Social dynamics in the classroom: Teacher support and conflict and the peer ecology

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HIGHLIGHTS

- Teacher support is positively related to overall peer liking and prosocial behavior.
- Teacher conflict is positively related to peer disliking and aggressive behaviors.
- The more differentially teachers behave, the more hierarchical the peer ecology is.
- The more support teachers provide, the less hierarchical the peer ecology is.

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ABSTRACT

By showing support and conflict, teachers may function as a model for students regarding how to interact and how to evaluate each other, thereby shaping the classroom peer ecology. Associations of general and student-specific levels and differential provision of teacher support and conflict with the classroom peer ecology were investigated. Multivariate multiple regression analyses were performed with a sample of 58 Dutch fifth-grade classrooms (1454 students). In particular student perceptions of teacher support and conflict, rather than teacher perceptions or observations, explained peer liking and disliking, the degree of social hierarchy, and how prosocial versus aggressive the peer ecology was.

1. Introduction

The classroom peer ecology, or the social environment of classroom peers in interaction with each other, is one of the most important proximal environments for students' social (Ahn, Rodkin, & Garandeau, 2010; Farmer & Xie, 2007; Hodges, Boivin, Vitaro, & Bukowski, 1999; Roland & Galloway, 2002) and academic development (Kindermann, 2007; Roseth, Johnson, & Johnson, 2008; Wentzel & Caldwell, 1997). Teachers, as professionals in a position very close to the peer group, may have a role in shaping the nature of their classroom's peer ecology. Affecting the peer ecology deliberately may even be a strategy for teachers to foster students' development (Gest & Rodkin, 2011; Rodkin & Hodges, 2003). Nonetheless, there has been little research on associations between teacher behavior and peer relations. Because of this relative lack of research, Farmer, McAuliffe Lines, and Hamm (2011) referred to the teacher's influence on peer relations as "the invisible hand" of the teacher. The few studies conducted so far (e.g., Hughes, Cavell, & Willson, 2001; McAuliffe, Hubbard, & Romano, 2009) have mainly examined how teacher–student interactions and relationships are associated with the position of specific students within the classroom group, and have not investigated how teachers may influence the classroom peer ecology as such. Some characteristics of the peer ecology, such as the social structure or status hierarchy, only exist at this classroom-level and cannot be grasped when focusing on student-level outcomes. In only one study, Gest and Rodkin (2011) examined associations between general teacher practices and the peer ecology of the entire classroom group. In the present study, we aim to further reveal the teacher's invisible hand by examining how teacher support and conflict are related to the nature of the classroom peer ecology.

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To study the complexity of peer relations within the social system of a class, we employed a social network approach. Social network analysis is used not just to count the number of ties between peers in a class, but also to examine in more detail patterns or structures of relationships (e.g., hierarchy) among individuals in a group (Borgatti, Everett, & Johnson, 2013).

1.1. Classroom peer ecology

The concept of peer ecology is rooted in ecological systems theory (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 2006), which describes how an individual is nested within social settings, like families or classrooms. Interactions the child has within a setting, called proximal processes, are considered to be "primary mechanisms producing human development" (Bronfenbrenner & Morris, 2006, p. 795). Thus, by interacting with each other, children influence and socialize each other. A set of individuals in interaction is referred to as a social microsystem (Neal & Neal, 2013), within which Bronfenbrenner and Morris (2006) further distinguished between patterns of interpersonal relations, social roles, and activities. This distinction was used in research on peer relationships (Gest & Rodkin, 2011) to describe the classroom peer ecology as encompassing (a) the richness of interpersonal ties, (b) social structure or status hierarchy, and (c) patterns of social behaviors exhibited by classroom peers (see also Rubin, Bukowski, & Parker, 2006). In the present study, we examine these three aspects of classroom peer ecologies.

1.1.1. Richness of interpersonal ties

The richness of interpersonal ties indicates how many positive and how few negative relationships are present among students in a classroom. Following a long history of research on peer relationships (e.g., Coie, Dodge, & Coppotelli, 1982; Rubin et al., 2006), we focus on liking and disliking. In classrooms where many students like each other well, students are more likely to feel secure and accepted, which in turn positively affects academic adjustment (Roseth et al., 2008; Wentzel & Caldwell, 1997). Larger numbers of positive ties in a classroom also imply less negative behavior like bullying (Roland & Galloway, 2002).

1.1.2. Status hierarchy

The status hierarchy refers to the degree to which social status in the classroom peer ecology is structured in an egalitarian versus hierarchical manner. In the case of an egalitarian distribution, each student has a similar status, whereas in a hierarchical peer group a small number of students has a relatively high peer status and is in that sense more socially dominant (Brown, 2011). At the student level, likeability and popularity reflect two aspects of peer status (Cillessen, 2011). Whereas likeability is a combination of how well a student is liked by every other individual in the classroom, popularity refers to a student's visibility, dominance, or prestige and thus more directly reflects a position in the peer ecology (Cillessen, 2011). When likeability or popularity is distributed highly hierarchically in the class, only some students are liked by the majority of their peers or are considered to be highly popular. Schäfer, Kron, Brodbeck, Wolke, and Schulz (2005) found that with a more pronounced status hierarchy, there was more negative behavior – in their study tapped by bullying and victimization – than in classrooms where social status was distributed more equally. Furthermore, a study by Cappella, Kim, Neal, and Jackson (2013) showed that students in classes with a more egalitarian structure were more behaviorally engaged than students in classes with less network equity.

1.1.3. Social behavior

A third aspect of the peer ecology is the social behaviors that characterize daily interactions among peers. In the current study we focus on both positive (prosocial) and negative (aggressive) behaviors. Two of the most basic prosocial behaviors are cooperating and helping (Rubin et al., 2006). Aggression has often been subdivided into overt aggression (hitting, calling each other names) and relational aggression (gossiping, excluding others; Crick & Grotpeter, 1995). As the prevalence or commonness of such behavior describes what is currently normal behavior in a group, we use the term *descriptive norm* (see Chang, 2004; Lapinski & Rimal, 2005). Next to current commonness of behaviors, classroom descriptive norms are associated with future prevalence of behaviors, as social behaviors tend to be contagious (Dishion & Piehler, 2009); in classrooms where aggression is the norm, students tend to conform to this norm and become more aggressive themselves (Espelage, Holt, & Henkel, 2003; Thomas, Bierman, & the Conduct Problems Prevention Research Group, 2006). Furthermore, descriptive norms predict how strongly behaviors are associated with acceptance or rejection (Chang, 2004).

1.2. Teacher support and conflict

Given the importance of the classroom peer ecology as a social context for students' development, it is necessary for teachers to understand how they may, unwillingly or deliberately, affect these ecologies. Gest and Rodkin (2011) suggested that the teacher, who has a position close to the peer group, is the one professional who has the opportunity to oversee and affect the classroom peer ecology. Gest and Rodkin developed a model of how teacher practices affect students' individual development, partly through affecting the classroom peer ecology. They described how the peer ecology is impacted both by everyday teacher–student interactions and by "network-related teaching", that is, conscious teaching strategies directly aimed at affecting peer relationships. In the present study the focus is on everyday teacher–student interaction, and more specifically on the amount of support and conflict in teacher–student relationships and interactions. Teacher support, or warmth, fosters individual students' social (e.g., Luckner & Pianta, 2011; Verschueren, Doumen, & Buyse, 2012) and academic adjustment (e.g., Cornelius-White, 2007; Den Brok, Brekelmans, & Wubbels, 2004), whereas teacher conflict amplifies externalizing behavior (e.g., Doumen et al., 2008; Runions, 2014) and is negatively related to academic achievement (e.g., Ladd, Birch, & Buhs, 1999; Mantzicopoulos, 2005).

In daily classroom practice, teachers interact both with individual students and with the classroom group as a whole. Wubbels et al. (2015) argued that teachers differ in the extent to which they establish warm, supportive relationships at these two levels. A teacher who shows much support to individual students may not be able to establish supportive interactions during whole-class teaching. Another teacher may convey much warmth or support when teaching the class as a whole, but may keep individual interaction formal and less supportive. Corresponding to these conceptually different levels, studies have either investigated teacher support and conflict with a specific student as the object (e.g., Hughes et al., 2001; Verschueren et al., 2012) or as more general – in the sense of not student-specific – teacher or classroom characteristics (e.g., Luckner & Pianta, 2011; Mainhard, Brekelmans, & Wubbels, 2011). A study by Den Brok, Brekelmans, and Wubbels (2006) illustrates the relevance of distinguishing student-specific from general teacher support and conflict; Den Brok et al. found qualitative differences in teacher support, depending on whether the class as a whole or individual students were the focus in otherwise similar questionnaire items.

The present study adopts this distinction between general and student-specific teacher support and conflict. Although student-specific teacher support and conflict are first and foremost oriented at the individual student, these can be informative about

a teacher's classroom practices in interactions with their students in (at least) two different ways. First, classroom-average measures of student-specific support and conflict indicate how a teacher generally behaves with students in dyadic interaction (e.g., Buyse, Verschueren, Verachtert, & Van Damme, 2009; Hughes, Zhang, & Hill, 2006). Hughes et al. (2006) referred to this aggregate as the classroom *norm* of support and conflict, which resonates with the classroom descriptive norms of student behaviors as discussed in Section 1.1.3. Second, it may also be worthwhile to examine the extent of teachers' *differential* provision of support and conflict. Research on teacher differential behavior has its origins in studies on the teacher-expectancy effect (Rosenthal & Jacobson, 1968), which states that some teachers treat students differently based on the level of achievement they expect of the student (see Babad, 2009). One aspect of teacher–student interaction in which teachers treat students differentially is the amount of support or affect they show, which is typically higher for high-expectancy students (Babad, 2009) and also for students whom teachers feel closer to (Newberry & Davis, 2008). So, in the present study, student-specific teacher support and conflict are used as the building blocks of classroom norms of support and conflict and of teacher differential behavior.

1.3. Teacher support and conflict and the peer ecology

Two mechanisms describe how teachers' general and student-specific support and conflict may relate to the peer ecology, being *modeling* and *social referencing*. We first elaborate on these mechanisms and then relate them to the three aspects of peer ecologies as introduced above. First, teachers' general social practices in class can be a *model* for peer interactions and peer relationships. In this view, teacher support or conflict set the tone for, or model, peer interactions in the classroom and communicate information about the types of interactions and relationships that students are expected to establish with each other (Farmer et al., 2011; Gest & Rodkin, 2011). When teachers generally show support and have positive interactions, the modeling perspective assumes that students are likely to emulate this behavior, that is, to show warmth to each other and engage in positive interactions with peers as well. Likewise, teachers who generally show much conflict and negative affect may stimulate conflicted contact among students as well (Farmer et al., 2011; Mikami, Griggs, Reuland, & Gregory, 2012).

Whereas the modeling perspective emphasizes how students take in their teachers' general support and conflict as implicit lessons for how to behave themselves, the *social referencing* perspective focuses on how students implicitly learn how to evaluate and approach a specific student, depending on the teacher's student-specific provision of support and conflict (Buyse et al., 2009; Hughes & Chen, 2011). Hughes et al. (2001) were the first to reason that the teacher functions as a social referent in the classroom, that is, that "classmates make inferences about children's attributes and likeability based, in part, on their observations of teacher–student interactions" (p. 289). The social referencing principle applies to both norms of teacher support and conflict and teacher differential behavior. That is, when a teacher shows support to many individual students and thereby sheds a positive light on each of them, this may result in peers learning how to view specific students more positively, which in turn may lead to a more pleasant peer ecology. When teachers differentially treat students and focus their positive (or negative) comments on only a few students, they inform the classroom group on their peers' differential value (Mikami, Lerner, & Lun, 2010), which may result in a more hierarchical peer ecology.

1.3.1. Richness of interpersonal ties

Through general support versus conflict, teachers may model positive versus negative interpersonal relationships. As a result, students in classes with relatively higher levels of general teacher support are expected to form more liking and less disliking relationships. In line with this notion, Gest and Rodkin (2011), in a U.S. sample of first, third and fifth-grade classes, found that teachers who showed high levels of general emotional support had classrooms with more reciprocated friendships.

Classroom norms of student-specific support are also expected to result in a peer ecology that is richer in positive ties, since students are more likely to be viewed by their peers in a positive light. Similarly, in a classroom in which a teacher has many conflicted relationships with individual students, the peer ecology is likely to be characterized by more negative ties as students learn to approach many students negatively. In a Belgian study, Buyse et al. (2009) indeed found that first-grade classroom norms of student-specific teacher support were positively related to third-grade peer liking, whereas first-grade classroom norms of student-specific teacher conflict were negatively associated with third-grade peer liking. In the same vein, Hughes et al. (2006) showed that the classroom norm of supportive relationships was positively related to the average amount of peer liking in the classroom group in first and second grade in the U.S.

1.3.2. Status hierarchy

We expect social status hierarchy to be mainly related to teachers' differential behavior; when teacher support or conflict is highly focused on a small group of students, the teacher informs the students on the differential value of these peers. Hughes, Im, and Wehrly (2014) have studied the impact of teacher differential provision of support on peer experiences in third and fourth grade in the U.S. They reasoned that when the provision of support is more egalitarian, more students have the opportunity to be perceived positively by their peers, leading to less hierarchy in the peer-ecology. Hughes et al. found that when supportive relationships were concentrated on just a few students, also more status hierarchy in peer relations occurred. This was true however, specifically for students' academic reputation as an outcome rather than for peer liking.

Next to differential provision of individual teacher support and conflict, general teacher support may also be related to the hierarchy in ties. Chang (2003) showed that in Chinese middle-school classrooms where teachers rated themselves as showing relatively more warmth, peers disliked withdrawn and especially aggressive students less than in classrooms where teachers deemed themselves as being less warm. A study by Cappella and Neal (2012), with second to fourth-grade students, also showed that general teacher support can buffer negative relationships of victims of bullying. A generally supportive teacher may thus relieve negative peer evaluations of neglected or rejected students, and thereby foster a more egalitarian peer ecology.

1.3.3. Social behavior

By modeling supportive interactions in general, teachers communicate to their students the social value of prosocial interaction (Farmer et al., 2011). Luckner and Pianta (2011) have found that general teacher support was positively related to students' prosocial behaviors in a sample of fifth-grade students in U.S. elementary schools. Similarly, teacher conflict may function as a model for students' antisocial, aggressive behaviors. Furthermore, we expect that in a classroom with a higher classroom norm of student-specific support, prosocial behavior receives more attention, whereas in classrooms with a higher norm of student-specific conflict, aggressive behaviors are addressed more. This may add to the students' perception of the degree to which these behaviors
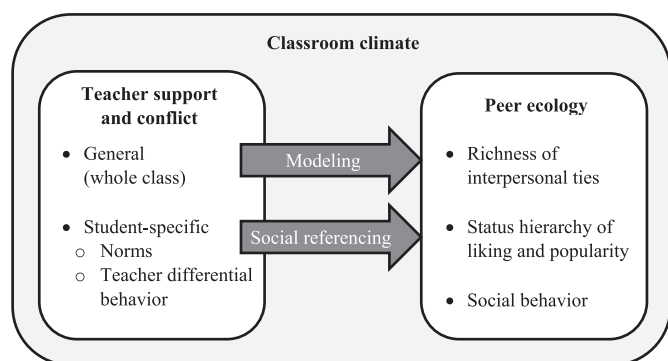
Fig. 1. Overview of the study constructs. General, classroom-based teacher support and conflict are hypothesized to function as a model for the relationships and interactions students have in the classroom peer ecology. Student-specific teacher support and conflict, both the average level and the differential behavior of the teacher, are expected to function as a social referent, providing information about students within the peer ecology.

are normative, and as a result to their own exhibition of the behavior. In the study by Buyse et al. (2009), first-grade classroom normative conflict was indeed positively associated with aggressive student behaviors.

1.4. The present study

In the present study associations between teacher support and conflict and the classroom peer ecology are examined. By focusing on these class-level constructs, we aimed to investigate the social structures that define the setting within which students develop. More specifically, we examined three aspects of teacher support and conflict, being (a) the level of *general* support and conflict, (b) classroom norms of *student-specific* teacher support and conflict, and (c) teachers' *differential* provision of student-specific support and conflict. Also three aspects of peer ecologies were examined, being (a) *richness* of interpersonal ties, (b) *hierarchy* of these ties, and (c) classroom norms of *social behaviors*. An overview of these constructs is provided in Fig. 1.

Both when a teacher models support or conflict in general (Farmer et al., 2011; Gest & Rodkin, 2011) and when the teacher is a social referent for the social evaluation of specific students by peers (Hughes et al., 2001), the teacher's influence on the peer ecology seems to depend on the students' intake of teacher behavior. Therefore, we made sure to incorporate the students' views on all aspects of teacher support and conflict. For triangulation purposes, a multiple informants design was used, including the students' as well as the teacher's or an external observer's perspective for each of the three aspects of teacher support and conflict. The overarching research question was: *How are teacher support and conflict associated with the classroom peer ecology?*

Given what we discussed so far, we expected that teachers would model peer interactions and relationships in general but would also be a social referent for the evaluation of specific students. We expected that the more support and the less conflict teachers showed in general and to specific students, (a) the more classrooms would be characterized by positive rather than negative ties, and (b) the more prosocial behaviors would prevail over aggressive behaviors. Furthermore, more differential provision of teacher support was expected to be related to more status hierarchy in classrooms, since then the teacher would specifically highlight differences between students. Also, we expected that the more general support a teacher would show, the more egalitarian the classroom distribution of ties would be.

2. Method

2.1. Participants

Teachers and their students in 58 fifth grade classrooms in 40 Dutch primary schools participated in this study, which was part of a larger research project on the classroom climate in fifth grade of elementary school. [1] In the Netherlands, elementary school students have the same teacher for every lesson (approximately 25 h a week), or two teachers who each work part-time. When a class had two teachers, the teacher who spent most hours in the classroom participated in the study (60.3% of the participating teachers spent at least 4 days a week with the class). Teachers were on average 41.25 years old (range 24.51–62.47, $SD = 11.91$); teachers' mean experience was 15.17 years (range 1–39, $SD1 = 10.99$) and 37 teachers were women (63.8%).

Class size ranged from 18 to 34 students ($M = 26.16$, $SD = 3.70$). Only students for whom informed parental consent was obtained participated (1496 out of 1518, participation rate 98.6%). On the day of data collection, 42 students were absent, resulting in a sample size of 1454. Of these students, 47.4% were girls, and classrooms contained 30.4%–66.7% girls. Students' mean age was 10.59 years ($SD = .49$). Based on the classification by Statistics Netherlands (2012b), 84.2% of the students were Dutch (both parents were born in The Netherlands) and classes had 0%–80% students who were not Dutch (at least one parent was not born in The Netherlands). This distribution was representative for the areas in which the schools were located (Statistics Netherlands, 2012a).

2.2. Measures of peer ecology

Peer ecology measures were based on peer nominations of likeability and popularity status and social behaviors. Participants answered several questions about which of their classmates best fitted a certain description. With a minimum of one, they could nominate as many classmates as they wanted, whether or not present and whether or not consented. We excluded nominations of non-consented students from the dataset. To avoid sequence effects (Poulin & Dishion, 2008), the order of the classmates' names from which participants could choose was different for each participant.

2.2.1. Richness of interpersonal ties

Students completed nominations about peers whom they liked most ("Which classmates do you like most?"), and peers whom they liked least ("Which classmates do you like least"). To indicate to what degree liking and disliking ties were present in the classroom, density of both types of ties was calculated. That is, we divided the total number of nominations within the classroom by the maximum possible nominations, being $m*(n-1)$, where m is the number of individuals who providing ratings and n is the number of consented students in the classroom (Wasserman & Faust, 1994). The resulting density scores lie between 0 and 1 and represent the degree to which liking and disliking ties are present in the classroom. A liking density score close to 0 means that very few students indicated that they liked others, whereas a score of 1 indicates that all students indicated that they liked all of their peers.

2.2.2. Status hierarchy

The degree to which social status was hierarchically distributed in a classroom was based on the distribution of nominations for

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[1] One classroom participating in the larger study was excluded from these results, because of a diverting teaching approach with two teachers in the class at all times.

the sociometric item measuring liking and an item measuring popularity: "Which classmates are most popular?". We calculated in-degree centralization for each of the status items to represent how hierarchically versus equally nominations were distributed. In-degree refers to the number of nominations received by an individual, and centralization refers to the level of concentration of these nominations on one or a few students. In-degree centralization is the difference in number of received nominations between the most nominated student and all the others. The formula presented by Wasserman and Faust (1994) was used: In-degree centralization $= \text{sum}[\text{max}(Pi)\text{-}Pi]/((m-1)*(n-1))$, where $\text{max}(Pi)$ is the largest number of nominations received by anyone in the classroom, Pi is the number of nominations received by an individual, m is the number of individuals providing ratings and n is the number of consented students in the classroom. The centralization scores lie between 0 and 1, with a higher score representing a higher degree of status hierarchy. The lowest score of 0 means that all classmates have equal status. The highest score of 1 indicates that only one classmate has very high status, whereas all the others have very low status.

2.2.3. Social behavior

For every classroom, we calculated the descriptive norms of prosocial behavior and aggression as the density of peer nominations for each of the behaviors. The prosocial items were "Which classmates cooperate well?", and "Which classmates help other children?" ($r = .75$, $p < .001$). Aggression comprised both overt aggression: "Which classmates call other children names?", and "Which classmates hit or kick other children?", and relational aggression: "Which classmates gossip about other children?" and "Which classmates exclude other children?". The Cronbach's alpha for these four items was .86. For each student composite scores were calculated for each type of behavior as the average number of received nominations on the relevant items. Next, as an indicator of the commonness of each type of behavior in a class (i.e., the classroom norm) density scores were computed using the formula that was presented above.

2.3. Measures of teacher support and conflict

2.3.1. General teacher support and conflict

Both teachers and students completed the Questionnaire on Teacher Interaction for Primary Education (QTI-PE), a measure that targets teacher support and conflict in general and combines the two as opposite ends of a single dimension: communion. The QTI-PE is an adaptation of the QTI as developed for secondary education (Wubbels, Brekelmans, Den Brok, & van Tartwijk, 2006). For this younger population, the questionnaire contained shortened items, and words that had proven to be difficult to read or understand were replaced with synonyms. The questionnaire consists of 16 items which each reflect a certain degree of communion. The item "This teacher is friendly", for example, reflects a high degree of communion (i.e., support), and items such as "This teacher yells" and "This teacher is impatient" reflect a low level of communion (i.e., conflict). A 5-point Likert-scale was used, ranging from 1 (almost never) to 5 (almost always). Students completed the questions about their teacher, and teachers indicated how they perceived their own teaching in this class. For every class, items stated the name of the teacher involved. Following standard procedures (Wubbels et al., 2006) each item was weighted for the degree of communion and the sixteen weighted item scores were averaged, resulting in a single score for each teacher, ranging between minus 1 and plus 1. For the student version, the Cronbach's alpha was .81. Individual students' reports of teacher support were averaged per classroom. The intra-class correlation (ICC1), or the average agreement between a pair of students within the same class, was .21.

To assess the reliability of the group averages, we computed the ICC2 (see Lüdtke, Robitzsch, Trautwein, & Kunter, 2009), which was .87, indicating a highly reliable class-mean rating. For the teachers' self-perception, the Cronbach's alpha was .77.

2.3.2. Classroom norms of student-specific teacher support and conflict

Sociometric items were used to tap peer teacher relationship reputation (cf. Hughes et al., 2001), a measure for student-specific teacher–student relationships from a peer perspective. We used two items measuring peer reputation of teacher support ("Which classmates are liked most by the teacher?" and "Which classmates are praised a lot by the teacher?", $r = .71$, $p < .001$) and two items to tap peer reputation of teacher conflict ("Which classmates are liked least by the teacher?" and "Which classmates does the teacher often get angry with?", $r = .92$, $p < .001$). For each student a score for peer reputation of teacher support as well as conflict was calculated as the average number of received nominations for the two items. To obtain classroom norms of student-specific teacher support and conflict as perceived by peers, we calculated density scores for each of the composite scores in the same manner as the peer ecology density scores were calculated.

Video observations were used to measure normative student-specific teacher support and conflict from an observer's perspective. We coded all public dyadic teacher–student interactions for the amount of support and conflict as expressed by the teacher. Public dyadic teacher–student interactions were those interactions noticeable for at least half the classroom and as expressed to or about a single student or a small group, that is, those students whose name was called or a small group of collaborating students (maximum four students, e.g., "the group over there", "the green group"). Each occurrence received a coded that represented the amount of support or conflict, ranging from -2 (very low, i.e., conflict) to $+2$ (very high, i.e., support). The classroom norm of student-specific teacher support was calculated as the mean score of all instances of teacher–student interaction throughout the video.

Table 1 shows an overview of the operationalization and examples for each score. The first author and two trained research assistants scored the videos. Inter-observer agreement was first checked for video segmentation; agreement that an event had occurred ranged from 81% to 87% for the pairs of observers. Next, a set of 1624 occurrences of teacher–student interaction (9% of the total number of fragments) was coded by all three coders to test for inter-observer agreement. Weighted Cohen's kappa ranged from .69 to .76 for the pairs of observers, which can be considered substantial agreement (Landis & Koch, 1977).

2.3.3. Differential teacher behavior

As an indication of differential teacher behavior as perceived by the students, we calculated in-degree centralization of the peer reputation of teacher support and conflict nominations in the same manner as for the status hierarchy scores. A higher score represented a higher degree of differential behavior. The lowest score of 0, for example for centralization of nominations for teacher support, means that all classmates are perceived by their peers to receive an equal amount of support. The highest score of 1 indicates that only one classmate is perceived to receive teacher support.

To tap differential teacher behavior from an observer's perspective, first per student the mean support score in all the observed interactions the teacher had with that student was computed. The standard deviation of the classroom mean of these individual scores represented the degree of teacher differential behavior.

Table 1
Operationalization of observed student-specific teacher support.

Score	Level of teacher support	Indicators
−2	Very low (i.e., conflict)	Angry or hostile
		Sarcasm
		"Stop that!"
		"Don't … !"
		"You are being really annoying right now!"
−1	Low	Voice is not louder than normal
		"Please stop that"
		"Could you sit normally?"
		"I don't like that"
		Warning a child by calling their name
0	Intermediate/no information	Organizational comments
		"What is the answer to question 8?"
		"Sally will work with Ellen"
		"That is correct"
1	High	Showing compassion
		Smiling
		"That's nice of you"
		"Thank you"
2	Very high (i.e., support)	Words of affection, like sweetheart, darling, dear, my friend
		Laughing and joking
		"That is very nice of you!"
		"Thank you very much!"

2.4. Procedure

Data were collected in the fall semester of 2012/2013, at least one month after the start of the school year. Schools located in the middle, south, and east of the Netherlands were recruited to participate. After a school's principal and the classroom teacher agreed to participate, parents received information about the goals of the study and were asked for their consent regarding the participation of their child. All students for whom consent was granted completed the questionnaires on netbook computers in their own classrooms. Students could not skip questions themselves. Yet, if they wanted to pass over a question or stop participating, they could inform the researcher and were allowed to do so. Students sat separately and had partition screens flanking the netbooks to prevent distraction and to increase students' privacy. A standard instruction was given concerning the content of the questions and confidential data handling. Teachers also completed their questionnaires on a netbook. In addition, 2 h of video were recorded on the same day the questionnaires were completed. During the observation teachers were free to follow their normal lesson plans. We did ask them not to schedule tests, because generally hardly any interaction takes place during tests, and individual presentations, because interaction then typically revolves around the presenting student, resulting in an unrepresentative amount of differential behavior. After all data were collected, teachers received a summary of the findings for their classrooms.

2.5. Analysis

First, we checked the data for normality, multicollinearity and (multivariate) outliers and found no violations. Data were then analyzed using multivariate multiple regression analysis in MPlus version 7.2 (Muthén & Muthén, 2014). Because of the limited sample size, not all peer ecology measures could be tested within a single model. Instead, three separate models were tested, one for each of the peer ecology measures. These models included all correlations among teacher support and conflict measures. Finally, we controlled for class size, since density and centralization measures are not completely independent of the number of students providing nominations (cf. Gest & Rodkin, 2011).

3. Results

3.1. Peer ecology

Table 2 shows the descriptive statistics for the peer ecology variables. Peer ecologies on average were more positive than negative in nature; density for liking was higher than for disliking, $t(57) = 8.78$, $p < .001$, and prosocial behavior nominations were more common than nominations of aggression, $t(57) = 18.30$, $p < .001$. Popularity was to a higher degree centralized than liking, $t(57) = 20.47$, $p < .001$.

There was a positive association between liking and disliking density, $r = .52$, $p < .001$. This correlation was less strong but still apparent when controlling for class size, $r = .46$, $p < .001$. Apparently, in classrooms where students indicated liking for more peers, students also indicated disliking for more peers. Hierarchy in likeability and popularity were positively correlated, $r = .47$, $p < .001$. Furthermore, liking hierarchy was positively related to liking density, $r = .32$, $p = .013$. So, in classrooms where students indicated that they liked more peers, these nominations were more strongly focused on a small group of students. Finally, prosocial behavior and aggression were uncorrelated when class size was controlled for, $r = .15$, $p = .273$.

3.2. Teacher support and conflict

Table 3 shows the descriptive statistics for the teacher support and conflict variables. Teachers perceived themselves as generally less supportive than their students did, $t(57) = -6.25$, $p < .001$. Both teachers and students saw more general teacher support than conflict, as both values were above 0, $t(57) = 14.82$, $p < .001$ and $t(57) = 28.48$, $p < .001$ for teachers and students, respectively. Consistently, student-specific teacher support was perceived by the students to be more common than teacher conflict, $t(57) = 13.97$, $p < .001$. However, the average observed support score was below 0, $t(56) = -2.22$, $p = .030$, so according to the coders teachers expressed somewhat more conflict than support in their student-specific interactions. Finally, support was less centralized on a small group of students than conflict, $t(57) = 13.76$, $p < .001$.

Moderate positive correlations were found between the teachers' and students' perception of the amount of general teacher sup-

Table 2
Descriptive statistics for peer ecology measures.

	1	2	3	4	5	M	SD	Min	Max
Richness of ties									
1 Liking density	–					.14	.04	.06	.29
2 Disliking density	.52**	–				.10	.03	.04	.17
Status hierarchy									
3 Liking hierarchy	.32*	.03	–			.19	.05	.11	.34
4 Popularity hierarchy	.11	−.03	.47**	–		.55	.15	.20	.84
Social behavior									
5 Prosocial behavior	.60**	.36**	.26*	.09	–	.27	.07	.13	.44
6 Aggressive behavior	.24	.72**	−.15	−.13	.34**	.12	.04	.06	.26

*$p < .05$. **$p < .01$.

Table 3
Descriptive statistics for teacher support and conflict measures.

	1	2	3	4	5	6	7	M	SD	Min	Max
General											
1. Students' perspective	–							.47	.13	.15	.69
2. Teacher's perspective	.46**	–						.34	.18	−.25	.72
Student-specific											
3. Support norm	.34**	.19	–					.29	.09	.11	.56
4. Conflict norm	−.24	−.26*	.11	–				.12	.03	.06	.20
5. Observed support norm	.35**	.22	.32*	−.08	–			−.05	.17	−.47	.37
Differential behavior											
6. Differential support	.09	−.23	−.07	.23	.12	–		.29	.08	.10	.50
7. Differential conflict	.02	−.21	−.06	−.00	−.08	−.02	–	.61	.15	.25	.92
8. Differentiality observed	−.25	−.01	−.20	−.04	−.05	.04	.06	.31	.16	.05	.85

*$p < .05$. **$p < .01$.

port were positively correlated, $r = .46$ $p < .001$ and between observations and student ratings of student-specific teacher support, $r = .31$ $p = .018$. General and student-specific teacher support and conflict were also correlated in the expected directions; the more supportive the students perceived the teacher to be in general, the more student-specific teacher support they reported, $r = .34$ $p = .009$, and the more student-specific supportive interactions were observed, $r = .35$ $p = .007$. Furthermore, teacher-perceived general support was negatively related to classroom norms of peer-perceived teacher conflict, $r = −.26$ $p = .046$. The measures of differential teacher behavior were not related to one another or to the measures of general or normative teacher support.

3.3. Teacher support and conflict and the classroom peer ecology

Finally, the multivariate multiple regression analyses were performed, one for each aspect of the peer ecology.

3.3.1. Richness of interpersonal ties

The left part of Table 4 shows the results for the measures of richness of interpersonal ties. As expected, in classrooms where students nominated more peers to receive teacher support, students also indicated liking for more peers, $\beta = .66$, $p < .001$. Also as expected, in classrooms where students indicated more student-specific teacher conflict, students reported disliking for more of their peers, $\beta = .43$, $p = .001$. Surprisingly, disliking density was also positively associated with classroom norms of student-specific support, $\beta = .33$, $p = .005$. The overall model explained 37.5%, and 45.0% of the variance in liking density and disliking density, respectively.

3.3.2. Status hierarchy

The middle section of Table 4 shows the results for the status hierarchy variables. Classrooms where students perceived more general teacher support had a more egalitarian liking structure, $\beta = −.32$, $p = .042$. Contrary to this finding and to the expectations, also in classes with higher norms of student-specific teacher

conflict liking nominations tended to be distributed more equally, $\beta = −.33$, $p = .028$. Furthermore, as expected, when teachers according to students provided support more differentially, liking nominations were more hierarchically distributed, $\beta = .32$, $p = .015$. Surprisingly, hierarchy in popularity was not associated with any of the teacher support measures. The model explained 19.0% and 5.5% of the variance in hierarchy in liking and popularity, respectively.

3.3.3. Social behaviors

As shown in the right part of Table 4, in classrooms with higher norms of student-specific teacher support, significantly more prosocial behavior was reported by students, $\beta = .63$, $p < .001$. Surprisingly, also when teacher support was provided more differentially (i.e., to a larger extent centralized on only a few students) more prosocial behavior was reported, $\beta = .22$, $p = .027$. In classrooms where students reported higher norms of student-specific teacher conflict, students reported more aggressive behavior, $\beta = .45$, $p < .001$. The model explained 55.2% and 49.8% of the variance in prosocial behavior and aggression, respectively.

4. Discussion

In the present study associations between teacher support and conflict and the classroom peer ecology were examined. By focusing at the peer ecology at the classroom level, we had the opportunity to investigate how teacher support and conflict are related to the social structure of a class within which student learning and development occur (Bronfenbrenner & Morris, 2006). General and student-specific teacher support and conflict were expected to function as a model (see Farmer et al., 2011) and a social referent for peer relationships (see Hughes et al., 2001), showing students how to behave in social interaction in general and how to evaluate and approach specific peers. Next to overall levels of support and conflict, we included differential behavior in our models, in order to tap how equally teachers divided their attention, both positive

Table 4
Richness of Interpersonal Ties, Status Hierarchy, and Social Behavior as explained by Teacher Support and Conflict.

	Richness of interpersonal ties				Status hierarchy				Social behavior			
	Liking density		Disliking density		Liking hierarchy		Popularity hierarchy		Prosocial behavior		Aggression	
	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β
General												
1. Students' perspective	−.06 (.05)	−.18	.01 (.03)	.03	−.13 (.07)**	−.32	.01 (.20)	.01	−.12 (.06)	−.22	.07 (.04)	.24
2. Teacher's perspective	−.01 (.03)	−.02	−.03 (.02)	−.14	.02 (.05)	.08	−.09 (.14)	−.10	.03 (.04)	.08	−.04 (.03)	−.17
Student-specific												
3. Support norm	.30 (.06)**	.66	.11 (.04)**	.33	.13 (.08)	.24	.17 (.25)	.11	.46 (.08)**	.63	.07 (.05)	.19
4. Conflict norm	−.17 (.20)	−.11	.45 (.14)**	.43	−.61 (.28)**	−.33	-.91 (.86)	−.18	.01 (.27)	.00	.58 (.16)**	.45
5. Obs. support norm	−.04 (.03)	−.17	.00 (.02)	.02	.02 (.04)	.07	.04 (.13)	.05	.01 (.04)	.03	.01 (.02)	.04
Differential behavior												
6. Differential support	.03 (.06)	.06	.01 (.04)	.03	.20 (.09)*	.32	.00 (.26)	.00	.18 (.08)**	.22	.02 (.05)	.05
7. Differential conflict	.00 (.03)	−.00	.00 (.02)	−.02	−.00 (.04)	−.00	−.14 (.13)	−.14	−.02 (.04)	−.05	.04 (.02)	.15
8. Differentiality obs.	.02 (.03)	.08	−.02 (.02)	−.08	−.06 (.04)	−.18	.03 (.14)	.03	−.01 (.03)	−.03	−.01 (.03)	−.05
R^2	.37**		.45**		.19*		.06		.55**		.50**	

Note. obs. = observed.
*$p < .05$. **$p < .01$.

and negative, over their students. Indeed, teachers seemed to exert an invisible hand, as their provision of support and conflict was associated with all of the three aspects of peer ecologies: richness of interpersonal ties, status hierarchy, and social behaviors.

4.1. Richness of interpersonal ties

When a teacher showed support to more students, students reported more liking for each other, whereas when a teacher showed more conflict, students reported more disliking for each other. These findings support the notion of student-specific teacher support and conflict as a social referent for peer relationships (Hughes et al., 2001; McAuliffe et al., 2009). However, contrary to our expectations, student-specific teacher support was also positively related to peer disliking. This could be due to a teacher's pet effect (Babad, 1995; 2009), when some students are seen by their peers as the teacher's favorite and as a result are disliked more. Importantly, classes where the teacher has a pet who is not popular with the other students tend to have more negative classroom climate and lower student satisfaction and morale (Babad, 2009), which is likely reflected by more peer disliking. Alternatively, this finding could be a consequence of students feeling secure in their relationship with the teacher and therefore feeling more freedom to indicate peers they dislike. Another possibility might be that in an overall positive classroom climate, a slightly negative feeling might result in a nomination for disliking sooner than in a classroom where negativity is to a larger extent the norm, due to a contrast effect. That is, the threshold (Terry, 2000) for indicating dislike for anyone might be lower, which makes it difficult to objectively compare the actual richness of negative ties among peer ecologies. For future research it would be worthwhile to additionally measure peer disliking and aggression from an outsider's point of view.

4.2. Status hierarchy

As expected, in classrooms where the teacher more clearly concentrated positive affect on specific students, more hierarchy existed in the peer ecology, but only for liking and not for popularity. The finding for hierarchy in liking status fits the notion of the teacher as a social referent, that is, the teacher informed his class on the differential value of the students. Surprisingly, the more teacher–student conflict was reported by students, the less hierarchical the distribution of likeability status was. This result may indicate that when the teacher has more conflicted relationships with students, students react against or compensate for this negativity by being more supportive of more of their peers.

Hierarchy in popularity was not associated with any of the teacher support or conflict measures in this study. The classroom structure of popularity may be associated more with student and group characteristics or other aspects of teaching than conveying conflict and support. It could also be the case that by taking the classroom peer ecology as the unit of analysis, influential subgroups are overlooked. For instance, Moore, Shoulberg, and Murray-Close (2012) found that teacher support and conflict affected popularity differently for boys and girls. For future research it seems necessary to delve deeper into the popularity issue, to further unravel how the teacher might affect this type of status within the peer ecology.

4.3. Social behaviors

Following our hypothesis, in classes with higher norms of teacher support, students reported more prosocial behavior. This may indicate that indeed a teacher's stronger focus on positive student characteristics models positive student interaction as well. Likewise, in classes with higher norms of teacher conflict, students reported more aggression, so teachers' negative interactions may pave the way for negative student behavior. Of course, this association could also be due to the teacher having to intervene more often when students show aggressive behavior.

Unexpectedly, also differential teacher support was positively associated with prosocial behavior. It could be the case that teachers deliberately differentiate in the amount of support in order to accommodate students with specific needs. Teachers who do so may model for their students an inclination to help and cooperate with each other, that is, show prosocial behavior. Alternatively, these results may indicate that in some situations peers compensate for the negative consequences of a less equally supportive teacher by making an effort to show more support to each other. For future research it might be interesting to investigate between-class differences not only in the amount, but also in the nature of teacher differential behavior.

4.4. Student-specific versus general teacher support and conflict

In line with the analyses by Den Brok et al. (2006) and Wubbels et al. (2015) we conclude that the conceptualization of support and conflict the teacher expresses either towards specific students or in more general terms deserves consideration. As expected, general teacher support and the classroom norm of student-specific

teacher support were positively associated, but correlations were, at best, only moderate in strength (*r* range .19–.35). Therefore, these measures seem to be best interpreted as two distinct facets of teacher support. This was also reflected in our results for the student-specific and general support measures. For future research it is important to keep this distinction in mind and to conceptualize and operationalize classroom measures of teacher support and conflict according to the particular object of research.

4.5. Observed and teacher-reported teacher support and conflict

We did not find any associations between peer ecology and our observations or teacher self-reported support and conflict in class. Possibly, the students' perceptions of a supportive climate are more tightly connected to the peer ecology than the teacher's or an outsider's perceptions. As described earlier, we expected that the modeling and social referencing mechanisms imply that the teacher affects the peer ecology through the students' intake of what the teacher does. In the broader classroom climate literature the importance of the students' subjective perceptions and attributions has long been recognized (e.g., Fraser, 1989; Wubbels et al., 2015). The general reasoning is that for individual student outcomes, such as school engagement, general well-being, or externalizing behavior, it might be more important whether a student *feels* supported by the teacher rather than exactly how a teacher treated the student. This is not to say that the teacher's or an observer's perception are irrelevant, but it may account for the finding that observations and the teacher's perspective did not add to the explanation of the several peer ecology outcomes.

For the observations in particular, the lack of significant results could be due to the fact that we were only able to record 2 h of video material per class. Therefore, it is possible that this material was not representative, for example because we observed a teacher on a particularly positive or moody day. Another possibility is that the 2 h of video did not include rare, but influential occurrences of teacher behavior. The students' perceptions, however, were based on a wealth of witnessed teacher–student interactions, including those rare but potentially influential teacher interactions. For instance, research on the negativity bias (e.g., Rozin & Royzman, 2001; Vaish, Grossman, & Woodward, 2008) suggests that one negative interaction may have a far stronger impact than many positive ones. Thus, a single conflicted interaction between the teacher and a student may have colored peer perceptions of this student's level of teacher conflict, but was not recorded on camera. Another possible explanation is that peer perceptions are not only informed by observed teacher behavior, but are likely to be biased by students' prior judgments of their peers (Mikami et al., 2012), and therefore may be more closely related to the peer ecology than observed behavior. The positive correlations between student-specific support measures and both observed interactions and student-perceived collective support, however, do suggest that these nominations are at least partly associated with the teacher's actual interaction with students. Thus common-method variance does at least not seem to be the only source for co-variation.

4.6. Limitations and future directions

In sum, our study shows that in particular the level and distribution of student-specific teacher support and conflict is related to several aspects of the peer ecology. These results need to be interpreted in the light of some limitations. First, in this study we have mainly explained the associations in terms of the teacher functioning as a model or social referent and as such influencing the peer ecology. However, given the correlational design that was used, statements regarding causality cannot be made. Interrelations between the teacher and peer variables are probably more

complex than they are depicted here. If the teacher and peers together form a system that evolves through time with elements mutually influencing each other (Sabol & Pianta, 2012), the peer ecology also affects teacher behavior. A classroom in which students all like each other and behave nicely probably makes it easier for teachers to act in a supportive way, whereas in classrooms where bullying and fighting are more common teachers may need to correct students more often. Although the plausibility of bidirectional effects has been acknowledged by researchers (e.g., Bierman, 2011; Gest & Rodkin, 2011), empirical research in this area is only in its early stages. An important challenge for future research is to study to what extent associations between teacher support and conflict on the one hand and peer ecology on the other are the result of an ongoing interaction between the two aspects of the classroom climate. Still, reciprocity in the associations between teacher practices and peer ecology does not alter the possibility (or necessity) for the teacher, as a responsible professional, to take action and exert her influence to guide the development of the peer ecology in a desirable direction.

Secondly, although peer nominations have proven their value extensively in prior studies (see Cillessen, 2009; Rubin et al., 2006), the peer ecology measures derived from them may provide a one-sided image. For example, conclusions about social behaviors can only be derived from the students' perceptions of each of their peers, not about a more absolute level of prosocial behavior or aggression in the classroom climate in general. Directly asking participants to rate the ecology as such could improve and enrich the conceptualization of the peer ecologies (cf. Boor-Klip, Segers, Hendrickx, & Cillessen, 2015).

A final limitation is the sample size. Although most data entries were based on information gathered from almost 1500 students, data about our main focus of classroom peer ecologies and teacher support regarded the 58 higher level cases. This clearly limited statistical power and only relatively strong effects could be detected. Still, we found that some of the teacher support and conflict measures were significantly related to the peer ecology outcomes. Therefore, we encourage future research to investigate these processes using larger samples of classrooms. Only then can the more subtle associations between the teacher and the classroom peer ecology be found and can the teacher's touch be fully unraveled.

4.7. Implications for practice

The study findings indicate that for teachers, showing support and avoiding conflict is important for the peer ecology within which students interact with each other. Education and intervention programs focusing on classroom social dynamics might benefit from addressing how elevating the classroom level of teacher support may function as an effective intervention for altering the way students approach and value each other. In this sense, every-day teacher practices could become network-related teaching strategies (see Gest & Rodkin, 2011), when teachers deliberately apply them to affect the peer ecology. As an example, Reinke, Lewis-Palmer, and Merrell (2008) studied an intervention called Classroom Check-Up (CCU), in which they aimed to increase teachers' supportive comments and decrease their more conflicted, reprimanding remarks. CCU did alter teacher behavior, and consequently also students' aggressive behavior declined.

Building and maintaining supportive relationships with all students may not always be easy for teachers (Newberry, 2010). Emotionally or behaviorally demanding students place more relational press on teachers than those who are easily managed (Newberry & Davis, 2008). Not reprimanding these students, but instead showing support, might moreover interfere with classroom management goals, such as preventing or decreasing disruptive behavior.

Following from our study, a solution might be not to reprimand students publicly for their behavior, but more privately. Because in our study in particular the peer-perceived teacher support and conflict measures were related to the peer ecology, teachers need to be aware of supportive or conflictive interactions that are visible and/or audible to the other students in the classroom. So, the combination of a private reprimand aimed at decreasing disruptive behavior and a public expression of support another time might serve both classroom management and peer ecology, and thus individual students' development, best.

5. Conclusion

This study illustrates that in the classroom, teacher support and conflict and peer ecologies are not isolated constructs but are related to each other. Research aimed at investigating classroom social dynamics and student development, but also teachers and teacher educators, thus should be cognizant of both constructs. Our findings support the notion that the teacher functions as a model or social referent for students regarding how to interact and form relationships with others. When teachers are aware of this, they can deliberately use their everyday interactions with students as network-related teaching strategies. Future research in this field may build on these insights in further revealing the invisible hand of the teacher.

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