between actors have a specific direction or not (Grunspan et al., 2014). Undirected networks have no specific direction, a tie are not sent or received by any actor, but the actors are

connected via the tie (Borgatti et al., 2018). By contrast, directed networks comprise

relational interests with an associated direction. Lastly it is also possible to define links or

connections as valued or binary. A binary connection can shed light on whether one can say

there is a relation or not (Grunspan et al., 2014). Valued links, on the other hand, includes

relational information of a quantitative nature, adding layers of complexity for both data

collection and data analysis.

Network density is considered the most basic measurement in network analysis. A

density measure tells us what is the probability that a connection exists between a randomly

chosen pair of actors in the network (Borgatti et al., 2018). Density is best used when

comparing data, for example in a classroom network one can compare who plays with whom

and draw a hypothesis about how connected they are in the class. Other measurements are

ties, degree, centralization, connectedness, fragmentation, and arc reciprocity.

Ties, Connectedness, and Fragmentation

Ties or edges is the connection between two nodes (Borgatti et al., 2018). Degree is

the number of ties that are likely to occur between one or more nodes that are adjacent to

another node (Borgatti et al., 2018). If ties are directed, the interest can be in how a tie from

one node to another is matched the reverse way. Let say if there is a tie from A to B and there

is a tie from B to A, this is called Arc reciprocity (Borgatti et al., 2018). Arc simply is another

name for tie or edge in a directed network. Arc reciprocity then means reciprocity in a

directed network. The measurement of connectedness tells us something about the amount of

pairs of nodes that can find each other in the largest set of nodes where everyone can come in

contact with each other via some trajectory, also known as a component (Borgatti et al.,

2018). Connectedness is how many nodes there are in the same place in the network

(Borgatti et al., 2018). This is relevant because it gives the opportunity to say something about

how the actors view how they belong in the network, and who are the glue in the network

(Borgatti et al., 2018). Fragmentation is the opposite of connectedness, the number of pair of nodes that cannot reach each other (Borgatti et al., 2018).

Selection

In social network analysis selection is a category of hypothesized social processes (Borgatti et al., 2018). This means that when an actor nominates another actor there is a process of choice that can be analyzed (Borgatti et al., 2018). An analysis can say something about their connection or ties with others in the network, and one can hypothesize about the actors role or position in the network (Borgatti et al., 2018; Grunspan et al., 2014).

In the field of Behavior Analysis selection has a special place, in which it refers to how the environment affect the behavior of living organisms (Catania, 2013). There are three primary ways that it can do that; phylogenic selection, ontogenetic selection, and cultural selection. Phylogenic selection is the natural process of selection in evolutionary history of species. Ontogenetic selection is how behavior is selected by consequences during an individual's lifetime. Cultural selection is connected to social learning and verbal behavior, how behavior learned by an individual during its lifetime is passed on and repeated by others (Catania, 2013).

From a behavior analytical position, the analysis from social network analysis about selection can maybe be used in the work with cultural selection to say something about how many one actor can reach and pass on behavior to. This can be useful when wanting to find out the possibility of a behavior to be learned by others, e.g. via imitation, or the how language passes on and will survive (Catania, 2013).

Homophily

A concept that is concerned with who is linked to whom is homophily (Grunspan et al., 2014). Homophily is a tendency where actors in a network have a tendency to connect with others that are similar to themselves. Homophily can show itself in several processes,

examples of this are social preference and social influence. When a relationship is more feasible to happen because two actors have the same characteristics is known as social preference (Grunspan et al., 2014). Another thing we see in relationships is social influence, this is when actors change their characteristics to fit their relational partners because they are influenced by them (Grunspan et al., 2014).

Centrality

Within a network we can measure nodes by defined attributes (Borgatti et al., 2018). These attributes can be familiar ones like age, gender, and race. But also, measurements of where the nodes are in the network (Borgatti et al., 2018). Regarding measures of position this is part of a cluster of interrelated metrics that inhere to the concept of centrality. In the concept of centrality one can find data that informs about to what length a network is influenced by a single node, this is called centralization (Borgatti et al., 2018). Other ways of measuring centrality are by degree, closeness, betweenness and eigenvector. When it is talk about the total number of links a node has, one is referring to the degree centrality (Borgatti et al., 2018). Directional networks include measures of indegree and outdegree centrality (Borgatti et al., 2018). Betweenness centrality looks at actors who work as bridges in the shortest distances between two actors (Borgatti et al., 2018). As one might figure out by its name, closeness centrality is about how close one actor is to another. This measure is on average along the shortest path between two points that meet (Borgatti et al., 2018). When it comes to the importance of being connected to other well-connected actors, one is talking about eigenvector centrality (Grunspan et al., 2014). One can look at eigenvector centrality as a measurement of someone's popularity, an example can be a person who has a high eigenvector centrality and is connected to others that are also well connected can be said to be popular and have popular friends (Borgatti et al., 2018).

An Area of Use

In the quest for academic success social relations can be useful to develop and maintain since a child's immediate environment influence its mental development (Li & Stone, 2018). Teachers can use the social network analysis to understand a classroom network when it comes to norms, and it can shed light on how students learn. It also allows the teachers to examine what role popularity in the network in question plays (Grunspan et al., 2014). A popular strategy when conducting a classroom network analysis is to ask the students to nominate their best friend and so forth. If this is a social network with directed centrality, a nomination a student give is an outgoing link, while one the student receive is an incoming link. These links can then be used to compute different social network indicators, for instance the levels of positive interactions in a classroom (Li & Stone, 2018).

Interlacing Applied Behavior and Analysis Social Network Analysis

Behavior is defined as everything a living organism does (Miltenberger, 2020). It can be measured, observed, described, and recorded; this is what Applied Behavior Analysis does. Behavior is impacted by the environment and vice versa, and its lawful. Behaviors can be overt and covert and are under the control of the consequences that follows it.

A fundamental part of Applied Behavior Analysis's methodology is the detailed analysis of behavior (Bailey & Burch, 2016). There are seven dimensions that describe how the field should be (Baer et al., 1968). It is applied, behavioral, analytic, technological, conceptually systematic, effective, and generalized. Applied signals that behavior that is the target for modification is socially significant for the participants, and that it is meant to improve the life of people (Bailey & Burch, 2016; Cooper et al., 2007). Behavioral means that it is a study of behavior, it must be measurable, and changes in behavior must be observable (Baer et al., 1968). Analytic means that it enables the researcher to demonstrate effectiveness and provides proof that the changes have a functional and replicable relation to the

intervention. The technological dimension encompasses that one can identify every part of the procedure in such a way that it can be replicated by others. Effectiveness points to that the interventions must lead to a practical improvement of the behavior, and it must improve the subject's life (Baer et al., 1968; Cooper et al., 2007; Wolf, 1978). Generality says that behavior change last, and that it occurs in natural settings outside treatment (Baer et al., 1968). Another pivotal part of Applied behavior Analysis is the use of functional analysis to detect a behavior's function (Cooper et al., 2007). Functional analysis allows the researcher to detect what happens when behavior occurs, e.g., right before (antecedence) the response behavior and what follows, the consequence. By conducting function analysis one can demonstrate not only the antecedent and consequences of a single response, it can also demonstrate the role they play in the recurrence of behavior classes (Skinner, 1969).

Whereas behavior analysis emphasizes functional relations between one's behavior and environmental events, which is pivotal for behavior prediction, network science is the subdivision of complexity science concerned with studying how interactions are comprised in complex systems (Bento et al., 2020). For the latter, structural factors of the networks that either facilitate or constraint interaction are the focus of investigation. Thus, when analyzing behavior, one can draw on the relational perspective from complexity science about how behavior spans out in social groups, or when one seeks to explain behavior in certain networks based on the position of individuals in the network (Bento et al. 2020, p. 68).

One can look to concepts that have educated the field of complex systems about the processes of network expansions, concepts like homophily and preferential attachment (Bento et al., 2020). Homophily show that nodes are inclined to connect to similar nodes. When new nodes are inclined to connect with old nodes that is well connected it is mechanism called preferential attachment. Taking a behavioral analytic perspective, it can be interesting to investigate closer these two mechanisms. Both can be considered as behaviors. Further they

can be seen as ever-changing structural contingencies that can aid or hinder cooperation and distribute new form of behavior in social networks (Bento et al., 2020, p. 81). Homophily and preferential attachment are important when explaining how network group form, and the merging of connections among different groups in the same network (Bento et al., 2020). Regarding how behavioral changes may fan out in a network, homophily and preferential attachment are important concepts when explaining how this happens through the emergence of social reinforcement spaces and the channels that enables the spread of behavior.

An area from behavior analysis that can contribute to the explanation of how, and if behavior spread is the theory of social discounting. Social discounting can explain why some behaviors spread and others does not. If, as Rachlin (2015) states, the individuals in the network does not include many in their social space, they discount the value of sharing faster than if they include more. This leads to fewer channels for the behavior to spread through. Another factor that is seen as important when searching to explain how behavior and complex information fans out in networks is the process of social reinforcement (Centola, 2018, in Bento et al., 2020, p. 68). Social Network Analysis defines social reinforcement as when an actor needs several prompts from other members of the network before appropriating the behavior or information (Zheng, Lü, & Zhao, 2013, in Bento et al., 2020, p. 68). In behavior analysis social reinforcement is defined as "an increase in likelihood of future behavior as a function of the interaction with other individuals or groups" (Bento et.al, 2020, p. 68). From both definitions the behaviors can be said to take place in a social context of interactions, and therefor like behavior analysis can expand their work utilizing network analysis, network analysis can utilize behavior analysis in its work (Bento et al., 2020).

Behavior Analysis and Social Network Analysis complement each other (Bento et al., 2020). When wanting to explain behaviors in a network Social Network Analysis can provide the information about the interactions at a specific period, and Behavior Analysis can

contribute by explaining why patterns of behavior come to be and advance (Bento et al., 2020).

Research Question

This article will tackle the following research question: How do social distance and connectedness evolves over time of school semester among pupils in the same classroom?

Social network analysis will be used as the methodological framework in the study, aiming at exploring the contributions of this area of research to the investigation of pupils' behavior and their developmental pathways from a relational perspective.

Lastly, a second and broader aim of this study is to discuss how mapping and analyzing social networks can contribute to future investigations of the effects of the Good Behavior Game. This area of research offers a useful tool to measure connectedness among pupils, which can bring potential insight on the development of social behaviors in children.

Method

Participants

The participants are 19 fifth-grade pupils, 10 boys and 9 girls, from a public primary school located in Norway. The pupils form the same class and have the same reference teacher who is responsible for most of the pupils' instruction in school.

Design and Procedure

The study used a social network approach (Grunspan et al., 2014; Li & Stone, 2018) for screening the distance of ties between students from a fifth-grade classroom throughout a 6-month period. Data were collected in short individual interviews with pupils, of approximately 10 minutes. The questions were oriented around nominating peers based on like or dislike (John D. Coie, 1982; G. Leflot et al., 2013) and questions regarding their sense of belonging e.g., nominate the classmates with whom you play the most, ask for help, do school activities with. Raising varied questions as such led to the analysis of different co-

existing social networks in classroom settings, allowing for the exploration of changes in

social structures. Data were collected at two time-points: at the beginning of the spring-term,

January of 2021, and the end of the 2020/2021 academic year, June 2021. In the first

interview the pupils were asked four questions. They were asked to nominate: 1) classmates

who they played with the most at school the last week, 2) classmates that helped them the last

week when/if they needed it, 3) classmates who they helped the last week if/when those

needed it, and 4) classmates who they did academic assignments with the last week. In the

second interview the four from the first interview was asked again plus two additional

questions. The two additional questions were 1) about if they had noticed if they and their

classmates had changed their behavior since the first interview, and 2) a twofold question

about would they consume a price alone or share it with others.

The measures include number of nodes, degree, centralization, connectedness and

fragmentation, and reciprocity.

Materials

For recording of the interviews, the imbedded voice recording app from Apple

Computers on an Apple iPhone 7, 128 GB, smartphone is used. The data is first put into a

matrix using Microsoft Excel run on a MacBook Air, 13" screen, with Mac OS Big Sur 11.5.1

operating system, 8GB RAM, 256 GB SSD, and 1M processor. Consequently the matrix are

put into UCINET 6 for Windows software package for social network analysis (Borgatti et al.,

2002), run on a Hewlett Packard 14" screen laptop, Window 10 64 bit operating system,

AMD Ryzen 5 4500U processor, 8 GB RAM, 512 GB SSD. A consent letter is sent out to the

pupil's guardians for written consent for their child to participate, this is distributed by the

school. It was also used the following interview guide:

1) Instructions to pupils prior to asking the research questions:

I am going to ask you six questions about your interactions with your classmates, and you should nominate the peers who fit the questions' description with their first and last name, if possible, as well as their classroom. The names will be re-coded in a way that we will not know which specific students you indicated to each question. The students that you list will not know that you listed them in this study, nor you will be informed if anyone listed you. Also, your answers will not be used for any class or school purpose.

2) Questions:

1. Nominate the classmates with whom you played the most this week.

2. Nominate the classmates that helped you this week when you needed it.

3. Nominate the classmates that you helped this week when they needed.

4. Nominate the classmates with whom you did academic assignments with this week.

   Second interview the first four questions plus:

5. Can you describe the changes in your interactions with classmates?

6. Imagine there is a mystery surprise bag in your school this week, filled with folded papers. Each folded paper has the name of one of your favorite indoor and outdoor activities – as playing board games, riding a bike, watching a movie, playing with slime, sledding, playing videogames, etc. Imagine you have been drawn to pick <u>five</u> surprises for you, which means you would be able to play with one of them on each day of this week at a free period in the school, beginning today.

   a. If you could invite classmates to join you in the activities, who would you invite?

   b. If you could not invite anyone to join you in the activities, you would have the option to share with others the chances of picking up surprises for them. In this case, instead of keeping <u>five</u> surprises for you alone, you would keep <u>three</u> surprises for you, and let your classmates pick the remaining <u>two</u> surprises for them. Who would you let pick up <u>two</u> surprises for them?

Setting

The interview takes place in a group-study room at the elementary school, approximately 4 by 6 meters in size. There's a desk and chair for the pupil to sit at, and a desk and chair for the researcher to sit. The researcher and the pupil face each other during the interview.

Data Analysis

Relational data from each time-point are analyzed in terms of the average distance between peers, the network density, indicators of inclusion/exclusion, and measures of cluster coefficient. Data from the two moments has been compared for the screening of structural differences and steady patterns over time.

Ethical Considerations

Today's ethics are based on thousands of years of practice that strived to be compassionate (Bailey & Burch, 2016). Ethics can be said to have three branches: normative ethics, meta-ethics, and practical ethics. These three branches influence values and guide professional applied behaviorist in their work to ensure that they do not inflict harm to others (Bailey & Burch, 2016). For Behavior Analysis, as for other scientific fields, Koocher and Keith-Spiegel's nine ethical principles (1998, in Bailey & Burch, 2016, p. 15) are very applicable to ensure good ethical practice. They are as follows (Bailey & Burch, 2016, pp. 15-24): 1) Doing no harm. To do no harm reminds the behavior analyst to be lawful, not do anything they are not competent to do, and offer all the information necessary to take decisions. 2) Respecting autonomy, this holds the behavior analyst responsible to ensure that one is promoting independence or self-sufficiency. 3) Benefiting others, this is the primary purpose for a behavior analyst to be of benefit for others in whatever situation. 4) Being just means to treat others the way one wants to be treated. 5) Being faithful means that the behavior analyst manages the trust given by being honest and loyal. 6) According to dignity,

this makes the behavior analyst responsible for ensuring that the client is treated with dignity and respect. 7) Treating others with caring and compassion means that the behavior analyst must see to that the clients have choices and that they as professionals show sympathy and care. 8) Pursuit of excellence. The behavior analyst must strive to be up to date on the latest research in the filed one is conducting their work. 9) Accepting accountability. A behavior analyst is given a great responsibility when analyzing the behaviors of others and giving advice for treatment. Therefor the behavior analyst is accountable for making sure that the treatment is proper, justified, and worthy to be considered.

In this study these ethical considerations have been a guidance to ensure that the participation in the study does not imply risks to the participants' physical and psychological integrity. The information gathered are regarded confidential and are not shared with anyone outside the research team. All data were anonymized, kept on an encrypted memory stick, and stored in a password protected box kept in the home of the researcher. Everything was deleted when the project was ended. Informed consent from parents was collected which the participation was based upon. The consent letters were also stored in a password protected box kept in the home of the researcher. The parents were informed in the consent letter that their child's name could be nominated by their peers even if they decided to not authorize their participation in the study. Anonymization would serve the purpose of protecting their child's data. In addition, the pupils were given the choice to withdraw from participating before, during and after the interview regardless of parental consent, see Appendix A for information of oral consent. The consent could be withdrawn at any time without any penalty or loss to the pupil. Data collection and handling were performed following the standards outlined by the General Data Protection Regulation (GDPR), and Oslo Metropolitan University, see Appendix B for a summary on the basis of the risk assessment. The project

was submitted to and approved by The Norwegian Center for Research Data prior to the data

collection under the reference code 814594, see Apendix C for the approval letter.

Results

The pupils were asked to nominate peers form their classroom, both those that

participated in the study and peers that did not. They also ended up nominating peers from

their parallel class. Nominations of peers from parallel classes were not excluded due to it

could give a wrong image of the pupils' network enclosed within their level of education.

Pupils form the same classroom have the letter B assigned to their id-number. From the

number 1 to 19 are those that participated in the study, numbers from 20 to 26 are not

participants. Pupils form the parallel class are assigned the letter A in their id-number.

Nominated pupils that are not participants will end up as not being reciprocal in the network.

Data from questions 1,2, 3,4, 6a and 6b are analyzed through the UCINET whole-

network measures. The following measures are presented: ties, average degree, centralization,

connectedness, fragmentation, and arc reciprocity.

Regarding questions about nominating 1) the classmates with whom you played the

most this week, 2) the classmates that helped you this week when you needed it, 3) the

classmates that you helped this week when they needed, and 4) the classmates with whom you

did academic assignments with this week, the results from the two time-points, January

2021(time point 1) and June 2021(time point 2) are compared.

Comparisons of node data from the two timepoints show that the number of nodes in

the networks are almost the same size (28 -> 29) for questions 1 – 4.

Ties and Average Degree

Results from question 1 (see Table 1) show that regarding the ties there has been a

reduction going from time point 1 to time point 2 (85 -> 70). This indicates that each of the

pupils played with less classmates at the end of the school year than at the beginning of the

spring semester. That is, for each pupil their groups of friends became less diversified between the two time points. This is supported by the average degree, that has also diminished between the two time points (3.036 -> 2.414).

The results from question 2 (see Table 1) show a reduction in ties between the two time-points (13 -> 11) indicating that each pupil was helped less by classmates at time point 2 that at time point 1. This is supported by the average degree, that has also diminished between the two time points (0.464 -> 0.379).

Question 3 (see Table 1) show an increase in ties between the two time points (17 -< 19) which indicates that the pupils helped more classmates at point 2. This is supported by the average degree with an increase between the two time points (0.607 -< 0.655).

Results from question 4 (see table 1) shows that the ties have reduced from point 1 to point 2 (38 -> 28). Indicating that each pupil worked with less classmates at the second point, that is the group of classmates which they worked together with became less diversified. The average degree supports this since this also has been reduced form point 1 to point (1.357 -> 0.966).

In comparison network for question 6a and 6b (see table 1) the ties were more than twice the number for the network for question 6a than 6b (76 -> 30), and more than double the level of average degree (2.621 -> 1.034).

Connectedness and Fragmentation

Regarding connectedness in question 1 (see table 1) there is a decrease from point 1 to point 2 (0.485 -> 0.267) and consequently an increase in fragmentation (0.515 -< 0.733). Question 2 (see Table 1) show a decrease in connectedness from time point 1 to time point 2 (0.022 -> 0.016) and an increase in fragmentation (0.963 -< 0.984). Results from question 3 (see Table 1) show a decrease in connectedness from point 1 to point 2 (0.048 -> 0.027), and consequently an increase in fragmentation (0.952 -< 0.973), which can be seen as a highly

fragmented. Looking at the results form question 4 (see Table 1), there is a decrease in connectedness (0.091 -> 0.086) and an increase in fragmentation (0.909 -< 0.914), a highly fragmented network. For question 6a and 6b (see table 1) there is a decrease in connectedness from the first scenario to the second (0.229 -> 0.092), and an increase in fragmentation (0.771 -< 0.908), the second network is highly fragmented.

Arc Reciprocity

The arc reciprocity in question 1(see table 1) falls from time point 1 to time point 2 (0.612 -> 0.429), this suggest that the pupils nominate more peers at time point 2 that do not nominate them as classmates they play with. Results from question 2 (see table 1) show that arc reciprocity has an increase from time point 1 to time point 2 (0.154 -> 0.182) suggesting that the pupils nominate more peers at time point 1 that do not nominate them as classmates that helped them back. In Question 3 (see table 1) the arc reciprocity falls to zero from time point 1 to time point 2 (0.235 -> 0), suggesting that the pupils nominated more classmates at time point 2 that do not nominate them back. This calls attention to that the pupils think they helped more classmates than helped them. Results from question 4 (see table 1) show a reduction in arc reciprocity (0.632 -> 0.214). A probable explanation is that the pupils nominate more classmates at time point 1 that do not nominate them. In the comparison of the networks for question 6a and 6b (see table 1) the arc reciprocity falls from scenario 1 to scenario 2 (0.342 -> 0.133) but there is still some reciprocity in scenario 2.

Centralization

Comparing the centralization data going from time point 1 and 2 in question 1 (see table 1) show that the domination by a single actor is diminished. Especially in terms of in-centralization (0.152 -> 0.133) – those that are selected as frequent playmates in comparison to those that name several playmates. The centrality measures for each pupil for question 1 (see Figure 1) show that pupils 5B4 and 5B9 have no nomination in the indegree and they

only nominate one or two peers that they had played with. This could at that point indicate

that they are more isolated. The same is shown for 5B4 at point 2, 5B9 however got one

nomination at time point 2 and nominated 6 others. At the other end at time point 1 the ones

that are more in the center of it all are 5B2, 5B11 and 5B14. At time point 2 (see Figure 2) it

is a bit more fragmentation but 5B3 and 5B11 both have central roles based on the indegree

and outdegree measures. 5B7 goes from nominating a total of seven at time point 1 to only

nominating one at time point 2. At point 2 5B7 get a total of seven nominations which can

indicate this pupil as more central based on these nominations.

Centralization in question 2 (see table 1) has been diminished from time point 1to time

point 2 (Deg Centralization 0.085 -> 0.050, Out- Centralization 0.097 -> 0.060, and In-

Centralization 0.059 - < 0.060). Individually the centrality measures from question 2 (see

Figure 3) at time point 1, show by the outdegree measures that four of the participating pupils,

5B4, 5B5, 5B10, and 5B14, did not experience getting help from any of their peers during the

last week. For the same pupils the indegree measures show that they did not receive any

nomination for getting help either. At time point 2 (see Figure 4), 5B4 and 5B5 gave and got

no nominations. 5B10 gave and got 1 nomination, and 5B14 nominated 2 but got no

nominations. Two other pupils who has a contrast in the outdegree and indegree measures at

point 2 are 5B9 and 5B12. 5B9 show 2 outdegree and 0 indegree nominations at both time

points. 5B12 gave 3 nominations at time point 1 and 2 at time point 2, but 5B12 got no

nominations at both time points. 5B1, 5B7, 5B13, 5B15, 5B16 and 5B17 of the participating

pupils gave and got no nominations at time point 2 in contrast to point 1 were 5B1 and 5B17

gave one nomination but got none. 5B7, 5B15 and 5B16 got each one nomination, 5B13 gave

and got one nomination at time point 1.

From question 3 (see table 1) the results show that centralization increased from time

point 1 to time point 2 (Deg Centralization 0.077 -< 0.142, Out- Centralization 0.053 -<

0.161, and In- Centralization 0.092 - > 0.050). One cause can be due to that some pupils said that they helped a lot of others. Outdegree and indegree centrality measures at time point 1for each participating pupil, shows for question 3 (see Figure 5) that the majority say that they gave help to their peers. Five of the pupils did not nominate any they gave help to (pupils 5B2, 5B11, 5B13, 5B14 and 5B15). Only one of these five, 5B13, got a nomination for giving help. At time point 2 (see Figure 6) the data show that 9 of the 19 participants did neither nominate peers they helped or get nomination for giving help. Of those that did nominate, four nominated more than one peer that they helped, and got the same number of nominations in return. One that stands out for giving and getting most nominations is 5B12. 5B12 gave and got 5 nominations, which makes 5B12 in this context a central figure.

Results from question 4 (see table 1) show that centralization diminished form time point 1 to time point 2 (Deg Centralization 0.125 -> 0.087, Out- Centralization 0.102 -< 0.112, and In- Centralization 0.140 - > 0.075). The individual outdegree and indegree centrality measures for question 4 (see Figure 7), show at time point 1 that all but two of the 19 participants nominated one or more peers they did academic work with during the last week. At time point 2 (see Figure 8) the data show at all but one did nominate one or more they did academic work with. When it comes the Indegree measures at time point 1, there are some pupils that does not get nominations even though they give it, these pupils are 5B1, 5B7, 5B9, 5B12, 5B17 and 5B18. At the other end at point 1 5B2, 5B3, 5B11, 5B13, 5B14, and 5B16 got two or more nominations. Indegree data at point 2 shows four of the participating pupils that did not get any nominations (5B1, 5B3, 5B12, 5b17), and six got two or three nominations (5B2, 5B7, 5B8, 5B11, 5B13, 5B14).

Results from question 6a and 6b (see table 1) when it comes to connectedness, there is an overall reduction going from scenario 1 to scenario 2 (Deg Centralization 0.217 -> 0.233, Out- Centralization 0.162 -> 0.036, In- Centralization 0.236 -> 0.184). For 6a the outdegree

and indegree measures for the individual participating pupils show that all but two, 5B2 and 5B3 who gets zero, nominates (outdegree) two or more peers, and all but two, 5B17 and 5B18, gets one or more nominations (indegree). 5B7 nominates 5 and gets 7 nominations, this indicates that this pupil is both one of the most social and one of the most popular. There are several very social pupils in the group. They nominate five or more pupils, but they do not get as many nominations, e.g., 5B17 nominates seven but only gets one nomination (see figure 9). For question 6b, the measures show (see Figure 10) that two nominates no one, they are 5B3 and 5B13, but both gets one nomination each. The rest nominates one or two. A total of nine participating pupils don't get nominated. The nine peers that are not participants get nominated, eight of them gets one nomination, and one, 5B25, gets two. 5B7 is the one that gets the most nominations, six in total, one less than in question 6a. Such a number can draw a hypothesis that this pupil is quite popular.

Question 5

Regarding if they have noticed if they and their classmates have changed their behavior since the first interview, asked at the second timepoint, showed that 37% of the students noticed a change in their behavior, that is 7 out of 19 pupils. The ones that reported a change said that they talk more together, 5 out of 7, 71,5%. One said they were more together as a larger group, and one said they had gotten to know each other better.

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Summarization and Discussion

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The first thing that stands out is that the networks are small and the networks in questions 2, 3, 4 and 6b are highly fragmented. The question is then what can be the reasons for this highly fragmentation? Since March of 2020 there has been a pandemic, the sars-CoV-2 aka Covid-19, in the world that has had great impact on all lives. It has caused intrusive restrictions shutting down all normal life for a long period of time. The restrictions have affected the lives of children and youth in ways society has not yet got a clear picture of

(Nøkleby et al., 2021). Their social arenas have been closed, and schools have had to shut down and been replaced with school over the internet, and when schools have been open it has been with restrictions. Pupils have had to be in quarantine, they have not been able to hang out with friends, have birthday parties and so forth (Nøkleby et al., 2021). The pandemic is a variable that most likely have played a role in affecting their behavior and their answers.

Other reasons that come to mind is the way they are organized in the classroom; they use the teaching model of learning pairs or partners. The model organizes the pupils in pairs of two where they work together on assignments and are encouraged to support each other with the academic work. The goals for the model are for the pupils to learn to cooperate with each other, evaluate and support each other, and to help each other to reach the goals in the curriculum (Olsen & Aasland, 2013). From information retrieved through the conversations during the interviews the pupils at least a couple of times during the semester changed learnings partners, this change is teacher-led. Might this learning partnership hinder diversity in who they interact with in academic work and thus lead to a more fragmented network? It can be a plausible hypothesis.

Another segment connected to academic work is the fact that the pupils report that they are helped less by their classmates at the end of the year than at the start of the semester. The data can suggest that the pupils are not used to helping each other, or that they don´t define help the same way as adults might do. Considering that they are used to working in pairs and might not see that they often help one another during this work and might not ask for help or be asked for help explicitly. But it is interesting that from the network in question three the data suggest that the pupils think they help others more than they themselves are helped. The data also show that who they played with got less diverse as time went by and got to the end of the school year. Some pupils report in question five at the second time point that they have noticed a change in how they interact with one another. They mature at different

rates and get to know their peers better as time passes, consequently this can be seen as reasons for this change in diversity. They have found their friends that they match with and keep to their more defined friendships.

When asked about sharing and giving up prizes in questions 6a and 6b the networks are noticeable different. If they can take part in the activities, they are very willing to share with their classmates, most of the pupils also expressed that it was more fun to share with other than doing all the activities by themselves. When asked to give up activities so that others could benefit, their sharing behavior were put to the test. From the data alone one can see that their sharing behavior gets more fragmented. Only two ends up keeping it all for themselves, the rest either picked one or two. It is worth mentioning that all the pupils expressed that they did not take the questions lightly, and they were concerned with fairness. From the perspective of prosocial behavior and altruism the results from 6a and 6b shows a decline in their prosocial behavior and altruistic behavior. From a behaviorist's view of these behaviors the decline can be explained by the reduction or lack of social reinforcements. It could be that many of the pupils have not experienced social reinforcement in scenarios like the one in 6b. Another explanation is that they discount the value of the reinforcer that may be a consequence. Looking at it from the theory of social discounting one could draw the conclusion that they discount based on what they recon is a social distance. The more distance between them, the less value there is in sharing when they cannot take part in the activities. As Rachlin (2015) states, the closer they feel to their peers more likely they include them in their social space to maximize the reward. Because the network is fragmented it is likely they don't feel that close to many of their peers when it comes to sharing and giving away rewards and they discount at a steeper rate.

What can the results say about the risk of maladaptive behaviors? From the definition provided by Schreuders et al. (2018) there is a risk of developing maladaptive behaviors if

one aims to maximize the outcomes only for one self. Schreuders et al. (2018) also mentions that behaviors that lead to relationships based on dislike can be seen as maladaptive. Nesdale and Lambert (2007) mention behaviors that lead to non-nurturing relationships as risk factors, behaviors like disruptive behaviors, aggressive behaviors, and disobeying authorities. Based on the results this is a fragmented classroom where there are pupils that have loosely connections to the group. This loose connection can at least be a seen as reminder investigate their relationships closer and be aware of signs of behaviors that can be maladaptive. Those pupils that does not get any nominations are the once that can be in risk of engaging in maladaptive behaviors or having a lack of nurturing relationships. Results show that there is a decline in what one would define as prosocial behaviors from time point 1 to time point 2, behaviors like helping each other and working together. It is not clear that this is a warning sign for maladaptive behaviors, but it should be an area of focus.

Social Network Analysis and the Good Behavior Game

How can Social Network Analysis be used in combination with the Good Behavior Game? The Good Behavior Game has proven to be an effective intervention to improve both academic and social behaviors (Bowman-Perrott et al., 2016; Sewell, 2020). The Social Network Analysis is effective to detect patterns and the structure of relational data in a network or networks in classrooms (Grunspan et al., 2014). Social Network Analysis can make it easier to pinpoint behaviors that need to be addressed. SNA allows the user to "see" the structure of certain types of interactions rather than "only" analyzing the interactions from a functionalist perspective. As Bento et al. (2020) states network analysis contribute with analysis of emergent phenomena from the past or recent happenings on a complex level of group interactions, and how complex information and behavior reaches the actors in the network. They also emphasize that using the strength of Behavior Analysis when it comes to analyzing behavior in the present and making interventions that can utilize the network

analysis will broaden both fields (Bento et al., 2020). Therefore, it is plausible statement to say that Social Network analysis can contribute valuable information to Behavior Analysis and the use of the Good Behavior Game when the phenomenon of interest involves the interaction between individuals in a group.

Based on the results from the Social Network Analysis in this case study there is several social behaviors that the Good Behavior Game can be useful as an intervention. It can help the pupils to meet more of their peers and learn behaviors that help them identify how to recognize how and when they seek help and give help to others and give them the opportunity to establish new ties. The same can be the case for academic work, they can be encouraged to work together in larger groups or with others than just the person sitting beside them. The Good Behavior Game can also be directed at promoting socializing with peers they might not otherwise would think of getting to know. The Social Network Analysis can work as a pre-analysis to find the behaviors one would focus on in the Good Behavior Game intervention, and it can be used as an efficiency measure for the intervention in a post-analysis. Particularly to measure if the pupils become more connected and if their position in the network changes over time.

Limitations

There are limitations to this study. First knowledge about how the teachers organizes their lessons and what are the overall goals for the curriculum are paramount to fully draw conclusions. Conclusions about what kind of questions one would ask to better collect data that would give a clear picture of the everyday life of the pupils' networks in a school setting, to get this it would require observations in classrooms and in recess. Furthermore, the way the questions are formulated can be an issue. We cannot be sure without a doubt that the pupils fully understood the questions, or at least had the same understanding of the meaning as we did. If they did express uncertainty, we did try to the best of our abilities explain to minimize

misunderstandings. In future studies it would be a good idea to maybe have a screening of the

questions with the same age group with the aim to use language that leaves little doubt about

what is asked.

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Table 1

Whole Network Measures at Time Point 1 and 2

| Network	Ties		Avg degree		Connectedness		Fragmentation		Arc reciprocity	
	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
Play together	85	70	3.036	2.414	0.485	0.267	0.515	0.733	0.612	0.429
Peer support										
Get help	13	11	0.464	0.379	0.022	0.016	0.978	0.984	0.154	0.182
Help peers	17	19	0.607	0.655	0.048	0.027	0.952	0.973	0.235	0.000
Academic assignments	38	28	1.357	0.966	0.091	0.086	0.909	0.914	0.632	0.214
Share benefits		76		2.621		0.229		0.771		0.342
Give away benefits		30		1.034		0.092		0.908		0.133

Figure 1

Directed Network of Peers Playing Together at Time-point 1
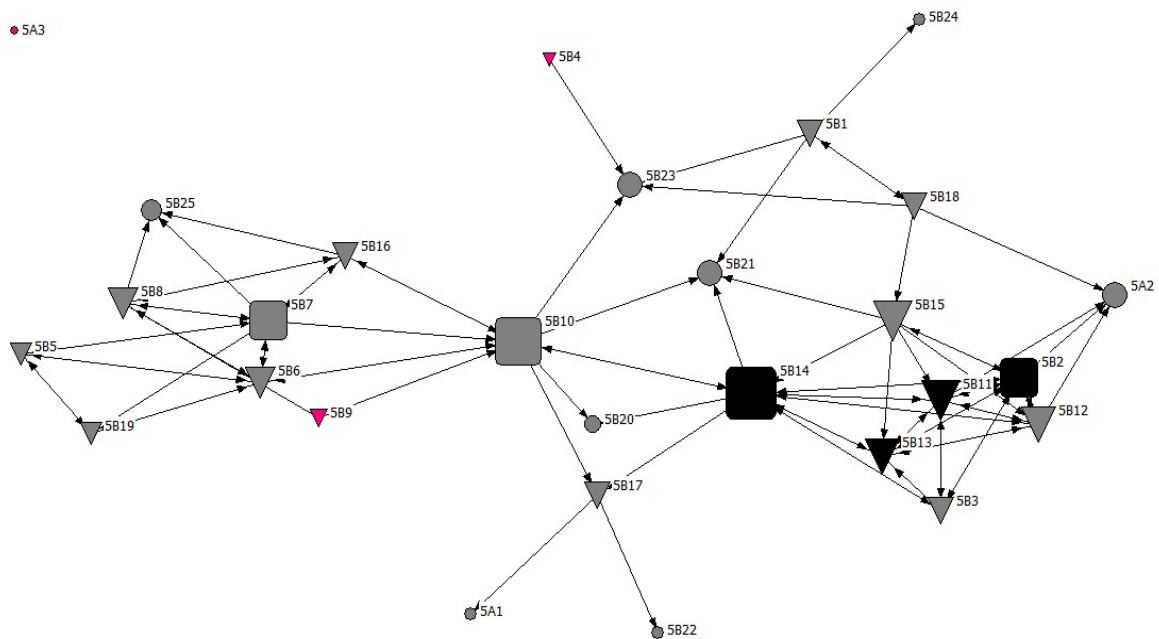
Note. The figure shows the indegree and out degree measures for each individual pupil at time -point 1 for question 1 about who they play with. Indegree measures are shown in colors and outdegree measures are shown as shapes. The indegree colors are pink = 0 nominations, grey = 1 to 5 nominations, and black = 6 and 7 nominations. The outdegree shapes are circle = 0 nominations, down triangle = 1 to 6 nominations, and rounded square = 7 and 9 nominations.
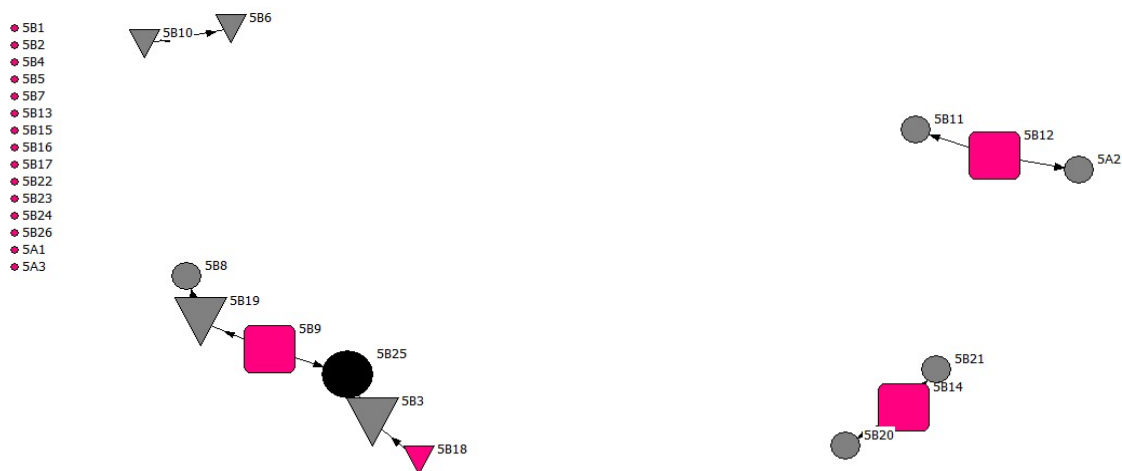
Figure 2

Directed Network of Peers Playing Together at Time-point 2
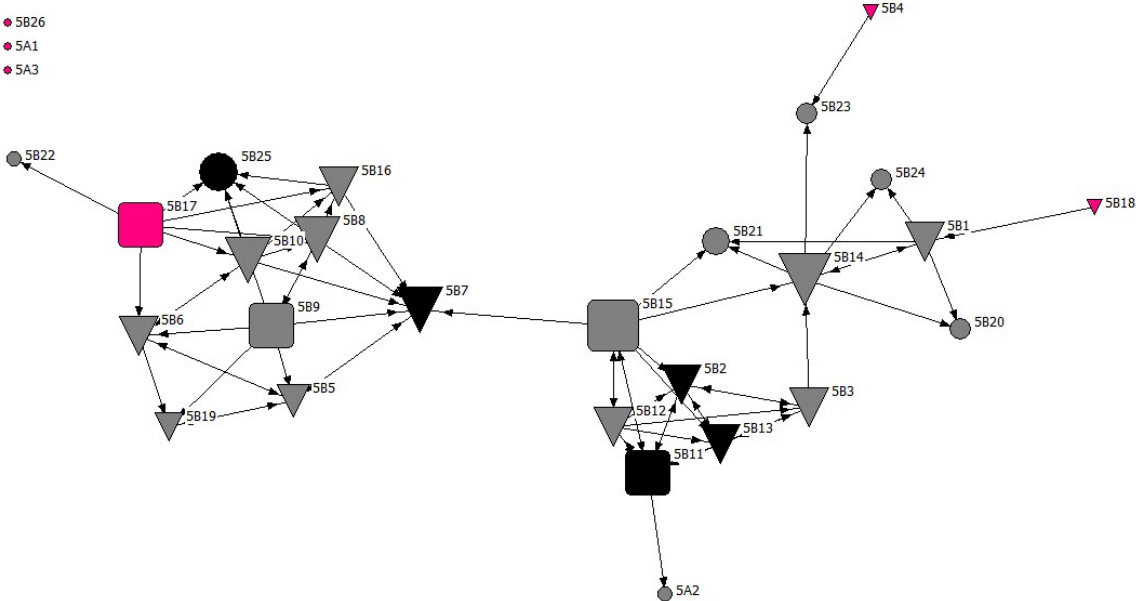
Note. The figure shows the indegree and out degree measures for each individual pupil at time-point 1 for question 1 about who they play with. Indegree measures are shown in colors and outdegree measures are shown as shapes. The indegree colors are pink = 0 nominations, grey = 1 to 4 nominations, and black = 5 and 6 nominations. The outdegree shapes are circle = 0 nominations, down triangle = 1 to 5 nominations, and rounded square = 6 and 7 nominations.
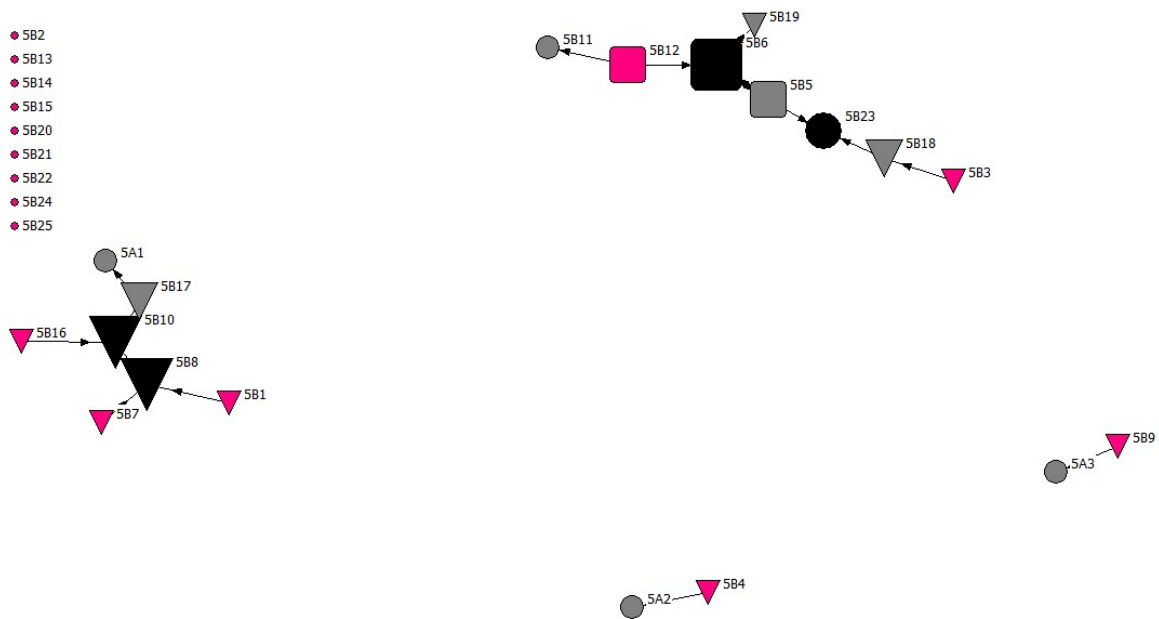
Figure 3

Directed Network for Getting Help at Time-point 1
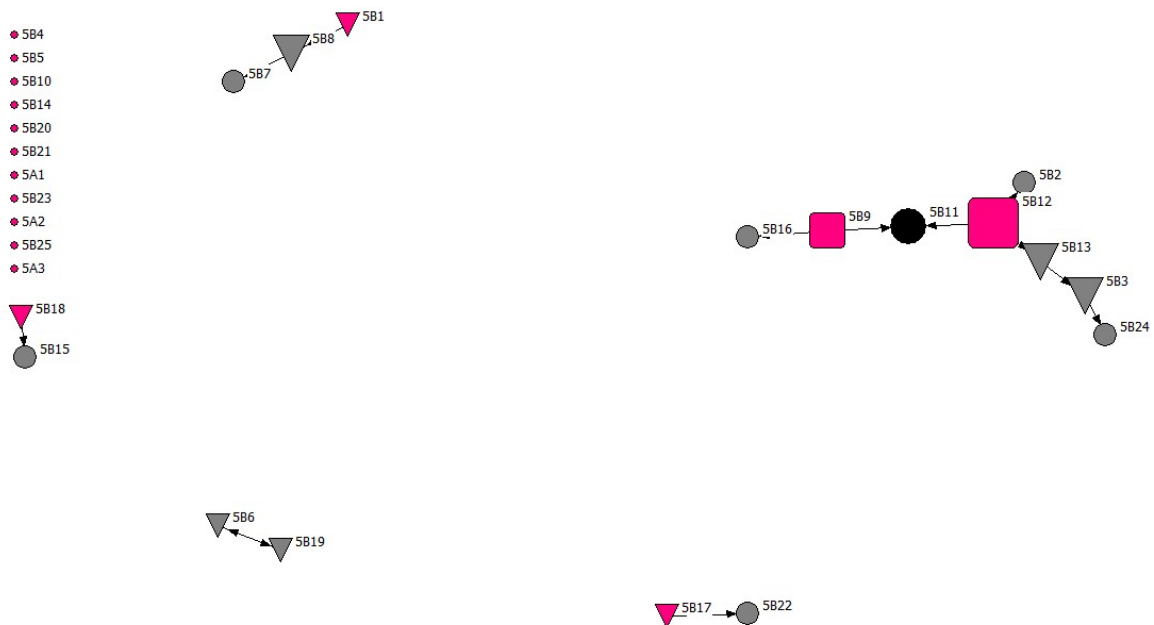
Note. The figure shows the indegree and out degree measures for each individual pupil at time-point 1 for question 2 about if they got help. Indegree measures are shown in colors and outdegree measures are shown as shapes. The indegree colors are pink = 0 nominations, grey = 1 nomination, and black = 2 nominations. The outdegree shapes are circle = 0 nominations, down triangle = 1nomination, and rounded square = 2 - 3 nominations.

Figure 4

Directed Network for Getting Help at Time-point 2

Note. The figure shows the indegree and out degree measures for each individual pupil at time-point 2 for question 2 about if they got help. Indegree measures are shown in colors and outdegree measures are shown as shapes. The indegree colors are pink = 0 nominations, grey = 1 nomination, and black = 2 nominations. The outdegree shapes are circle = 0 nominations, down triangle = 1nomination, and rounded square = 2 nominations.
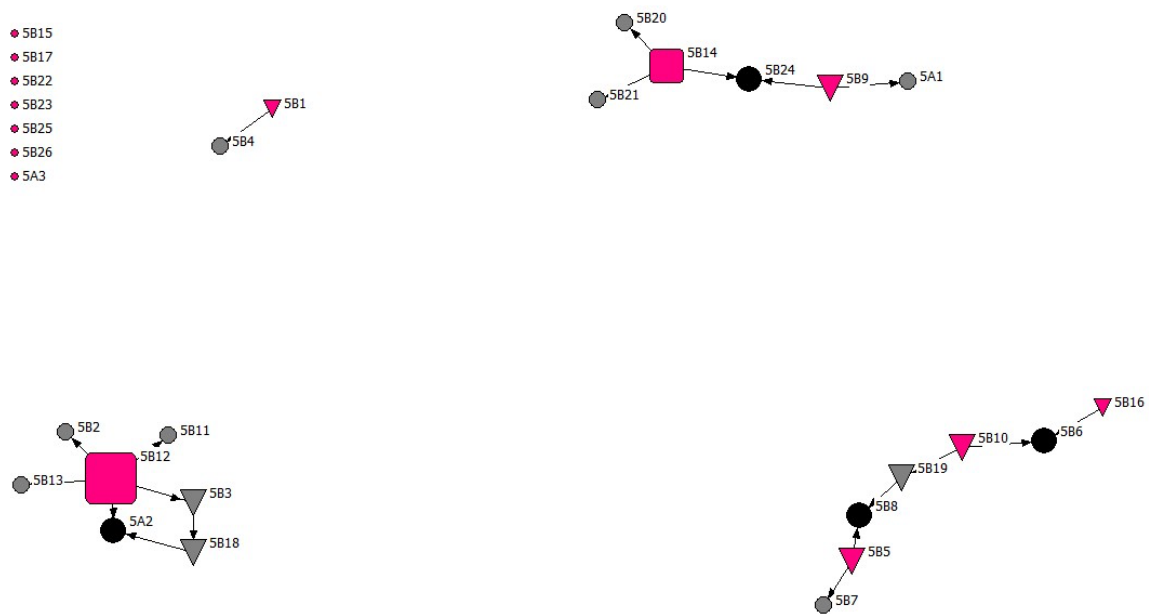
Figure 5

Directed Network for Helping Peers at Time-point 1

Note. The figure shows the indegree and out degree measures for each individual pupil at time-point 1 for question 3 about if they helped peers. Indegree measures are shown in colors and outdegree measures are shown as shapes. The indegree colors are pink = 0 nominations, grey = 1 nomination, and black = 2 - 3 nominations. The outdegree shapes are circle = 0 nominations, down triangle = 1nomination, and rounded square = 2 nominations.
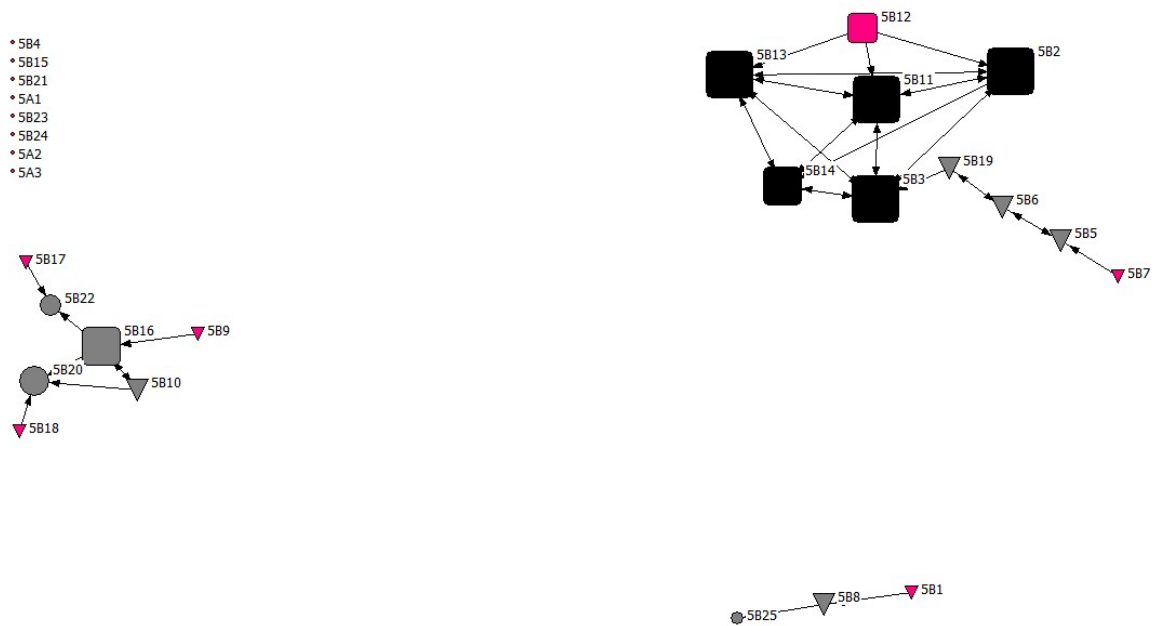
Figure 6

Directed Network for Helping Peers at Time-point 2

Note. The figure shows the indegree and out degree measures for each individual pupil at time -point 2 for question 3 about if they helped peers. Indegree measures are shown in colors and outdegree measures are shown as shapes. The indegree colors are pink = 0 nominations, grey = 1 nomination, and black = 2 - 3 nominations. The outdegree shapes are circle = 0 nominations, down triangle = 1nomination, and rounded square = 2 nominations.
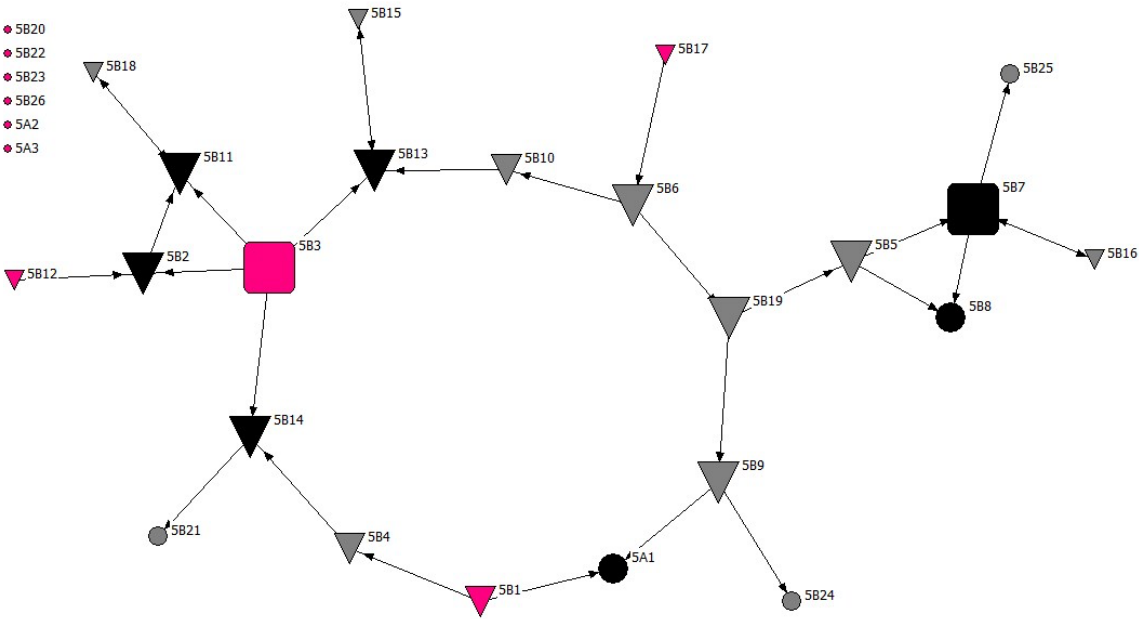
Figure 7

Directed Network for Academic Assignments at Time-point 1

Note. The figure shows the indegree and out degree measures for each individual pupil at time -point 1 for question 4 about academic assignments. Indegree measures are shown in colors and outdegree measures are shown as shapes. The indegree colors are pink = 0 nominations, grey = 1-3 nominations, and black = 4-5 nominations. The outdegree shapes are circle = 0 nominations, down triangle = 1-2 nominations, and rounded square = 3-4 nominations.
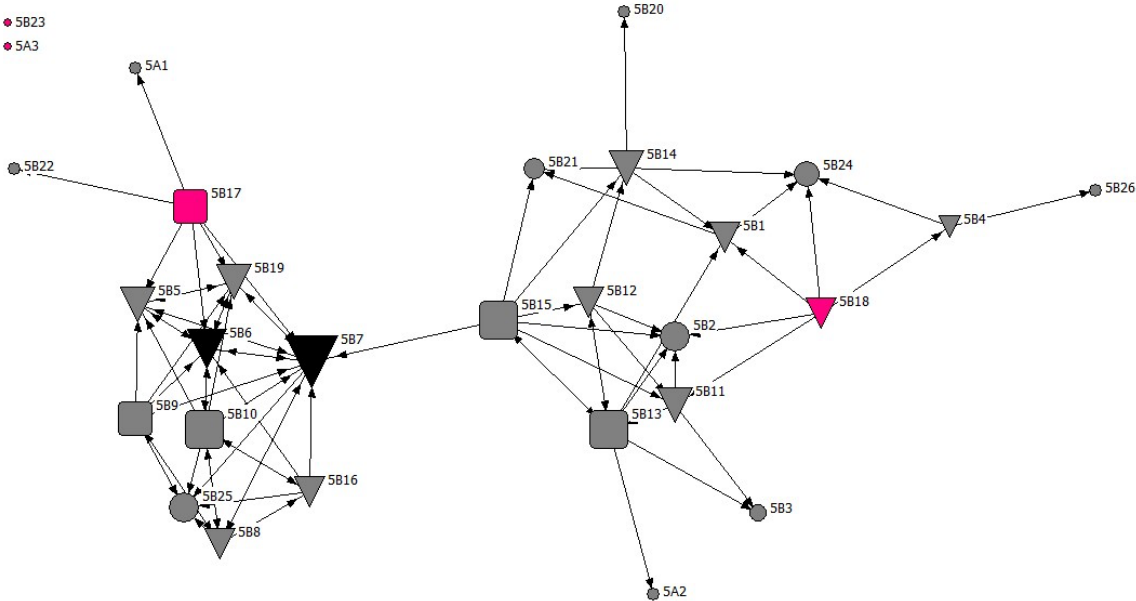
Figure 8

Directed Network for Academic Assignments at Time-point 2

Note. The figure shows the indegree and out degree measures for each individual pupil at time -point 2 for question 4 about academic assignments. Indegree measures are shown in colors and outdegree measures are shown as shapes. The indegree colors are pink = 0 nominations, grey = 1 nomination, and black = 2-3 nominations. The outdegree shapes are circle = 0 nominations, down triangle = 1-2 nominations, and rounded square = 3-4 nominations.
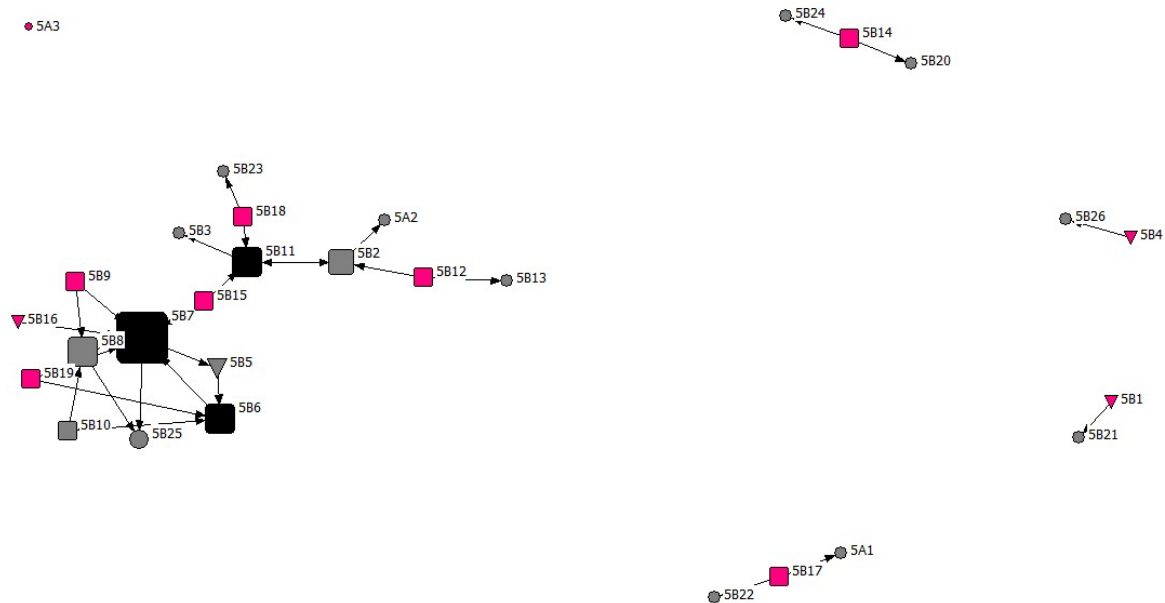
Figure 9

Directed Network for Sharing Benefits at Time-point 2

Note. The figure shows the indegree and out degree measures for each individual pupil at time -point 2 for question 6a about sharing benefits. Indegree measures are shown in colors and outdegree measures are shown as shapes. The indegree colors are pink = 0 nominations, grey = 1-6 nominations, and black = 7 and 9 nominations. The outdegree shapes are circle = 0 nominations, down triangle = 2-5 nominations, and rounded square = 6-7 nominations.

Figure 10

Directed Network for Giving Away Benefits at Time-point 2

Note. The figure shows the indegree and out degree measures for each individual pupil at time -point 2 for question 6b about giving away benefits. Indegree measures are shown in colors and outdegree measures are shown as shapes. The indegree colors are pink = 0 nominations, grey = 1-2 nominations, and black = 3 and 6 nominations. The outdegree shapes are circle = 0 nominations, down triangle = 1 nomination, and rounded square = 2 nominations.

Appendix A

General Information for Oral Consent

You are being invited to continue your participation in the study "Connectedness among pupils". Your parents have given consent to your participation. We are interested in learning about social interactions in a fifth-grade classroom throughout one academic year, which will help us understand how peer connection in school change over time. Your participation in the project is voluntary, and if you do not want to participate or withdraw later, it will not affect your relations with the school and/or teachers. The questions from the study are related to a few of your interactions with classmates in the past week, and your responses are completely confidential. No one will know that you are participating in this study, and we will not give information about your answers to strangers. The study results will be published in a scientific article, but it will not be possible to identify the children who participated, nor their classrooms or school. If you have any question, feel free to ask us now or at any time you wish. You will receive the researchers' phone number and e-mail address in case you want to contact us later. Would you like to participate?

Appendix B

Summary/Action Plan on the Basis of the Risk Assessment

Case number of the ROS-Analysis: 20/10901-30
Brief description of the measures taken for data protection in the face of risk elements.

Data collection: In situations where it was necessary to resort to an additional source to complete the information about nodes (children) nominated in the interviews, research data confidentiality was a priority. It was protected via keeping the interviews' content completely restricted. The data availability to the research team was resolved by reaching out to the headmaster to confirm the classrooms to which the students belong, preventing the need of discarding the incomplete data from a few nodes. The risk of confidentiality breach is very low, almost null, since the content of the interviews and the informants' identities were preserved. The availability risk was resolved. No additional measures seem necessary.

Storage of data: The original data, collected through notes and audio recordings of interviews with the participants, was and is stored with a high degree of security and very low probability of breaches in terms of the information falling into the wrong hands or being disclosed to unauthorized persons. Two researchers from the research team have conducted the interviews, and the original data is stored in password protected boxes (physical), located at their home offices. The measures taken are considered sufficient to control the risks of breaches in confidentiality, integrity and availability of the stored data. No additional measures seem necessary.

Sharing of data and data analysis: In the situation regarding an external researcher entering the research team, data protection was also a top priority. No file with original or anonymized data was exchanged via email. Only metrics generated in the software UCINET from fragments of the anonymized data and with no clear link to both original or anonymized data were exchanged. However, as the external researcher provides supervision in the project regarding the social network analysis perspective, it would be preferable if she could access at least the complete files with the anonymized data in order to facilitate her supervising role. The way we have been working now imposes certain contraints to the research speed, since the other members in the study team are less experienced in the UCINET software, as well as in treating and analyzing the data using the social network analysis framework. Besides the work plan that has been defined on a weekly basis, NSD was consulted on whether it was possible to allow for the external co-workers from outside the EU/EEA to have access to the research data. Due to the complexity of doing so, and to the need of asking the parents for another consent, it was decided to keep the researcher from outside EU/EEA without access to personal data.

Project conclusion: The dissemination of the research findings might need to go under one restriction, in case adding the students' attribute of their spoken language at the network analysis enable the partial identification of participants by close persons. The discussion about the risks of this event is ongoing, and it is clear to the research team that no data that leads to participants' identification will be published, in order to protect their data. Although this can represent one limitation to the study, the confidentiality of the informant's participation and nominations in the interviews have a higher priority degree. Thus, confidentiality was assessed as more critical than availability and dissemination, in this case.

Appendix C

Message NSD 11.12.2020 08:07

Det innsendte meldeskjemaet med referansekode 814594 er nå vurdert av NSD. Følgende vurdering er gitt: Our assessment is that the processing of personal data in this project will comply with data protection legislation, so long as it is carried out in accordance with what is documented in the Notification Form and attachments, dated 11.12.2020, as well as in correspondence with NSD. Everything is in place for the processing to begin. NOTIFY CHANGES If you intend to make changes to the processing of personal data in this project it may be necessary to notify NSD. This is done by updating the Notification Form. On our website we explain which changes must be notified. Wait until you receive an answer from us before you carry out the changes. TYPE OF DATA AND DURATION The project will be processing special categories of personal data about ethnic origin and health, and general categories of personal data, until 31.08.2021. LEGAL BASIS: THE SAMPLE The project will gain consent from the parents of the data subjects to process the children's personal data. We find that consent will meet the necessary requirements under art. 4 (11) and 7, in that it will be a freely given, specific, informed and unambiguous statement or action, which will be documented and can be withdrawn. The children will also give their consent. The legal basis for processing special categories of personal data is therefore explicit consent given by the parents of the data subject, cf. the General Data Protection Regulation art. 6.1 a), cf. art. 9.2 a), cf. the Personal Data Act § 10, cf. § 9 (2). LEGAL BASIS: THIRD PERSONS During the interviews personal data about the children's classmates will be processed. This will include special categories of personal data about health. The data will be processed for only a short period of time (given the short project period); the data will be processed only in a pseudonymised form during analysis; and the third persons will be made anonymous in all presentations/publications. NSD finds that the benefit to society of such research taking place far exceeds the potential risks to the rights and freedoms of the data subjects. The project will process special categories of personal data about third persons on the legal basis that processing is necessary for scientific or historical research purposes, cf. the General Data Protection Regulation art. 6 nr. 1 e), cf. art. 6 nr. 3 b), cf. art. 9 nr. 2 j), cf. the Personal Data Act §§ 8 and 9. PRINCIPLES RELATING TO PROCESSING PERSONAL DATA NSD finds that the planned processing of personal data will be in accordance with the principles under the General Data Protection Regulation regarding: - lawfulness, fairness and transparency (art. 5.1 a), in that data subjects will receive sufficient information about the processing and will give their consent - purpose limitation (art. 5.1 b), in that personal data will be collected for specified, explicit and legitimate purposes, and will not be processed for new, incompatible purposes - data minimisation (art. 5.1 c), in that only personal data which are adequate, relevant and necessary for the purpose of the project will be processed - storage limitation (art. 5.1 e), in that personal data will not be stored for longer than is necessary to fulfil the project's purpose THE RIGHTS OF DATA SUBJECTS Data subjects (including third persons) will have the following rights in this project: transparency (art. 12), information (art. 13), access (art. 15), rectification (art. 16), erasure (art. 17), restriction of processing (art. 18), notification (art. 19), data portability (art. 20). These rights apply so long as the data subject can be identified in the collected data. NSD finds that the information that will be given to data subjects and their parents about the processing of personal data will meet the legal requirements for form and content, cf. art. 12.1 and art. 13. We remind you that if a data subject/their parents contacts you about their/their children's rights, the data controller has a duty to reply within a month. FOLLOW YOUR INSTITUTION'S GUIDELINES NSD presupposes that the project will meet the requirements of accuracy (art. 5.1 d), integrity and confidentiality (art. 5.1 f) and security (art. 32) when processing personal data. To ensure that

these requirements are met you must follow your institution's internal guidelines and/or consult with your institution (i.e. the institution responsible for the project). FOLLOW-UP OF THE PROJECT NSD will follow up the progress of the project at the planned end date in order to determine whether the processing of personal data has been concluded. Good luck with the project! Contact person at NSD: Lene Chr. M. Brandt Data Protection Services for Research: +47 55 58 21 17 (press 1)