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ORIGINAL RESEARCH

Predicting elementary teachers' efforts to manage social dynamics from classroom composition, teacher characteristics, and the early year peer ecology

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Abstract
Teachers' efforts to manage classroom social dynamics are associated with students' social and academic adjustment, but the determinants of teachers' use of social dynamics management strategies have remained unexplored. Multiple potential determinants of strategy use were examined in a study of 164 teachers and their 2986 students in 164 1st, 3rd, and 5th grade classrooms. Teachers who employed more of these strategies were: female, rated by observers as emotionally supportive, expressed compassion for withdrawn students, perceived a more positive classroom social climate, and had students who reported more negative peer relations. Results suggest that teachers' personal characteristics influence their strategy use. In addition, results suggest that teachers' strategy use may be a response to the immediate peer ecology.

Keywords Elementary teachers · Social dynamics · Peer relations · Classroom management

1 Introduction: teachers as social leaders of the classroom

A revival of the idea that elementary teachers play a critical role in classroom social relationships (Lewin 1943) has led to a small but rapidly growing body of literature investigating how teachers manage these relationships (Farmer et al. 2011; Farmer et al. 2018; Gremmen et al. 2016). Interest in this area has increased due to new conceptual analyses of teachers' role as social leaders of the classroom (Farmer 2000; Farmer et al. 2006; Gest and Rodkin 2011; Hughes 2012), correlational studies suggesting that teacher-student relationships and specific teaching practices have

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an impact on classroom peer relations (Gest et al. 2014; Hendrickx et al. 2016; Hughes 2012; Madill et al. 2014), and intervention studies demonstrating that efforts to modify teachers' management of classroom social relationships can positively impact peer relationships (van den Berg et al. 2012) and academic engagement (Hamm et al. 2014).

Optimism about the potential to support teachers' efforts to manage classroom social relationships is tempered by limitations in teachers' current preparation, knowledge, and efficacy in this area. Historically, teachers have received little formal training in managing classroom social relationships (Schmuck and Schmuck 2001). Not surprisingly, results from multiple studies demonstrate that teachers have only moderately accurate knowledge of the peer ecology (e.g., who is most/least popular; who is friends with whom; Gest 2006; Pearl et al. 2007; Rodkin and Ahn 2009). This limited preparation and knowledge may contribute to teachers' limited sense of efficacy in this domain: Ryan et al. (2015) found that teachers reported lower efficacy for managing classroom peer relationships than for other aspects of their teaching responsibilities (e.g., instruction, classroom management).

Given the increasing evidence for the importance of teachers' social management efforts but their limited preparation, knowledge and efficacy, it is important to better understand factors that contribute to variations in teachers' social management practices (Burger et al. 2015; Ritter and Hancock 2007). Improved understanding of these factors could inform future professional development efforts. Accordingly, the purpose of the present study is to clarify the extent to which classroom compositional factors, teacher characteristics, and teachers' and students' early year perceptions of the classroom peer ecology are associated with teachers' use of strategies for managing social dynamics.

The classroom peer ecology encompasses students' social experiences with peers in the classroom and can be characterized by dynamics involving social status and social networks (Rodkin and Gest 2010). *Social status dynamics* refer to the distribution of power in the classroom. Powerful students have more access to the social resources of influence and prestige, typically measured in terms of peer acceptance (vs. rejection) and popularity. At the classroom level, social status dynamics are represented in status hierarchies that reflect variability in status within the classroom. Egalitarian classrooms, where students have relatively similar status levels, are associated with more positive youth outcomes (Rodkin and Gest 2010). In contrast, in classrooms with more extreme variations in levels of peer rejection, levels of peer victimization increase over the course of a school year (Serdiouk et al. 2015).

Social network dynamics refer to patterns of affiliative relationships. At the individual level, social networks take the form of friendships or clique memberships. At the classroom level, social network dynamics are represented by indices of tightknittedness (e.g., the density of friendship ties existing among students). Classrooms that are more tightknit provide students with close social bonds and feelings of safety that support both academic and social exploration and growth (Rodkin and Gest 2010).

Aggressive behavior often emerges from unhealthy dynamics involving social status and social networks. In most classrooms, aggressive students are low in peer status (Rubin et al. 2009), but in classrooms with relatively extreme status hierarchies,

aggressive students often occupy positions of high peer status (Garandeau et al. 2011). When an aggressive student holds high status and is well-connected in the classroom network, peers reinforce aggressive behavior. A key implication of this work emphasizing the social functions of aggression (Farmer 2000) is that teachers can reduce aggressive behavior in the classroom by providing healthier alternate "pathways" to friendships and status.

1.1 Social dynamics management strategies

Classroom management is described as "actions taken by the teacher to establish order, engage students, or elicit their cooperation" (Emmer and Stough 2001, p. 103). Building on the work of Farmer (Farmer 2000; Farmer et al. 2006, 2018), we consider social dynamics management (SDM) strategies to be a subset of classroom management: Specifically, SDM strategies refer to actions taken by the teacher to manage student-to-student interactions that are related to the peer ecology (i.e., status, networks, and aggression; Gest and Rodkin 2011). Teachers may influence the classroom peer ecology through their general approach to teacher–student interactions, as evidenced by findings that warm-responsive interactions with students (Pianta et al. 2008) are associated with a more positive peer ecology (Madill et al. 2014); or through student perceptions of whom the teacher likes (Hendrickx et al. 2016). In the present paper, however, we focus on more specific teaching strategies or practices that are intended to manage classroom social dynamics. These SDM strategies take three forms: managing status dynamics, managing network dynamics, and addressing the social functions of aggression. It is of interest to better understand teachers' involvement in each of these domains, as their involvement has been shown to have positive impacts for students (Gest et al. 2014; Madill et al. 2014; Serdiouk et al. 2015), as described in more detail below.

1.1.1 Managing status dynamics

Managing status dynamics entails efforts to reduce the imbalance of social status or power in the classroom. For example, teachers may seek to deemphasize social status in the classroom, they may promote multiple paths to status by highlighting the value of diverse skills and accomplishments (Farmer et al. 2006), or they may showcase the abilities of low-status students (Cohen and Lotan 1995). These strategies share the goal of managing social status dynamics by fostering a more egalitarian status system. Recent research indicates that teachers' efforts in this domain are associated with more positive patterns of within-year change in student reports of peer community (Madill et al. 2014) and lower rates of victimization at the end of the year (Serdiouk et al. 2015).

1.1.2 Managing network dynamics

Teachers may seek to manage network dynamics by promoting new friendships for students who are relatively isolated or by extending the friendship networks of students

whose existing friendships are conflict-ridden or cliquish. For example, they could emphasize the importance of developing new friendships to the class as a whole, they could work with isolated students to develop friendship skills, or they could provide opportunities for students to broaden their friendship networks through strategic small-group projects. These strategies share the goal of promoting a classroom social network that is more broadly interconnected by positive social ties. Teachers' efforts to manage social networks have been linked to positive changes in students' sense of peer community (Gest et al. 2014).

1.1.3 Managing aggression

Teachers may seek to manage aggression in ways that recognize aggression as intertwined with social status and peer affiliations within the classroom peer ecology (Farmer 2000). For example, teachers could assign aggressive students to positive classroom leadership roles, or they could provide extra recognition for the positive, non-aggressive behaviors of these students. These strategies share the feature of promoting alternative positive opportunities for aggressive students (and their victims) in ways that allow aggressive students to gain status for positive behaviors, and encourage positive network dynamics for bullies and victims. Teachers' efforts to promote positive behavior in aggressive students is associated with within-year declines in aggression (Gest et al. 2014).

1.1.4 Measurement of SDM strategy use

Direct observation of SDM strategy use is not feasible because interpreting a teacher action appropriately requires knowledge of both the existing peer ecology and the teacher's intention. For example, a teacher may pair two students to work together, but an observer could not know whether the pairing is random or a strategic attempt to manage social dynamics (e.g., connecting a socially vulnerable student with a popular-prosocial classmate). In principle, direct observations could be paired with data from sociometric surveys and teacher interviews to clarify the peer context and teacher intentions underlying teacher actions, but the low base rate of specific SDM strategies makes this approach impractical. Given these challenges to direct observation and the lack of existing survey scales, we employ a teacher self-report measure developed for this project that demonstrated validity in predicting changes in the classroom peer ecology: After accounting for the effects of generally responsive teaching (Pianta et al. 2008), teachers who reported more SDM strategy use had classrooms with more positive trajectories of peer community and school motivation (Gest et al. 2014) and lower rates of peer victimization (Serdiouk et al. 2015). In the present study, we consider several possible determinants of teachers' self-reported SDM strategy use.

1.2 Framework for identifying determinants of SDM strategy use

We identified potential determinants of teachers' SDM strategy use from models of teacher decision-making (Borko and Shavelson 1990) and ecological systems theory

(Bronfenbrenner 1994). Models of teacher decision-making highlight the role of *antecedent conditions* (e.g., characteristics of students, the classroom or school), *teacher characteristics* and teachers' *cognitive processes* (Borko and Shavelson 1990). In the present context, salient antecedent conditions include classroom compositional factors such the grade level and class size. Teacher characteristics include static traits (e.g., gender), teachers' prior beliefs (e.g., regarding bullying and social withdrawal among students), and general patterns of teacher–student interaction. Cognitive processes involve teachers' more proximal inferences about students, including judgments and expectations (e.g., perceptions of student behavior in the classroom). We also considered ecological perspectives that emphasize the critical importance of proximal social processes in driving behavior, suggesting that teachers' use of SDM strategies may be a reaction to challenges or opportunities in the immediate peer environment (e.g., levels of aggression or prosocial behavior). These considerations guided our review of evidence for possible determinants of teachers' use of SDM strategies.

1.3 Determinants of SDM strategy use: classroom composition

Evidence for variation in teacher SDM strategy use according to class size is mixed. Teachers in smaller classes have more positive expectations for behavior management and report that they tailor their classroom instruction to the size of the class; however, observations show no impact of class size on instructional methods or time spent interacting with individual students (Shapson et al. 1980). Moreover, a meta-analysis of the effects class size, single sex classes, and combination grade-level classes show no difference in teaching activities based on any of these dimensions (Hattie 2002). Other research suggests that elementary teachers' beliefs about bullying or strategies used to manage bullying do not differ across grade level (Kochenderfer-Ladd and Pelletier 2008). On the basis of this limited and mixed evidence, we include class size and grade level as potential predictors of teachers' use of SDM strategies but do not offer directional hypotheses.

1.4 Determinants of SDM strategy use: teacher characteristics

1.4.1 Gender

Social role theory posits that women are more socially-oriented than men; the physical attributes that have historically shaped men and women's distinct roles in society, along with the contemporary social pressures, have brought rise to this phenomenon (Eagly and Wood 2012). Indeed, empirical evidence suggests that women place greater importance than men on matters of interpersonal relationship dynamics (Cross and Madson 1997; Eagly and Wood 2012; Gore et al. 1993; Umberson et al. 1996). For example, women provide more social support than men, and are more often viewed as responsible for maintaining social relationships (Umberson et al. 1996; Cross and Madson 1997). A logical extrapolation of these findings is that female teachers may be more involved with the social dynamics of their classes than

male teachers. However, in a large study of 282 elementary and secondary school teachers that employed the Attitudes and Beliefs of Classroom Control (ABCC) Inventory, there were no gender differences in people management, the subscale that maps most closely to teachers' involvement in students' social dynamics (Martin and Yin 1997; Martin et al. 1998). Additional studies using the ABCC replicate this finding (Martin et al. 2006; Rahimi and Asadollahi 2012). Studies using measures other than the ABCC also find limited evidence of gender differences in approaches to social management (Sak et al. 2015). However, given that the ABCC people management subscale does not align perfectly with the present definition of SDM strategies, we explored whether female teachers place greater emphasis on the management of classroom social relationships than male teachers.

1.4.2 Responsive teaching

Responsiveness to student needs, regard for student perspectives, and modeling positive relational skills are the core components of emotionally supportive—or responsive—teacher-student relationships (Hamre et al. 2014). Responsive teaching is associated with student gains in language and working memory and with lower levels of teacher–child conflict (Hamre et al. 2014) and higher levels of school motivation (Gest et al. 2014). Emotionally supportive teaching is also associated with higher rates of reciprocated friendships (Gest and Rodkin 2011). We expect teachers who are highly responsive to their students to be more involved in their social relations, as evidenced by more frequent use of SDM strategies.

1.4.3 Teacher beliefs

Most research on teaching beliefs has focused on practice beliefs, context knowledge, and the process–product relationship in academic areas (Fang 1996). This body of literature indicates that teachers' beliefs about academic areas are strongly associated with their academic practices (Wilkins 2008). Recent research has extended this literature to the social realm; teachers' beliefs about students are related to the way that they interact with their class (Hu et al. 2017). Extrapolating from this line of work to SDM strategies, we expect teachers' beliefs about classroom social relations to influence their practice and use of strategies for managing social dynamics. Specifically, we expect that teachers who expressed the view that withdrawn students should be treated with extra care or who expressed particularly strong disapproval of bullying (Chang 2003) will report more SDM strategy use.

1.5 Determinants of SDM strategy use: early year peer ecology

1.5.1 Teacher perceptions

Teachers are most likely to intervene in classroom relations when a behavior or relationship is disruptive to the classroom. For example, Coplan et al. (2015) provided 400 preschool teachers with vignettes of various social behaviors. Teachers

indicated they were most likely to intervene in instances of physically and relationally aggressive behavior. Accordingly, we expected that teachers who perceive higher levels of classroom aggression early in the school year would report higher levels of SDM strategy use. Teachers also express concern about shy/withdrawn students and identify ways to support them (e.g., social learning techniques and peer pairing; Coplan et al. 2011; Bosacki et al. 2011). Based on this literature, we expect teachers to report more SDM strategy use when they perceive more behaviors characteristic of shy children, such as low levels of prosocial behavior.

1.5.2 Peer perceptions

Students are active participants in the peer ecology and thus their perceptions are more proximal to the social dynamics of the classroom than teachers' perceptions. Teachers' descriptions of classroom social relationships align with peer reports only moderately well (Gest 2006; Pearl et al. 2007), but nonetheless teachers may respond to peer concerns about classroom peer relations with more SDM strategy use. Accordingly, we expect that peer reports of classmates' aggression early in the school year would predict more SDM strategy use, and that higher peer perceptions of prosocial behavior among classmates would predict less SDM strategy use.

1.6 Present study

The first aim in the present study was to clarify factors associated with variability in teachers' self-reported use of strategies for managing classroom social dynamics. Due to limited prior research on this topic, there was no empirical basis for hypothesizing unique antecedents of specific SDM strategies. Accordingly, we use a structural equation modeling framework to predict a single latent variable representing a broad range of SDM strategies. Despite the absence of prior research predicting SDM strategy use, we derived several hypotheses from empirical studies of other domains of teaching practices: We expected that SDM strategy use would be more common among teachers who engaged in responsive teaching and expressed special concern for shy/withdrawn students, and in classrooms with a more negative early-year peer ecology (as reported by both the teacher and peers). Prior research did not provide a clear basis for expecting teacher SDM strategy use to vary by gender or grade level. Research on the effects of teachers' management of social dynamics has spanned the elementary years. To facilitate the integration of the present study into the current body of literature, the second aim of this study was to explore whether these influences differ in strength across the elementary years.

2 Method

2.1 Participants

Data were analyzed from a study of 1st, 3rd, and 5th grade teachers ($N = 164$) and their students ($N = 2986$) in 164 classrooms from multiple communities in Pennsylvania, Illinois, and Indiana, including a broad range of rural, suburban and urban community settings. Upon receiving approval from the Pennsylvania State University and the University of Illinois' human subjects review board, all teachers of 1st, 3rd, and 5th grade classrooms at participating schools were invited to participate in the study. Of the 166 teachers who consented (representing over 85% participation of all teachers at the sampled schools), two teachers did not complete the study and were removed from analyses. On average, teachers were 39 years old ($SD = 11$) and had 12 years of teaching experience ($SD = 8.73$); 48% possessed a Master's degree and 86% were female.

Informed parent consent was obtained for 82% of all students in participating classrooms. Because our focus was on variables at the level of the teacher or classroom, we describe sample-wide student demographics, but focus on classroom-level student data in analyses. For example, 79% of students in participating classrooms participated in the study. The overall student sample was ethnically diverse (47% white, 32% black, 11% Hispanic, 4% Asian) and economically diverse (63% qualified for free/reduced price lunch). At the classroom level, ethnic diversity varied widely, with one-fourth of classrooms being ethnically homogenous (100% white or 100% black), one-third having more balanced ethnic proportions (40–60% white) and one-third having one ethnicity in the clear majority (20–40% or 60–80% white). Similarly, the percentage of students eligible for free or reduced-price lunch varied widely across classrooms (e.g., 26% of classrooms had 25–50% of FRL students; 33% of classrooms had 75–100% FRL students). Overall, this suggests that teachers sampled in the present study were teaching in a broad range of classrooms that reflect much of the economic, racial, and community-setting diversity present in the U.S. educational system. Descriptive information about participating teachers and students is provided in Table 1 (Please insert Table 1 about here).

2.2 Procedures

Data were collected at three time points across a single school year. Classroom factors, teacher demographics, and teacher and peer perceptions of the classroom peer ecology were collected within 8 weeks of the start of school (Time 1). Approximately 8 weeks later (Time 2), teachers reported their disapproval towards bullying and compassion for withdrawn students. Within 8 weeks of the end of the school year (Time 3), teachers reported on the social dynamics management strategies they had used during the year. Teacher surveys were administered in written and online format. Student surveys were administered in group format for 3rd and 5th grade students; 1st grade students were interviewed individually.

Table 1 Descriptive statistics for teachers' reported social dynamics management strategies, compositional factors, teacher characteristics, and teacher and peer perceptions of the early year peer ecology

	N	Mean	*SD*	Min	Max
Social dynamics management strategies					
Managing status dynamics (mitigating status extremes)	149	4.14	0.58	2.17	5
Managing network dynamics (supporting isolated students)	149	3.73	0.70	2.25	5
Managing aggression (promoting positive behavior)	149	4.18	0.65	2.80	5
Compositional factors					
Participation rate	164	0.79	0.11	0.52	1
Class size	164	21.39	2.94	12	29
Proportion FRPL	147	0.58	0.28	0	1
Proportion female	164	0.50	0.11	0.23	0.78
Teacher characteristics					
Teacher age	161	38.5	11.07	23	64
Years teaching	163	12.15	8.73	0	40
Responsive teaching	164	0	0.96	−2.99	1.85
Bullying disapproval	157	4.05	0.66	1.25	5
Compassion for withdrawn students	157	4.12	0.53	3	5
Early year peer ecology: teacher perceptions					
Aggressive behavior	163	1.76	0.39	1.04	3.03
Prosocial behavior	163	3.83	0.40	2.75	4.78
Early year peer ecology: peer perceptions					
Aggressive behavior	164	0.10	0.06	0	0.28
Prosocial behavior	164	0.42	0.11	0.16	0.71

N Number of participants, *SD* standard deviation, *FRPL* free or reduced price lunch

2.3 Measures

2.3.1 Social dynamics management strategies

At Time 3, teachers rated how often they used various strategies to manage classroom social dynamics. No rating scales measuring these practices existed prior to this study, so items were generated based on a review of relevant literature (e.g., Farmer et al. 2006) and informal feedback from teachers who were not participants in the present study. Items were created to capture teachers' management of the three broad domains of the classroom peer ecology: social status dynamics, social network dynamics, and the social functions of aggression. Factor analysis of these items (Gest et al. 2014) resulted in a scale related to status dynamics (mitigating status extremes), a scale related to network dynamics (supporting isolated students), and a scale related to the social functions of aggression (promoting positive behavior). Items were rated on a 5-point Likert scale (1 = *Never*, 5 = *Very Often*).

Managing status dynamics: mitigating status extremes Teachers rated their efforts to make social status differences less salient by deemphasizing the

importance of social status or by enhancing the status of low status students. Three items focused on reducing the salience of status differences (e.g., I try to structure the classroom environment so that social status is less relevant, I try to create multiple routes to social status in the classroom) and three items focused on supporting low status students (e.g., I try to coach low-status children to help them develop skills and strategies that could *lead to a more favorable status* in the classroom). These six items formed an internally consistent scale ($\alpha = .81$, $M = 4.14$, $SD = 0.58$).

Managing network dynamics: supporting isolated students Teachers rated their efforts to support children with no or few friends (4 items; $\alpha = .80$, $M = 3.73$, $SD = 0.70$). This scale included items such as: "I try to create opportunities for isolated and friendless children to develop new friendships," and "I try to support isolated or friendless children by working with them to develop and practice social skills or strategies for forming relationships." These items are similar to those for mitigating status extremes in focusing on socially marginal students, but differ in their purpose: Items on the mitigating status extremes scale focus on improving social status, whereas those on the supporting isolated students scale focus on helping students develop new friendships.

Managing the social functions of aggression: promoting positive behavior Teachers rated their efforts to promote positive behavior and social roles in aggressive students and their victims (5 items; $\alpha = .87$, $M = 4.18$, $SD = 0.65$). This scale included items such as: "I try to influence social interactions of children who display aggressive, mean behavior by creating positive social opportunities for them," and "I try to help support children who are often the target of aggressive, mean behavior by creating extra, positive classroom roles for them."

2.3.2 Compositional factors

Classroom compositional factors were measured at Time 1. Teachers were relatively equally distributed across 1st ($N = 56$), 3rd ($N = 52$), and 5th grades ($N = 56$). Class size ranged from 12 to 29 students ($M = 21$, $SD = 2.94$).

2.3.3 Teacher characteristics

Teachers reported on demographic information at Time 1 (see Table 1).

Responsive teaching Teacher–student interaction quality was assessed using the Classroom Assessment Scoring System at Time 1 (CLASS; Pianta et al. 2008). The CLASS captures the dynamic interaction between teachers and students. Because it is measured at the teacher-level, we conceptualize CLASS scores to reflect teachers' orientation towards interacting with students. As such, we include it as a teacher characteristic. Two trained observers visited each classroom. At the end of each of the four 20-min cycles, the observers independently rated the quality of teacher–child interaction ($1 = Low$, $7 = High$) on 10 dimensions. Inter-rater agreement for each dimension was acceptable (ICCs ranged .75–.91). Consistent with recent approaches (Gest et al. 2014; Hamre et al. 2014) we created scales under a bifactor model through confirmatory factor analysis (CFA), which allows all 10

items to load on a single general factor and some items to load on either of two specific factors. Items with the strongest loading on the general factor include positive climate and teacher sensitivity, suggesting that the general factor captures overall teacher–student interaction quality. Scores on this general factor have been labeled Responsive Teaching in recent studies (Hamre et al. 2014).

Beliefs about bullying and compassion for withdrawn students At Time 2, teachers responded to 24 items regarding their beliefs about bullying and interacting with students. Items were rated on a 5-point Likert scale (1 = *Never*, 5 = *Always*). Two subscales: *Bullying Disapproval* and *Compassion for Withdrawn Students* were used in the present study (Chang 2003). Bullying disapproval includes four items relating to teachers' feelings towards bullying (α = .69, $M = 4.05$, $SD = 0.66$). This scale included items such as: "I feel angry when students bully others," and "Bullies must be disciplined." Three items focused on teachers' beliefs about and approaches towards withdrawn students (α = .55, $M = 4.12$, $SD = 0.53$; e.g., "Extra patience is needed with those who are reticent and withdrawn," "I am protective of those who are shy and timid").

2.3.4 Early year peer ecology: teacher perceptions

At Time 1, teachers rated each participant in their class on their aggressive and prosocial behavior using 5-point Likert scales (1 = *Always*, 5 = *Never*). For each scale, ratings were averaged across all students in the classroom to arrive at a single score characterizing the teacher's general perception of the classroom in that domain. Teachers responded to four items relating to students' *aggressive behavior*: "Gets in fights," "Teases classmates," "Harms others," and "Controls temper" (reverse coded). All items were coded so higher values indicate higher levels of aggression (α = .86). Teachers generally perceived low to moderate levels of classroom aggression: range 1.04–3.03, $M = 1.76$, $SD = 0.39$. Teachers responded to four items relating to *prosocial behavior*: "Cheers up others," "Helpful to others," "Kind to others," and "Friendly" (α = .86). Items were coded so higher values indicate higher levels of prosocial behavior. Teachers generally perceived moderate to high levels of classroom prosocial behavior: range 2.75–4.78, $M = 3.83$, $SD = 0.40$.

2.3.5 Early year peer ecology: peer perceptions

At Time 1, students nominated peers who were aggressive and prosocial. For all peer nominations, the number of nominations was unlimited but self-nominations were not counted. As with the teacher ratings, individual student scores were averaged within each classroom to arrive at a single classroom-level score for each domain summarizing general peer perceptions of the peer ecology. Individual scores for *aggressive behavior* were operationalized as the proportion of classmates nominating a student as someone who "starts fights." Classroom-average scores ranged from 0 to .28, $M = .10$, $SD = .06$, indicating that in the average class, students were nominated by 10% of their peers as aggressive. Students nominated classmates on two items reflecting *prosocial behavior*: "These kids are always willing to do something nice for somebody else," and "these kids cooperate: they pitch in, share, and

give everyone a turn" ($r = .81$). Individual proportion scores for these items were averaged at the student-, then classroom-level. Classroom-average scores ranged from .16 to .71, $M = .42$, $SD = .11$, indicating that in the average class, students were nominated by 42% of their peers for these prosocial behaviors.

2.4 Analytic strategy

2.4.1 Preliminary analyses

The intraclass correlations of the measures of teachers' and students' perceptions of the early year peer ecology were calculated to verify that there was meaningful between-classroom variability. We explored the possibility of collinearity among predictors by examining correlations among teachers' SDM strategies, classroom factors, teacher characteristics, and teacher and peer perceptions of the peer ecology.

2.4.2 Structural equation modeling

The main research question focused on the predictors of teachers' general use of strategies for managing social dynamics, rather than examining possible differences between strategies. There was also moderate overlap between teachers' use of these strategies, the average correlation = .58. For these reasons, structural equation modeling, which allows for the creation of a latent variable from specific observed variables, was best suited to answer this question. For the main analyses, we fit a structural equation model using the "lavaan" package in R (Rosseel 2012) to predict teachers' strategy use for managing classroom social dynamics. In this model, the latent variable, SDM strategies, is measured by three observed variables: managing social status (mitigating status extremes), managing network dynamics (supporting isolated students), and managing the social functions of aggression (promoting positive behavior). Grade, class size, teacher gender, responsive teaching, compassion for withdrawn students, bullying disapproval, and teacher and peer perceptions of aggression and prosocial behavior were predictors of the latent variable. All predictors were allowed to covary. Because missingness constituted < 3% of these data, maximum likelihood estimation was used in these analyses.

Standard fit indices were used to assess acceptability of model fit, including X^2, comparative fit index (CFI > .95), Tucker–Lewis Index (TLI > .95), root mean square error of approximation (RMSEA < .06) and standardized root mean square residual (SRMR < .08; Hu and Bentler 1999). Grade was centered at Grade 1, teacher gender was centered so 0 = Male. All other predictors were grand mean centered to aid in interpretation such that intercepts may be interpreted as reported strategy use for a male, 1st grade teacher, when all other predictors are held at their mean.

Although we had no a priori hypotheses regarding differences in predictors for teachers in 1st, 3rd, and 5th grades, we explored this possibility through a series of multi-group models. For example, to test whether the effects of class size varied by grade level, we compared the fit of a model that constrained all regression coefficients to be consistent across grade levels with the fit of a model that permitted

the regression coefficients for class size to vary across grade levels. We used the Chi square difference test (with two degrees of freedom) to determine whether the improvement in fit associated with estimating effects separately for each grade level was statistically significant at the $p < .05$ level. We performed this same comparison for each of the nine predictors.

3 Results

3.1 Preliminary analyses

3.1.1 Between-classroom variation in teacher and peer perceptions

Intraclass correlations were calculated for the measures of teachers' and students' perceptions of the early year peer ecology. Fifteen percent of the variance for teachers' perceptions of prosocial behavior and aggression occurs between classes; 25% of the variance in peer perceptions of prosocial behavior, and 10% of variance in peer perceptions of aggression occurs between classes. These results confirmed there was sufficient variance at the classroom level to warrant inclusion in analyses (Madill et al. 2014).

3.1.2 Correlations among predictors

Table 2 presents simple correlations between teachers' SDM strategies, classroom factors, teacher characteristics, and perceptions of the peer ecology. Teachers' SDM strategies were moderately correlated, as expected (range $r = .52$ to $r = .65$). Correlations among predictors were generally moderate (median $r = -.02$; max $|r| = .42$). (Please insert Table 2 about here)

3.2 Structural equation model to predict teachers' SDM strategy use

3.2.1 Overall model fit

Results indicate that the model was an adequate fit for the data, $X^2(20) = 32.28$, $p = .04$. CFI = .97, TLI = .86, RMSEA = .06, and SRMR = .02. All path coefficients are presented in Fig. 1 in both unstandardized and standardized form. (Please insert Fig. 1 about here)

3.2.2 Unique effects

To facilitate interpretation, we describe unstandardized coefficients for independent variables for which there is an intuitive scaling (class size, teacher gender). Teachers of larger classes ($B = 0.03$, $SE = 0.01$, $p = .01$) reported higher SDM strategy use: for example, increasing class size from 15 to 25 would be associated with a 0.30

Table 2 Correlations among teachers' social dynamics management strategies, classroom factors, teacher characteristics, and perceptions of the early year peer ecology

	Social dynamics management strategies			Compositional factors		Teacher characteristics				Peer ecology: teacher perceptions		Peer ecology: peer perceptions	
	1	2	3	4	5	6	7	8	9	10	11	12	13
Social dynamics management strategies													
1. Managing status dynamics (mitigating status extremes)	–												
2. Managing network dynamics (supporting isolated students)	0.65	–											
3. Managing aggression (promoting positive behavior)	0.57	0.52	–										
Compositional factors													
4. Grade	−0.01	0.02	−0.03	–									
5. Class size	0.02	0.03	0.09	0.17	–								
Teacher characteristics													
6. Teacher gender (1 = *Female*)	0.24	0.18	0.16	−0.17	−0.16	–							
7. Responsive teaching	0.05	0.19	0.17	0.12	−0.31	−0.03	–						
8. Bullying disapproval	−0.05	−0.08	0.02	0.07	−0.02	0.16	−0.07	–					
9. Compassion for withdrawn students	0.24	0.35	0.27	−0.12	−0.05	0.26	0.01	0.12	–				
Peer ecology: teacher perceptions													
10. Aggressive behavior	−0.16	−0.11	−0.21	0.01	−0.07	−0.01	−0.05	0.09	−0.15	–			
11. Prosocial behavior	0.10	0.20	0.25	0.02	−0.16	0.01	0.20	−0.11	0.11	−0.35	–		
Peer ecology: peer perceptions													
12. Aggressive behavior	0.03	0.06	0.00	0.09	0.02	0.08	−0.23	0.13	−0.04	0.42	−0.20	–	
13. Prosocial behavior	0.01	0.11	0.09	0.37	−0.20	−0.09	0.26	−0.09	−0.04	−0.05	0.19	−0.07	–

All correlations $|r| > .15$ are significant at $p < .05$

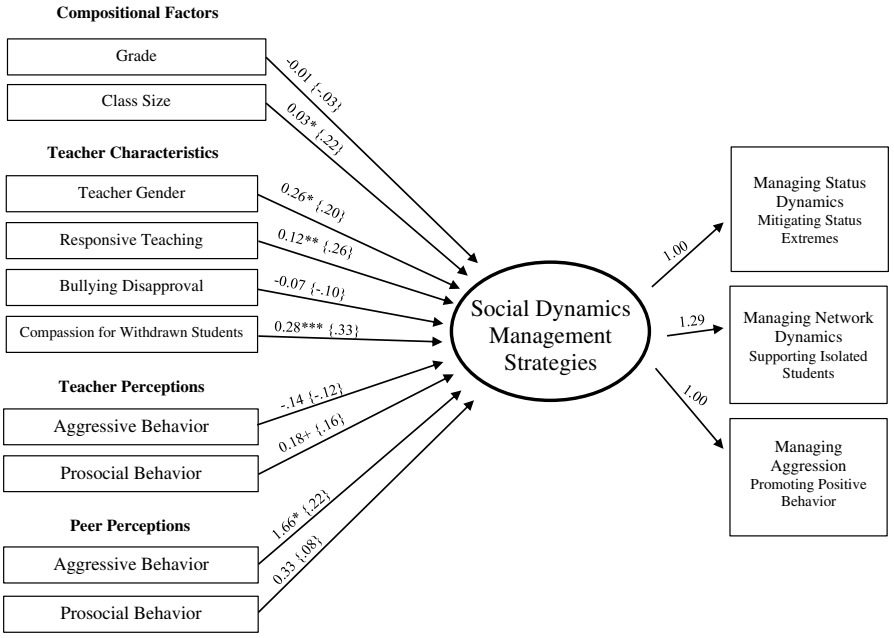

Fig. 1 Structural equation model predicting elementary teachers' self-reported social dynamics management strategies. Unstandardized and {standardized} betas are reported. Grade is coded as continuous. Gender is coded so 1 = female. ***$p < .001$; **$p < .01$; *$p < .05$; +$p < .10$

increase on the 5-point SDM scale. Female teachers reported higher SDM strategy use than their male counterparts ($B = 0.26$, $SE = 0.11$, $p = .02$).

For all remaining independent variables, we report unstandardized coefficients here but interpret effect sizes in terms of standardized coefficients (in brackets in Fig. 1) to facilitate interpretation. Teachers who were observed to be highly responsive to their students reported higher SDM strategy use ($B = 0.12$, $SE = .04$, $p = .003$); one standard deviation increase in responsive teaching is associated with a 0.26 standard deviation increase in SDM strategy use. Compassion for withdrawn students is associated with higher SDM strategy use ($B = 0.28$, $SE = .07$, $p < .001$); one standard deviation increase in compassion for withdrawn students is associated with a 0.33 standard deviation increase in SDM strategies. Teachers whose students report high levels of aggression ($B = 1.66$, $SE = .69$, $p = .02$) report employing more SDM strategy use, such that one standard deviation increase in peer reported aggression was associated with 0.22 standard deviation increase in teacher SDM strategy use. Higher teacher-perceived prosocial behavior was associated with marginally significantly higher SDM strategy use ($B = 0.18$, $SE = .10$, $p = .06$).

3.2.3 Exploring differences in predictions for 1st, 3rd, and 5th grade teachers

Multi-group models exploring the possibility of differences in strength of predictors across grade levels revealed two statistically significant Chi square difference tests.

Allowing the effect of responsive teaching to vary by grade level led to a significant improvement in model fit, $\Delta\chi^2$ (2)=8.59 p=.01. Responsive teaching was positively and significantly associated with SDM strategy use in 3rd grade (B=0.25, SE=.08, p=.002), but not in 1st grade (B=−.01 SE=.04, *ns*) or 5th grade (B=0.10, SE=.07, *ns*). Similarly, allowing the effect of teachers' perceptions of prosocial behavior to vary across grade levels produced a significant improvement in model fit, $\Delta\chi^2$ (2)=8.08 p=.02. Teachers' perceptions of prosocial behavior were positively and significantly associated with SDM strategy use in 3rd grade (B=0.50, SE=.18, p=.006) but not in 1st grade (B=0.06, SE=.10, *ns*) or 5th grade (B=−0.18, SE=.16, *ns*). Model comparisons for the remaining seven predictors were not statistically significant.

4 Discussion

Elementary teachers' use of strategies to manage social dynamics is associated with larger class size, being female, being a more responsive teacher, being more compassionate towards withdrawn students, and the presence of an early year peer ecology characterized by peer-nominated aggression. Prior theory and evidence have provided a conceptual framework and initial evidence that teachers' efforts to manage social dynamics related to status, affiliations, and the social functions of aggression are associated with positive student outcomes (Gest et al. 2014; Serdiouk et al. 2015). This is the first study to examine factors that are associated with teachers' use of SDM strategies.

4.1 Larger classes: an indicator of more complex social dynamics?

Previous studies found no association between class size and teaching practices (Hattie 2002; Shapson et al. 1980). However, the present study found larger class size to be associated with more frequent use of strategies for managing classroom social dynamics. This may reflect two unique features of this particular domain of teaching practice. First, as class size grows, the complexity of the classroom social network also grows, which may lead teachers to be more aware of and attentive to social dynamics. For example, small classrooms may have only one or perhaps two cliques of each gender, whereas large classrooms may have three or four cliques of each gender, multiplying the possibilities for intergroup conflict and struggles for status. Second, larger classes may offer teachers more opportunities to use social management strategies. For example, teachers may find it easier to identify alternative peers suitable as peer models for a struggling student. In these ways, larger classes may both promote the necessity of SDM strategies and offer more opportunities to use them.

4.2 Teacher characteristics: an orientation towards social dynamics

4.2.1 Gender

Female teachers reported more use of SDM strategies than male teachers. No such gender difference emerged in research on the people management subscale of the

ABCC (Martin and Yin 1997). This difference likely reflects the fact that the ABCC people management subscale focuses on teacher *beliefs*, including beliefs about the basic nature of students' peer relations (e.g., I believe students will develop their own ways of interacting with each other), whereas the SDM strategy use items focus on the frequency with which teachers engage in *actions* that reflect specific social management strategies.

The fact that teacher gender remained significant even after accounting for teacher beliefs about bullying and social withdrawal and teacher perceptions of the peer ecology suggests that more basic gender differences in social interactions may be relevant. Women, for example, provide more social support than men, and are considered responsible for maintaining social relationships (Umberson et al. 1996; Cross and Madson 1997). These findings are consistent with social role theory (Eagly and Wood 2012), which posits that women have come to be the more socially-oriented gender. This tendency to engage actively in the maintenance and management of social relationships may extend to female teachers' behavior in the classroom. Future research could investigate this possibility by testing whether gender differences, in social dynamics management are accounted for by how teachers think about their role as the classroom social leader, or by their efficacy beliefs in these domains (e.g., Ryan et al. 2015).

4.2.2 Responsive teaching

Teachers who were rated by observers as warmer and more responsive in their interactions with students were more likely to report using SDM strategies. Responsive teaching and related constructs have been associated with lower levels of teacher–child conflict, closer relationships with students, and more classroom friendships (Gest et al. 2014; Hamre et al. 2014). Present results help to explain these previous findings by suggesting that teachers' warmth and responsiveness may be an indicator of a tendency to reach out to provide active support for students facing specific social challenges. Established intervention programs such as Responsive Classroom (Rimm-Kaufman et al. 2014) and My Teaching Partner (Mikami et al. 2011) focus on building teachers' skills for establishing positive teacher-student relationships. The link between responsive teaching and SDM strategy use suggests that interventions aiming to bolster responsive teaching may provide a useful context for highlighting the numerous ways that teachers can effectively manage classroom social dynamics.

4.2.3 Compassion for withdrawn students

Consistent with research that connects teachers' beliefs to teaching practices (Wilkins 2008), teachers who expressed more compassion for withdrawn students—endorsing the need to be patient and protective toward these students—reported higher SDM strategy use. The fact that teachers' compassion for withdrawn students was the strongest predictor of the overall SDM strategies latent variable, even after accounting for levels of responsive teaching, suggests that it may serve as a useful marker for teachers' general inclination to take action to address a wide variety of

social problems in the classroom. In that regard, it would be interesting to explore the extent to which interventions that promote supportive teacher-student relationships (Mikami et al. 2011; Rimm-Kaufman et al. 2014) have any impact on teachers' compassion for withdrawn students, which may in turn predict eventual use of SDM strategies.

4.3 Early year peer ecology: warning signals or opportunities?

We expected that early year peer ecologies characterized by high levels of aggression and low levels of prosocial behavior would be associated with greater use of SDM strategies: Such troubled peer ecologies would function as warning signals to teachers that some action was required to support healthier peer ecologies (Bosacki et al. 2011; Coplan et al. 2011, 2015). Results provided limited support for this perspective. Peer reports of aggressive behavior were positively associated with SDM strategy use, which is consistent with the notion that peer perceptions of problems in the peer ecology signaled a need for teacher intervention. However, contrary to hypotheses, teachers' perceptions of high levels of prosocial behavior were marginally and *positively* associated with SDM strategy use. Substantively, this suggests that teachers who perceive their class as more prosocial may believe that their students would be receptive to further actions to promote a healthy peer ecology (e.g., pairing isolated students with prosocial peers).

4.4 Developmental similarities and differences among teachers in 1st, 3rd, and 5th grades

Grade was not a significant predictor of teachers' reported SDM strategy use, which suggests that 1st, 3rd, and 5th grade teachers employ SDM strategies at a similar level. This is consistent with previous research indicating that teachers' *expectations* for instruction and classroom management differ significantly by grade level (Shapson et al. 1980), but that their actual *practices* do not differ by grade level (Kochenderfer-Ladd and Pelletier 2008; Shapson et al. 1980).

We had no a priori hypotheses about grade differences in the determinants of teachers' use of SDM strategies, but results of exploratory model-comparisons indicated that some predictors of teachers' SDM strategy use may differ in strength across the elementary years. The two statistically significant cases of grade-level differences both involved stronger prediction for 3rd grade teachers: responsive teaching and teachers' perceptions of prosocial behavior were significantly and positively associated with SDM strategy use in 3rd grade, but not in 1st grade or 5th grade. Considered together, these patterns suggest that SDM strategy use by 3rd grade teachers was more strongly anchored in positive classroom relationships in the form of warm teacher–student interactions and prosocial behavior among peers. Such potential grade differences in the determinants of SDM strategy use could be clarified by qualitative research that further explores teachers' beliefs and intentions regarding the management of classroom social dynamics. However, given that we had no reason to expect such a nonlinear pattern of grade differences and given the

limited sample size at each grade level, these exploratory findings should be interpreted with caution pending replication.

4.5 Practical implications

The present analyses do not permit us to make claims about causation, but they do suggest potential points of leverage that could be incorporated into professional development programs. For example, increasing teachers' general responsiveness to students or compassion for socially vulnerable students may naturally lead to more SDM strategy use. Support for these relational orientations to teaching may fit well into existing intervention programs like My Teaching Partner (Mikami et al. 2011). To the extent that SDM strategy use may also be a reaction to an unhealthy peer ecology, it may help to promote teachers' attunement to—that is, their accurate awareness of—these negative peer dynamics. For example, the SEALS intervention encourages teachers to recognize and react to social conditions within the classroom (Motoca et al. 2014).

4.6 Strengths, limitations and future directions

The present study has several notable strengths. The multi-method measurement strategy allowed us to consider a variety of different factors that could relate to teachers' use of SDM strategies and permitted a triangulation strategy that reduced the chance of key associations reflecting shared method variance. The longitudinal nature of the data allowed us to use teacher and student perceptions of the peer ecology from the start of the school year to predict teachers' SDM strategy use as reported at the end of the year. The structural equation model clarifies the unique contributions of key factors after accounting for other possible predictors.

Future research could clarify how teacher beliefs and personality affect SDM strategy use. In the present study, variations in compassion for withdrawn students predicted SDM strategy use despite the fact that most teachers reported strong compassion for withdrawn students (e.g., scale mean was 4.12 on a 5-point scale). Despite having low reliability, variations in this scale were reliably related to SDM strategy use. Studies that elicit teachers' more specific thoughts and feelings regarding different social challenges faced by students could clarify these effects. It is also possible that teachers' own social experiences as schoolchildren contribute to the compassion they express toward withdrawn students and their likelihood to intervene on their behalf (Coplan et al. 2011). More broadly, teacher personality may influence SDM strategy use (e.g., rule conscious teachers may be more controlling of their students; Martin and Yin 1997).

Future research could expand strategies for measuring SDM strategy use. In this study, teachers responded to a set of researcher-driven prompts at the end of the school year about their SDM strategy use throughout the year (Gest et al. 2014). Teachers' reports may have been influenced by social desirability. Teachers also may enact additional strategies to manage social relations that were not anticipated in the survey. Qualitative methods could be useful in establishing a culturally grounded set

of SDM strategies. In addition, teachers' end-of-year, reports precluded an analysis of how SDM strategy use changes across the school year. Finally, given the early stages of research in this area and the moderately strong correlations among the three SDM strategy subscales, this study examined predictors of overall levels of SDM strategy use. Future research could test whether the predictors of SDM strategy use vary across subscales (e.g., managing status vs managing networks).

This study contributes to an emerging literature on teachers' active efforts to influence and manage classroom peer relations. There is considerable evidence that teachers influence classroom peer relations through their general level of warm-responsiveness and the quality of their relationships with individual students as perceived by teachers, students and peers (Hendrickx et al. 2016; Hughes 2012). A smaller literature documents that teachers' deliberate efforts to influence classroom peer relations are associated with positive student outcomes (Gest et al. 2014; Serdiouk et al. 2015), with particularly compelling evidence coming from studies employing experimental designs (van den Berg et al. 2012; Hamm et al. 2014). The present results provide some insights into which elementary teachers employ these strategies more than others (i.e., teachers who are female, emotionally supportive, and express compassion toward withdrawn students; teachers in classrooms with more peer-nominated aggression). These results may be used to inform professional development programs designed to increase teachers' use of SDM strategies in the service of creating healthier classroom peer ecologies.

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