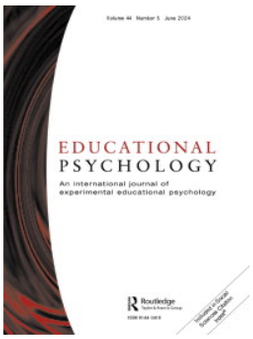

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Educational Psychology

An International Journal of Experimental Educational Psychology

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/cedp20

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**To cite this article:** Ariana Garrote, Marion Diener, Brigitte Hepberger, Susanne Kuratli Geeler, Celina Nesme & Elisabeth Moser Opitz (2024) Social behavior, academic achievement, language skills, and peer rejection in elementary school classes: the moderating role of teacher feedback, Educational Psychology, 44:5, 613-631, DOI: 10.1080/01443410.2024.2387544

**To link to this article:** https://doi.org/10.1080/01443410.2024.2387544



Published online: 12 Aug 2024.

EDUCATIONAL PSYCHOLOGY
2024, VOL. 44, NO. 5, 613–631
https://doi.org/10.1080/01443410.2024.2387544

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# Social behavior, academic achievement, language skills, and peer rejection in elementary school classes: the moderating role of teacher feedback

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**ABSTRACT**

The study examines the influence of teacher feedback in the relationship between peer rejection and student level predictors of rejection. Feedback on academic performance and social behaviour recorded during a standardised lesson was analysed for each of 36 Grade 1–3 classes ($N=709$). Student social behaviour, academic achievement, and language skills were assessed at the start of the school year. Peer rejection was assessed at both the beginning and end of the school year. Three types of feedback behaviour were identified: Teachers who gave most negative feedback on social behaviour, those who gave most positive feedback on academic performance, and those who gave less feedback, positive or negative. Results provide evidence for the moderating role of teacher behaviour in the relationship between student academic achievement and peer rejection. In classrooms with the highest proportion of positive feedback on academic performance, academic achievement predicted peer rejection and there was a decrease in peer rejection over an academic year.

**ARTICLE HISTORY**
Received 27 November 2023
Accepted 29 July 2024

**KEYWORDS**
teacher feedback peer rejection social behaviour academic achievement video study

Rejection by peers can have a serious negative impact on the social and academic adjustment of a student (Ladd et al., 2008, 2017; Mayeux et al., 2007). Rejected students have higher levels of stress (Peters et al., 2011), are less engaged in school (Buhs et al., 2006; Ladd et al., 2017), and are more likely to drop out (Zettergren, 2003). Because rejection status is stable over time, students can experience rejection over a prolonged period (Mayeux et al., 2007; Walker, 2009). Rejection by peers has been associated with low levels of academic achievement (Nakamoto & Schwartz,

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2010), language skills (Menting et al., 2011; von Grünigen et al., 2012), and social behavioural skills (García Bacete et al., 2017; Stormshak et al., 1999).

Peer dynamics in the classroom moderate the relationships and interactions between students (Gest & Rodkin, 2011; Mikami et al., 2010). Since these peer dynamics are influenced by how teachers manage behaviour or set expectations in the classroom it may be that students are at a greater risk of experiencing rejection in some classes than in others (Boor-Klip et al., 2015; Chang, 2003, 2004; Mikami et al., 2010).

Teacher feedback is an important factor in student learning and the way it is delivered can enhance learning and achievement (Berner et al., 2022; Harris et al., 2014; Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Mandouit & Hattie, 2023). Most of the direct exchanges in a classroom between teacher and students involve teachers giving feedback to students (Rubie-Davies, 2007). There is a growing body of evidence that teacher feedback behaviour affects peer dynamics by influencing peer perceptions of the students who receive feedback (White & Jones, 2000) and their acceptance or rejection by the peer group (Hendrickx et al., 2017; Huber et al., 2014; Schwab et al., 2022). Most of these studies investigated whether positive and negative teacher feedback correlates with peer acceptance or rejection. Less is known about whether some teachers are more likely to show certain feedback behaviour patterns (Rubie-Davies, 2007) or whether these teacher behaviour types can have different effects on peer dynamics.

To develop a more detailed understanding of the social dynamics in the classroom that lead to peer rejection, it is important to better understand how much the teacher feedback behaviour, a classroom factor, moderates the relationship between peer rejection and individual factors such as student social behaviour, academic achievement, and language skills.

### *Individual factors of peer rejection*

Peer acceptance and positive peer relationships are important factors in the socio-emotional development of children (Gifford-Smith & Brownell, 2003). However, not all children have positive relationships with peers; some are rejected. Children need to display certain skills and social behaviours to be accepted by peers (Menting et al., 2011; Stormshak et al., 1999) and studies consistently show that social behaviour can predict social acceptance (Caprara et al., 2000; Ladd et al., 2008; Stormshak et al., 1999). Inappropriate social behaviour, such as aggression or behaviour that threatens the norms of social and school behaviour, puts students at a greater risk of experiencing peer rejection (García Bacete et al., 2017; Mercer & DeRosier, 2008). By contrast, children who display prosocial behaviour (e.g. helping, sharing) are more likely to be accepted and less likely to be rejected by their peers (Caputi et al., 2012; Dirks et al., 2018; von Grünigen et al., 2012).

The development of social behaviour is linked to language skills (Girard et al., 2017; Menting et al., 2011). Higher level language skills can facilitate prosocial behaviour through increased social interaction, which can lead to an increased understanding for others' perspectives, clear expression of one's own needs, and an increased desire to engage in helpful and cooperative behaviour with others. von Grünigen et al. (2012) found that preschoolers with low level skills in the language of instruction

were more likely to exhibit social behaviour problems and in turn were more likely to be rejected by their peers than their classmates. Menting et al. (2011) reported that the impact of language deficits persists—preschoolers with poor language skills were shown to experience more rejection than their more skilled peers in fourth grade.

Student academic achievement has an impact on social interactions and status in the peer group in school, where much of the content of classroom teacher-student and student-student interaction concerns academic performance (Nakamoto & Schwartz, 2010; Shin & Ryan, 2014). High levels of achievement are seen as positive and desirable; low academic achievement is to be avoided. As a result, student perception of the academic achievement of peers influences their peer preferences. Many studies have shown that high achieving students have a higher status in their peer group and low achievers are more likely to be rejected (Hughes et al., 2006; Nakamoto & Schwartz, 2010; Nowicki, 2003; Shin & Ryan, 2014; Wang et al., 2014). There is also evidence that academic achievement is positively related to social behaviour (Caprara et al., 2000; Malecki & Elliot, 2002).

The rejection of students is not only influenced by individual factors, such as social behaviour, language skills, and academic achievement, but also by conditions in the class they are enrolled in (Boor-Klip et al., 2015; Chang, 2003; 2004; Dijkstra & Gest, 2015; Stormshak et al., 1999). Teachers act as the key influencers in the social dynamics that result in peer preferences (Chang, 2003; Endedijk et al., 2022; Farmer et al., 2011). It has been reported that teacher variables play a moderating role in the relationship between individual factors (e.g. social behaviour) and peer preferences (Chang, 2004; Kim & Cillessen, 2023).

### *Teacher feedback as a moderator*

How a teacher delivers instructions, explanations, and feedback gives students clues about the academic attainment and social behaviour of their peers (Kuklinski & Weinstein, 2000), which in turn influences their acceptance or rejection of those peers (Hendrickx et al., 2017). The theory of social referencing developed by Feinman (1982) helps to explain this process. In social referencing there is a referrer (person being influenced), the referee (person doing the influencing), and a referent (the object of the message—an event, object, or person). In the classroom, teacher feedback, the information provided by the teacher (the referee) about the correctness of a response, how a task was performed, or social behaviour (the referent), is believed to affect how students (the referrers) relate to each other (see Huber et al., 2014; Weinstein, 2002; Wullschleger et al., 2020).

Endedijk et al. (2022) stress that teacher–student interactions can also influence peer relationships through social modelling. According to the theory of social learning (Bandura, 1971), students build their interaction repertoire based on teacher-student interaction patterns and use it to interact with peers. Students therefore learn which behaviours are valued in the classroom by observing teacher-student interactions (Chang, 2004; Mikami et al., 2010). For example, Kim and Cillessen (2023) found a positive association between the classroom level of peer-perceived liking by the teacher and the levels of peer preference in the classroom. This suggests that positive teacher-student interactions may be imitated, leading to positive peer interactions.

The study also provides further evidence for differences between teachers in behaviour patterns in the classroom (Rubie-Davies, 2007). Teachers who were perceived to like many students in their class had mostly positive interactions with their students while teachers with high levels of peer-perceived dislike generally interacted in a negative way with their students. Kim and Cillessen (2023) also reported that the classroom level of peer-perceived liking by the teacher moderated the relationship between prosocial behaviour and peer preference. This indicates that teacher-student interactions may affect the relationship between individual student factors (e.g. social behaviour) and peer preferences. In other words, individual predictors of peer acceptance and rejection might have an effect that depends on the behaviour of the teacher.

### *Examining teacher behaviour in a naturalistic setting*

Teacher feedback has been related to peer acceptance and rejection in experimental (Huber et al., 2014; White & Jones, 2000) and cross-sectional naturalistic studies (Schwab et al., 2022). To the best of our knowledge, only two studies with multiple measurement points have examined this relationship in a naturalistic setting. A video study of fifth graders investigated whether the relationship between teacher behaviour and peer acceptance was mediated by the students' perceptions of teacher-student relationships (Hendrickx et al., 2017). Teacher behaviour was categorised as positive (showing warmth, verbalising liking for student, praising) or negative (showing conflict, verbalising dislike of a student, indicating that a student's contribution is incorrect). The study found that the more negative behaviour a teacher displayed towards a student, the more peers thought that the teacher disliked the student, and the more the student was disliked by peers. There was no association between positive teacher feedback and increased peer acceptance. Wullschleger et al. (2020), also a video study, examined teacher feedback as a level 2 predictor of peer acceptance and distinguished teacher feedback related to student social behaviour and to student academic performance. Multilevel analyses revealed that the level of peer acceptance in the classroom was higher when teachers gave more feedback about academic performance and less about disruptive behaviour (Wullschleger et al., 2020). No significant effect of teacher feedback behaviour on peer rejection was found.

It is possible that the content and setting of the lessons observed had a non-controlled impact on teacher behaviour because both studies (Hendrickx et al., 2017 and Wullschleger et al., 2020) used observations of non-standardised lessons. For example, a teacher might give more feedback during a lesson devoted to practicing mathematical problems than in a lesson where students are being taught new calculation strategies. Ideally, instructional conditions such as the learning content and social forms (e.g. group work, individual work) should be controlled or standardised.

### *Present study*

Individual factors such as the social behaviour, language skills, and academic achievement of students are predictors of peer rejection, but their effects can be influenced

by classroom factors such as teacher behaviour. Few studies have investigated types of teacher feedback behaviour using observational data, none have examined their moderating role in the relationship between individual factors and peer rejection. There is also no data collected in a naturalistic standardised lesson setting about the role of teacher feedback in peer rejection. The present study contributes to these research gaps by investigating the following questions:

1. Do the individual student factors language skills, academic achievement, and social behaviour predict peer rejection?
2. Do types of teacher feedback behaviour moderate the relationship between peer rejection and individual student factors?

## Method

### *Participants*

The participants were 36 teachers and their early elementary school students ($N = 709$ students, 50.4% girls, $M_{age}$ = 7;1; $SD = 6.8$ months) in 36 classrooms in the German-speaking part of Switzerland. The classes were part of a mathematical intervention study on the use of non-counting computation strategies during which sociometric data were also collected. All teachers and students took part voluntarily; written parental consent was obtained for participating students. It is common in Switzerland for elementary schools to have mixed-age classes. Ten of the classes included first and second-grade students and one class had first to third-grade students. Most of the classes ($n = 25$) were comprised of only first-grade students. A total of 599 first graders, 91 second graders, and 10 third graders participated in the study ($n = 9$ missing). The average number of students per class was 19.45 ($SD = 1.85$) at the beginning ($t_1$) and 19.33 ($SD = 1.97$) at the end of the school year ($t_2$). The participation rate was high with an average of 18.78 students per class ($SD = 2.15$) at $t_1$ and 18.79 ($SD = 2.1$) at $t_2$. Twenty-three students moved away, and 16 new students were enrolled in the classes between $t_1$ and $t_2$.

### *Procedure*

Student data (i.e., peer rejection, social behaviour, academic achievement, and language skills) were collected at $t_1$. Peer rejection was also measured at $t_2$. Students were interviewed individually to assess peer rejection and student social behaviour. The questions were read out loud by a member of the research team and students indicated their answers on a rating-scale with smileys. Standardised group tests were carried out to assess the academic achievement of students. Language skills were rated by teachers.

The participating teachers implemented a program with 21 standardised lesson plans on calculation strategies with their Grade 1 students over a period of eight months. Each lesson plan included the introduction of the topic in a class discussion, cooperative work in pairs, and a reflection on the results of the work phase involving all students. The materials and examples of pre-written questions were provided.

To assess teacher feedback behaviour, the implementation of a lesson plan on doubling (see Appendix) was videoed during a mathematics lesson for first graders. Video data from the introduction and reflection phases were analysed using a coding manual. The average duration of the teaching phases analysed was 20.20 min (SD = 6.76, Min = 11.00 min, Max = 39.13 min).

Eleven of the 36 classes had a mixed-age composition, so mathematics teaching was carried out in age groups, presenting a challenge for the study. While student data were collected from all students in all classes, the video recording only involved Grade 1 students. This raises the issue of whether the data can be used to assess the influence of teacher behaviour on all students. However, we can assume that it is possible to study feedback behaviour with a subgroup of the sample for several reasons: the teacher was the same for all students and was the person who taught most of the lessons, and the lesson plans were standardised. In addition, Wullschleger et al. (2020) concluded that teacher feedback behaviour is – like classroom management (Praetorius et al., 2014) – a stable disposition of teachers that can be assessed in one lesson.

The study was approved by the Ethics Committee of the Faculty of Art and Social Sciences of the University of Zurich. Participation was voluntary. Teachers gave their informed consent. Parents gave their written informed consent for the participation of their children. Students whose parents agreed to the interviews but refused permission for video recordings ($n = 55$) sat off-camera during the recording.

## Measures

### Teacher feedback behavior

Teacher feedback behaviour was coded using a coding manual (Table 1), based on an instrument developed by Wullschleger et al. (2020). First, sequences with verbal or nonverbal teacher feedback were identified. The focus of the study was on the effect of feedback on social processes in the peer group, so feedback was identified using the level of interaction between the teacher and students. A sequence was coded as a feedback event if a teacher reacted immediately, verbally, or nonverbally, to a student's answers, behaviour, or learning output, by telling the student if the response/behaviour was correct or not. The inter-coder agreement in MAXQDA was measured by comparing the duration of the coded sequences in milliseconds. This made it difficult to achieve good inter-coder agreement for very short feedback events (e.g. 'good' or 'nodding'). Setting the code for events with millisecond discrepancies (e.g. due to differences caused by teachers pausing to breathe) has a significant impact on inter-coder agreement. Therefore, the coders had to agree on the code, but not on the exact duration of the sequence. This is reflected in the good inter-coder agreement, $\kappa = .69$, for this step.

The second step involved coding the previously identified feedback sequences for the recipient of the feedback (i.e., class, group, student in public). Only feedback sequences that were publicly directed at a student in public were considered in this step. Such feedback informs classmates about how a teacher assesses a students' academic performance and social behaviour. In step three, the content of the feedback during the mathematics lesson was coded as social behaviour or academic

**Table 1.** Coding manual for teacher feedback behaviour.

| Step | Facet | Category | Indicator |
|---|---|---|---|
| 1 | Occurrence of feedback | – | Immediate verbal or nonverbal reaction by the teacher to students' answers, behaviour, or learning outputs. |
| 2 | Feedback recipient | Class | Teacher feedback to the whole class, e.g., 'You are all doing a very good job.' |
| | | Group | Teacher feedback to a group of students, e.g., 'You should listen to each other.' |
| | | Student | Verbal or nonverbal feedback directed at a single student. |
| 3 | Content of feedback | Social behaviour | Verbal or nonverbal feedback on disturbances, observance of rules, etc. during the class discussion. |
| | | Academic performance | Verbal or nonverbal feedback on subject-related answers, behaviour, or learning outputs. |
| 4 | Assessment of response | Correct/incorrect | The feedback informs the student about the correctness of an answer, a behaviour, or a learning output. |

**Table 2.** Feedback coding frequency data.

| Code | *n* | % | *M* | *SD* | Min | Max |
|---|---|---|---|---|---|---|
| Feedback | 1587 | 100 | 44.08 | 13.66 | 20 | 87 |
| Recipient: student in public | 1446 | 91 | 39.72 | 11.55 | 13 | 82 |
| Correct social behaviour | 3 | 0.2 | 0.08 | 0.15 | 0 | 1 |
| Incorrect social behaviour | 130 | 9 | 3.61 | 3.24 | 0 | 16 |
| Correct academic performance | 1192 | 82 | 33.11 | 9.18 | 13 | 65 |
| Incorrect academic performance | 121 | 8 | 3.36 | 2.15 | 0 | 11 |

performance. The fourth step was coding the teacher's assessment of students' answers, behaviour, or learning outputs (correct or incorrect social behaviour and correct or incorrect academic performance). The inter-coder agreement of two coders for the steps two to four was very good (Cohen's Kappa score ƙ = .81).

Table 2 summarises the feedback frequency data. The total number of times teachers gave feedback includes all public feedback directed at the whole class, to groups, and to individual students. The quantity of feedback differed substantially between the classes ($M = 44.08$, $SD = 13.66$; $Min = 20$; $Max = 87$). Public feedback to single students accounts for 91% of all instances of feedback and the frequency of this type of feedback also varied between teachers ($M = 39.72$, $SD = 11.55$; $Min = 13$; $Max = 82$). The overwhelming majority of the feedback was verbal (94%) and was addressed to individual students in public (91%) related to academic performance. Most of the social behaviour feedback targeted incorrect behaviour, whereas most of the academic performance feedback targeted correct academic performance.

### *Student social behavior*

This variable was assessed using two subscales of the Self- and Other-Oriented Social Competences questionnaire (Perren et al., 2012): prosocial behaviour and cooperative behaviour. Participants were asked to rate the prosocial behaviour with two items (i.e., 'X helps voluntarily if someone is hurt, upset, or feeling ill.') and cooperative behaviour with four items (i.e., 'X willingly takes turns in peer activities.') of four randomly selected classmates on a five-point scale with smileys (1 = Λ = 'I do not agree at all' to 5 = ☺ = 'I totally agree'). Cronbach's alpha for the six items was very good $\alpha = .92$ ($n = 693$, $M = 3.7$, $SD = 0.74$).

### Student academic achievement

Academic achievement was assessed with mathematics tests. No standardised group tests were available in Switzerland. Mathematical competence in Grade 1 was assessed using an author developed test. It included 31 items ($n = 567$, Cronbach's Alpha = .87). Students in Grade 2 were assessed using an author developed test (25 items, $n = 95$, Cronbach's Alpha = .90) prepared for publication (Schnepel et al., in preparation). Mathematical achievement of students in Grade 3 was assessed with an author developed test (Moser Opitz et al., 2020), with 28 items ($n = 6$, Cronbach's Alpha = .84). The mathematical achievement scores were z-standardised for each test.

### Student language skills

Teachers rated participants' skills in the language of instruction with two items (i.e., 'This student understands German in class.' and 'This student can express him/herself well in German in class.') on a four-point Likert scale (0 = 'I do not agree at all' to 3 = 'I totally agree'). The correlation between the two items was strong $r = 0.87$. A mean score of both ratings was calculated for each student ($M = 2.6$, $SD = 0.67$).

### Peer rejection

The rejection of students by their peers was evaluated using peer ratings. Participants rated how much they liked to play with each classmate on a five-point-scale with smileys (1 = Λ = 'I do not like to play with X at all' to 5 = ☺ = 'I like to play with X a lot'). Rejection scores for $t_1$ and $t_2$ were calculated for each student by taking the lowest ratings awarded by all classmates and standardising them (peer rejection $t_1$: $M = 0.16$, $SD = 0.13$; peer rejection $t_2$: $M = 0.15$, $SD = 0.13$).

## Statistical analyses

First, teachers were categorised according to feedback behaviour. There were few instances of feedback for correct social behaviour or incorrect academic performance (see Table 2), so teachers were only categorised on the basis of feedback on correct academic performance and incorrect social behaviour. For each of these, teachers were placed into one of four groups based on the percentile rank of the amount of feedback given: lowest 25$^{th}$, between 25$^{th}$ and 50$^{th}$, between the 50$^{th}$ and 75$^{th}$, and upper 25$^{th}$. The patterns revealed by the percentile ranking of teacher feedback behaviour was used to put teachers into one of three groups (types) of feedback behaviour. The groups were then compared with Bonferroni-corrected post-hoc tests on SPSS 27.0.1.0 to explore the significant differences in terms of peer rejection at $t_1$ and $t_2$, social behaviour, language skills, and mathematical achievement of the students.

Second, the latent construct *social behaviour* was validated using confirmatory factor analysis (CFA) with the R package lavaan version 0.6–16 (Rosseel, 2012; Rosseel et al., 2019). Goodness of fit was evaluated with four indicators: chi-square test, comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardised root-mean-square residual (SRMR). Based on the modification indices and their similar content, four items were allowed to covary. The CFA results indicated

a good fit between the model and the observed data for the construct social behaviour, $\chi^2(7) = 35.03$, $p = .000$, CFI = 0.99, RMSEA = .08, SRMR = 0.02. Measurement invariance was tested to ensure that the latent construct was equal over the three groups. First, the model was tested with the three groups, $\chi^2(21) = 41.02$, $p = .006$, CFI = 0.99, RMSEA = .06, SRMR = 0.02. Then, the configuration of variables and all factor loadings were constrained to be constant across groups, $\chi^2(31) = 43.73$, $p = .064$, CFI = 0.99, RMSEA = .04, SRMR = 0.03. Invariance of factor loadings was supported by the non-significant difference test that assessed the model similarity, $\Delta\chi^2(10) = 3.33$, $p = .973$, $\Delta$CFI = 0.003. Then, the intercepts were constrained to be the same for each group, $\chi^2(41) = 43.84$, $p = .352$, CFI = 0.99, RMSEA = .02, SRMR = 0.03. The non-significant difference between the models indicates factorial invariance between the groups, $\Delta\chi^2(10) = 4.3$, $p = .933$, $\Delta$CFI = 0.004.

Third, a multigroup structural equation model was specified with the type of feedback behaviour as a grouping variable using lavaan (Rosseel et al., 2019). Student social behaviour was estimated as a latent variable. Peer rejection at $t_2$, language skills, and academic achievement were added as manifest variables. The effects of the student level predictors on peer rejection were tested at the student level with type of teacher feedback behaviour (grouping variable) as a moderator. Full information maximum likelihood estimation was employed to make use of all available data. Because students were enrolled in classes, the hierarchical structure of the data was taken into account within the groups by specifying the classes as clusters.

Teacher feedback was only coded for first grade lessons. Therefore, the model was also tested with a subsample of just first graders ($n = 599$). The results were similar to those using the whole sample. This provides evidence that the results align with previous studies on the relationship between student level predictors and peer rejection for students of various ages (García Bacete et al., 2017; Menting et al., 2011; Nakamoto & Schwartz, 2010; von Grünigen et al., 2012). There were mixed-age classes in each of the three teacher feedback groups. Thus, the model run with the whole sample is presented in the results section.

## Results

### *Teacher feedback behavior types*

Percentile rank analysis of teacher feedback revealed that 25% of teachers ($n = 9$) were in the upper quartile for feedback on correct academic performance and 27.8% were in the upper quartile for feedback on incorrect social behaviour ($n = 10$). The rest of the teachers ($n = 17$; 47.2%) gave less feedback on correct academic performance and incorrect social behaviour compared to the other two groups. Based on these teacher behaviour patterns, teachers and their classes were assigned to three groups (Table 3): group$^{NEG}$ ($n = 209$; 9 first grade classes, 1 mixed-age class) where, on average, 20% (*Min* = 11%, *Max* = 30%, *SD* = 7%) of teacher feedback addressed incorrect social behaviour and 74% (*Min* = 64%, *Max* = 88%, *SD* = 8%) was related to correct academic performance; group$^{POS}$ ($n = 170$; 7 first grade classes, 2 mixed-age classes) where an average of 97% (*Min* = 94%, *Max* = 100%, *SD* = 2%) of teacher feedback was related to correct academic performance and only 2% (*Min* = 0%, *Max* = 6%, *SD* = 2%) addressed

incorrect social behaviour; and group$^{AVG}$ ($n = 330$; 9 first grade classes, 8 mixed-age classes) in which, on average, 84% (*Min* = 69%, *Max* = 93%, *SD* = 7%) of teacher feedback was related to correct academic performance and 5% (*Min* = 0%, *Max* = 10%, *SD* = 4%) addressed incorrect social behaviour.

In the next step, differences between the three groups were examined. There were no significant differences in the academic achievement and social behaviour of the students. However, the language skills of students in group$^{NEG}$ were significantly lower ($M = 2.48$, $SD = 0.74$) than those of students in group$^{POS}$ ($M = 2.72$, $SD = 0.52$, $p = .004$, $M_{Diff} = 0.24$, 95%-CI [0.07, 0.41]). Language skills in group$^{AVG}$ were not significantly different from those in group$^{POS}$ and group$^{NEG}$.

Figure 1 shows the peer rejection at $t_1$ and $t_2$ for each group. At $t_1$, students of group$^{AVG}$ had significantly lower levels of peer rejection ($M = 0.14$, $SD = 0.13$) than students in group$^{POS}$ ($M = 0.18$, $SD = 0.14$, $p = .016$, $M_{Diff} = 0.04$, 95%–CI[0.01, 0.07]) and group$^{NEG}$ ($M = 0.18$, $SD = 0.13$, $p = .002$, $M_{Diff} = 0.04$, 95%-–CI[0.01, 0.07]). Group$^{POS}$ and group$^{NEG}$ did not significantly differ in the level of peer rejection at both measurement points ($t_1$: $M_{Diff} = 0.01$, 95%–CI[−0.03, 0.04]; $t_2$: $M_{Diff} = 0.03$, 95%–CI[−0.003, 0.06]). By the end of the school year, the levels of peer rejection of students in the group$^{POS}$ significantly decreased, $t(162) = 2.6$, $p < .011$, to a level ($M = 0.15$, $SD = 0.14$) where it no longer significantly differed from peer rejection in group$^{AVG}$ ($M = 0.13$,

**Table 3.** Average feedback frequency by feedback behaviour type.

| Code | *M* (%) | *SD* | Min (%) | Max (%) |
|---|---|---|---|---|
| group$^{NEG}$ | | | | |
| Correct academic performance | 31.72 (74) | 13.31 | 21 (64) | 61 (88) |
| Incorrect social behaviour | 8.78 (19) | 5.15 | 3 (11) | 16 (30) |
| group$^{POS}$ | | | | |
| Correct academic performance | 34.7 (97) | 14.07 | 13 (94) | 65 (100) |
| Incorrect social behaviour | 0.89 (2) | 0.87 | 0 | 2 (6) |
| group$^{AVG}$ | | | | |
| Correct academic performance | 33.05 (84) | 9.13 | 18 (69) | 50 (93) |
| Incorrect social behaviour | 1.91 (5) | 1.67 | 0 | 6 (10) |

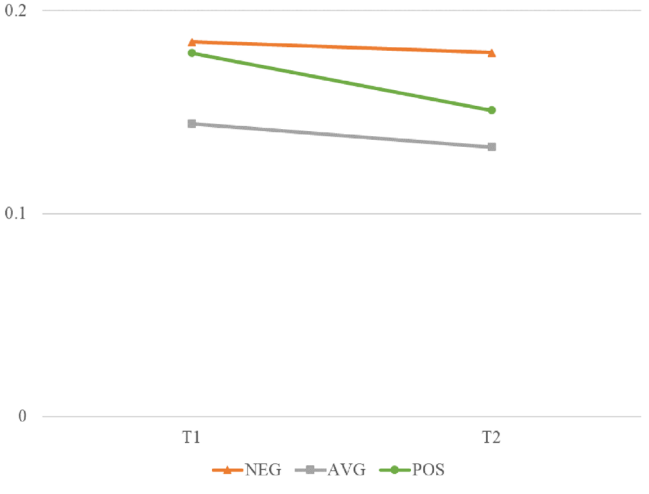


**Figure 1.** Peer rejection over a school year by teacher feedback behaviour type.

$SD = 0.12$, $p = .293$, $M_{Diff} = 0.02$, 95%–CI[−0.01, 0.05]). The peer rejection level did not significantly change over time in either in group$^{NEG}$ or group$^{AVG}$. The peer rejection levels of students in group$^{NEG}$ ($M = 0.18$, $SD = 0.12$) remained significantly higher than those in group$^{AVG}$ ($p < .001$, $M_{Diff} = 0.05$, 95%–CI [0.02, 0.07]).

### *Predictors of peer rejection by teacher feedback behavior type*

Student social behaviour, language skills, and academic achievement were examined as predictors of peer rejection at $t_2$ in each of the groups (Figure 2). The structural equation model fitted the data well, $\chi^2(66) = 94.72$, $p = 0.012$, CFI = 0.99, RMSEA = .04, SRMR = 0.03.

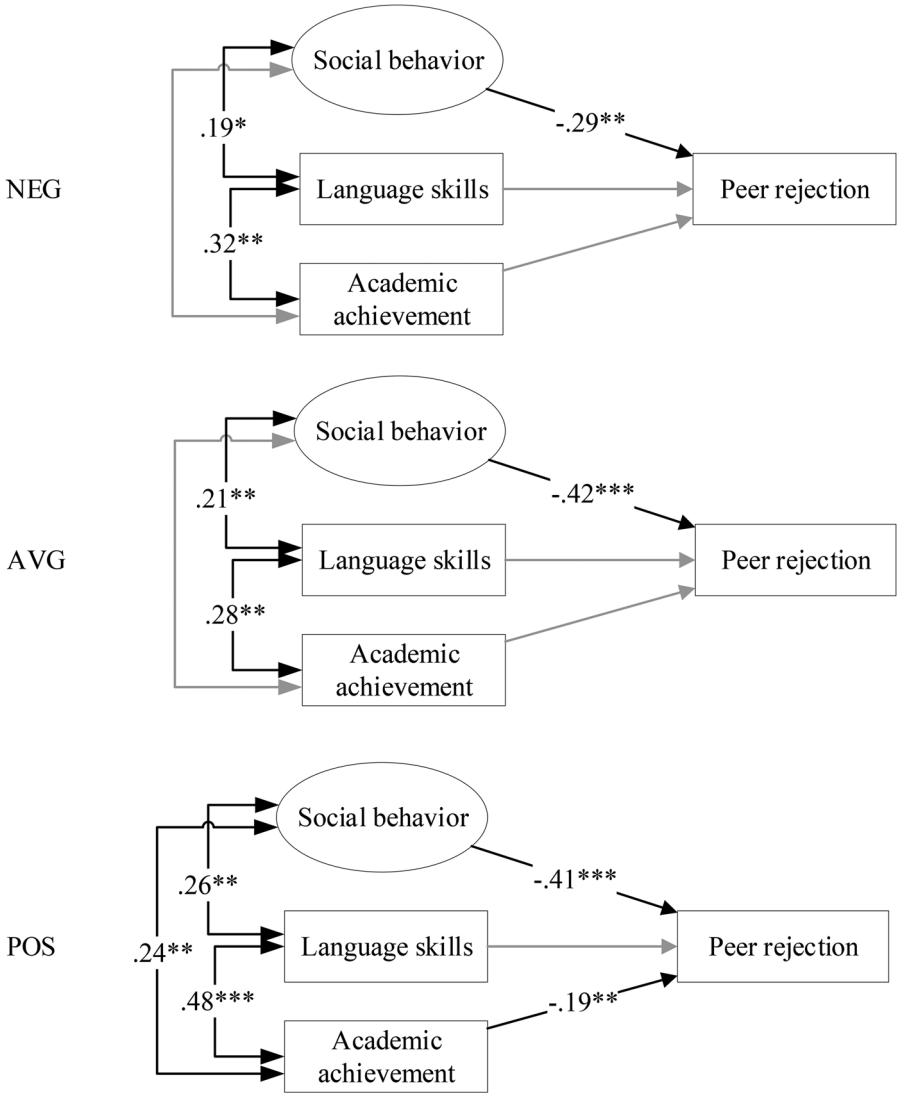


**Figure 2.** Predictors of peer rejection by teacher feedback behaviour type.
*Note*. Grey arrows depict nonsignificant paths and covariances. Standardised estimates are provided with their respective levels of significance. *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

Social behaviour significantly predicted peer rejection in group$^{NEG}$ ($\beta = -0.05$, $p = .001$). Language skills ($\beta = -0.01$, $p = .645$) and academic achievement ($\beta = -0.01$, $p = .267$) were not significant predictors. Peer rejection was also predicted by social behaviour in group$^{AVG}$ ($\beta = -0.07$, $p < .001$), but not by language skills ($\beta = -0.03$, $p = .062$) or academic achievement ($\beta = -0.001$, $p = .842$). In group$^{POS}$, social behaviour ($\beta = -0.09$, $p < .001$) and academic achievement ($\beta = -0.03$, $p = .001$) predicted peer rejection; language skill did not ($\beta = -0.004$, $p = .873$).

To verify the difference of the path from academic achievement to peer rejection between the groups, comparisons were made between group$^{POS}$ and each of the two other groups. A first constrained model was specified with fixed loadings and regressions (POS vs. NEG: $\chi^2(52) = 58.8$, $p = 0.24$, CFI = 0.99, RMSEA = .03, SRMR = 0.04; POS vs. AVG: $\chi^2(52) = 76.15$, $p = 0.02$, CFI = 0.98, RMSEA = .04, SRMR = 0.03). A second constrained model was specified with fixed loadings and regressions, but with the path from academic achievement to peer rejection freed (POS vs. NEG: $\chi^2(51) = 56.13$, $p = 0.29$, CFI = 0.99, RMSEA = .02, SRMR = 0.04; POS vs. AVG: $\chi^2(51) = 73.52$, $p = 0.02$, CFI = 0.98, RMSEA = .04, SRMR = 0.03). The two models showed significant differences between group$^{POS}$ and group$^{NEG}$, $\Delta\chi^2(1) = 4.03$, $p = .045$, $\Delta$CFI = 0.001, but did not between group$^{POS}$ and group$^{AVG}$, $\Delta\chi^2(1) = 3.01$, $p = .08$, $\Delta$CFI = 0.001. This indicates that the significant path from academic achievement to peer rejection differed significantly between group$^{POS}$ and group$^{NEG}$.

## Discussion

This study explored types of teacher feedback behaviour in elementary classrooms and how these moderated the relationships between peer rejection and the individual student factors social behaviour, language skills, and academic achievement.

Three types of teacher feedback behaviour were identified. In group$^{POS}$, most teacher feedback was for correct academic performance. Teachers in group$^{NEG}$ were more likely to give feedback on incorrect social behaviour and less likely to give feedback for correct academic performance. In group$^{AVG}$ teachers gave more feedback for correct academic performance but did so to a lesser extent than teachers in group$^{POS}$. They also gave less feedback on incorrect social behaviour than teachers in group$^{NEG}$.

These analyses of feedback behaviour show that during the standardised mathematics lesson, all teachers mostly gave feedback on academic performance and that most of these were positive. However, only a fifth of the teachers managed to interact with their students in an almost exclusively positive manner during class. Most teachers interrupted the mathematical discussion to provide feedback on incorrect social behaviour. In approximately a third of the classes (group$^{NEG}$), up to a third of the instances of teacher feedback addressed disruptive behaviour. This is an astonishing amount of negative feedback on social behaviour considering that the lesson observed was standardised and the students were familiar with the setting. The standardisation and preparation of the lesson should have had a positive effect on the way teachers managed their classrooms. Studies show that good classroom management practices can reduce classroom disruption (Hutchings et al 2013; Rubie-Davies, 2007). Interestingly, similar percentages of teacher feedback behaviour on academic performance and social behaviour have been found in comparable studies conducted with

non-standardised lessons (Wullschleger et al., 2020). This suggests that lesson standardisation may have a small effect on teacher feedback behaviour patterns and questions its importance for the study goals.

Given that social behaviour predicts peer rejection, it is surprising that teachers were sparing in their use of positive feedback on social behaviour (Beaman & Wheldall, 2000; Sprouls et al., 2015; Wullschleger et al., 2020). These results from both standardised and non-standardised naturalistic learning settings suggest that teachers use feedback mainly to confirm correct academic performance. Royer et al. (2019) and Beaman and Wheldall (2000) argue that neglecting to praise correct social behaviour is a missed opportunity. Behaviour-specific praise can be a good strategy for decreasing disruptive and increasing desirable behaviour in classrooms. Intervention programs that focus on rewarding desirable behaviour, such as the Good Behaviour Game, have been found to be effective for reducing disruptive behaviour and improving peer acceptance (Witvliet et al., 2009). There is evidence that teachers increasing the amount of positive feedback they give to students who rarely receive it can have a positive influence on the social acceptance of those students (Spilles et al., 2024). Therefore, teachers increasing the amount of positive feedback they give to students who display poor social behaviour could reduce those students' risk of rejection by their peers.

Students in group$^{NEG}$ had the lowest levels of language skills. It could be argued that the poor language skills resulted in more negative feedback on incorrect social behaviour. Students who do not understand the language of instruction well might find it harder to understand directions and class rules. However, the language skills of students in group$^{NEG}$ were only significantly different from students in group$^{POS}$, not from students in group$^{AVG}$. This suggests that many teachers in group$^{AVG}$ were able to give more positive feedback on correct academic performance and less negative feedback on incorrect social behaviour despite having students with poor language skills in their classes. The analyses also revealed that language skills did not predict peer rejection in any of the groups. This finding differs from the results of other studies which have shown a correlation between language skills and peer rejection (Menting et al., 2011; von Grünigen et al., 2012). The difference might be due to how we measured language skill or the age of the students. The relationship between language skills and peer rejection needs further investigation.

It might also be that teachers interact differently with classes where most students display better social behaviour and higher mathematical achievement than in classes where the opposite is true. However, no significant differences in social behaviour and academic achievement were found between the groups. We can therefore assume that the conditions teachers experienced in this study were comparable.

The study provides evidence for the moderating role of teacher behaviour in the relationship between student academic achievement and peer rejection. Academic achievement was a significant predictor of peer rejection in group$^{POS}$. In these classes where teachers gave the highest proportion of feedback on correct academic performance and the lowest on incorrect social behaviour, there was a significant decrease in peer rejection. Over the course of the academic year. In classes where teachers gave the most feedback on incorrect social behaviour, peer rejection remained high. We can assume that teachers who gave students mostly positive feedback about their

academic performance had a positive impact on student social status, leading to reduced peer rejection by the end of the school year. This suggests that a strategy of maximising positive feedback on student academic performance would have a positive influence on classroom peer dynamics. The results of an intervention study by Spilles et al. (2024) confirm the effectiveness of this strategy.

Social behaviour was a significant predictor of peer rejection in all classes, regardless of teacher behaviour. Students who were perceived by their peers as being helpful and cooperative were less likely to be rejected by them, in line with previous findings (Caputi et al., 2012; Kim & Cillessen, 2023; Stormshak et al., 1999). Stormshak et al. (1999) argue that some social behaviours are important for peer acceptance, independent of classroom variables. This suggests that it might be the inappropriate social behaviour of students that leads to peer rejection rather than a social learning process, in which high amounts of negative teacher feedback would lead to a negative perception of peers and consequently to their rejection.

## Limitations

This study has several limitations. The analyses were conducted using recordings of two relatively short phases in one lesson. This was due to funding and time constraints. As discussed in Procedures, we feel that we were justified to assume that teacher behaviour is a stable construct.

Teacher behaviour was studied as a variable at the classroom level. To preserve the anonymity of the participants, it was not possible to link the feedback to individual students. Investigating teacher behaviour towards individual students or student-teacher relationships as predictors of peer rejection could have provided more detailed information about the social dynamics in the classroom.

While the findings contribute to the understanding of the moderating role of different types of teacher feedback in classroom social dynamics, we were not able to identify factors that lead to different patterns of feedback. For example, class size or teacher expectations have been investigated as factors explaining differences between teachers in terms of their behaviour (Blatchford & Russell, 2019; Rubie-Davies, 2007).

## Conclusions

Social behaviour is a significant predictor of peer rejection of students in elementary classrooms. It may therefore be important to promote prosocial and cooperative behaviour to prevent the rejection of students by their peer group. The role of positive feedback on correct social behaviour in peer dynamics requires further investigation so that strategies to prevent rejection can be developed and shared with practitioners.

When teachers almost exclusively give feedback related to the correct academic performance by students, academic achievement predicts peer rejection and peer rejection decreases. Future research should examine whether the peer rejection of low achievers could be prevented by systematically trying to give them positive feedback on their class contributions.

## Ethical approval

The study was approved by the University of Zurich Ethics Committee. For ethical reasons, access to the complete data set cannot be provided.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Funding

This study was funded by swissuniversities (P-9/TP2).

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## Data availability statement

Requests to access data should be directed to Elisabeth Moser Opitz. Email: elisabeth.moseropitz@uzh.ch

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## Appendix

### *Excerpt from a Lesson Plan on Doubling*

**Doubling** (Excerpt from Lesson Plan 15)

Aims: Recognising the relationship between sum and summand; structural subitising, decomposition and description of summands in the twenty frame; using the structure doubling for computation

Introduction (all children)

Teacher: *The groups of five on the twenty-frame helped us to determine the number of red dots. Now, we double numbers using the 'power of five'.*

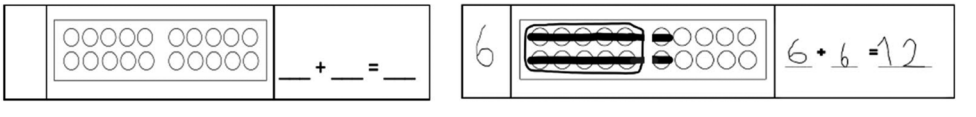
The teacher puts 4 dots of the same colour on the top row of the twenty-frame.

*I put red dots in the top row of the twenty-frame. Now I put exactly the same number of blue dots on the bottom row of the twenty-frame. How many dots did I put down first? How many did I add? How many dots are there in total? Why is it easy to see that there are 8 dots?*

Another example with 6 dots is practiced.

Working in pairs

The children are given several strips of paper with the empty twenty-frame, on which they can mark doubles (see illustration).




*Teacher: You (name of child A) choose a number of dots (e.g. 6) and mark the exact number of dots on the twenty-frame (first line). You (name child B) double the number and mark the exact number of dots with another colour on the bottom line of the twenty-frame. Together, you jot down the correct term including the result.*

*Discuss: Why are you sure that the result is correct? Circle the group of dots that helped you find the result. Then you take the next strip, choose another number of dots and repeat the procedure.*

Reflection (all children)

The teacher selects the strips with the doubles worked out by a selected pair of children. She arranges them (ascending summands).

Here are some doubles. Are these all doubles you can put on the twenty-frame? Which doubles are missing? What do you notice about the results? Why is that?