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Effects of teacher feedback behavior on social acceptance in inclusive elementary classrooms: Exploring social referencing processes in a natural setting

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ABSTRACT

Teacher feedback behavior is a key determinant of the social referencing processes that influence the social acceptance of pupils. The present longitudinal study explores how teacher feedback on academic performance and social behavior is related to social acceptance during classroom activities and recess in the natural setting of inclusive classrooms. Data come from a study with 32 teachers and their 546 first to third grade pupils in Switzerland. Teacher feedback behavior was videotaped and peer nominations and ratings were used to assess social acceptance. Multilevel regression analyses showed that feedback on incorrect social behavior was negatively correlated with feedback on correct academic performance. Teacher feedback on incorrect social behavior and on correct and incorrect academic performance predicted how pupils were accepted by their peers during classroom activities. However, teacher feedback did not affect social acceptance during recess. The effect of teacher feedback behavior on social acceptance appears to depend on context. Social acceptance during classroom activities is influenced by teacher feedback whereas social acceptance at recess is not.

1. Introduction

The school environment is an important setting for satisfying children's need for relatedness. Relatedness is defined as the urge to interact with, be connected to, and experience caring for others, and is an innate psychological need (Deci & Ryan, 1985). When the need for relatedness is satisfied, a person will be highly motivated to achieve a goal (Rheinberg, 2008). Therefore, the social aspects of attending school with peers are important, not only for effective learning, but also for social and personal development and a pupil's general wellbeing at school (Grewe, 2017; Hascher & Baillod, 2004). This is especially important and challenging in the context of inclusive classrooms. Inclusive education aims to support the social involvement of pupils with special educational needs (SEN) in regular school classes while ensuring that all pupils learn effectively. However, researchers investigating social outcomes in inclusive classrooms have consistently found that pupils who are unpopular, rejected, and less likely to be nominated as friends, seating neighbors, or play and collaboration partners, often have SEN, behavior problems, or low academic achievement levels (Huber & Wilbert, 2012; Koster, Pijl, Nakken, & Van Houten, 2010; Krull, Wilbert, & Hennemann, 2014; Nepi, Fioravanti, Nannini, & Peru, 2015; Pijl, Skaalvik, & Skaalvik, 2010).

These negative social outcomes are linked to the individual characteristics of these pupils and also to the context of interactions. For example, pupils with SEN, with behavior problems, and those with low academic achievement levels are less accepted and rejected more often during class activities than during play activities (Nepi et al., 2015). There is also an increased interest in investigating the role of teachers in social processes in the peer group (Farmer, McAuliffe Lines, & Hamm, 2011). Studies show that what teachers think about their pupils and how they behave towards them has an impact not only on pupils' achievement but also on their social experiences in the peer group (McAuliffe, Hubbard, & Romano, 2009; Weinstein, 2002). According to social referencing theory (Feinman, 1992), a teacher's behavior towards pupils provides peers with information about the competence and likeability of their classmates (Huber, 2011; Hughes, Im, & Wehrly, 2014). There is evidence that teacher feedback, an important aspect of teacher behavior, is associated with social acceptance between peers (Huber, Gebhardt, & Schwab, 2015; Weinstein, 2002). However, the effects of teacher feedback behavior on social acceptance have primarily been investigated in experimental studies (e.g., Huber et al., 2015; White & Jones, 2000). We have found only one longitudinal

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study in a natural setting that has investigated the effect of teacher feedback behavior on pupil acceptance in the literature. It was a study of fifth graders conducted by Hendrickx, Mainhard, Oudman, Boor-Klip, and Brekelmans (2017).

The present study is the first to investigate the extent to which teacher feedback on academic performance and social behavior affects social acceptance during both classroom activities and recess, of first to third grade pupils in inclusive classrooms. The study focuses on this age group because teachers are likely to have more influence on pupil social relationships and interactions in the early grades (Bierman, 2011; Huber, 2011; Pellegrini & Blatchford, 2000). Investigating the distinction between feedback on academic performance and feedback on social behavior, and between social acceptance in the context of classroom activities compared with recess, is also very essential because pupils with SEN, low achieving pupils, and pupils with behavior problems are especially vulnerable when it comes to social acceptance.

1.1. Social acceptance and teacher behavior

Social acceptance by the peer group is crucial for the healthy socio-emotional development of children (Gifford-Smith & Brownell, 2003). Some children unfortunately experience social difficulties with peers and suffer adverse effects such as stress, externalizing problems, or academic disengagement (Ladd, Herald-Brown, & Reiser, 2008; Peters, Riksen-Walraven, Cillessen, & de Weerth, 2011; Sturaro, van Lier, Cuijpers, & Koot, 2011).

How well a pupil is accepted by peers can be affected by a number of individual characteristics factors, including social behavior and academic performance. Studies show that pupils with behavioral problems experience more social difficulties in their peer groups (Henricsson & Rydell, 2006; Ladd et al., 2008). For instance, elementary school children cite problematic behavior that does not conform to the norms and expectations of the school as an important reason for rejecting their peers (Bacete, Planes, Perrin, & Ochoa, 2017). Low academic achievement levels are also associated with negative peer experiences (Henricsson & Rydell, 2006; Huber & Wilbert, 2012; Wang et al., 2014). In a study by Huber and Wilbert (2012), third and fourth graders were less likely to be nominated as seat neighbors by peers when they had a low academic achievement level and/or a high level of SEN. These findings suggest that pupils use information about the academic performance and social behavior of their peers to make decisions about social acceptance (Bacete et al., 2017, Huber & Wilbert, 2012).

In the classroom, teachers are the most important source of such information (Weinstein, 2002). Observing teacher behavior, such as how teachers give instructions and explanations, how carefully they explain concepts, or how they provide classmates with feedback on their learning (Rubie-Davies, 2007), pupils become aware of the academic performance and social behavior of their classmates (Kuklinski & Weinstein, 2000; Weinstein, 2002). How this pupil-perceived teacher behavior is related to social acceptance in the peer group is explained by the theory of social referencing (Feinman, 1982; 1992). Social referencing describes “a process in which one person utilizes another person’s interpretation of the situation to formulate her own interpretation of it …” (Feinman, 1992, p. 4). Referencing has three components: the referrer (person being influenced); the referee (person doing the influencing); and the referent, which is the influencing message about an unfamiliar event, object, or person (Feinman, Roberts, Hsieh, Sawyer, & Swanson, 1992). In the classroom context, pupils’ decisions on whether to accept other pupils are influenced by the teacher, who is a key influencer (Farmer et al., 2011). For instance, teacher behavior towards individual pupils influences the social acceptance of each pupil in the peer group. This influence of teachers occurs through social referencing processes and is especially significant among young pupils in phases when a class community has been newly created (Huber, 2011).

1.2. Teacher feedback behavior

The way a teacher provides feedback is a significant aspect of teacher behavior that has been extensively investigated. Feedback, in the context of instruction, is conceptualized as information provided by the teacher about the correctness of a statement, a task performance, or working and learning behavior. Its aim is supporting pupils’ learning and decreasing the discrepancies between the current level of understanding and a new learning goal (Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Lipowsky, 2009). Research shows that feedback is highly effective for learning (Hattie, 2009). However, feedback is not, of itself, a guarantee of effective learning (Kluger & DeNisi, 1996). Its effects on learning depend on the kind and content of feedback provided. Hattie and Timperley (2007) developed a model of effective feedback to enhance learning and understanding with three core questions: Where am I going (feed up)? How am I going (feed back)? Where to go next (feed forward)? Each of these questions works on four levels: task performance, the process of understanding, the regulatory or metacognitive process, and the self or personal level, which is not related to specific tasks. In short, high quality feedback has to be provided with information that initiates the learner’s active engagement (Havnes, Smith, Dysthe, & Ludvigsen, 2012), making them able to understand how well they are doing and how to proceed to further attain their goals.

Alongside its significant impact on performance, feedback informs peers about how a teacher assesses a pupil’s performance and behavior (Weinstein, 2002). However, it appears that the frequency of teacher feedback for pupil performance differs from that for pupil behavior. For instance, correct performance attracts more teacher feedback than correct behavior whereas teachers give far more feedback for incorrect social behavior than for correct social behavior (Beaman & Wheldall, 2000).

Extensive research into teacher effects on pupil outcomes has provided further evidence that pupils notice differential teacher behavior (Kuklinski & Weinstein, 2000; Weinstein, 2002). A study by Kuklinski and Weinstein (2000) showed that pupils felt that high achievers in their elementary school classroom received more positive feedback from their teachers than low achievers. This means that by giving feedback in class, teachers provide pupils with information not only on their peers’ competences, but also on their relationships with other pupils, which in turn has an impact on pupil acceptance in the peer group (Hughes & Im, 2016). In fact, pupils who are perceived as having a positive relationship with their teachers are more accepted by their peers (Hughes et al., 2014). These findings are in line with studies showing that low academic achievement levels are associated with negative peer experiences in regular classrooms (Henricsson & Rydell, 2006; Wang et al., 2014), and also in inclusive classrooms (Huber & Wilbert, 2012).

1.3. The effect of teacher feedback on social acceptance

Using a video experiment, White and Jones (2000) analyzed whether teacher feedback could change first and second graders’ perception of a fictitious classmate with a specific reputational status, such as a pupil with behavior problems. The authors found that both sources of information, the child’s reputation and teacher feedback, had an effect on pupils’ perception of their fictitious peer. In particular, negative feedback had a strong effect on pupils’ perception of a classmate. Huber (2013) extended the setting of the study and differentiated between feedback on academic performance and feedback on social behavior. He focused on the effective direction between feedback and social acceptance. The study was conceived as a computer-based experimental pre-post-test design in which elementary school pupils were informed about teacher feedback on the academic performance and social behavior of four fictitious pupils. Then, pupils were asked to rate how much they would like to sit next to these fictitious pupils. The results revealed that teacher feedback had a significant effect on social acceptance. Positive

Table 1
Descriptive characteristics of the sample for each grade, the pupils with ID or LD and sample total.

	Grade 1 *n* (%)	Grade 2 *n* (%)	Grade 3 *n* (%)	Pupils without ID/LD *n* (%)	ID/LD *n* (%)	Sample total *n* (%)
Pupils	61	324	120	505	41	546
Sex						
Male	34 (55.7)	166 (51.2)	52 (43.3)	252 (49.9)	25 (61)	277 (50.7)
Female	27 (44.3)	158 (48.8)	68 (56.7)	253 (50.1)	16 (39)	269 (49.3)
Language						
National language	18 (29.5)	218 (67.3)	51 (42.5)	287 (56.8)	22 (53.7)	309 (56.6)
Other	10 (16.4)	95 (29.3)	33 (27.5)	138 (27.3)	18 (43.9)	156 (28.6)
Missing	33 (54.1)	11 (3.4)	36 (30)	80 (15.8)	1(2.4)	81 (14.8)
Linguistic region						
German	41 (67.2)	198 (61.1)	102 (85)	341 (67.5)	30 (73.2)	371 (67.9)
French	20 (32.8)	126 (38.9)	18 (15)	164 (32.5)	11 (26.8)	175 (32.1)

teacher feedback resulted in a positive development of social acceptance and negative teacher feedback in a negative development of social acceptance. The effect was similar for feedback on academic performance and feedback on social behavior. In a second experimental study, Huber et al. (2015) showed that teacher feedback had an effect on social acceptance, even if a control variable with positive and negative personal information was included (e.g., information on whether it is fun to play a card game with a fictitious pupil).

However, the external validity of these computer-based experimental studies is low, as this type of experiment does not sufficiently reflect social reality. A longitudinal design in a natural setting can lead to a fuller understanding of a complex real life process, such as the effects of teacher feedback on pupils' social acceptance in the peer group. Hendrickx et al. (2017) used such a design to investigate whether teacher feedback behavior and peer (dis)liking of fifth graders in Dutch elementary schools was mediated by how peers perceived teacher–pupil relationships. Teacher feedback behavior was assessed using video observations and categorized as positive or negative. Some evidence for social referencing was found. The more negative behavior a teacher showed towards a pupil, the more peers thought that the teacher disliked this pupil, and in turn, the more the pupil was disliked by their peers. However, positive teacher feedback behavior was not linked to peer liking via social referencing, leading the authors to stress, in their conclusions, the importance of differentiating between processes of peer liking and peer disliking.

The aforementioned studies provide evidence that social acceptance in a peer group is affected by teacher feedback. This study aims to further contribute to the understanding of this social referencing process by undertaking a longitudinal examination of the effect of teacher feedback behavior on the social acceptance of pupils in the natural setting of inclusive elementary classrooms.

Most research on teacher feedback focuses on the impact of feedback on learning (Shute, 2008). The quality of feedback provided by teachers is crucial in that context (Hattie & Timperley, 2007; Shute, 2008). In the present study however, feedback is not examined regarding its effect on learning processes and is defined as a specific form of interaction between teachers and pupils in the classroom (Huber et al., 2015). There is evidence that this form of teacher–pupil interaction is perceived by peers as an indicator of teacher liking and disliking (Hendrickx et al., 2017). Consistent with social referencing theory (Feinman, 1992), the more important aspect of teacher feedback in this context is the influencing message about the likeability of the pupil that it conveys to the pupil's peers.

While this study does not assess feedback quality, it does distinguish between two types of feedback content: feedback on academic performance and feedback on social behavior (Huber, 2013). Thus, teacher feedback about correct or incorrect academic performance is assessed separately from feedback about social behavior. Further, on the level of social acceptance, the study distinguishes between social acceptance and social rejection (Hendrickx et al., 2017). In addition, social acceptance is considered in two distinct contexts: classroom and recess (Nepi et al., 2015).

Conducting the study in inclusive classrooms, with their high achievement heterogeneity, provides an especially useful setting for investigating how these social processes are related to academic achievement. In this study, inclusive classrooms were attended by pupils with a diagnosed intellectual disability (ID) or severe learning disabilities (LD). This setting allows for a more in-depth examination of teacher feedback towards this special group of pupils. All of the factors listed above make this investigation of teacher feedback and social acceptance far more comprehensive than any previous studies. The following main research questions are addressed:

1. To what extent do teachers give feedback on pupils' social behavior and academic performance during class?
2. To what extent does teacher feedback on social behavior affect the social acceptance of pupils during classroom activities and in recess?
3. To what extent does teacher feedback on academic performance affect the social acceptance of pupils during classroom activities and in recess?

Based on social referencing processes, it is expected that both teacher feedback on social behavior and teacher feedback on academic performance affect the social acceptance of pupils in inclusive classrooms. While it is hypothesized that feedback on social behavior has a similar impact on social acceptance during classroom activities as it does on social acceptance in recess, it is assumed that feedback on academic performance is particularly relevant for the acceptance during classroom activities.

2. Method

2.1. Participants and procedure

Participants were 32 teachers and their first to third grade pupils (N = 546, 49% girls, M_{age} = 7.94; SD = 0.79) in inclusive classrooms in two linguistic regions of Switzerland (Table 1). In Switzerland, pupils attend a public school in their neighborhood and school authorities determine the allocation of the pupils to the schools. This is also the case for pupils with LD and behavior problems: they attend inclusive classrooms in their neighborhood. However, these pupils are not officially diagnosed as having SEN and researchers therefore cannot know if any such pupils attend a classroom. Pupils with severe LD and ID are officially diagnosed, and special education resources are individually allocated. In this study sample, at least one pupil with ID or severe LD was enrolled in each class (n = 41).

To assess teacher feedback behavior, one non-standardized mathematics lesson was videotaped approximately three months after the beginning of the school year in each classroom. The classroom teacher always led the instruction. Pupil data were collected at the beginning

Table 2
Coding manual of teacher feedback behavior.

Coding steps	Facet	Category	Description
1	Occurrence of Feedback	–	Immediate reaction to pupils' answers, activities, or learning outputs.
2	Feedback recipient	Class	The teacher gives feedback to the whole class, e.g. "You all did a very good job."
		Group	The teacher works with a group and gives feedback to the group members, e.g. "Come on, you can do it faster."
		Pupil in private	The feedback is directed at a single pupil, without other listeners.
		Pupil in public	The feedback is directed at a single pupil and can potentially be heard by other children.
3	Content of the feedback	Social behavior	Feedback on cooperation, disturbances, observance of rules, dealing with conflicts, etc.
		Academic performance	Feedback on subject-related answers, activities, or learning outputs.
4	Assessment of response	Correct	The feedback informs the pupil on the correctness of an answer, an activity, or a learning output.
		Incorrect	
5	Affective connotation	Enthusiastic	The teacher is visibly (facial expressions/gestures) and audibly (sound of the voice) pleased with an answer, an activity, or a learning output.
		Clearly negative	The teacher is visibly (facial expressions/gestures) and audibly (sound of the voice) annoyed by an answer, an activity, or a learning output.
		Neutral	The teacher reacts with a neutral expression and a neutral voice to an answer, an action, or a learning output.

(t1) and at the end of the school year (t2). Pupils were interviewed one-to-one and asked to nominate and rate classmates on the basis of social acceptance. In addition, pupils took a mathematics test at the beginning of the school year (t1). From t1 to t2 fourteen pupils dropped out, resulting in 2.6% fewer cases for social acceptance variables at t2. In addition, 12 pupils did not take the mathematics test. The final sample used for the analyses was $n = 520$ pupils.

2.2. Measures

2.2.1. Teacher feedback behavior.

Teacher feedback behavior in the videos was coded using the program MAXQDA and a coding manual (Table 2). The coding manual was based on an existing instrument developed to describe how first grade teachers design reading exercises for cognitive activation (Lotz, 2014). The coded variables are – like classroom management variables – regarded as stable enough to be measured with one lesson per teacher (Praetorius, Pauli, Reusser, Rakoczy, & Klieme, 2014). In a first step, sequences with teacher feedback were identified in the videos. A sequence was coded as a feedback event if a teacher reacted immediately to a pupil's answers, activities, or learning outputs, by informing the pupil about the correctness. The inter-coder agreement in MAXQDA was measured by comparing the duration of the coded sequences in milliseconds. This makes it challenging to achieve a satisfying inter-coder agreement for very short feedback events (e.g., "good"). Setting the code for such an event with a discrepancy of some milliseconds (e.g., due to differences caused by teachers' pausing to breathe) has a significant impact on inter-coder agreement. The coders agreed on the code, but not on the exact duration of the sequence. This is reflected in a Cohen's Kappa of two coders in this step of $\kappa = 0.66$.

The second step was to code the previously identified feedback sequences in relation to the recipient of the feedback (i.e., class, group, pupil in private, pupil in public). In the following steps, only the feedback sequences addressing a pupil in public were considered. Such feedback informs the classmates about how a teacher assesses a pupil's academic performance and social behavior. In step 3, the content of the feedback (social behavior or academic performance) was coded, and step 4 included the assessment of pupils' answers, activities, or learning outputs by the teacher (correct or incorrect academic performance and correct or incorrect social behavior). Finally, in step 5 the affective connotation of the teacher feedback was coded with the categories enthusiastic, clearly negative, or neutral. However, feedback with an enthusiastic or clearly negative connotation was almost never observed. Therefore, the affective connotation was disregarded from the analyses. The inter-coder agreement of two coders for the steps 2 to 4 was very good, with a Cohen's Kappa score of $\kappa = 0.90$.

2.2.2. Mathematics achievement.

Switzerland does not administer nationwide assessment tests to pupils in the lower grades. Therefore, a series of researcher-developed mathematics tests had to be used for first and second grade pupils. These were versions of tests that are being prepared for publication. For third grade, a standardized test (Moser Opitz, Stöckli, Grob, Reusser, & Nührenbörger, 2019) was used. All tests evaluate whether the pupils have acquired knowledge on the basics of arithmetical understanding and aim to diagnose LD in mathematics. Linguistic requirements are low, most information is given with tables and pictures, and the test administrators were allowed to read out the short instructions (see Appendices A and B for examples). All math scores were z-standardized.

The test for first graders included 31 items ($n = 61$, Cronbach's Alpha $= 0.87$). The following topics were assessed: Counting objects, comparing numbers up to 20, number sequence up to 20, number decomposition, addition with pictures, coins, formal addition, and formal subtraction (see Appendix A for examples). The small sample size made it impossible to carry out Rasch analyses.

The test for second graders (24 items, $n = 324$) covered counting by steps, number decomposition, doubling, addition, subtraction, and word problems (see Appendix B for examples). Rasch analyses were conducted to assess the quality of the test. Weighted likelihood estimate of reliability was 0.98. The item fit was acceptable (0.85 – 1.29; Smith & Smith, 2004). Measurement was invariant across sex and language (criteria DIF $p < .05$ and a difference of parameter < 0.638; Paek & Wilson, 2011).

The assessment for third grade (Moser Opitz et al., 2019) is a standardized test which includes 28 items ($n = 120$, Cronbach's alpha $= 0.84$), and covers grouping by tens, marking numbers on the number line, counting by steps, number decomposition, doubling, addition, subtraction, and word problems.

Pupils with ID or LD ($n = 41$) mastered an adapted version of the TEDI-MATH test (Kaufmann et al., 2009). It comprises 95 items (e.g., verbal counting, comparing numbers, reading numbers) and Cronbach's alpha was 0.98.

2.2.3. Social acceptance.

The social acceptance of pupils was determined by asking their peers questions about playing together (recess) and collaboration (classroom activities). All of the following variables (see Table 3) were assessed at the beginning (t1) and end of the school year (t2). The sociometric instruments were developed based on the recommendations in Hymel, Vaillancourt, McDougall, and Renshaw (2002). First, participants were asked to nominate classmates with whom they play most of the time. These play partner nominations were used to calculate the indegree for each pupil. Indegree refers to the number of nominations received by individuals. The normalized indegree values for t1 ($M = 13.17$, $SD = 11.95$) and t2 ($M = 15.88$, $SD = 11.3$) were used in

Table 3
Descriptive statistics of the mathematical achievement and social acceptance variables.

	n	*M*	*SD*
t1			
Mathematical achievement			
Grade 1	59	23.8	4.99
Grade 2	314	17	6.01
Grade 3	119	20.1	5.1
Pupils with ID/LD	41	43.3	26.3
Social acceptance			
Playing nominations	546	2.52	1.81
Playing ratings	546	2.25	2.24
Collaboration ratings	546	3.72	0.85
t2			
Social acceptance			
Playing nominations	532	2.81	1.85
Playing ratings	532	2.06	2.1
Collaboration ratings	532	3.65	0.84

Note. The values are not standardized.

the analysis. This score was deemed to represent a pupil's social acceptance during recess.

Second, participants rated how much they liked to play with every single classmate on a five-point-scale with smileys (1 = ☹ = "I do not like to play with X at all" to 5 = ☺ = "I like to play with X a lot"). For each pupil, a rejection score was calculated by counting the lowest ratings for playing (1 = ☹ = "I do not like to play with X at all") received from all classmates and standardizing them for t1 (M = 0.13, SD = 0.12) and t2 (M = 0.12, SD = 0.12). This score represents social rejection during recess. Based on the concept of social participation by Koster, Nakken, Pijl, and van Houten (2009), social rejection is considered as an aspect of social acceptance.

Finally, pupils used the same five-point-scale with smileys (1 = ☹ = "I cannot collaborate with X at all" to 5 = ☺ = "I can collaborate very well with X") to rate four randomly selected classmates on how well they could collaborate with them. Based on these peer ratings, a standardized mean score was calculated for each pupil. This score represents acceptance during classroom activities.

2.2.4. Statistical analyses

The data from our study is hierarchically structured, with pupils nested within classes. Multilevel analysis offers an appropriate framework for modeling this complex data structure (Hox, Moerbeek, & van de Schoot, 2018). In addition, the data satisfies normality and linearity assumptions. The analyses were conducted using R package multilevel 2.6 and nlme 3.1–137 (Bliese, 2016) to predict social acceptance at t2: social acceptance in recess, social rejection in recess, and social acceptance during classroom activities. To verify whether the three acceptance variables represent discrete concepts, regression analyses were carried out with the three variables of social acceptance. The results demonstrated that the variables social rejection in recess and social acceptance during classroom activities explain up to 15% of the total variance in social acceptance in recess.

There was a significant difference between the classes for each of the main variables: social acceptance in recess, $F(31, 500) = 6.75$, $p < .001$; social rejection in recess, $F(31, 500) = 5.05$, $p < .001$; and social acceptance during classroom activities, $F(31, 500) = 1.72$, $p = .01$. The intraclass correlation coefficient $ICC(1)$ values showed that the differences between the classes explain 26% of the total variance in social acceptance in recess, 20% in social rejection in recess, and 4% in social acceptance in the classroom.

Two models were specified for the three acceptance variables at t2: one model for teacher feedback on pupil behavior and one model for teacher feedback on pupil academic performance. Mathematical achievement at t1 (group mean centered) and the grand mean centered social acceptance variable at t1 (i.e., acceptance in recess, rejection in recess, or acceptance during classroom activities) were entered in the models as predictors on the individual level. Mathematics achievement and sex were inserted as predictors on the individual level because of their association with social acceptance. Teacher feedback variables (i.e., feedback on social behavior and academic performance) and the average mathematics achievement of the class were included as predictors at the classroom level. The predictors were included in the model as fixed effects. Random intercept models with predictors on level 1 and level 2 were calculated. The estimation method of full maximum likelihood was used. The equation for the model of social behavior feedback is:

$$Acceptance_{behavior_{ij}} = \gamma_{00} + \gamma_{10} sex_{ij} + \gamma_{20} math_{ij} + \gamma_{30} social\_acceptance_{ij} + \gamma_{01} math\_class_j \gamma_{02} + feedback\_behavior\_incorrect_j + \mu_{0j} + e_{ij}.$$

The equation for the model of academic performance feedback is:

$$Acceptance_{performance_{ij}} = \gamma_{00} + \gamma_{10} sex_{ij} + \gamma_{20} math_{ij} + \gamma_{30} socialacceptance_{ij} + \gamma_{01} math\_class_j + \gamma_{02} feedback\_achievement\_incorrect_j + \gamma_{02} feedback\_achievement\_correct_j + \mu_{0j} + e_{ij}.$$

3. Results

3.1. Frequency data of teacher feedback

Table 4 summarizes the frequency data of the feedback coding. The quantity of identified teacher feedback differs substantially between the classes. At 68%, public feedback to single pupil's accounts for the majority of all identified feedback. Within feedback to individual pupils in public, most (75%) are related to correct academic performance. The frequencies reveal that the majority of social behavior feedback targeted incorrect behavior, whereas the majority of academic performance feedback targeted correct academic performance. On average, 73% (SD = 0.15) of teacher feedback during one mathematics lesson targeted correct academic performance, 17% (SD = 0.93) targeted incorrect academic performance, 9% (SD = 0.12) targeted incorrect social behavior, and 1% (SD = 0.03) correct social behavior. Almost a fifth of pupils in the sample (n = 98) – on average 19% (SD = 9.18) of pupils per classroom – received feedback on incorrect social behavior. Only two (4.8%) pupils with ID or severe LD out of 41 received one single feedback for incorrect social behavior, whereas 96 pupils without a diagnosed ID or severe LD (19%) had up to seven instances of feedback for incorrect social behavior in one recorded lesson. As there are only a few instances of feedback for a correct social behavior, further analyses were carried out without this variable.

3.2. Correlations between social acceptance and teacher feedback variables

Table 5 below shows the Pearson correlation coefficients for the social acceptance and feedback variables. Acceptance in recess has a significant negative correlation with social rejection in recess (r = -

Table 4
Frequency data of the feedback coding.

Code	*n*	%	*M*	*SD*	Min	Max
Feedback	3041	100	92	26.73	14	162
Recipient: pupil in public	2069	68	63	26.80	13	151
Correct social behavior	21	1	1	1.52	0	6
Incorrect social behavior	166	8	5	5.74	0	25
Correct academic performance	1540	75	47	24.36	9	137
Incorrect academic performance	338	16	10	7.54	1	39

Table 5
Correlations between social acceptance at t2 and feedback variables.

	n	1	2	3	4	5	6
1. Incorrect social behavior feedback	546	–					
2. Correct academic performance feedback	546	-0.81***	–				
3. Incorrect academic performance feedback	546	-0.07	-0.51***	–			
4. Acceptance in recess	532	-0.01	-0.02	0.07	–		
5. Rejection in recess	532	0.09*	-0.11*	0.01	-0.38***	–	
6. Acceptance during classroom activities	532	-0.08	0.03	0.07	0.37***	-0.54***	–

Note.
*** p < .001.
* p < .05.

0.38, $p < .001$) and a significant positive correlation with social acceptance during classroom activities ($r = 0.37$, $p < .001$). According to the guidelines published by Cohen (1992), they correspond to a medium effect size. The relationship between social rejection and social acceptance in recess was linear and curvilinear, indicating that these two variables measure separate dimensions (Hymel et al., 2002). Social acceptance during classroom activities (collaboration rating) is negatively correlated with social rejection in recess ($r = -0.54$, $p < .001$), which is a large effect size. Teacher feedback variables also show a correlation: Feedback on incorrect social behavior is strongly negatively correlated to feedback on correct academic performance ($r = -0.81$, $p < .001$). Feedback on correct and feedback on incorrect academic performance are rather strongly negatively correlated ($r = -0.51$, $p < .001$), both corresponding to a large effect size. Most of the social acceptance and teacher feedback variables do not have a significant correlation, with exception of social rejection in recess, which is positively correlated to teacher feedback on incorrect social behavior ($r = 0.09$, $p = .03$) with a small effect size and negatively correlated to teacher feedback on correct academic performance ($r = -0.11$, $p = .01$) with a small effect size.

3.3. Relationship between teacher feedback and social acceptance of pupils

Two hierarchical linear models were specified for each variable of social acceptance (i.e., social acceptance in recess, social rejection in recess, and social acceptance during classroom activities): one with teacher feedback on incorrect social behavior as a predictor on level 2 (Table 6) and one with teacher feedback on correct and incorrect academic performance as a predictor on level 2 (Table 7). In all six models, sex, mathematical achievement, and social acceptance at t1 (social acceptance and rejection in recess, social acceptance during classroom activities) were included as predictors on level 1.

The results in Table 6 reveal that at level 1, the social acceptance at t1 predicted the social acceptance at t2 ($p < .001$). This indicates a high level of continuity in social acceptance of pupils over a school year. The mathematical achievement level of pupils at t1 was a significant predictor for social acceptance in recess ($p = .002$) and during classroom activities ($p < .001$) but was not significantly related to rejection in recess. Sex was only related to social acceptance during classroom activities ($p = .01$).

At level 2, teacher feedback on incorrect social behavior did not predict the social acceptance and rejection of pupils during recess. This means that pupils' nominations of play partners and playing ratings are not predicted by teacher feedback in the classroom. However, feedback on incorrect behavior appears to play a role in the social acceptance of pupils during classroom activities ($p = .007$). Average math achievement was also a significant predictor of social acceptance, but only during class activities ($p = .043$), indicating a negative relationship between average math achievement in class and the acceptance of pupils during classroom activities. The effect size for the overall model is $\mu^2 = 0.39$ indicating a large effect (Cohen, 1992).

At level 1, Table 7 shows results similar to the ones of the models in Table 6. Social acceptance at t1 was a significant predictor for all three models ($p < .001$). Sex and mathematical achievement were significant predictors for social acceptance during classroom activities at t2, $p = .01$ respectively $p < .001$. Further, mathematical achievement predicted social acceptance in recess ($p = .002$) but was not related to social rejection in recess. Sex was neither a predictor for social

Table 6
Multilevel regression for social acceptance at t2 with the predictor incorrect social behavior feedback (n = 520).

	Acceptance in recess			Rejection in recess			Acceptance during classroom activities		
	B	SE	p	B	SE	p	B	SE	p
Intercept	16.43	1.09	0.000	0.11	0.01	0.000	3.80	0.05	0.000
Level 1									
Sex (f = 0, m = 1)	0.11	0.75	*ns*	−0.00	0.01	*ns*	−0.17	0.06	0.010
Math achievement [a]	1.24	0.40	0.002	−0.00	0.00	*ns*	0.13	0.03	0.000
Social acceptance t1 [b c]	0.51	0.04	0.000	0.58	0.03	0.000	0.45	0.04	0.000
Level 2									
Average math achievement	−2.98	3.69	*ns*	−0.01	0.03	*ns*	−0.31	0.15	0.043
Incorrect social behavior feedback [d]	−3.25	7.17	*ns*	0.06	0.06	*ns*	−0.84	0.29	0.007
Random part	*Var*	*SD*		*Var*	*SD*		*Var*	*SD*	
σ_e^2	68.94	8.30		0.007	0.08		0.51	0.71	
σ_{u0}^2	16.97	4.12		0.001	0.03		0.003	0.06	
Explained total variance (%)		32.6			38.6			27.5	

Note.
[a] Centered at the group mean (classes).
[b] Centered at the grand mean of the sample.
[c] Variable of social acceptance at t1 according to the variable of social acceptance at t2 (i.e., acceptance in recess, rejection in recess, and acceptance during classroom activities).
[d] Only feedback on incorrect social behavior was included in the model.

Table 7
Multilevel regression for social acceptance at t2 with the predictor academic performance feedback (n = 520).

	Acceptance in recess			Rejection in recess			Acceptance during classroom activities		
	B	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*
Intercept	11.88	5.97	0.056	0.12	0.01	0.000	3.00	0.24	0.000
Level 1									
Sex (f = 0, m = 1)	0.11	0.75	*ns*	−0.004	0.01	*ns*	−0.17	0.06	0.010
Math achievement [a]	1.25	0.40	0.002	−0.004	0.00	*ns*	0.13	0.03	0.000
Social acceptance t1 [b c]	0.51	0.04	0.000	0.58	0.03	0.000	0.45	0.04	0.000
Level 2									
Average math achievement	−2.97	3.96	*ns*	−0.001	0.03	*ns*	−0.31	0.15	0.042
Correct academic performance feedback	4.16	6.58	*ns*	−0.08	0.06	*ns*	0.78	0.26	0.005
Incorrect academic performance feedback	7.32	10.35	*ns*	0.01	0.09	*ns*	0.89	0.41	0.036
Random part	*Var*	*SD*		*Var*	*SD*		*Var*	*SD*	
σ_e^2	68.94	8.30		0.007	0.08		0.51	0.71	
σ_{u0}^2	16.71	4.09		0.001	0.03		0.003	0.05	
Explained total variance (%)		32.8			39.2			27.6	

Note.
[a] Centered at the group mean (classes).
[b] Centered at the grand mean of the sample.
[c] Variable of social acceptance at t1 according to the variable of social acceptance at t2 (i.e., acceptance in recess, rejection in recess, and acceptance during classroom activities).

acceptance nor for social rejection during recess. At level 2, social acceptance and rejection in recess were not predicted by the average mathematics achievement of the class, nor teacher feedback on incorrect and correct academic performance. In contrast, teacher feedback on correct and incorrect academic performance significantly predicted pupils' acceptance during classroom activities, p =.005 respectively p = .036. In addition, the average mathematics achievement of the class was a significant predictor of acceptance during classroom activities (p =.042). The effect size for the overall model is μ^2 = 0.38 indicating a large effect (Cohen, 1992).

4. Discussion

4.1. Summary and interpretation

Social acceptance in inclusive classrooms is a topic of major importance in educational research and practice due to its link not only to learning outcomes, but also to the socio-emotional development and wellbeing of pupils (Gifford-Smith & Brownell, 2003; Ladd et al., 2008). In this study, the teacher's role as a social referee (Feinman, 1982) for the social acceptance of pupils in inclusive classrooms was of interest. Previous research has shown that teacher feedback has an impact on social acceptance (Hendrickx et al., 2017; Huber, 2013; Huber et al., 2015; White & Jones, 2000). This study aimed to contribute to the understanding of teacher feedback behavior and its effects on social acceptance by examining this relationship in inclusive elementary classrooms. In addition, the effect of teacher feedback on social acceptance in different contexts was assessed: social acceptance and rejection during recess as well as social acceptance during classroom activities.

The results show that almost three fourths of public teacher feedback to individual pupils during a mathematics lesson targeted the correct academic answers or actions of pupils. This result is in line with previous research findings (Beaman & Wheldall, 2000; Hendrickx et al., 2017; Noor, Aman, Mustaffa, & Seong, 2010; Rubie-Davies, 2007) and was predictable for two reasons. First, the teachers' objective in the mathematics lessons was primarily academic. Thus, teachers mostly asked academic questions or presented academic tasks that pupils could answer correctly and whose answers or actions they evaluated afterwards (Rubie-Davies, 2007). Second, in mathematics lessons pupils often solve many similar problems that have been discussed in class before, over a short period of time, such as by completing a worksheet during seatwork. This may also lead to a high frequency of feedback on the correct academic performances of pupils.

By contrast, when teachers gave public feedback on individual social behavior, they nearly always targeted incorrect social behavior, which is consistent with other study findings (Beaman & Wheldall, 2000; Sprouls, Mathur, & Upreti, 2015). In addition, this feedback was generally directed towards one fifth of the pupils in the classrooms. Pupils with ID or severe LD were not more likely to receive feedback on negative behavior than their peers. Either the pupils with ID or LD did not show such behavior, or teachers responded less to their social behavior. The latter explanation is corroborated by findings that teachers have low expectations of pupils diagnosed with SEN and thus supports the hypothesis that diagnosed disabilities and the SEN label influence how teachers behave and give feedback in their classrooms (Pit-ten Cate & Glock, 2018). This is an interesting line of research in the field of inclusive education and merits further investigation.

Correct social behavior was acknowledged by teachers in only a few instances. This is a revealing result in light of the body of evidence that shows that pupils with behavioral problems need positive support and reinforcement to improve their social behavior in the classroom. It seems that many teachers, not just those in this study (e.g., Rubie-Davies, 2007), fail to take full advantage of this potentially powerful tool to support appropriate social behavior (Beaman & Wheldall, 2000).

Further, teacher feedback for incorrect social behavior was strongly and negatively correlated with feedback for correct academic performance. This correlation could be interpreted in two different ways. It could mean that teachers, who had to spend a lot of time during the lesson correcting pupils' social behavior because of many disturbances in the classroom, had less time to concentrate on academic performance. Or, it could mean that teachers who focused on asking academic questions and on giving feedback for correct academic performances, used classroom management strategies that prevented children from showing problematic behavior (Hutchings, Martin-Forbes, Daley, & Williams, 2013; Rubie-Davies, 2007). Whereas the causality is not certain, it can be stated that teachers focused more either on incorrect social behavior or on the correct academic performance of their pupils. Further, the strong negative correlation between feedback on correct and incorrect academic performance leads to the assumption that teachers fall into two feedback behavior profiles. Either they praise their pupils' correct answers, activities and learning outputs, or they consistently comment on incorrect ones.

For both, feedback on academic performance and feedback on social

behavior, the multilevel analyses revealed similar predictor effects on the individual level. Social acceptance during recess and during classroom activities was predicted by mathematical achievement: The higher the mathematical achievement, the higher the social acceptance. The result confirms the relationship between the achievement level of pupils and their social acceptance (Henricsson & Rydell, 2006; Huber & Wilbert, 2012; Wang et al., 2014). Further, sex was a predictor of pupils' social acceptance during classroom activities. Girls were more likely to receive positive ratings with regards to their collaboration in classroom than boys. This is in line with most studies on social behavior, where girls are consistently rated as being more pro-social and cooperative than boys (e.g., Perren, Forrester-Knauss, & Alsaker, 2012), which might make them more likely to be rated positively for collaboration in class.

At classroom level, the results of the multilevel analyses showed that the average math achievement of the class was negatively associated with acceptance during classroom activities. Thus, in classrooms with a high average achievement level pupils had lower peer ratings for collaborative behavior than in classrooms with a low average achievement level. This suggests that the climate in high ability classes was less collaborative and thus more competitive. However, given that studies of the impact of academic achievement on class composition have so far only reported negative effects on pupils' nonacademic outcomes (e.g., negative school attitudes) in classes with a low average academic achievement level (Belfi, Goos, De Fraine, & Van Damme, 2012 for review), more studies are needed to fully understand the effects of class composition.

Teacher feedback targeting incorrect social behavior was negatively associated with pupils' social acceptance during classroom activities. The more corrective feedback for social behavior teachers gave in their classrooms, the lower peer ratings for collaborative behavior were. In contrast, feedback on academic performance was positively associated to social acceptance during classroom activities. Feedback on correct as well as incorrect academic performance predicted peer ratings for collaborative behavior. In other words, pupils who were enrolled in classrooms where the teacher gave more feedback on academic performance were more likely to be rated as collaborative by their peers. On the one hand, these results provide evidence that pupils respond to public information given by teachers (Weinstein, 2002), and that their social acceptance can be affected by this information (Hendrickx et al., 2017). On the other hand, these results are in line with findings on the behavior of teachers who have high expectations for their pupils. Specifically, teachers who expect more from their pupils interact more with them by giving more feedback than teachers who expect less from their pupils (Rubie-Davies, 2007). Thus, it could be assumed that in this study teachers who gave more feedback on correct and incorrect academic achievement had higher expectations of their pupils. Consequently, it could mean that the higher the teacher's expectations, the more public feedback on academic performance, the greater the effect of the teacher on social acceptance during classroom activities. In this process, teacher feedback would not only be a mediating variable between teacher expectation and pupil achievement (Pellegrini & Blatchford, 2000), but also between teacher expectation and social acceptance in the academic context. In other words, teacher feedback behavior in the classroom influences how peers perceive a pupil's success and therefore, has an effect on the collaboration among pupils during classroom activities.

In contrast, teacher feedback was not a significant predictor of social acceptance or social rejection associated with children's play activities. The specific impact of negative feedback on social acceptance, as reported by other researchers (Huber, 2013; White & Jones, 2000), was only confirmed for social acceptance during classroom activities. Neither teacher feedback on academic performance nor feedback on social behavior was related to social acceptance and rejection during recess. This means that teacher feedback affects only social acceptance in the academic context. If peers observe that a particular pupil receives a lot of teacher feedback on his or her incorrect social behavior, it is logical that peers prefer not to collaborate with this pupil. The peers could assume that the collaboration might be difficult and therefore be to their academic disadvantage. The opposite takes place with feedback for correct academic performance. If peers perceive that a pupil receives a lot of positive feedback for correct responses, they may assume that collaboration with that pupil will be beneficial in terms of academic performance. In sum, the findings suggest that those aspects of social acceptance by peers that are closely related to activities in the classroom are predicted by teacher feedback behavior. This is in line with the results from a study in an experimental setting by Huber (2013). In his study, social acceptance was also related to activities in the classroom. Thus, it seems that the role of the teacher as a social referee becomes less important if aspects of social acceptance go beyond the classroom context and are related to acceptance in recess.

4.2. Limitations and Future research

Some limitations have to be considered when interpreting the findings. First, the coding of teacher feedback behavior is challenging. The inter-coder agreement on the first step of coding (coding feedback) was acceptable, but not high. This was because the program MAXQDA measures the duration of the coded sequences (see Method section). Defining feedback is challenging. To facilitate the process of coding, a rather narrow definition of feedback compared to that used by other authors was chosen (e.g., Hattie & Timberly, 2007). Still, it was very difficult to distinguish between a feedback and an explanation. When a teacher gives an explanation right after an answer or action, a pupil receives – indirectly – feedback that something was not correct. Second, being videotaped probably had an influence on teacher and pupil behavior. For example, it was not possible to analyze the impact of the affective connotation of feedback because feedback with a very positive or a clearly negative connotation was very rarely observed. Third, the results are based on the data from one mathematics lesson. Even if it can be assumed that one lesson is enough to assess a teacher's feedback behavior (Praetorius et al., 2014), it would have been beneficial to analyze a dataset with more lessons. Fourth, the lesson was not standardized: In some classrooms pupils mostly worked individually on a task while in other classrooms pupils publicly answered the teacher's questions. These different settings are likely to have played a role in the amount of public feedback given by a teacher, which varied greatly from classroom to classroom. Fifth, it could be that the multilevel results were influenced by the different instruments used to assess the three variables of social acceptance (i.e., playing nominations, playing ratings, and collaboration ratings). Sixth, while the study controlled for mathematical achievement, there was no control for the social behavior of pupils in the classroom, the importance of which has been stressed in a recent study (Hendrickx et al., 2017). Also, teacher feedback was reported as a group variable because it was not always possible to link the feedback to individual pupils. By doing so, information about how teacher feedback is linked to social acceptance on an individual level was lost. Finally, the quality of the feedback was not assessed. For example, it could be that constructive feedback on incorrect performance and behavior has less of a negative impact on pupil acceptance than criticism.

4.3. Conclusions

This study shows that previous findings from experimental studies on teacher feedback and its effects on social acceptance of pupils can partially be confirmed in the natural setting of inclusive classrooms. In addition, the study adds to existing evidence in this field. The findings indicate that the context is crucial. On one hand, teacher feedback on social behavior as well as on academic performance has an effect on social acceptance in an academic context. More specifically, pupils in early school years seem to consider their teacher's feedback behavior

when rating the collaboration with peers. On the other hand, teacher feedback did not affect social acceptance in a play context. Pupils did not seem to consider previous teacher feedback directed at a particular pupil when deciding if they might like to play with him or her.

Any further research into this area should be careful to note the context of teacher feedback behavior when assessing social acceptance. Future studies should also consider investigating whether teacher feedback behavior might be influenced by teacher expectations towards pupils with behavioral problems, different achievement levels, and with or without SEN, and how the impact of teacher feedback on social acceptance might vary depending on the subject being taught. But there is no doubt that longitudinal studies into the effect of teacher feedback on social acceptance, in natural classroom settings, should yield important results.

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Appendix A

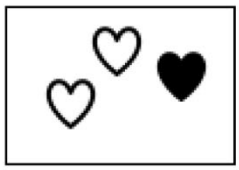
Examples of Math Problems for First Graders

Counting objects.

How many apples?

_____

Calculating with pictures.



2 + 1

_____

Shopping.

You buy: You give:

You still have: _____

Computation problems.

4 + 4 =___

7 + 7 =___

9 - 3 =___

18 - 8=___

Appendix B

Examples of Math Problems for Second Graders

Computation problems.

9 - 3 =___

18 - 8 =___

17 - 12=___

14 - 7 =___

Number sequence.

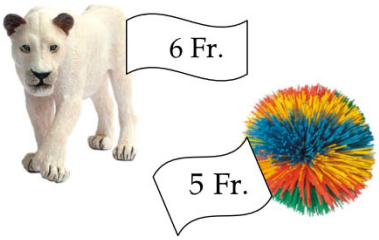
Finish the sequence:

3, 5, 7, ____, ____, ____, 15

12, 14, 16, ____, ____, ____, 24

Shopping.

You buy:



You give:

You still have: _____

My calculation: _____

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