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Now it's Your Turn. Preschool Children's Social and Emotional Interaction in Small Groups

Yili Wang[a], Anu Kajamies[b], Tarja-Riitta Hurme[b], Jarmo Kinos[b] & Tuire Palonen[b]

[a] *University of Turku, Department of Teacher Education, Finland, corresponding author, e-mail:* yiwang@utu.fi
[b] *University of Turku, Department of Teacher Education, Finland*

ABSTRACT: There is concern over social and emotional skill development in early childhood settings. The aim of this systematic observational study was to examine children's prosocial and problem behaviors in small group settings. Especially, we studied how gender and closeness of friendships influence on children's group level behavior. Altogether, nine video recordings were coded to observe peer interactions among children during tablet game sessions, where all 15 participants, aged 5 and 6 years, were allocated into four-member groups. The recordings were coded with a modified version of the Social Skills Improvement System Rating Scale. Social network analysis was employed to analyze the density and centrality of the interactions. Our results showed a wide variety of frequencies in different behaviors. In all, prosocial behavior was four times more typical than problem behavior, and there were more initiating than responding behaviors. Unlike prosocial behaviors, which were often verbal, most problem behaviors were nonverbal. The children interacted more actively with their best friends, and boys contributed more to both prosocial and problem behaviors than girls. A practical and concise peer interaction observation tool (PIOT) was developed for this study that can be used to follow children's social and emotional skills in peer interactions.

Keywords*: peer interaction, prosocial behavior, problem behavior, social network analysis*

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Introduction

Supporting children's social and emotional skills and development are highly important in early childhood education. Empirical studies have shown that positive social and emotional skills are a predictor of children's school readiness (Denham, 2006), academic performance (Walker, Ramsey, & Gresham, 2004), and success in establishing relationships with their peers and adults (Ashiabi, 2007). This has led to increased efforts to provide high-quality early childhood education to foster social and emotional skills and to ameliorate problem behaviors.

Various measurements and scales (e.g., the Sutter–Eyberg Student Behavior Inventory [Querido & Eyberg, 2003] and the Social Skill Rating System [Gresham & Elliott, 1990]) and intervention and prevention models (e.g., The Incredible Years [Webster-Stratton, Reid, & Stoolmiller, 2008] and Second Step [Brown, Jimerson, Dowdy, Gonzalez, & Stewart, 2012]) have been developed to encourage and assess social and emotional skills in children. Despite the availability of several measurements and indicators, teachers are often not sure which scale is appropriate in different cases and for different purposes.

In the present study, we tailored a peer interaction observation tool (PIOT) to assess children's social and emotional skills in everyday play sessions. We studied children's social and emotional behavior differences based on a variety of peer compositions in terms of gender and closeness of friendship ties.

Overview of social and emotional skills

Social and emotional skills in early childhood are multivariate compositions of skills and knowledge that are integrated across the emotional, cognitive, and behavioral domains of development (Domitrovich, Cortes, & Greenberg, 2007). They include the ability to understand, manage, and express the social and emotional aspects of life that enable successful handling of life tasks such as learning, forming relationships, solving everyday problems, and adapting to the complex demands of growth and development. For example, self-control, which is an aspect of social and emotional skills, includes the ability to take others' points of view into account when thinking through problem situations (Youngstrom, Wolpaw, Kogos, Schoff, Ackerman, & Izard, 2000).

On the other hand, prohibiting and reducing problem behaviors and promoting prosocial behaviors enables children to develop social and emotional skills at an early age (Darling-Churchill & Lippman, 2016; Malti & Noam, 2016). As children grow, their relationships with their peers become more complex, and their ability to be prosocial thus needs to be enhanced. However, there is also a risk that their problem behaviors will concurrently increase (Rose & Rudolph, 2006).

Prosocial behavior

Prosocial behavior is characterized by feelings of empathy and compassion and having positive attitudes towards sharing, helping others, making compromises, showing respect, and expressing positive feelings for other children. Prosocial behaviors, thus, include cooperation, inclusion, giving compliments, and comforting peers (Honig, 2004). Fisch, Truglio, and Cole (1999) have proposed that friendship, conflict resolution, cooperation, sharing, turn taking, and entering social groups are the most important aspects of social and emotional interactions. Further, children's self-control as a feature of inhibitory control is frequently discussed as one of the prosocial skills that all children should be taught (Diamond, 2012). In a 1996 study, Asher, Parker, and Walker suggested that managing disagreement and resolving conflicts with friends are among the top 10 desirable prosocial skills. Some other researchers have noted that prosocial behavior includes traits such as "follows directions" and "controls temper with peers" (Lane, Givner, & Pierson, 2004).

Mastery of prosocial behavior leads to successful interactions with peers, and peer acceptance is a primary developmental task for preschool children (Corsaro, 1985). During this period of development, child-directed peer activities provide the context wherein preschool children are supposed to share, take turns, cooperate, consider other's perspectives, and inhibit aggression. Further, improving prosocial skills and inhibiting problem behaviors should be simultaneously cultivated in children during the same time period of their lives.

Problem behavior

It has been indicated that social and emotional problem behaviors, including internal and external problems, appear at early ages (Egger & Angold, 2006). For young children, the internal problems are associated with anxiety and depression, and the external problems include aggression and impulsivity (Sterba, Prinstein, & Cox, 2007). Externalizing behavior is identified as outward acts of aggression, disruption, and defiance, whereas internalizing behavior is observed as social isolation and depression (Gresham & Elliott, 1990).

Researchers have stated that defining social and emotional problem behaviors in young children is challenging because occasional minor signs of problem behaviors are considered a part of children's normative development (Carter & Pool, 2012). Primarily, children in our study were also expected to exhibit minor signs of problem behaviors rather than severe problems such as depression. Nonetheless, problem behaviors in children can become habitual if there is no intervention to teach the child to inhibit them (Basten et al., 2016). It is, therefore, important to observe and prohibit minor problem behaviors in children to prevent them from degrading into more severe problem behaviors.

Interaction with best friends and casual peers

Friendship and social and emotional expression among peers have attracted empirical attention (Miller-Slough & Dunsmore, 2016). Friendships are defined as voluntary relationships with a strong emotional investment. Successful management of anger by using different strategies is expected and essential in maintaining close friendship ties. Previous research has reported on various aggressive, nonaggressive, and ignoring strategies that are used to solve conflicts among peers (MacEvoy & Asher, 2012; Tangney et al., 1996), and it has been found that conflicts between best friends are no shorter or less intense than conflicts between casual peers. However, friendly interaction is more likely to resume after conflicts between best friends (Hartup, Laursen, Stewart, & Eastenson, 1988). For older age groups, there is some evidence that prosocial behavior towards friends increases from early to mid-adolescence (Padilla-Walker, Carlo, & Nielson, 2015), but there is not much evidence regarding young children's behavior towards best friends and casual peers. Our earlier findings indicate that children's relationships start to stabilize at a young age (Wang, Hurme, Kinos, & Palonen, in review). It is thus necessary to deepen our understanding of how young children's behaviors towards their best friends and casual peers differ.

Gender differences in peer interaction

Boys and girls interact with same-gender and cross-gender peers in various ways during the first years of their development. Maccoby and Jacklin (1987) reported that preschool children were three times more likely to associate with same-gender peers than with cross-gender peers. However, while both boys and girls prefer same-gender interaction, boys are somewhat more open to cross-gender interaction than are girls (Halim, Ruble, Tamis-LeMonda, Shrout, & Amodio, 2016).

With regard to prosocial behaviors, girls have been shown to be more prosocial than boys (Padilla-Walker, Carlo, & Mommott-Elison, 2017), especially in conflict situations (Rose & Rudolph, 2006). Further, girls exhibit more willingness to collaborate (Strough & Berg, 2000) and spend more time in conversation than boys (Moller, Hymel, & Rubin, 1992). Boys' self-regulation skills have been reported to be significantly weaker than girls (Veijalainen, Reunamo, & Alijoki, 2017). In turn, girls experience more emotional stress than boys (Albano & Krain, 2005).

With regard to problem behaviors, boys often show more problem behaviors than girls (Foster, 2005). For example, boys are more hyperactive and aggressive than girls, while girls have more internalizing problems than boys (Hill, Degnan, Calkins, & Keane, 2006). Furthermore, girls lean towards relational aggression (for example, excluding a friend from a certain group) while boys exhibit overtly aggressive behaviors (Crick, 1996). Thus, there is a clear difference between girls and boys. The present study aims at clarifying how children's prosocial and problem behaviors differ during peer interaction in small groups.

Research questions

The purpose of the study is to observe children's social and emotional interactions in small group settings with their peers in the context of playing tablet games. Building on prior research, this study aims to compare whether children behave differently in different group settings based on gender and the closeness of friendship ties. Furthermore, the practical goal of this study is to develop an observation tool for children's social and emotional interactions in real-life kindergarten situations.

The main questions that structured our study are:

1. *Which are the most typical and the most rare prosocial and problem behaviors in small group interactions?*
2. *Do children behave differently with their best friends than with their casual peers?*
3. *Does the cohesion of peer interaction differ between playgroups consisting of best friends and casual peers?*
4. *Do boys and girls behave differently during small group interactions?*

Method

Participants

The participants in this longitudinal study were children in full-time kindergarten at a private kindergarten located in the southern part of Finland. Altogether, 15 native Finnish-speaking five- to six-year-old children, seven girls and eight boys, participated in the study. All 15 children attended daily activities together in the same kindergarten space. Parental consent was obtained, and the study arrangements were explained to the parents at a parents' evening organized before the study. The response rate for parents' written consent was 100%. All the children's names have been pseudononymized and their personal information has been kept confidential. The topic of the study was also weekly discussed with the children to be sure that they participate willingly and voluntarily in the study.

Tablet game sessions

In the present study, the children were divided into groups of four in which group members were selected by the children themselves or by a teacher. In the case of the child-selected groups, the children tended to form groups with their same-gender best friends (hereafter referred to as "best friends"). In the teacher-selected groups, the children were divided into groups with a cross-gender makeup to encourage interaction with casual peers (hereafter referred to as "casual peers"). During the first week, children selected their same-gender friends as their group members, and in the next week, they were allocated their cross-gender casual peers. This strategy was used in

order to investigate children's behaviors towards their best friends and casual peers, and the procedure was repeated all through the academic year.

For each play session, the groups of four children shared one tablet computer. At the beginning of each session, the teachers explained and emphasized the social and emotional rules and expectations to the children. The children's prosocial behavior was operationalized in the form of questions and negotiations guided by the teacher (e.g., "How many games can one child play in a row?"), sharing of materials (e.g., when to give the tablet to the next player), providing help ("Can I help you in here?"), offering positive feedback, and initiating communication by, for instance, asking questions related to the games. In addition, the children were reminded by the teachers that they should be aware of their self-control skills and should not disturb other children during the tablet game sessions. In order to create a natural context in which to observe peer interaction, teachers were instructed to get involved only if the children encountered technical problems or were in an unsolvable conflict situation. Thus, the teacher's role was passive during the sessions. This was also done to maximize the children's contributions.

During the sessions, the children were allowed to discuss and decide among themselves which games they wanted to play. Early research indicates that compared to the earlier boring drill-and-practice games, the newer ones target the problem-solving abilities of children and pose open-ended problems, as a result of which children find themselves engaging in creative play and interacting with their peers in a positive manner (Johnson & Christie, 2009; McManis & Gunnewig, 2012; Verenikina & Kervin, 2011). In our study, the children were allowed to play any game they wanted. Most of the games they selected were based on problem-solving and open-ended processes (e.g. Creativity Studio, Restaurant Asia, and Hill Climb). Furthermore, the children were encouraged to collaborate with their peers while gaming, but solo playing was also possible. The tablet computers were expected to create a situation with multiple possibilities for active social interaction within the group (cf. Mustola, Koivula, Turja, & Laakso, 2018). Tablet gaming also provided a controlled situation where children sat together instead of running around the room, thereby creating an appropriate environment for recording group interaction for the study.

Data collection

The study began in the autumn semester and continued until the end of the spring semester, for a total duration of 10 months. The study thus covered one academic year, which was considered to be enough time for data gathering. We did not control how much the children played tablet games at home, as it was not a focus of our study. However, at about three weeks before the data gathering was started, all the children were invited to a session where they were familiarized with the tablet computers as well as the video camera. The tablet computers were occasionally available for the children to use outside of the study.

For each tablet game session, two video cameras were stationed in the classroom, and two groups of children were seated in front of the cameras. During the recording, the teacher was seated behind the camera and the children were seated around a table. At any point of time, the tablet computer was in the hand of only one child, with the others following the game. As the first author of the article was one of the teachers, the children were familiar with her and, thus, did not find her presence disruptive. This is important, as researchers need to establish respect and trustworthy relationships with children in order to interact in a secure atmosphere (Parkinson, 2001). Furthermore, this dual role of the first author increased the ecological validity of the study, since the empirical aspects of the study were carefully adapted to the kindergarten practices. This was pivotal because the practical goal of this study was to develop an observation tool for children's social and emotional interactions in real-life situations. The fact that only one of the authors knew the children also ensured the objectivity of the data analysis and writing.

Altogether, 13 sessions were organized for all the groups, and 52 × 30 minutes of video data were collected. For the purpose of the present study, nine video clips were selected for more thorough analysis, including three videos each from the beginning, middle, and end of the academic year (9 × 30 minutes) (see Table 1). The group composition was used as a criterion to select the video clips, as we aimed to analyze interaction within the same or similar group. However, changes in the group members could not be completely avoided on account of members going on sick leave or nominating their peers to the sessions. Further, due to practical reasons, such as the limited number of children included, it was not always possible to prevent best friends from joining the same cross-gender group (see Asko and Arto in Table 1). In the case of child-selected groups, the teachers helped any child who had not been selected by their peers to join a group. This is a normal procedure in Finnish kindergarten practice.

TABLE 1 Grouping of participants in the observed sessions

Groupings		*Participants*			
Best friends	Girls 1	Sinikka	Seija	Outi	Marita
	Girls 2	Sinikka	Seija	Veera	Emilia
	Girls 3	Sinikka	Seija	Outi	Marita
	Boys 4	Asko	Olavi	Eemeli	Arto
	Boys 5	Asko	Olavi	Oskari	Lauri
	Boys 6	Asko	Olavi	Oskari	Arto
Casual peers	Cross-gender 7	Outi	Emilia	Oskari	Kalle
	Cross-gender 8	Veera	Marita	Asko	Arto
	Cross-gender 9	Sanna	Seija	Aatu	Olavi

Data analysis

Two kinds of methodological approaches were used in this study: observational analysis was used for coding the interaction, and social network analysis was used to analyze the density and centralization of the interaction.

Observational analysis

The ELAN annotation software (Max Planck Institute for Psycholinguistics, Nijmegen, The Netherlands; Wittenburg, Brugman, Russel, Klassmann, & Sloetjes, 2006) was used to analyze interaction in the videos. ELAN is a linguistic annotation tool that is designed for the creation of text annotations on video files. The data were coded to identify and analyze events related to prosocial and problem behaviors in the children, and the number of prosocial and problem behaviors was presented under each child's name in the left-hand column (see Figure 1).

FIGURE 1 Example of data coded with ELAN

Each time a child initiated a prosocial or problem behavior, it was marked in the corresponding row. A child's verbal behaviors and nonverbal behaviors were coded only when they contributed actively to peer interaction. To indicate the target of interaction, either the name of the child or of the group of children was written in the annotation part of the initiating child's tier.

PIOT

Peer interaction in this study was analyzed by PIOT, which is based on the preschool version of the Social Skills Improvement System (SSIS) Rating Scales (Gresham & Elliott, 1990). According to SSIS, prosocial behavior is divided into seven categories: cooperation, assertion, responsibility, self-control, communication, engagement, and empathy. The structure of problem behavior in SSIS is divided into five categories: externalizing, bullying, hyperactivity/inattention, internalizing, and autism spectrum. However, those dimensions of SSIS that were not directly linked to peer interaction, that

were difficult to track in video analysis, or that indicated internalizing problems (e.g. dimensions related to autism spectrum) were excluded from this study. The final PIOT that was developed is presented in Table 2.

TABLE 2 PIOT

Subcategories of prosocial behavior	***Description or example in real-life situation***
Initiating	
1. Provides verbal help	Offers advice
2. Provides concrete help	Shows a peer/peers what to do
3. Initiates conversation	Starts a new topic or asks a question
4. Invites a peer	Says, for example, "Would you like to play with me?"
5. Takes responsibility	Suggests how to make the activity go smoothly
6. Follows the rules	Takes turns as agreed
7. Speaks politely	Says "please" or "thank you"
8. Praises a peer	Says "that's good," "great," or "nice"
Responding	
1. Accepts verbal help	Plays as suggested or advised
2. Accepts concrete help	Allows a peer to contribute in play
3. Replies to a peer	Reacts to a peer's question
4. Stands up for a peer	Helps a peer who is treated unfairly
5. Solves a problem verbally	Handles a problem by saying something calmly
6. Ignores distraction	Ignores a peer when he or she interrupts or distracts
7. Stays calm	Is calm when teased
Subcategories of problem behavior	***Description or example in real-life situation***
Initiating	
1. Acts impulsively	Has difficulty waiting for his or her turn
2. Bullies	Annoys a peer and enjoys when the peer gets upset
3. Forces a peer	Makes a peer act against his or her will
4. Excludes a peer	Keeps a peer out of activity
Responding	
1. Accuses a peer	Blames a peer whenever a problem occurs
2. Is aggressive	Hits or hurts a peer physically
3. Has temper tantrums	Shouts or gets angry
4. Is inattentive	Is distracted, for example, stares at something else

To deepen our understanding of dynamic social and emotional interactions with the help of PIOT, we focused both on the child himself or herself and also the other children participating in the situation. Moreover, we divided all prosocial and problem behaviors into the subcategories "initiating" (when the child started the behavior) and "responding" (when the child was reacting to other children's behavior) based on how the child contributed to the interaction. Whether a behavior was categorized as "initiating" or "responding" was indicative of how each child was positioned in reference to their peers during the interaction (Iiskala, Volet, Lehtinen, & Vauras, 2015).

Initiating behavior indicates a child's active role in peer interaction (for example, "invites a peer," "provides concrete help," or "acts impulsively"), wherein the child spontaneously conducted the behavior without any external prompting. On the other hand, responding behavior indicates a responsive role, which was triggered by a peer's behavior, for example, "solves a problem verbally", "ignores distraction", or "accuses a peer." The initiating and responding behaviors of the participating children were analyzed based on the situative perspective of when and where each behavior occurred. Situative perspective refers to the interpretation of an individual's behavior when participating in social contexts or systems (Turner & Nolen, 2015). Some researchers have pointed out that teachers' expectations and responses towards boys and girls are different (Myhill & Jones, 2006; Serbin, O'Leary, Kent, & Tonick, 1973). However, in our study, we analyzed the data purely based on children's initiating and responding behaviors and tried to avoid any personal biases on the part of the teachers.

Social network analysis

For the social network analysis (SNA; Wasserman & Faust, 1995), interactions among peers, including both prosocial and problem behaviors, were added into square matrices from which the densities and centrality values were later calculated. For each group, a 4 × 4 square matrix was created to analyze group-level interaction based on the frequencies calculated with ELAN. The values in the rows of each matrix indicate the interaction a child had initiated toward the other children, and the values in the columns indicate interactions toward a child himself or herself (see Table 3). All matrices were analyzed using the UCINET software (AnalyticTech, Lexington, KY, USA; Borgatti, Everett, & Freeman, 2002).

TABLE 3 Example of a square matrix for prosocial behavior

Best friends (Girls 1)	*SINIKKA*	*SEIJA*	*OUTI*	*MARITA*
SINIKKA		7	20	31
SEIJA	12		0	11
OUTI	5	8		14
MARITA	11	11	28	

The density and centralization of the interaction were measured for each tablet game session separately. Density is a group-level measure that indicates how frequent the interaction was among the group members. The standard deviation values for group-level densities were used as a measure of centralization, which indicated whether any child dominated the interaction or if the communication inside the group was equally distributed (initiated and responded) across all group members. Density and centralization analyses measure different perspectives of interaction and, thus, complement each other.

Results

Based on our research questions, we first present the results on the emergence of prosocial and problem behaviors in peer interactions. Second, we discuss whether these results differ according to whether an interaction is between best friends or between casual peers. Third, we examine how much variance there was in prosocial and problem behaviors within the groups and among peers, and finally, we review how these behaviors differed between genders.

Prosocial and problem behaviors during the tablet game sessions

Our results indicate that the majority of interactions were categorized under prosocial behavior (N = 2,119). This number was about four times more than that of the interactions categorized as problem behaviors (N = 534).

The results in Figure 2 present the frequencies of prosocial behavior categorized as initiating and responding behavior.

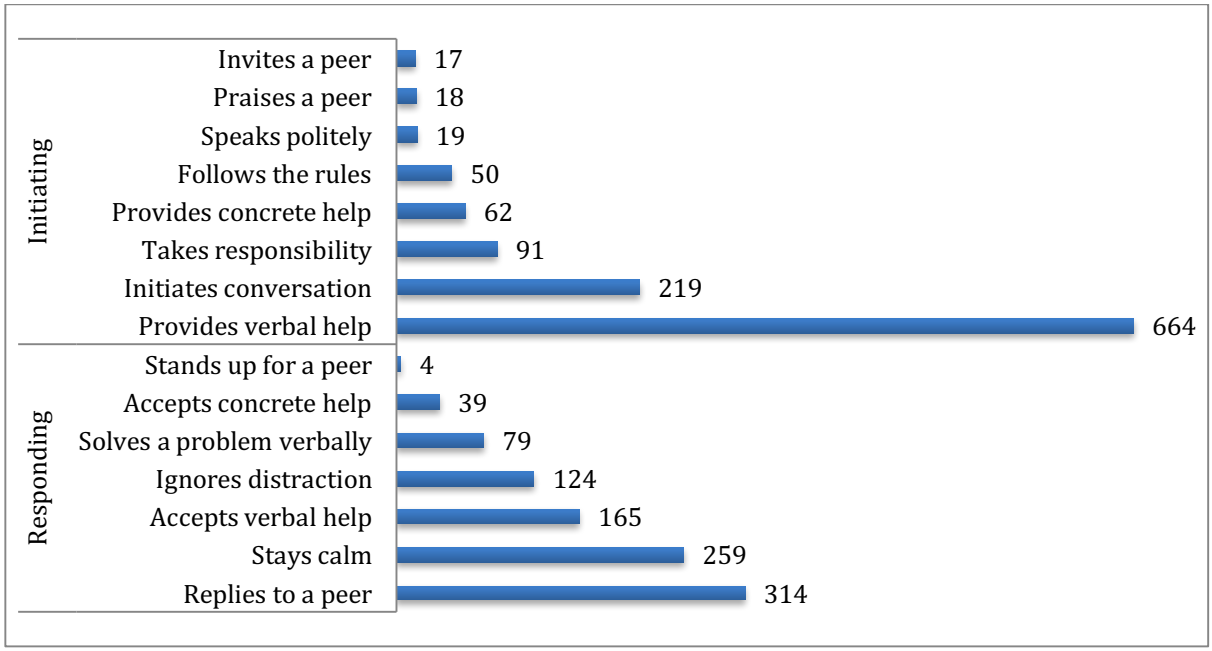

FIGURE 2 The distribution of prosocial behaviors (during 3 × 3 × 30 minute sessions)

Altogether, there were 1,135 initiating prosocial behaviors and 984 responding prosocial behaviors. This seems to imply that the children were eager to start interactions. The most typical initiating prosocial behaviors were "provides verbal help" and "initiates conversation." With regard to the responding prosocial behaviors, "replies to a peer" and "stays calm" were the most common subcategories, but the variation between the subcategories was not as clear as it was for the initiating behaviors. Nevertheless, the least common initiating prosocial behaviors were "invites a peer," "praises a peer," and "speaks politely." Comparatively, the least common responding

prosocial behavior was "stands up for a peer." Based on these data, we can conclude that most of the initiating prosocial behaviors were verbal, but the trend is not as clear for the responding behaviors.

With regard to the problem behaviors, there were 465 initiating problem behaviors and 69 responding problem behaviors (see Figure 3). Out of these behaviors, the subcategory "acts impulsively" was overwhelmingly frequent. The rest of the categories did not differ from each other clearly in terms of their rates of occurrence, either within or between initiating problem behaviors and responding problem behaviors. Unlike the prosocial behaviors, most problem behaviors were nonverbal.

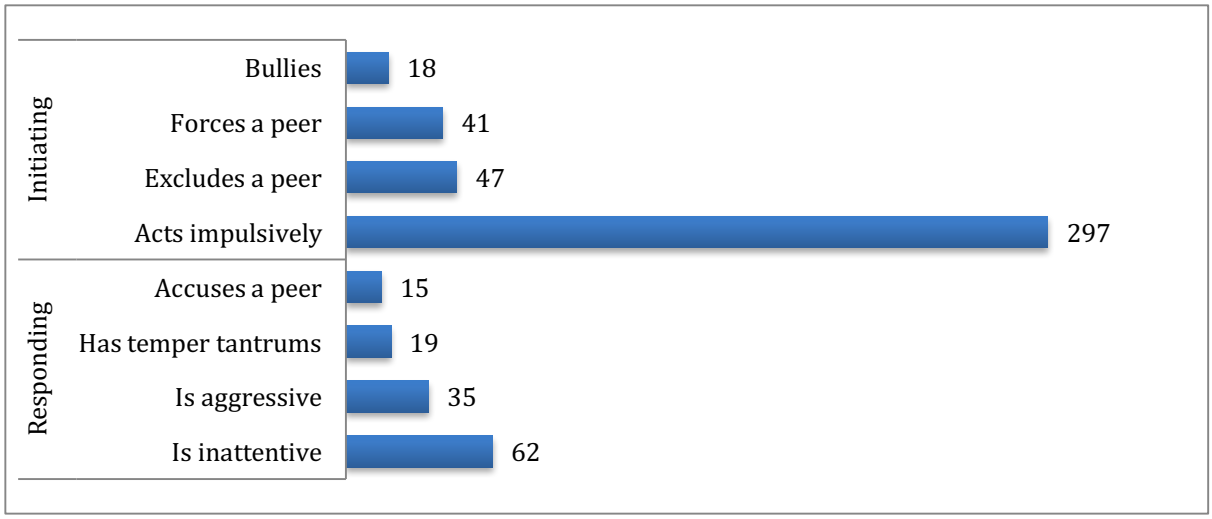

FIGURE 3 The distribution of problem behaviors (during 3 × 3 × 30 minute sessions)

Interaction with best friends and casual peers

We compared mutual interactions in best friend groups and casual peer groups. The occurrence rate of prosocial behaviors and problem behaviors was assessed for each type of group separately. As Table 4 indicates, prosocial behavior in the casual peer groups was somewhat less frequent, across the board, than in the best friend groups. We can conclude from the results that children interact three times more with their best friends than with casual peers, both in terms of initiating prosocial behaviors and responding prosocial behaviors.

TABLE 4 Prosocial behaviors in best friend and casual peer groups (during 3 × 3 × 30 minute sessions)

Prosocial behavior		*Best friends (%)*	*Casual peers (%)*
Initiating	Provides verbal help	23.4	7.9
	Provides concrete help	2.5	0.4
	Initiates conversation	8.2	2.1
	Invites a peer	0.3	0.2
	Takes responsibility	3.3	1.0
	Follows the rules	1.7	0.7
	Speaks politely	0.8	0.1
	Praises a peer	0.7	0.1
	Total	**40.9**	**12.5**
Responding	Accepts verbal help	4.4	4.0
	Accepts concrete help	1.3	0.5
	Replies to a peer	11.5	3.3
	Stands up for a peer	0.2	0.0
	Solves a problem verbally	3.1	0.6
	Ignores distraction	4.0	2.0
	Stays calm	11.1	1.1
	Total	**35.6**	**11.5**

Table 5 shows the corresponding results for problem behaviors. Problem behaviors were much more frequent when children played with their best friends than with their casual peers. Children were engaged in almost five times more initiating problem behaviors with their best friends than with their casual peers, and responding problem behaviors were observed twice as frequently with best friends as with casual peers. This is probably because children are most active when they play with their best friends. In the case of the responding behaviors, only “is inattentive” was observed less frequently in best friend groups than in casual peer groups (see Table 5). Some behaviors were never observed (“has temper tantrum” and “bullies”) or were rare (“excludes a peer” and “accuses a peer”) among casual peers, but this finding was rather unexpected.

TABLE 5 Problem behaviors in best friend and casual peer groups (during 3 × 3 × 30 minute sessions)

Problem behavior		*Best friends (%)*	*Casual peers (%)*
Initiating	Acts impulsively	44.6	11.0
	Bullies	3.4	0.0
	Forces a peer	6.7	0.9
	Excludes a peer	8.4	0.4
	Total	**63.1**	**12.3**
Responding	Accuses a peer	2.4	0.4
	Is aggressive	5.6	0.9
	Has temper tantrums	3.6	0.0
	Is inattentive	4.5	7.2
	Total	**16.1**	**8.5**

Based on these results, we think that perhaps the children were more involved in gaming activities when playing with their best friends than with casual peers (see Table 4 and Table 5). However, when the children encountered problems or conflicts, they seemed to be more straightforward and less self-controlled with their best friends, which sometimes led to problem behaviors

Density and centralization of interaction at the group level

The density values of the children's prosocial behaviors are presented in Table 6. The density value indicates how often, on average, a certain behavior was found in the group. These results are in agreement with the observational other results already presented. In addition, it is possible to see how behavior varies in each group: that is, it is possible to understand how much individual-level behavior differs inside the groups. The standard deviation of density can be seen as a simple centralization indicator. The lower the value, the more similarly members of a group interact. Table 6 shows the density and centralization data for best friend and casual peer groups.

TABLE 6 Cohesion and centralization of prosocial behavior in best friend and casual peer groups

(Density values/standard deviations during 3 × 3 × 30 minute sessions)

	Initiating								Responding						
Density /SD	Provides verbal help	Provides concrete help	Initiates conversation	Invites a peer	Takes responsibility	Follows the rules	Speaks politely	Praises a peer	Accepts verbal help	Accepts concrete help	Replies to a peer	Stands up for a peer	Solves a problem verbally	Ignores distraction	Stays calm
Best friends															
Girls 1	2.5/4.1	**0.3/1.1**	**0.5/1.5**	**0.2/0.9**	**0.2/0.4**	**0.1/0.3**	**0.1/0.2**	**0.1/0.2**	1.7/3.2	**0.4/1.3**	**0.6/1.4**	0.0/0.0	0.0/0.0	**0.4/0.9**	0.0/0.0
Girls 2	5.5/6.2	**0.1/0.2**	1.2/1.8	0.0/0.0	**0.6/1.3**	**0.1/0.3**	0.0/0.0	**0.5/1.0**	2.2/3.3	**0.1/0.2**	1.8/2.2	0.0/0.0	**0.2/0.5**	1.0/1.6	**0.7/2.0**
Girls 3	4.0/5.4	**0.1/0.3**	2.9/4.0	0.0/0.0	1.0/1.6	**0.2/0.4**	**0.1/0.2**	**0.2/0.4**	0.7/0.9	**0.1/0.3**	3.0/3.8	0.0/0.0	0.0/0.0	**0.3/0.8**	0.7/1.1
Boys 4	3.5/6.4	0.0/0.0	0.5/0.7	**0.1/0.3**	0.7/1.2	**0.3/0.6**	**0.2/0.5**	0.0/0.0	**0.6/1.3**	0.0/0.0	0.7/1.3	0.0/0.0	**0.4/0.8**	0.7/1.2	3.0/4.8
Boys 5	4.9/6.0	2.4/3.3	2.2/2.4	0.3/0.5	**0.5/1.0**	**0.2/0.4**	**0.5/1.1**	**0.1/0.3**	**0.9/1.8**	**1.0/2.4**	3.0/4.2	**0.1/0.2**	0.7/0.9	0.9/2.2	2.3/3.5
Boys 6	2.5/3.4	**0.3/0.6**	1.0/1.4	0.3/0.5	0.9/1.4	**0.2/0.5**	**0.3/0.8**	0.0/0.0	**0.2/0.4**	**0.3/0.7**	2.3/2.7	**0.2/0.5**	**2.1/4.7**	1.2/1.9	2.9/4.4
Casual peers (C-G for Cross-gender)															
C-G 7	2.0/3.0	**0.1/0.3**	**1.2/2.4**	0.0/0.0	0.9/1.2	0.3/0.5	**0.1/0.3**	**0.1/0.4**	**0.8/1.7**	**0.2/0.4**	**1.2/2.6**	0.0/0.0	**0.3/0.6**	**0.1/0.2**	**0.6/1.5**
C-G 8	4.0/4.7	0.0/0.0	0.6/0.9	0.0/0.0	**0.4/1.0**	**0.2/0.4**	0.0/0.0	0.0/0.0	1.5/2.4	**0.1/0.2**	1.0/1.3	0.0/0.0	0.3/0.5	1.5/2.3	0.5/0.9
C-G 9	2.5/4.1	**0.3/1.1**	**0.5/1.5**	**0.2/0.9**	**0.4/0.9**	**0.1/0.3**	**0.1/0.2**	**0.1/0.2**	1.7/3.2	**0.4/1.3**	**0.6/1.4**	**0.1/0.2**	**0.1/0.2**	**0.4/0.9**	**0.1/0.2**

The bold numbers indicate that the standard deviation is double or more the density value, which indicates centrality at the group level (centrality indicates whether communication inside the group is equally distributed)

According to the results, interaction is most centralized (indicated by high SD values) in the case of prosocial behaviors with the lowest density values, that is, "follows the rules," "speaks politely", and "accepts concrete help." This implies that certain children dominated the interaction in the case of these behaviors. This was not observed with any other prosocial behaviors, which were more or less equally distributed among all the children.

With regard to problem behaviors, the findings for cohesion and centralization are somewhat different (see Table 7). The standard deviations were highest in the boys' groups for "has temper tantrum," "bullies," "excludes a peer," and "accuses a peer." In the girls' groups, interaction was somewhat centralized only for inattentive behavior, which is explained by one girl in a group that had not actively participated in the gaming. In all groups, "forces a peer" and "is aggressive" were typical behaviors only for some children. There are also many zero cells in the table, which indicate that problem behaviors were found only in some groups, mostly among the boys' groups. In conclusion, problem behaviors were somewhat more centralized than prosocial behaviors. In other words, in conflict situations, certain children dominated the group interactions.

TABLE 7 Cohesion and centralization of problem behavior in best friend and casual peer groups

(Density values/standard deviations during 3 × 3 × 30 minute sessions)

	Initiating				Responding			
	Acts impulsively	Bullies	Forces a peer	Excludes a peer	Accuses a peer	Is aggressive	Has temper tantrums	Is inattentive
Best friends								
Girls 1	**0.5/1.2**	0.0/0.0	**0.1/0.2**	0.0/0.0	0.0/0.0	**0.1/0.2**	**0.5/1.2**	**0.5/1.2**
Girls 2	1.5/2.6	0.0/0.0	**0.1/0.2**	0.0/0.0	0.0/0.0	**0.1/0.2**	1.5/2.6	**0.2/0.5**
Girls 3	**0.5/1.2**	0.0/0.0	**0.2/0.5**	0.0/0.0	0.0/0.0	**0.1/0.2**	**0.5/1.2**	**0.3/0.9**
Boys 4	3.0/5.1	0.0/0.0	**0.6/1.5**	**1.2/2.5**	**0.1/0.3**	**0.4/0.9**	3.0/5.1	0.0/0.0
Boys 5	1.8/3.2	**0.2/0.7**	**0.3/0.6**	**0.8/1.6**	**0.2/0.5**	**0.2/0.7**	1.8/3.2	0.0/0.0
Boys 6	**1.8/4.8**	**0.6/1.6**	**0.4/1.1**	**0.3/0.6**	**0.3/0.7**	**0.6/1.2**	**1.8/4.8**	0.0/0.0
Casual peers								
Cross-gender 7	**0.5/1.4**	0.0/0.0	**0.1/0.4**	**0.1/0.2**	**0.1/0.2**	**0.2/0.7**	**0.5/1.4**	**1.5/3.0**
Cross-gender 8	2.1/3.2	0.0/0.0	**0.1/0.3**	0.0/0.0	**0.1/0.2**	**0.1/0.2**	2.1/3.2	0.0/0.0
Cross-gender 9	**0.5/1.1**	0.0/0.0	**0.1/0.2**	0.0/0.0	0.0/0.0	0.0/0.0	**0.5/1.1**	**0.5/1.2**

The bold numbers indicate that the standard deviation is double or more the density value, which indicates centrality at the group level (centrality indicates whether communication inside the group is equally distributed)

Gender differences in prosocial and problem behaviors

We next analyzed gender-based differences in prosocial and problem behaviors. For this purpose, we compared the boys' and girls' groups when they played with their best friends.

The results indicate that 7 out of the 15 prosocial behaviors were exhibited more by boys than by girls (see Table 8). Further, only boys exhibited the initiating behaviors "invites a peer" and "stands up for a peer." In comparison, girls were most active in three subcategories: "praises a peer," "provides verbal help," and "accepts verbal help." There were no significant differences between girls and boys with regard to the rest of the behaviors.

TABLE 8 Prosocial behaviors in same-gender groups (during 2 × 3 × 30 minute sessions)

Prosocial behavior (f)		*Boys (%)*	*Girls (%)*	*Binominal test Exact Sig. (2-tailed)*
Initiating	Provides verbal help (496)	42	58	.001**
	Provides concrete help (54)	94	6	.000***
	Initiates a conversation (174)	43	57	.081
	Invites a peer (7)	100	0	
	Takes responsibility (70)	47	53	.720
	Follows the rules (36)	60	40	.243
	Speaks politely (16)	94	6	.001**
	Praises a peer (15)	13	87	.007**
Responding	Accepts verbal help (93)	31	69	.000***
	Accepts concrete help (28)	89	11	.000***
	Replies to a peer (244)	51	49	.848
	Stands up for a peer (4)	100	0	
	Solves a problem verbally (66)	91	9	.000***
	Ignores distraction (84)	58	42	.156
	Stays calm (236)	72	28	.000***
Total (1,623)		54	46	

**p < .01. ***p < .001.

Many differences were found with regard to the frequency of problem behaviors between boys and girls (see Table 9). When interacting with same-gender peers, boys were more likely to exhibit problem behaviors than girls. Almost all (90% or more) instances of "bullying," "has temper tantrums," "excluding a peer," and "aggressive behavior" were found in the boys' groups. In contrast, all instances of inattentive behavior were recorded in the girls' groups. All differences with the exception of "forces a peer" were statistically significant.

TABLE 9 Problem behaviors in same-gender groups (during 2 × 3 × 30 minute sessions)

Problem behavior (f)		*Boys (%)*	*Girls (%)*	*Binominal test Exact Sig. (2-tailed)*
Initiating	Bullies (18)	100	0	
	Forces a peer (36)	67	33	.065
	Excludes a peer (45)	91	9	.000***
	Acts impulsively (238)	74	26	.000***
Responding	Accuses a peer (13)	85	25	.000***
	Has temper tantrum (19)	95	5	.000***
	Is aggressive (30)	90	10	.000***
	Is inattentive (24)	0	100	
Altogether (423)		74	26	

***$p < .001$.

In all, boys exhibited more prosocial as well as problem behaviors (see Table 8 and Table 9).

Discussion

In this research, we studied peer interaction during group activities for five- and six-year-old children in a kindergarten context. We observed groups of children playing with tablet computers in a motivating environment, with many possibilities for prosocial and problem behaviors with peers. Over one academic year, we studied how the children interacted in various group constructions—when playing with their best friends and with casual peers—and how the interactions varied in boys' and girls' groups. We also studied the cohesion and centralization of interactions in the various groups in order to understand whether some children dominated peer interaction in groups.

Our finding was that prosocial behaviors were much more common than problem behaviors across all the groups. This is, of course, a very encouraging finding. The positivity of peer interactions highlights the great learning potential in young children's peer interactions that has also been noticed in other studies (Kankaanranta, Koivula, Laakso, & Mustola, 2017; Sylva, Ereky-Stevens, Pastori, Slot, & Lerkkanen, 2016). In our study, children frequently provided help and participated in conversations with their peers. The children in this study also exhibited self-control by staying calm, ignoring distractions, and taking responsibility. The most common problem behavior observed

was acting impulsively; this points to the need for providing support for self-control, as pointed out in previous studies too (Diamond, 2012; Whitebread, 2014). Moreover, the need to have children practice empathy skills is emphasized by the present findings, because children only seldom invited, praised, or stood up for their peers, and they sometimes forced or excluded their peers.

In the present study, the children behaved more actively when playing with their best friends than with their casual peers, as they engaged in more prosocial and problem behaviors with the former. For teachers, these results mean that in order to create functional play groups, they need to think carefully about who plays with whom. Earlier studies have indicated that young children already preferentially share resources with close relations, such as people who have shared with them (reciprocity), and with people who have shared with others (indirect reciprocity). This is a starting point for cooperation, despite children's limited experience with complex cooperative networks (Olson & Spelke, 2008; Plötner, Over, Carpenter, & Tomasello, 2015). Further, since learning to solve conflicts is important for the development of social and emotional skills (Shantz, 1987), teachers should provide all possible support for children's practicing.

Children's social and emotional skills are understood as dynamic and interrelated. Accordingly, the way a child initates an interation would affect how others respond (see, also, Iiskala et al., 2015). Presumably, children behave in various ways depending on the group atmosphere or the "chemistry" between children. For example, prosocial initiating behavior is related to children's trustworthiness, and girls are perceived to be more trustworthy than boys (Malti et al., 2016). In this study, we followed the interaction dynamics through the whole academic year and we took samples from the beginning, middle and end of the year. This natural dynamics of children's social and emotional skills also emphasizes the need to follow interaction during long-term group processes.

When comparing same-gender groups, previous findings have, contrary to what we found, indicated that girls are more prosocial than boys (Eisenberg, Spinrad, & Knafo-Noam, 2015). In our results, boys were more active in terms of both prosocial and problem behaviors. According to previous studies, children receive positive responses from their peers during same-sex play and negative responses during other-sex play (Fagot, 1977). In line with a study by Veijalainen et al. (2017), boys showed less capability for self-control than girls and were prone to problem behaviors. Girls showed a calm style of interaction along with low activity levels and less aggression, in line with earlier evidence (Martin & Fabes, 2001). In all, same-gender peers seem to offer for boys a forceful, active and rough style of play (Maccoby & Jacklin, 1987). In line with this, boys showed more initiating problem behaviors than girls in the present study. This is probably because boys tended to engage in nonverbal problem behaviors; as reported in

an earlier study, they sought physical means instead of verbal means when solving problematic situations in groups (Crick, 1996).

Earlier studies have shown that social and emotional learning can enhance children's behavioral adjustment in the form of increased prosocial behaviors and reduced problem behaviors (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). Understanding children's social and emotional skills and knowing how children may behave differently in various social settings is crucial and should be a basis for systematic planning and prevention when educational goals are confirmed (McLeod, Sutherland, Martinez, Conroy, Snyder, & Southam-Gerow, 2016). The purpose of social and emotional skill assessment of individual children is to identify the problems or risks at an individual and group level, so that the progress of children in kindergarten settings can be tracked to provide a portrait of young children's social and emotional development (Darling-Churchill & Lippman, 2016).

The observation model implemented in the present study contributes to identifying children's social and emotional skills in the kindergarten context. According to our understanding, even though the research focused only on the tablet game context for the convenience of video data collection and children's collaboration, the tool we have developed, PIOT, can be generally implemented in various small group activities that could encourage children's interaction with their peers.

Implications of the study

Children employ different social and emotional skills in various social contexts. For example, how children behave may vary based on physical context, group composition, or the number of children in the group. When teachers evaluate children's social and emotional skills, they need to take into account how such social context factors affect children's behavior. Understanding children's interaction patterns would be helpful in determining the best possible group compositions and supporting children's social and emotional development based on their individual needs.

Carefully designed early interventions provide excellent opportunities for teachers to prevent escalation of observed minor problem behaviors to severe problem behaviors (Basten et al., 2016). Because skills to solve conflicts without problem behavior are important in maintaining friendship ties (MacEvoy & Asher, 2012; Tangney et al., 1996), prosocial skills need to be continuously practiced in these interventions.

The limitations of this study include the small sample size and narrow context. The fact that our study was based on six best-friend and three casual-peer sessions has a potential to favor the best-friend groups. Additionally, 15 prosocial items and eight

problem behaviors in PIOT would result unevenness for comparison. These two perspectives the generalization of our results to a larger or a very different context. Further studies and larger data sets are needed to deepen our understanding of children's social behavior in small groups.

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