



Bidirectional Links Between Teachers' Disciplinary Practices, Students' Peer Status, and Students' Aggression in Kindergarten

Roxane L'Écuyer¹ · François Poulin¹ · Frank Vitaro² · France Capuano³

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Abstract

This study examined bidirectional links between teachers' disciplinary practices (punitive and educational), students' peer status in class (acceptance and rejection), and students' aggressive behaviors. A sample comprising 1,038 students (mean age = 5.43 years) was assessed with the same instruments in the fall and spring of one kindergarten year. Teachers reported the disciplinary practices they used with each student in their class. Aggression, peer rejection, and peer acceptance were measured by peer sociometric nomination. Autoregressive cross-lagged modeling was used to test bidirectional associations. The results showed reciprocal links between punitive disciplinary practices, peer rejection, and students' aggressive behaviors. More specifically, punitive discipline at kindergarten start predicted greater peer rejection and higher levels of aggressive behaviors at year end. Students' aggressive behaviors and peer rejection at year start predicted greater use of punitive practice at year end. Educational discipline did not contribute to a change in students' peer status and students' aggressive behaviors.

Keywords Teachers' disciplinary practices · Students' peer status · Aggression · Kindergarten

Children's development unfolds in a dynamic process that involves reciprocal interactions between their individual characteristics and various socialization agents. At school, students interact with their teachers and peers, two influential agents that have rarely been examined simultaneously. The disciplinary practices that teachers use with individual students are likely to influence the behaviors of these students and their peer status in the classroom (Weyns et al., 2017b; White & Jones, 2000). Conversely, students' behaviors and peer status in class would influence their teachers' disciplinary practices (Mercer & DeRosier, 2008). Therefore, according to the bioecological model of human development (Bronfenbrenner & Morris, 2006) and the transactional model (Sameroff, 2009), teachers' disciplinary practices, students' peer status, and students' behaviors would be likely to show bidirectional associations.

These bidirectional associations have rarely been examined simultaneously, and even more rarely over one kindergarten year. The present study fills this gap by distinguishing between two types of disciplinary practices (punitive and educational) and by considering two indicators of students' peer status (acceptance and rejection) in addition to students' aggressive behaviors.

Teachers' Disciplinary Practices and Students' Peer Status

Teachers are likely to play a significant role in how students form social relationships in the classroom. Based on observations of student interactions in class, Farmer et al. (2011) concluded that "teachers are in a position to develop and guide the classroom as a society" (p. 247). They wield a direct influence, for example, by providing students with opportunities to construct a peer culture composed of positive social relationships. They also wield an indirect influence through their daily classroom practices and interactions with students, metaphorically conceived as "the invisible hand" (Farmer et al., 2011). This influence can be exercised via a process called social referencing, whereby students form positive or negative perceptions of their

✉ Roxane L'Écuyer
l'ecuyer.roxane@courrier.uqam.ca

¹ Department of Psychology, Université du Québec à Montréal, Montréal, Québec, Canada

² School of Psychoeducation, Université de Montréal, Montréal, Québec, Canada

³ Department of Education and Specialized Training, Université du Québec à Montréal, Montréal, Québec, Canada

classmates' attributes and likeability based partly on how their teachers' interact with them (Hendrickx et al., 2017; Hughes et al., 2001). Consequently, the students will accept (e.g., play together with, socialize with) or reject (e.g., refuse to play together with, exclude) classmates based on their teachers' behaviors. This influence would be particularly determinant in kindergarten, where peer adjustment lays the groundwork for healthy psychological development, with important implications for subsequent social and academic trajectories (Parker et al., 2006).

Among the various teacher-student interactions that occur in the classroom, teachers' disciplinary practices are particularly salient. They can influence the social impressions that peers form about a particular student (Farmer et al., 2011; McAuliffe et al., 2009). Disciplinary practices are concrete actions that teachers use when students misbehave or act in ways that interfere with class activities (e.g., breaking the rules, disruptive behaviors) (Belvel & Jordan, 2003). Disciplinary practices are considered *educational* when they act to clearly teach and reinforce expected behaviors (e.g., describing more acceptable ways to behave). In contrast, they are *punitive* when they focus on sanctions for inappropriate behaviors (e.g., reprimands, removal, loss of privileges) (Belvel & Jordan, 2003; Gaudreau, 2017).

Few studies have examined associations between teachers' disciplinary practices and students' peer status in kindergarten and elementary school. Those that did have observed that when a teacher adopted educational disciplinary practices with a student, that student was more likely to be accepted by peers, whereas punitive discipline was associated with peer rejection (Mikami et al., 2019; White & Jones, 2000; White & Kistner, 1992; White et al., 1996). Similarly, McAuliffe et al. (2009) found that corrective and negative teacher behavior toward children was associated with peer rejection. However, contrary to their hypothesis, praise by the teacher was associated with lower peer liking. The authors explained this finding in two ways. First, the school district had recently adopted a Positive Behavioral Support program that encouraged teachers to praise desired behaviors in students who behaved inappropriately. Second, they proposed the influence of a teacher's pet phenomenon. Mikami and Mercer (2017) recently showed that public correction of negative student behaviors was negatively associated with peer liking. However, they did not consider whether the corrections were positive or negative.

An important limitation of the abovementioned studies is that they did not examine the possibility that these links could also operate in the reverse direction. However, it is plausible that students' peer status in the classroom could influence the type of disciplinary practices used by teachers (Sameroff, 2009). In this sense, teachers would form a

cognitive scheme of the peer status of each student in their class (e.g., accepted or rejected) and would then act in a manner that confirms their associated beliefs (Mercer & DeRosier, 2008). Therefore, the associations between disciplinary practices and peer status would be bidirectional.

Teachers' Disciplinary Practices and Students' Aggressive Behaviors

Teachers' ability to adequately manage aggressive and disruptive behaviors in class would have an impact on students' subsequent behavior. It has been recognized that positive management of student behavior using educational interventions can reduce violence at school and prevent behavioral problems in class (Leflot et al., 2010; Stormont et al., 2007). In contrast, reprimands were shown to increase inappropriate, disruptive, and aggressive behaviors in class (Spilt et al., 2016; Weyns et al., 2017b; 2019).

Students' aggressive behaviors would also influence the disciplinary practices that teachers use with them (Hastings, 2005). Indeed, these practices do not depend solely on teachers' classroom management skills, but also from an interactive process with students' behaviors (Sameroff, 2009). It has notably been found that particular student's behavior provoked and triggered particular reactions by the teacher, and hence influenced the resulting intervention method (Hargreaves, 2000; Nurmi, 2012). Aggressive behaviors have been described as one of the most difficult behaviors to manage in class (Coleman & Gilliam, 1983). According to Hastings (2005), aggressive behaviors could provoke negative emotions in teachers (e.g., anger) and consequently influence how they respond to students. When teachers adopt a hostile attitude toward aggressive behaviors, they may resort to coercive interactions that reinforce the unwanted behaviors and thus increase their frequency (Patterson, 1982). These associations should be examined at school entry, a transition period that can be determinant for the emergence and growth of aggressive behaviors and social difficulties at school (Bongers et al., 2004; Rubin et al., 2006). This is an opportune time to examine these links because they have not yet been affected by previous social experiences, at least at school.

Peer Status and Aggressive Behaviors

The student characteristics that have been the most closely associated with peer status in class are social behaviors (Ladd et al., 1999; Rubin et al., 2006). When young children first enter the school system, aggression seems to be particularly determinant as children who displayed aggressive behaviors were more likely to be rejected by

their peers and less likely to be accepted (Bierman, 2004). It has also been shown that peer rejection contributed to increase aggression in children (Ladd, 2006). Thus, the two constructs are associated in a bidirectional manner at school entry (Ladd, 2006; Sturaro et al., 2011).

Simultaneous Testing of Bidirectional Links

No study to date has examined the presence of bidirectional links between teachers' disciplinary practices, students' peer status in class, and students' aggressive behaviors in kindergarten. The rare longitudinal studies that are available did not consider the three factors simultaneously, targeted older students, or focused mainly on the quality of the teacher–student relationship (De Laet et al., 2014; Hughes & Chen, 2011; Kiuru et al., 2015; Leflot et al., 2011; Mercer & DeRosier, 2008; Weyns et al., 2017a). Some of these studies found a bidirectional link between the quality of the teacher–student relationship and peer status (from 1st to 4th grade) (Hughes & Chen, 2011; Kiuru et al., 2015; Mercer & DeRosier, 2008). Another study obtained bidirectional links that are inconsistent from one year to the next (De Laet et al., 2014), while others found only a unidirectional path going from peer status to the quality of the teacher–student relationship (2nd to 6th grade) (Leflot et al., 2011; Weyns et al., 2017a). Moreover, whereas the majority of these studies investigated these links from one school year to the next (De Laet et al., 2014; Hughes & Chen, 2011; Kiuru et al., 2015; Weyns et al., 2017a) only two considered them over a same school year (Leflot et al., 2011; Mercer & DeRosier, 2008).

Of these studies, the two that considered students' aggressive behaviors presented contradictory results. Whereas Mercer and DeRosier (2008) found that aggressive behaviors systematically predicted lower quality of the teacher–student relationship at each time measure, Leflot et al. (2011) found little evidence of this link over time. However, they found bidirectional links between peer status and aggression. Although these studies are informative on the quality of teacher–student relationships, they provide little insight into the role of teachers' disciplinary practices.

The Present Study

The present study aimed to examine the direction of the associations between teachers' disciplinary practices (educational and punitive), students' peer status (acceptance and rejection), and students' aggressive behaviors from the fall to the spring of one kindergarten year. This allowed a deeper understanding of how the two types of disciplinary practices (educational and punitive) are differentially

linked to the two dimensions of peer status (acceptance and rejection), and whether these links are bidirectional. Furthermore, it enabled determining how the disciplinary practices and peer status are differentially linked to the development of aggressive behaviors, and whether these links are bidirectional. The advantage of examining these associations over the same school year was that the class composition remained stable.

Several covariates were included in the model. Given the empirical evidence on the links between the quality of the teacher–student relationship and students' peer status and behavior (e.g., Doumen et al., 2008; Hughes & Chen, 2011), two indicators of quality (closeness and conflict) were included in the model. This control enabled a better identification of the unique contribution of disciplinary practices. Student's age and sex and family income were included because at school entry these variables can have consequences for behaviors, socio-emotional development, and social relationships (Crawford et al., 2013; Ladd et al., 1999; Piotrowska et al., 2015). Finally, teachers' education level and years of teaching experience were included because they have been found to influence their use of certain disciplinary practices in class (Korkut, 2017; Unal & Unal, 2012).

Although all the bidirectional associations between the variables were examined simultaneously, certain specific hypotheses were formulated. With respect to the links between disciplinary practices and peer status, the use of punitive discipline in the fall was expected to be positively related to peer rejection in the spring, and this link would be bidirectional. In addition, a positive bidirectional link was expected between educational discipline in the fall and peer acceptance in the spring. In terms of disciplinary practices and aggressive behaviors, a positive bidirectional link was expected between punitive discipline at school start and aggression at year end. Moreover, educational discipline at school start was expected to show a negative bidirectional link to aggression at year end. Finally, as demonstrated in previous studies (Leflot et al., 2011; Sturaro et al., 2011) a bidirectional link was also expected between peer status (acceptance and rejection) and aggression.

Method

Participants

The sample comprised 1,038 kindergarten students (62% boys; mean age = 65.2 months, $SD = 3.7$). Students were recruited from 233 classrooms in 40 primary schools in a suburb north of Montreal (Québec, Canada). They were initially recruited as part of a larger study to assess the impact of a program to prevent violence and school dropout

(Poulin et al., 2013). This multimodal prevention program for kindergarten students included five components: 1) social and problem-solving skills, 2) home visits, 3) support for teachers, 4) friendship skills, and 5) pre-academic skills. Students, parents, and teachers participated in the project voluntarily. Written informed consent was obtained from each student's parents, as well as students' verbal assent at the start of each assessment. The majority of the participants lived in an intact family (72%), were White (85.5%), and spoke French (100%). Otherwise, 1.8% of the participants were born in Asia, 1.0% in North or South America, 1.0% in Europe, and 0.3% in Africa. Native country data were not available for about 10% of participants. The average annual family gross income was CAN\$60,900, with 7% below CAN\$20,000 and 18% over CAN\$100,000. The majority of parents had completed postsecondary studies (mothers = 69.1%; fathers = 64.0%).

The kindergarten teachers were mainly women (98%) and had an average of 15.56 years of teaching experience ($SD = 10.19$; range 0–38 years). About half (49.9%) had a bachelor's degree, 48.2% had or were studying toward a master's or doctoral degree, and 1.8% were studying toward a bachelor's degree. In terms of age, 8.2% were aged from 20 to 29 years, 36.8% from 30 to 39 years, 24.1% from 40 to 49 years, and 30.9% from 50 to 59 years.

Procedure

Data were collected at the schools at the start (fall; T1) and end (spring; T2) of the kindergarten year using the same procedures. Peer rejection and acceptance and students' aggression were measured with a peer nomination procedure held in class by trained and supervised research assistants. In the first step, the faces of the students whose parents had given consent were photographed. All the photographs for each class were then presented on a single page. The pages were reproduced to make up response booklets. Each page in the booklet corresponded to a single question. Given the young age of students, each page was identified with a unique pictogram.

In the second step, each student was given a response booklet. The instructions and statements were presented verbally to the whole class. The students responded to each statement individually by circling the face of the students who corresponded to the statement. The students were encouraged not to disclose their responses, and preventive measures were taken to maintain data confidentiality (i.e., installation of screens, spacing the students apart). Each student received a sticker as thanks for participating. The procedure took half an hour per class on average. The participation rate was over 50% for all classes, which exceeds the 40% threshold that is generally recommended to obtain valid and reliable peer nomination data (Marks et al., 2012).

Teachers self-reported their disciplinary practices (educational and punitive discipline) using a questionnaire. The control variables were measured at T1 with a questionnaire for parents (students' age and sex, family income) and another for teachers (quality of the teacher–student relationship, teacher education, years of teaching experience). Research assistants administered and collected the questionnaires at the schools. Teachers and parents received financial compensation for participating. This study was approved by the Institutional Review Board of the Université du Québec à Montréal.

Measures

Teachers' Disciplinary Practices. Teachers were questioned about how frequently they used certain disciplinary practices with each of their students who participated in the study. They responded on a five-point Likert scale from 1 (*never*) to 5 (*always*) to the item: “Over the last month, when this student broke the rules or did things that he or she was not supposed to, how often did you ... ?” Punitive discipline was measured with two items: “Raise your voice, scold, or yell at him or her?” and “Take away privileges or isolate him or her from the other children?” ($r = 0.65$; $p < 0.0001$). Educational discipline was measured with two items: “Calmly discuss the problem?” and “Describe alternative behaviors that are acceptable?” ($r = 0.86$; $p < 0.0001$). These items were drawn from questionnaires on parental disciplinary practices used in the Québec Longitudinal Study of Child Development (Institut de la Statistique du Québec, 2001) and the Canadian National Longitudinal Survey of Children and Youth (Statistics Canada, 2002). The items were adapted to measure teachers' disciplinary practices. A score was obtained for each scale by calculating the average score for the two items. The correlation between the scales was 0.34 ($p < 0.01$).

Peer Rejection and Acceptance. Peer rejection was measured with the statement “Circle the face of three children you don't like to play with” and peer acceptance with the statement “Circle the face of three children you most like to play with” (Coie et al., 1982). For each statement, the nominations received for each student were compiled and standardized within each class by conversion to z-scores. This procedure was demonstrated to be a reliable and valid method for assessing peer status in preschoolers (Wu et al., 2001).

Aggression. Students were asked to circle the faces of three classmates who best corresponded to each of the following statements: “fight the most,” “hit and push other children the most,” “say bad things to other children,” “tell their friends not to play with other children,” “tell their friends secrets or bad things about other children,” and “get angry when they don't get their way.” The nominations

received for each student were compiled and standardized within each class. The aggression score was obtained by averaging all item responses. This scale showed good internal consistency ($\alpha=0.84$ at T1 and $\alpha=0.86$ at T2).

Control Variables

Teacher–Student Relationship Quality. The quality of the teacher–student relationship was assessed with four statements from the Student–Teacher Relationships Scale (Pianta et al., 1995). Teachers responded to the statements for each student. Closeness was measured with two statements: “I share an affectionate, warm relationship with this child,” and “This child openly shares his/her feelings and experiences with me” ($r=0.51$; $p<0.0001$). Conflict was also measured with two statements: “This child and I always seem to be struggling with each other,” and “Despite my best efforts, I am uncomfortable with how this child and I get along” ($r=0.60$; $p<0.0001$). Teachers responded on a five-point Likert scale from 1 (*never*) to 5 (*always*). This short version of the scale has been used in other studies to measure the quality of teacher–student relationships (see Brendgen et al., 2011; Vitaro et al., 2012). A score was created for each scale by calculating the average score for the two items.

Family Income. Parents indicated their annual family income on a nine-point scale from CAN\$19,999 or less to CAN\$100,000 or more.

Students’ Age and Sex. Parents indicated the age (in months) and sex of their children.

Teachers’ Education. Teachers indicated their highest education level by choosing from among nine items ranging from “Some courses leading to a bachelor’s degree” to “doctoral degree.” This variable was recoded into three categories: “studying toward a bachelor’s degree,” “bachelor’s degree,” and “obtained or studying toward a master’s or doctoral degree.”

Years of Teaching Experience. Teachers indicated their years of teaching experience.

Analysis

Longitudinal associations between teachers’ discipline (educational and punitive), students’ peer status (acceptance and rejection), and students’ aggressive behaviors from T1 to T2 were examined using an autoregressive cross-lagged model (Jöreskog & Sörbom, 1979). This allowed determining cross-lagged longitudinal associations between variables while controlling for concomitant and stable links between them. The directions of the links between all the variables were examined simultaneously within the same model. Control variables measured at kindergarten start (students’ age and sex, family income, teacher–student

closeness and conflict, teacher education, years of teaching experience) were included in the analysis.

The analyses were performed with Mplus version 7 (Muthén & Muthén, 2012). Maximum likelihood with robust standard errors (MLR) was used to account for potential nonnormality of data. Missing data were handled with full-information maximum likelihood (FIML). The proportion of missing data points for all the model variables was 2.14%. Little’s MCAR test was significant ($\chi^2=398,80$ (339), $p=0.014$), suggesting that data were not missing completely at random (Little, 1988). Missingness was found to be significantly predicted by two auxiliary variables (teachers’ years of teaching experience and family income) ($p<0.05$), indicating that data were missing at random (Mellenbergh, 2019). More specifically, teachers with fewer years of teaching experience were more likely to have missing data on punitive and educational discipline, whereas children from lower-income families were more likely to have missing data on peer acceptance/rejection and aggression. Because the students were nested within classrooms, the complex analysis function was used to adjust the standard errors for the estimated path coefficients to account for the nonindependence of observations (Williams, 2000).

Overall model adequacy was determined with the following adjustment indices: the comparative fit index (CFI), the Tucker–Lewis index (TLI), the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), and the robust Satorra–Bentler scaled chi-square statistic ($S-B\chi^2$) (West et al., 2012). The following values were used to guide the model assessment: CFI and $TLI \geq 0.90$ (acceptable fit), CFI and $TLI \geq 0.95$ (good fit); SRMR between 0.08 and 0.10 (acceptable fit), $SRMR \leq 0.08$ (good fit), RMSEA between 0.06 and 0.08 (acceptable fit), and $RMSEA \leq 0.06$ (good fit) (Hu & Bentler, 1999). A nonsignificant chi-square value ($p>0.05$) indicates good model fit. However, this index is highly sensitive to sample size and should be interpreted with caution (West et al., 2012).

Results

Descriptive Statistics and Correlations

Tables 1 and 2 present the descriptive statistics for the variables at the two measurement times (T1 and T2) and the Pearson’s bivariate correlations. All the asymmetry and kurtosis values for the normality indices were within acceptable limits for the planned analyses (i.e., skewness < 2 ; kurtosis < 7) (West et al., 1995).

Punitive and educational discipline, aggression, and peer rejection and acceptance were stable from T1 to T2 ($r=0.50$ to 0.77 , $p<0.001$). Punitive and educational discipline were negatively correlated with acceptance

Table 1 Correlations among the study variables

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|-------------------|---------|---------|--------|---------|---------|---------|---------|---------|---------|---------|---------|-------|--------|---------|--------|--------|----|
| 1. Punitive T1 | - | | | | | | | | | | | | | | | | |
| 2. Punitive T2 | 0.72** | - | | | | | | | | | | | | | | | |
| 3. Educational T1 | 0.34** | 0.26** | - | | | | | | | | | | | | | | |
| 4. Educational T2 | 0.30** | 0.35** | 0.50** | - | | | | | | | | | | | | | |
| 5. Rejection T1 | 0.47** | 0.43** | 0.22** | 0.18** | - | | | | | | | | | | | | |
| 6. Rejection T2 | 0.48** | 0.50** | 0.16** | 0.20** | 0.60** | - | | | | | | | | | | | |
| 7. Acceptance T1 | -0.17** | -0.17** | -0.08* | -0.10** | -0.42** | -0.36** | - | | | | | | | | | | |
| 8. Acceptance T2 | -0.19** | -0.21** | -0.07* | -0.10** | -0.31** | -0.45** | 0.54** | - | | | | | | | | | |
| 9. Aggression T1 | 0.58** | 0.51** | 0.28** | 0.25** | 0.62** | 0.56** | -0.14** | -0.13** | - | | | | | | | | |
| 10. Aggression T2 | 0.59** | 0.58** | 0.25** | 0.25** | 0.54** | 0.66** | -0.11** | -0.17** | 0.77** | - | | | | | | | |
| 11. Sex | 0.21** | 0.18** | 0.15** | 0.10** | 0.18** | 0.16** | -0.03 | 0.04 | 0.37** | 0.34** | - | | | | | | |
| 12. Age | -0.05 | -0.04 | -0.04 | -0.04 | -0.06 | -0.07* | 0.09** | 0.12** | -0.04 | -0.03 | -0.02 | - | | | | | |
| 13. Income | -0.04 | -0.09** | -0.02 | 0.01 | -0.10** | -0.14** | 0.13** | 0.14** | -0.06 | -0.09** | 0.02 | 0.01 | - | | | | |
| 14. Conflict T1 | 0.62** | 0.47** | 0.18** | 0.18** | 0.32** | 0.34** | -0.09** | -0.11** | 0.39** | 0.41** | 0.11** | 0.02 | -0.05 | - | | | |
| 15. Closeness T1 | -0.17** | -0.11** | 0.10** | -0.01 | -0.16** | -0.17** | 0.15** | 0.11** | -0.12** | -0.14** | -0.11** | 0.05 | 0.11** | -0.33** | - | | |
| 16. Education T1 | 0.00 | 0.02 | 0.05 | 0.05 | -0.03 | -0.06* | 0.02 | 0.02 | -0.02 | -0.02 | -0.01 | 0.04 | -0.04 | 0.04 | 0.13** | - | |
| 17. Experience T1 | 0.00 | 0.04 | 0.06 | 0.10** | -0.00 | -0.03 | 0.01 | -0.01 | -0.02 | 0.01 | -0.00 | -0.04 | 0.02 | 0.10** | 0.07* | 0.26** | - |

T1 Time 1 (fall of the kindergarten year), T2 Time 2 (spring of the kindergarten year), Punitive punitive discipline, Educational educational discipline, Education teacher education, Experience years of teaching experience

* $p < 0.05$; ** $p < 0.01$

Table 2 Descriptive statistics

| Variable | M | SD | Skewness | Kurtosis |
|---------------------------|-------|-------|----------|----------|
| Punitive discipline T1 | 1.91 | 0.94 | 0.82 | -0.34 |
| Punitive discipline T2 | 1.97 | 0.94 | 0.73 | -0.46 |
| Educational discipline T1 | 3.44 | 1.10 | -0.52 | -0.45 |
| Educational discipline T2 | 3.46 | 1.09 | -0.54 | -0.38 |
| Peer rejection T1 | 0.05 | 0.99 | 0.90 | 0.20 |
| Peer rejection T2 | 0.02 | 0.99 | 0.96 | 0.15 |
| Peer acceptance T1 | 0.01 | 0.96 | 0.49 | -0.23 |
| Peer acceptance T2 | 0.02 | 0.96 | 0.38 | -0.44 |
| Aggression T1 | 0.13 | 1.07 | 1.35 | 1.07 |
| Aggression T2 | 0.11 | 1.07 | 1.43 | 1.11 |
| Sex | 0.62 | 0.49 | - | - |
| Age T1 | 65.32 | 3.49 | 0.11 | -1.10 |
| Family income | 5.48 | 2.51 | -0.17 | -1.07 |
| Conflict T1 | 1.40 | 0.69 | 1.79 | 2.45 |
| Closeness T1 | 3.77 | 0.81 | -0.51 | -0.12 |
| Teacher education T1 | 2.46 | 0.53 | -0.22 | -1.19 |
| Teaching experience T1 | 16.70 | 10.37 | 0.42 | -1.20 |

Sex is coded as 0 (girl) and 1 (boy)

and positively with rejection. Positive concomitant and longitudinal correlations were observed between punitive discipline, educational discipline, rejection, and aggression ($p < 0.001$). Moreover, negative concomitant

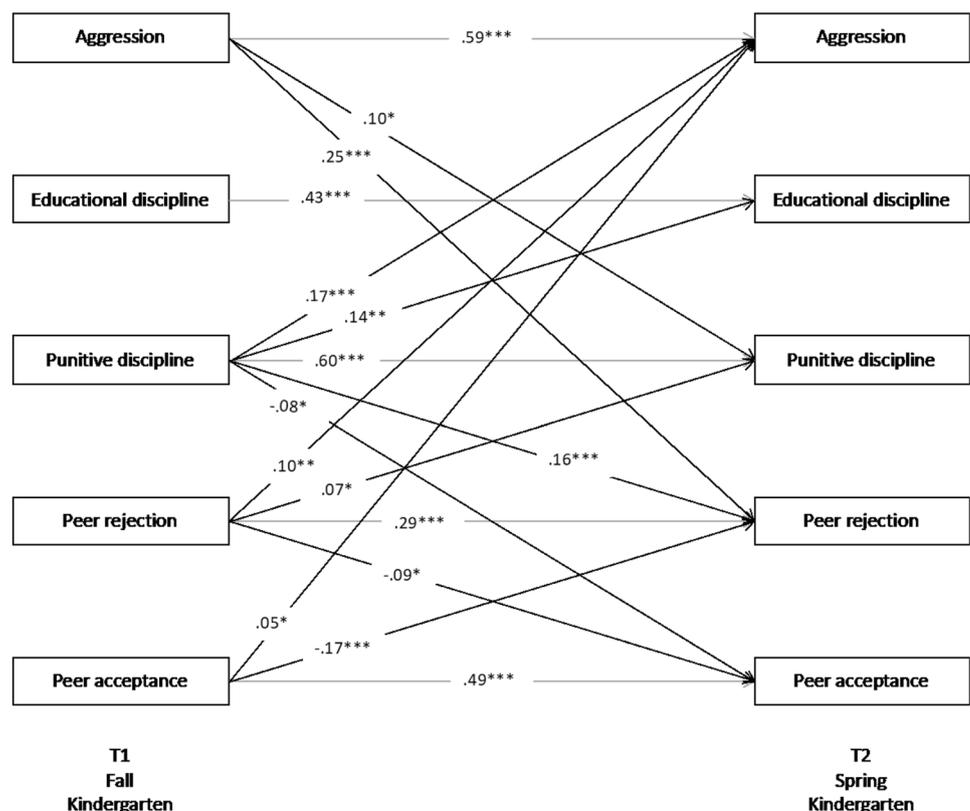
and longitudinal correlations were observed between peer acceptance and all the main variables in the model. Aggression was negatively correlated with acceptance and positively with rejection at both T1 and T2. In addition, aggression was positively and significantly correlated with both punitive and educational discipline.

With respect to the control variables, age correlated positively with acceptance at T1 and T2 but negatively with rejection at T2. Teacher–student closeness and conflict were correlated with all the main variables in the model, and at both measurement times, except for educational discipline at T2. Sex was positively correlated with all the main variables except for acceptance. Family income was positively correlated with acceptance and negatively with rejection at both measurement times, and negatively with punitive discipline and aggression at T2. Finally, teacher education was negatively correlated with rejection at T2, and years of teaching experience was positively correlated with educational discipline at T2.

Autoregressive Cross-Lagged Model

A model including the concomitant, autoregressive, and cross-lagged associations between the variables was estimated (i.e., discipline, peer status, and aggression). The model also accounted for all the above-mentioned control variables. The model fitted the data well, $\chi^2(32) = 68.45$,

Fig. 1 A cross-lagged model of teachers’ disciplinary practices, peer rejection and acceptance, and students’ aggression. *Note.* Standardized coefficients for the stability and bidirectional links. Only estimates significant at $p < .05$ or less are provided. Control variables at T1 (students’ age and sex, family income, teacher–student relationship quality characterized by closeness and conflict, teacher education, years of teaching experience) and the concomitant links between the variables are included in the analysis but not shown in the figure. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$



$p = 0.001$, CFI = 0.99, TLI = 0.97, RMSEA = 0.04, SRMR = 0.03. Figure 1 shows the model results.

In terms of temporal stability of the variables, the results revealed that disciplinary practices, peer status, and aggression were stable from T1 to T2 ($\beta = 0.29$ to 0.60 , $p < 0.001$). The results for the longitudinal cross-lagged associations showed several significant links, above and beyond the concomitant and stable associations between the variables. Punitive discipline at T1 positively predicted rejection at T2 ($\beta = 0.16$, $p < 0.001$) and negatively predicted acceptance at T2 ($\beta = -0.08$, $p < 0.05$). In addition, rejection at T1 positively predicted punitive discipline at T2 ($\beta = 0.07$, $p < 0.05$).

Aggression at T1 positively predicted punitive discipline ($\beta = 0.10$, $p < 0.05$) and rejection at T2 ($\beta = 0.25$, $p < 0.001$). The reverse associations were also observed: punitive discipline and rejection at T1 predicted aggression at T2 ($\beta = 0.17$, $p < 0.001$ and $\beta = 0.10$, $p < 0.01$, respectively). In addition, peer acceptance at T1 positively predicted aggression at T2 ($\beta = 0.05$, $p < 0.05$). However, peer acceptance did not contribute to a change in disciplinary practices: instead, it contributed to lower rejection ($\beta = -0.17$, $p < 0.001$). Conversely, rejection predicted lower acceptance ($\beta = -0.09$, $p < 0.05$).

No significant cross-lagged longitudinal associations were observed between educational discipline and the other variables in the model, except for punitive discipline, which positively predicted educational discipline ($\beta = 0.14$, $p < 0.01$). Educational discipline predicted only its own score at T2 ($\beta = 0.43$, $p < 0.001$).

Discussion

The aim of this study was to examine the longitudinal interplay between teachers' disciplinary practices (punitive and educational), students' peer status (acceptance and rejection), and students' aggressive behaviors. These links were investigated from the fall to the spring of one kindergarten year, a time when problems of social integration and behavior begin to emerge. The results of an autoregressive cross-lagged model revealed reciprocal links between the three sets of variables. The results are discussed with respect to the proposed hypotheses.

Bidirectional Links Between Disciplinary Practices and Peer Status

The results underscore the importance of separately examining the positive and negative dimensions of teachers' disciplinary practices and students' peer status. Notably, the two dimensions of disciplinary practices (punitive and educational) contributed differently to the two dimensions of peer status (acceptance and rejection). Furthermore, the

two dimensions of peer status contributed differently to the two dimensions of disciplinary practices.

As expected, results showed a reciprocal association between punitive discipline and peer rejection. More precisely, punitive discipline at kindergarten start predicted greater rejection at year end. Conversely, rejection at year start predicted greater use of punitive discipline at year end. The strengths of these associations were over and above those for students' aggressive behaviors, autoregressive associations, concomitant associations, and several covariates. These results align with other studies that found bidirectional associations between the quality of the teacher–student relationship and peer status (De Laet et al., 2014; Hughes & Chen, 2011; Kiuru et al., 2015; Mercer & DeRosier, 2008). Taken together, these findings suggest that different types of teacher–student interactions are likely to predict, and be predicted by, the peer status of individual students. These results are net of the quality of the teacher–student relationship, which was used as a control variable in the present study.

A unidirectional link was found between punitive discipline and decreased peer acceptance. Thus, punitive discipline appears to be harmful for students' peer status in the classroom. The other students would tend to perceive students who are punished by teachers as less likeable, leading to greater rejection and lower acceptance. Conversely, peer rejection is likely to influence the type of discipline the teacher uses with a student. One possible explanation is that the teacher could perceive rejected and less well-liked students less favorably (Mercer & DeRosier, 2008).

No links were found between educational discipline and peer status. A possible explanation is that students tend to find punitive discipline more salient than educational discipline (Doumen et al., 2009). This finding could also reflect a negativity bias, or the general tendency to remember and use negative over positive information (Vaish et al., 2008). Many studies have found that teachers' negative behaviors are more strongly associated with peer status than positive behaviors (McAuliffe et al., 2009; White & Kistner, 1992). Our results also support those of Hendrickx et al. (2017), who found that students used only negative versus positive teachers' behaviors as the basis for judging their classmates.

Bidirectional Links Between Disciplinary Practices and Aggressive Behaviors

A bidirectional association was found between teachers' punitive discipline and students' aggressive behaviors. Punitive discipline at year start predicted increased aggression at year end, and aggressive behaviors at year start predicted increased use of punitive discipline at year end. These associations were observed over and above students' peer status. These findings are consistent with transactional

models that consider child development as the result of complex and continuous transactions between the changing characteristics of children and their environments (Sameroff, 2009). Accordingly, a student's aggressive behaviors could influence how the teacher deals with that student. Conversely, the teacher's dealings with a particular student could influence that student to act more aggressively. Other studies have shown that interactions between aggressive students and their teachers tend to become increasingly negative (Doumen et al., 2008; Brendgen et al., 2006). The use of punitive discipline in response to aggressive behaviors therefore risks setting off a vicious spiral of negative teacher–student interactions. As students' behaviors become more aggressive, teachers tend to use more punitive disciplinary interventions, thereby fueling a coercive cycle (Patterson, 1982).

Unexpectedly, the use of educational discipline did not lead to decreased aggressive behaviors over the year. This goes against other studies that found associations between educational discipline and lower student aggression (Stormont et al., 2007; Weyns et al., 2017b). However, this finding is consistent with the idea that, compared to positive teacher–student interactions, negative teacher–student interactions make a stronger contribution to the development of aggressive and disruptive behaviors in class, at least in kindergarten (Roorda et al., 2014; Weyns et al., 2019). It is also possible that the educational discipline examined in the present study (i.e., describing expected behaviors) would have a positive effect on aggressive behaviors only when combined with other classroom management strategies. For instance, teachers could also praise appropriate behaviors and set clear rules and routines (Belvel & Jordan, 2003).

Bidirectional Links Between Peer Status and Aggressive Behaviors

As expected, peer rejection was bidirectionally associated with students' aggressive behaviors, over and above teachers' disciplinary practices. Rejection at the beginning of school year predicted increased aggression at the end of school year. Conversely, aggression at the beginning of school year predicted increased rejection at the end of school year. These results concur with those of other studies, as they also show that peer rejection and students' aggressive behaviors are mutually influential (Ladd, 2006; Sturaro et al., 2011).

Results also showed that peer acceptance at year start predicted increased aggression at year end. This is surprising, considering that peer acceptance correlated negatively with aggression at both measurement times. Moreover, some studies have demonstrated associations between peer acceptance and better social and academic adjustment (e.g., Beazidou & Botsoglou, 2016). One possible explanation would be that socially accepted children may become more aggressive in contexts where aggression

is frequent (strong descriptive norm) or socially approved by peers (injunctive norm). Additional studies are needed to explore this hypothesis further.

Finally, it is important to mention that the results of this study were over and above the well-known effects of the quality of the teacher–student relationship on students' behaviors and peer status. This control enabled a more rigorous determination of the direction of the associations between disciplinary practices, peer status, and aggressive behaviors.

Strengths, Limitations, and Future Directions

This study includes several methodological strengths. First, the large sample comprising 233 kindergarten classes contributed to the robustness of the analyses and results. Second, the use of a longitudinal design with two measurement times (fall and spring) in the same kindergarten year enabled good identification of the social dynamics at play in the classroom. Third, the data analysis strategy allowed simultaneous control of different aspects (correlations within time points and autoregressive paths), for a more robust examination of the direction of the links between the study variables. Fourth, the use of diverse information sources (i.e., teachers, peers, parents) enabled gathering information on individual students from many respondents without the risk of shared method variance. Finally, in a departure from previous studies, positive and negative dimensions of disciplinary practices (educational and punitive) and peer status (acceptance and rejection) were examined simultaneously within a same model. This allowed controlling for their overlap and provided a more refined understanding of their respective contribution.

This study also presents certain limitations. First, our measure of teachers' disciplinary practices was used for the first time. In addition, the four items making up the measure cover only a limited range of such practices, and would gain by being expanded. However, the use of a small number of statements enabled targeting specific teacher behaviors that could influence students' peer status and aggressive behaviors, and vice versa. Second, in future studies, it would be important to verify whether these disciplinary practices were enacted in front of the other students or privately. For example, Mikami and Mercer (2017) showed that public corrections of behaviors were associated with lower peer acceptance, whereas discreet corrections were not. Third, the teachers' disciplinary practices were self-reported. Hence, some teachers may have over- or under-reported their use of certain practices. Although direct classroom observations could have prevented this issue, teachers may reduce their use of certain practices when being observed or filmed. Fourth, data were collected from a relatively homogenous sample in terms of ethnicity and family income. Our results should be reproduced in more diversified

sociodemographic samples. Finally, although the longitudinal design helped identify directional links between the variables of interest, the correlational nature of the data did not allow drawing causal conclusions.

Despite these limitations, our results open up new research directions. First, potential moderators should be explored to better understand the conditions in which teachers' disciplinary practices are likely to predict students' peer status, and vice versa. With hierarchical data, independence of observations is situated at the cluster level, in this case, the class (Muthén & Muthén, 2012). The number of available classes and the complexity of the tested model (i.e., the number of parameters and variables included) precluded this possibility. The moderators could include students' characteristics such as sex and social behaviors in class as well as teachers' and classroom characteristics (e.g., teacher attunement, social norms, classroom composition). Second, the research has neglected the mechanisms by which students' peer status contributes to teachers' behaviors, and the underlying processes at play need to be better understood. Third, future studies should consider other types of disciplinary practices. For example, no links were found between educational discipline, students' aggression, and students' peer status. This does not exclude the possibility that other types of educational interventions (e.g., praise for appropriate behaviors, clear rules and routines) could have positive effects on aggression and peer status, and vice versa. Finally, although certain characteristics of the students (sex, age, and family income) and teachers (quality of the teacher–student relationship, education, and years of teaching experience) were used as controls, other potentially confounding variables such as classroom characteristics (e.g., gender composition, density of classroom ties, classroom average for behavioral problems) should be taken into account.

Theoretical and Practical Implications

Consistent with the transactional model (Sameroff, 2009) and the bioecological model of human development (Bronfenbrenner & Morris, 2006), our results support the need to consider the mutual influence of children's characteristics and the various agents of socialization that operate within their environments. The results also highlight the importance of simultaneously accounting for the roles of teachers and classroom peers in the development of students' aggressive behaviors. Finally, the results call for improved teacher training in the management of problematic classroom behaviors. Unfortunately, initial teacher training programs devote little time to developing classroom management skills for dealing with problematic and disruptive behaviors. Both researchers (Freeman et al., 2013; Woodcock & Reupert, 2017) and teachers (Reinke et al., 2011) have deplored this lack of preparation for day-to-day confrontations in class. Professional

development programs could not only help teachers improve their ability to handle difficult situations, but also inform teachers about the mutual influence between classroom social dynamics and diverse disciplinary practices. Well-equipped teachers could prevent increased aggression and peer rejection along with the harmful consequences for students' social and academic trajectories (Bierman, 2004; Bongers et al., 2004).

These suggestions derive from our results on the mutual associations between teachers' punitive discipline, students' aggressive behaviors, and peer rejection. When a student behaves inappropriately in class and the teacher reacts punitively, that student is more likely to be rejected and less well-liked by the other students and to act more aggressively. Conversely, both rejection and aggression lead to greater use of punitive discipline over the year.

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Data Availability Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data is not available.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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