A question of feedback? Studying effects of academic performance and teacher feedback on primary school students' social acceptance in an experimental setting

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Introduction: Being socially accepted by peers is a fundamental psychological need, and the consequences of social rejection are manifold. Investigating the causes of social rejection, a large body of studies have already established the relationship between social acceptance and individual characteristics (e.g., academic performance). However, the overall contributions of those individual characteristics are rather small, and the cause-and-effect relationship is still unclear. In addition, following social referencing theory, studies suggest that the feedback teachers give to students might also influence their social acceptance.

Methods: This experimental study, therefore, examined the influence academic performance, as well as teacher feedback, have on social acceptance. Teacher feedback was operationalized along the following two dimensions: feedback valence (positive/negative) and feedback focus (personal/task). A total of 737 third and fourth-grade primary school students (51% girls) from North Rhine-Westphalia (Germany) rated a fictional student's social acceptance on a scale of three sociometric items before and after watching an experimental video that showed a school day of the fictional student. Participants were randomly assigned to one level of academic performance (high/average/low) and one of four feedback conditions, with each being a combination of the two factors, feedback valence and feedback focus. Data were analyzed using linear mixed models.

Results: The results indicated that both academic performance and the valence of teacher feedback influenced participants' social acceptance of the student in the video. For instance, a high academic performance had a positive effect and a low academic performance had a negative effect on social acceptance. Further, positive teacher feedback influenced social acceptance positively, while negative teacher feedback influenced social acceptance negatively. However, this effect was moderated by the focus of the teacher's feedback. Feedback with a focus on the person had a more substantial effect on social acceptance for both positive and negative feedback than feedback with a focus on the task.

Discussion: These findings illustrate the importance teachers and their feedbacks have on students' peer relationships. They further suggest that it not only matters if teachers give positive or negative feedback but also how they do it.

Introduction

The need to belong is considered one of the fundamental psychological needs in humans (Baumeister and Leary, 1995). This also applies to children in the context of primary schools, where having stable friendships and positive peer relations, i.e., being socially accepted, is crucial (Ladd, 1990). Among others, social acceptance is considered as one dimension of social participation and specifically refers to acceptance by peers (Koster et al., 2009). Usually, social acceptance is measured using sociometric methods (Cillessen, 2009). The consequences of social rejection, i.e., poor social acceptance, are manifold. In general, the quality of a student's peer relationships is considered an indicator of future wellbeing and adaptive development (Wentzel, 2009). On the other hand, peer rejection in early childhood is associated with lower academic performance and overall problems in adult life (Bagwell et al., 1998). Social rejection by peers is further associated with an increased risk of internalizing and externalizing behavioral problems (Flook et al., 2005; Polanin et al., 2021) as well as distorted social-cognitive information processing (Syrjämäki and Hietanen, 2019). Unfortunately, the social position inside a classroom is generally considered to be relatively stable (Cillessen et al., 2000; Jiang and Cillessen, 2005), aggravating the situation further.

However, over the course of the last decade, a growing body of research has suggested that children with special educational needs (SEN) in inclusive classrooms are less accepted by their peers than children without SEN (Koster et al., 2009; Pijl and Frostad, 2010; Krull et al., 2014; Schürer, 2020). The stigmatizing effect of the SEN label is often discussed in this context (Caslin, 2021; Demetriou, 2022). However, comparing primary school children with and without a SEN diagnosis using propensity score matching, Henke et al. (2017) found no differences in social rejection when controlling for other relevant characteristics (i.e., academic performance and cognitive and social skills). The authors, therefore, concluded that, instead of being the cause of rejection, the SEN label can be considered an aggregate for certain individual characteristics that make rejection likely.

The relationship between academic performance and social acceptance

The association between a student's academic performance and their social acceptance is an often-replicated finding (Newcomb et al., 1993; Huber, 2009; Nakamoto and Schwartz, 2010; Huber and Wilbert, 2012; Garrote, 2020). Several studies have found evidence that the level of academic performance influences who students choose as their friends. In this context, two possible selection processes have been discussed. First, in line with social comparison theory (Festinger, 1954), homophily is understood as a guiding principle for friendship selection (most prominently concerning gender). Accordingly, several studies have suggested that students choose friends with a similar level of academic performance (Shin and Ryan, 2014; Laninga-Wijnen et al., 2018). Second, in line with the exchange theory (Thibaut and Kelley, 1959), children might prefer high-achieving peers to possibly benefit from association with them, especially in an academic context.

A recent longitudinal study by Garrote (2020) involving 506 second- and third-graders found that high-achieving students were more likely to be chosen by their classmates. Yet, the study was unable to replicate earlier findings regarding homophily. Furthermore, the effect of academic achievement was context-specific, i.e., students only preferred high-achieving peers in the academic context (working together) but not play activities. The cause-and-effect relationship between academic performance and social acceptance is thus not perfectly clear, as studies also show that social rejection can lead to a decrease in academic performance (Bagwell et al., 1998). Further experimental studies might be beneficial in this context. However, the overall contribution of individual characteristics, such as academic performance, in explaining social acceptance remains rather small (Nakamoto and Schwartz, 2010), and their impacts vary significantly between classrooms (Huber et al., 2022).

This points to the important role teachers play, especially in primary schools, in students' peer experience (Gest and Rodkin, 2011), as their respective behavior might influence how certain individual characteristics affect the social hierarchies in their classroom (Covington, 2000; McAuliffe et al., 2009).

Social referencing and the role of teachers in influencing social hierarchies

Social referencing theory (Walden and Ogan, 1988; Feinman, 1992) provides a theoretical framework to understand how teachers influence social hierarchies in their classrooms. In general, social referencing refers to the phenomenon of children relying on (adult) reference models when making judgments in ambiguous or unfamiliar situations. While usually studied in infants, social referencing processes can also be found in young children (Webster and Foschi, 1992). Parents are considered the obvious reference model for children (Zarbatany and Lamb, 1985); however, other studies suggest that, when confronted with competing reference models, even infants might choose the reference model they consider to have the most expertise in a given situation (Fawcett and Liszkowski, 2015). As parents are absent from classrooms, teachers can be considered the most important reference model for younger students (Webster and Foschi, 1992). In this context, researchers have found that social referencing is involved in the formation of social hierarchies in classrooms as well (White and Kistner, 1992; White and Jones, 2000). Thus, a specific student's social status among classmates is likely to be affected by the teacher's specific attitude and behavior toward this student (McAuliffe et al., 2009). In this vein, Farmer et al. (2011) use the metaphor of the "invisible hand" to describe the oft-neglected effect teachers have on classroom social dynamics.

In a broader sense, this is supported by the recurrent finding that the overall quality of the teacher-student relationship is linked to students' social acceptance by their peers (Howes et al., 1994; Hughes et al., 2001; Farmer et al., 2011; Mikami et al., 2012). While these studies do not deal with the occurrence of social referencing specifically, similar results have been obtained when the relationship quality between a student and a teacher was rated by peers (Hendrickx et al., 2017b). A longitudinal study by

Hendrickx et al. (2017c) showed that primary school students were influenced in their perception of the teacher-student relationship by how the teacher behaved toward a student. Their perception of the teacher-student relationship, in turn, influenced their acceptance of this particular student. Further studies suggest that students might rely on teachers' behavior and attitudes, especially in regard to students with behavioral problems (Chang, 2004; Hendrickx et al., 2017a).

These studies do not specifically detail which teacher behavior the students use as a reference to infer their teacher's attitude toward a specific student, but the most common way teachers (unwillingly) provide information about their attitudes toward specific students in everyday school life is teacher feedback (McAuliffe et al., 2009; Huber et al., 2018; Huber, 2019).

The effect of teacher feedback on social acceptance

In a broader sense, teacher feedback can be understood as information on a student's performance or understanding (Hattie and Timperley, 2007). To date, teacher feedback has mostly been studied with regard to its effect on the development of students' motivation, learning, or academic self-concept (Hattie and Timperley, 2007; Wisniewski et al., 2019). In fact, only a few studies have focused on how teachers' feedback might influence students' social status among their peers.

Based on research by Hattie and Timperley (2007) and Kluger and De Nisi (1996), Huber (2019) conceptualized teacher feedback along the following three dimensions: (1) The feedback valence describes the overall quality of feedback on a spectrum from positive to negative; (2) the feedback focus describes the level at which feedback is directed. While feedback focusing on the task targets the quality of the task-solving (e.g., "You need to pay more attention to punctuation in your writing, Peter") in relation to an individual or social or criterial norm, feedback with a personal focus primarily provides information on a teacher's attitude toward a student (e.g., "You are a great student, Jane"); and (3) the (emotional) temperature combines the elements of verbal, non-verbal and paraverbal communication and concerns the way teachers give specific feedback on a continuum from cold to warm.

In terms of social referencing theory, the effect of teacher feedback on a student's social acceptance can also be described along these following dimensions (Huber, 2019): (1) Whether feedback increases or decreases a student's social acceptance depends on the feedback's valence. Feedback with a positive valence usually increases the chances of social acceptance, while negative feedback might decrease social acceptance; (2) feedback with a personal focus generally has a greater effect compared to feedback with a focus on the task, as the former contains more information regarding the teacher's attitude toward a specific student and thus facilitates social referencing; and (3) the temperature of feedback further moderates the influence of feedback on social acceptance in that warm feedback typically has a positive effect and cold feedback negatively affects social acceptance.

To date, the effect of teacher feedback on students' social acceptance has mainly been investigated in experimental studies

(White and Kistner, 1992; White and Jones, 2000; Huber et al., 2015, 2018). In general, those studies found that positive teacher feedback increased a student's social acceptance, while negative feedback decreased it. However, experimental studies often rely on participants receiving information on teachers' feedback toward specific students in an indirect form (e.g., "the teacher often says: 'Tim, you didn't read well.'"), further limiting the ecological validity of the experiments (Huber et al., 2015, 2018).

Two longitudinal observational studies also appeared to support the general mechanism of teacher feedback influencing students' social acceptance (Hendrickx et al., 2017c; Wullschleger et al., 2020). However, the study by Hendrickx et al. (2017c) investigated the effect of broader teacher behaviors toward students. These behaviors included not only teacher feedback but also other behavior (i.e., words of affection or verbalized dislike). While the study by Wullschleger et al. (2020) followed a narrower definition of feedback, it used teachers' feedback as a predictor of class level and thus investigated the influence of teacher feedback on the overall class climate.

In addition, several cross-sectional studies have shown that the extent to which students perceive positive and negative teacher feedback from their peers was significantly related to their social acceptance of those peers (Huber, 2011; Spilles et al., 2023a,b). However, due to the cross-sectional design, the direction of the effect should be interpreted with caution.

In sum, these studies seemed to support the general notion that teacher feedback influences social acceptance among primary school students. However, the sole focus on the valence of feedback (positive vs. negative) suggests that research so far is disconnected from existing feedback research (Hattie and Timperley, 2007). Thus, the present study attempts to address this research gap and further investigate the role of teacher feedback in influencing students' social acceptance by also taking into account the focus of teacher feedback.

The present study

The present study aims to investigate the influence that academic performance and teachers' feedback have on social acceptance among primary school students. Simultaneously investigating both academic performance and teacher feedback is informed by the notion that teachers' behavior is crucial for the influence individual characteristics have on students' social acceptance by their peers. To do so, the study builds on existing experimental research and aims to address two weaknesses of earlier studies. First, while previous studies solely investigated the effect of the valence of teacher feedback on social acceptance, following Huber (2019), the present study takes the focus of feedback into account as well. The current study investigates whether the wording of a specific negative or positive feedback has a significant effect on a student's social acceptance, going beyond the examination of the different effects of positive and negative feedback on the same. Second, to address the general problem of ecological validity in experimental studies, we designed our experiment to be more immersive, with participants witnessing a teacher giving feedback to a student. The present study used a pre-design and post-design with an animated video showing the

school day of a fictional student (see Method section). For reasons of comparability with earlier studies, the present study focused on primary school students.

To begin with, the influence of academic performance on social acceptance was assessed in order to replicate earlier findings (Garrote, 2020) and to further investigate the cause-and-effect relationship. We expected that better academic performance would have a more positive influence on social acceptance than average academic performance and that average academic performance would have a more positive influence than low academic performance.

> Hypothesis 1: The academic performance of the fictional student shown in the video ought to influence participants' social acceptance of the student. A better academic performance has a more positive influence on social acceptance than an average academic performance, and an average academic performance has a more positive influence on social acceptance than a low academic performance.

Further, in line with earlier experimental research (Huber et al., 2015, 2018; Nicolay and Huber, 2021), we assessed the level to which the valence of teacher feedback influences participants' social acceptance. We expected positive feedback to have a positive effect and negative feedback to have a negative effect on social acceptance. From similar experimental studies (White and Jones, 2000; Nicolay and Huber, 2021), we also expected negative feedback to have a stronger influence on social acceptance than positive feedback.

> Hypothesis 2: The valence of the teacher's feedback toward a student ought to influence participants' social acceptance toward the student. Feedback with a positive valence has a positive effect on social acceptance, while feedback with a negative valence has a negative effect on social acceptance.

Relying on the conceptual work by Huber (2019), we assessed the role of the feedback focus. We expected both positive and negative feedback with a focus on the person to have a stronger influence than the feedback with a focus on the task.

> Hypothesis 3: The focus of the teacher feedback moderates the influence of the feedback valence on social acceptance. Feedback with a focus on the person has a stronger influence on social acceptance than feedback with a focus on the task.

Materials and methods

Sample

A total of 737 (*N*) third and fourth graders participated in the study. The sample size was determined by running a power analysis and increased by 15% in anticipation of extreme ratings in the pre-test that subsequently had to be excluded (see section 3). Approximately 51% of the students were girls. The mean age of the participants was $M = 9.33$ (SD = 0.80). Participants were recruited from 32 classes from 9 schools in the German state of North-Rhine-Westphalia; of these, there were 15 third-grade classes and 17 fourth-grade classes. All data were collected over the course of 2019.

Research design and procedure

The whole experiment was conducted on tablets using the software E-Prime® 3.0. Participants were taken out of their classes in small groups (10–15 students) into a separate room where the experiment took place. They were initially shown how to use the tablets. All items were presented in written form as well as read aloud via headphones, with participants able to listen to them repeatedly.

To begin with, participants watched a video following a fictional student (the target student) over the course of a school day. Starting with a short introductory scene of the protagonist entering the school building, the school day is comprised of four different school lessons. Each lesson consisted of a short scene showing the academic performance of the protagonist and the teacher giving feedback to the target student afterward. Academic performance, as well as teacher feedback, varied as between-subject factors among participants. To overcome gender bias and homophily in primary school students' social preferences (McPherson et al., 2001), male and female participants saw a male and female animated target student, respectively. To ensure identical experimental conditions between the gendered versions, the video track remained the same except for the gender of the animated protagonist; the audio track and the name of the protagonist (Kim)[1] were also unchanged. The audio track of the experimental video varied only in academic performance and the teacher feedback, which was manipulated as part of the experiment to evaluate feedback dimensions.

The experiment was roughly divided into three phases. In phase 1, participants were introduced to three different school children and asked to rate their social acceptance (pre-test). Male participants rated three different male schoolchildren, while female participants rated three different female schoolchildren. One of the three children was the later protagonist. The introduction and the subsequent rating of the other children, who were irrelevant to the future course of the experiment, were meant to avoid floor and ceiling effects in participants' initial ratings that had been found in earlier pilot studies.

In phase 2, participants were randomly assigned to one experimental condition that consisted of a combination of one level of academic performance (low, average, or high), one level of feedback valence (positive or negative), and one level of feedback focus (task or personal). They then watched the corresponding experimental video.

In phase 3, participants were again asked to rate the social acceptance of the target student (post-test) in the experimental video. The experiment ended with a manipulation check. The whole experiment took ~20 min for each participant.

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1 *Kim* is one of the few names in Germany that is ambiguous regarding gender.
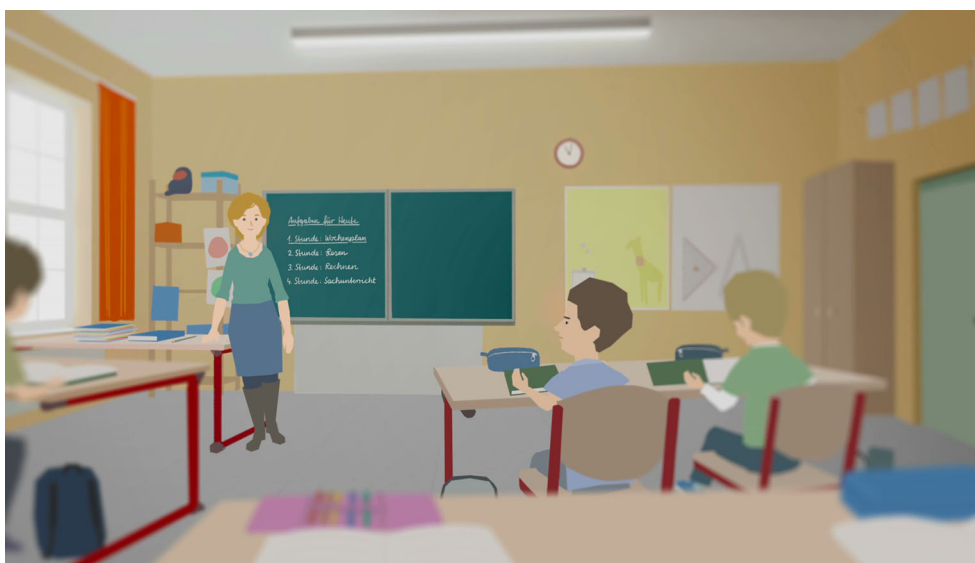
FIGURE 1
Screenshot of the experimental video.

Material

Social acceptance

Social acceptance was measured as a dependent variable using three items on a five-point Likert scale (0 = not very much; 4 = very much) that followed the sociometric method (Cillessen, 2009). The items reflect three different sociometric criteria that are commonly used in sociometric research (Hymel et al., 2011), such as seating neighbor ("How much would you like to sit next to Kim?"), play partner ("How much would you like to play with Kim?"), and birthday party guest ("How much would you like to invite Kim to your birthday party?"). The items showed sufficient internal consistency for the pre-test and the post-test (α_{pre} = 0.87, α_{post} = 0.87). Mean scores were calculated, leading to a score that ranged between 0 and 4.

Manipulation check

To check if participants perceived the protagonists' academic performance in the intended way, participants were asked to indicate on a five-point Likert scale (0 = very poor; 4 = very good) how well the protagonist performed at school that day ("What do you think: How well did Kim do in school today?"). They were further asked to indicate how the teacher evaluated the protagonist ("What do you think: How did the teacher evaluate Kim?") on a four-point Likert scale (0 = very poorly; 3 = very good).

Experimental video

The experimental videos were specially developed for this study. An animated format was chosen for standardization reasons and to be able to easily modify the videos over the course of the development process and for future research. Figure 1 shows a

screenshot of the experimental video. A sample video with English subtitles can be found in the accompanying OSF repository.[2]

The videos were developed over the course of several pilot studies. The figures of the male and female target students were chosen from a pool of five different figures because, in the first pilot study, participants (n = 47) showed less extreme social acceptance toward them.

The operationalization of the three levels of academic performance followed specific criteria (see Table 1). For this purpose, academic performance was partitioned into the following four different facets that were considered relevant in all primary school settings: (1) motivation, (2) reading skills, (3) grade, and (4) answer behavior during the lesson. The four different facets of academic performance corresponded to the four school lessons in the video. Each of these lessons was shown as a short scene ranging between 40 and 60 s. The operationalization of the three levels (low, average, high) of academic performance was evaluated in a second pilot study (n = 96; Nicolay and Huber, 2021). In the pilot study, no subsequent teacher feedback was presented, and this was to ensure participants' perception was not influenced by it.

Teacher feedback was operationalized based on the following two factors: feedback valence and feedback focus. The factor feedback valence had two levels, either positive or negative. To support the feedback valence on a paraverbal level (feedback temperature), positive feedback was provided with a friendly and warm voice, while negative feedback was delivered with an unfriendly and cold voice. The feedback focus also had two factors (levels)—it was either related to the task or the person. All feedback instances referred to an individual rather than a social reference norm to avoid a paradoxical situation (i.e., positive feedback for low academic performance) and be more plausible to the participants. Table 2 offers examples of phrases used in

2 https://doi.org/10.17605/OSF.IO/UK6XC.

TABLE 1 Four different teacher feedback phrases assessing the reading skills aspect of academic performance.

| | Level of academic performance | | |
	AP-	APØ	AP+
Motivation	Does not work, looks out of the window, talks a lot to the neighboring student, yawns, and low body tension	Delays the start of work, initially looks out of the window, talks shortly to the neighboring student, and has medium body tension	Starts quickly with his work, looks at the working material, makes notes, and high body tension
Reading skills	Reads simple text aloud hesitantly and slowly (30 words/min)	Reads simple text aloud with medium speed and sometimes hesitant (60 words/min)	Reads simple text aloud fluently, without mistakes, and smoothly (90 words/min)
Grade	The teacher returns math exams and names the grade out loud (5/"inadequate").	The teacher returns math exams and names the grade out loud (3/"satisfactory")	The teacher returns math exams and names the grade out loud (2/"good").
Answer behavior	The teacher asks a simple question ("five senses"), and the protagonist names 1 of 5 senses.	The teacher asks a simple question ("five senses"), and the protagonist names 3 of 5 senses.	The teacher asks a simple question ("five senses"), and the protagonist names 4 of 5 senses.

AP, Academic performance.

TABLE 2 Wording of the four different teacher feedback types for the reading skills aspect of academic performance.

| Teacher feedback | | |
Valence	Focus	Wording
+	Person	"Great, Kim! Much better than last time. I'm impressed with you today."
+	Task	"Great, Kim! That was really good. You did read more accurately than last time."
-	Task	"Gosh, Kim, that wasn't great. Your intonation was worse than last time."
-	Person	"Gosh, Kim, that wasn't right at all. I'm losing my patience with you."

the four different feedback conditions for a reading skills aspect of academic performance. We tested the operationalization of teacher feedback in a third pilot study ($n = 132$; Nicolay and Huber, 2021). It included feedback following an average academic performance to ensure that participants perceived the feedback in the intended way—positive feedback as positively, negative feedback as negatively, and task-focused feedback as less positive or negative than feedback with a focus on the person.

Statistical analysis

Data analysis was conducted with linear mixed models and maximum likelihood estimation in R (R Core Team, 2018) using the packages lme4 (Bates et al., 2015) and lmer Test (Kuznetsova et al., 2017) to account for the nested structure of the data (measurement points nested in students, with students nested in classes). We controlled for age and gender. Effect sizes and pairwise comparisons were calculated using the effect size (Ben-Shachar et al., 2020) and emmeans (Lenth, 2023) packages. Besides two cases of missing age values that were replaced by class mean, no data were missing.

Results

Descriptive results for the initial social acceptance show that 101 participants rated the target student as either extremely negative ($n = 26$) or extremely positive ($n = 75$). Since a change from pre- to post-test is only possible in one direction in these cases, they were removed from the sample. Excluded participants

TABLE 3 Distribution of the sample across the experimental conditions.

| Sex | FB valence | FB focus | Academic performance | | |
			AP-	APØ	AP+
Male	Positive	Personal	31	27	28
		Task	23	26	26
	Negative	Task	26	24	25
		Personal	25	24	26
Female	Positive	Personal	25	27	26
		Task	29	23	32
	Negative	Task	23	32	22
		Personal	29	29	26

FB, Feedback; AP, Academic Performance.

did not differ in age [$t_{(139.87)} = -0.126$, $p = 0.900$] or gender [$\chi^2(1) = 0.007$, $p = 0.931$) from the other participants. The final sample consisted of $N = 635$ students ($M_{age} = 9.33$, $SD_{Age} = 0.81$). Table 3 shows the distribution of the sample across conditions of feedback valence, feedback focus, and school performance for both sexes.

Descriptive results for the pre-test show an average social acceptance of $M_{pre} = 2.33$ ($SD_{pre} = 0.88$), that is, slightly above the theoretical mean of 2. Female participants showed a higher initial social acceptance ($M_{preF} = 2.58$; $SD_{preF} = 0.99$) than male participants ($M_{preM} = 2.07$; $SD_{preM} = 0.77$). The difference was significant [$t_{(609.15)} = -7.77$, $p < 0.001$].

TABLE 4 Results of the linear mixed models for social acceptance.

Predictor	Model 1			Model 2		
	Estimate	SE	p	Estimate	SE	p
(Intercept)	2.12	0.09	**<0.001**	2.12	0.10	**<0.001**
sex (f)	0.41	0.06	**<0.001**	0.41	0.06	**<0.001**
age	0.03	0.03	0.360	0.03	0.03	0.345
measurement point (post)	0.07	0.11	0.479	0.17	0.12	0.135
academic performance (average)	−0.03	0.09	0.718	−0.03	0.09	0.714
academic performance (low)	0.04	0.09	0.678	0.04	0.09	0.676
feedback valence (positive)	−0.08	0.07	0.288	−0.08	0.10	0.416
feedback focus (person)	0.08	0.07	0.248	0.08	0.10	0.456
measurement point (post) * academic performance (average)	−0.62	0.11	**<0.001**	−0.63	0.11	**<0.001**
measurement point (post) * academic performance (low)	−0.92	0.11	**<0.001**	−0.92	0.11	**<0.001**
measurement point (post) * feedback valence (positive)	0.59	0.09	**<0.001**	0.40	0.13	**0.003**
measurement point (post) * feedback focus (person)	−0.09	0.09	0.336	−0.28	0.13	**0.036**
feedback valence (positive) feedback focus (person)				0.01	0.15	0.924
measurement point (post) * feedback valence (positive) * feedback focus (person)				0.37	0.19	**0.047**
N	32 classes			32 classes		
	635 individuals			635 individuals		
Observations	1270			1270		
Marginal R^2/Conditional R^2	0.156/0.315			0.161/0.319		

Bold = $p < 0.05$.

Manipulation check

Analogous to the pilot studies, we also checked whether the experimental manipulation worked in the predicted direction for the main study. The results of the first ANOVA showed a significant main effect on the level of academic performance ($F_{(2,632)} = 69.57$, $p < 0.001$, = 0.180). *Post-hoc* tests revealed that all three conditions were perceived significantly differently and in the intended order. A second ANOVA indicated a significant main effect for feedback valence on how participants perceived the teacher's feedback ($F_{(1,633)} = 1052.66$, $p < 0.001$, $\eta_p^2 = 0.624$), i.e., the feedback in the positive feedback condition was perceived more positive than the feedback in the negative feedback condition. A significant interaction between feedback valence and feedback focus ($F_{(1,631)} = 22.770$, $p < 0.001$, $\eta_p^2 = 0.035$) indicated that the feedback with a focus on task was perceived as less negative and less positive, respectively, than feedback with a focus on the person.
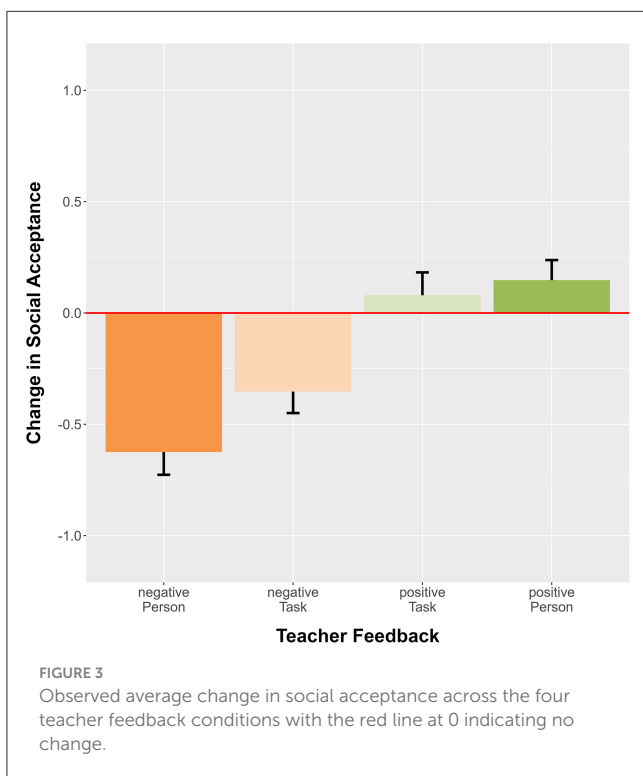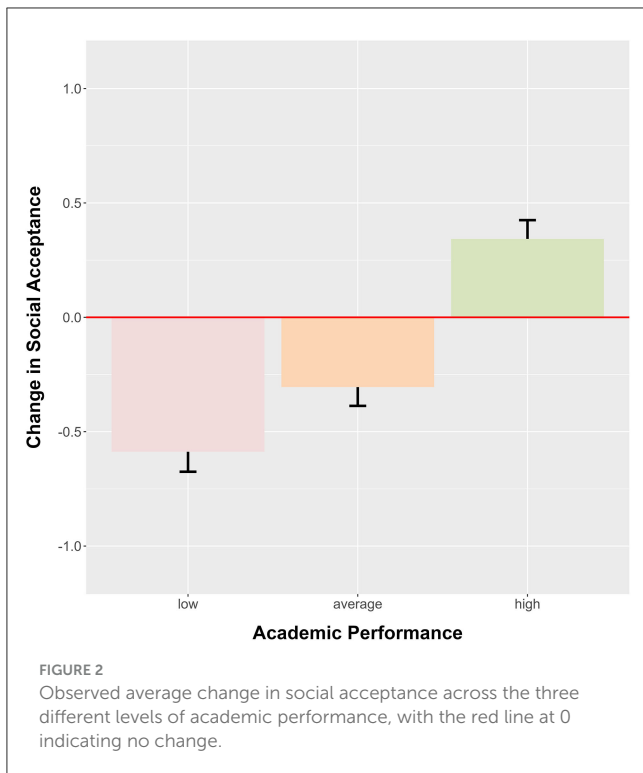
Hypotheses test

Linear mixed models for social acceptance were specified and main effects as well as interaction effects between the within-factor measurement point (pre/post) and the between-subject factors (academic performance, feedback valence, feedback focus) were sequentially added to the model (Table 4). Intraclass correlations (ICC) indicated that a substantial proportion of variance was explained at the individual level ($\rho_{individual} = 0.173$), while the

proportion of variance explained at the class level ($\rho_{class} = 0.003$) was marginal.

To test the first and the second hypotheses, only main effects and two-way interactions were added to the model (Model 1, Table 4). As can be observed in the descriptive statistics, there was a significant main effect for the control variable gender ($\beta = 0.41$, $p < 0.001$), with female participants showing a higher social acceptance toward the protagonist in the video across both measurement points.

The first hypothesis postulated the effect of academic performance on social acceptance. The interaction between this measurement point and academic performance was significant for both average ($\beta = -0.62$, $p < 0.001$) and low ($\beta = -0.92$, $p < 0.001$) academic performance compared to the reference level of high academic performance. An additional contrast was calculated, also showing a significant difference between the average and low academic performance conditions ($\beta = -0.30$, $p = 0.026$). Overall, the interaction effect could be considered to be medium, $\eta_p^2 = 0.10$. The effect of the three academic performance conditions on the target student's social acceptance is illustrated in Figure 2. The results show that low and average academic performance led to a decrease in social acceptance, while high academic performance led to an increase in social acceptance.

The second hypothesis predicted an influence of the feedback valence (positive/negative) on social acceptance. The interaction between this measurement point and feedback valence was significant ($\beta = 0.59$, $p < 0.001$) with an effect of medium size, $\eta_p^2 = 0.06$, indicating that the social acceptance toward the target

FIGURE 2
Observed average change in social acceptance across the three different levels of academic performance, with the red line at 0 indicating no change.

FIGURE 3
Observed average change in social acceptance across the four teacher feedback conditions with the red line at 0 indicating no change.

student increased among participants who were in the positive feedback condition group compared to those who were in the negative feedback condition group.

To test the third hypothesis, given that the effect of feedback valence on social acceptance was moderated by the feedback focus,

a three-way interaction between measurement point, feedback valence, and feedback focus was added to the model (Model 2, Table 4). The results indicate a significant moderation ($\beta = 0.37$, $p = 0.047$) with a small effect size, $\eta_p^2 = 0.006$. Additional interaction significantly increased the model fit [$\chi^2(2) = 7.086$, $p = 0.029$], although the explained variance increased only slightly by $\Delta R_m^2 = 0.004$. Figure 3 illustrates the interaction effect by showing observed average change in social acceptance across the four feedback conditions, with both positive and negative feedback with a focus on the task having a lesser influence on social acceptance than positive and negative feedback with a focus on the person. Accordingly, the effect of feedback valence was smaller for feedback with a focus on the task ($d = 0.484$) than for feedback with a focus on the person ($d = 0.931$). However, a pairwise comparison of task- and person-focused feedback in both positive and negative feedback valence conditions did not yield any significant difference ($p_{\text{pos}} = 0.897$; $p_{\text{neg}} = 0.158$).

Discussion

The present study aimed to investigate the influence of school performance and teacher feedback on primary school students' social acceptance. An experimental design was used to investigate cause-and-effect relationships and to be able to control for confounding variables that occur in field studies.

The results indicate that the academic performance of the target student in the video significantly influenced participants' social acceptance, thus confirming the first hypothesis. Investigating further, it was found that only high academic performance increased social acceptance, while both average and low school performance decreased it. The overall effect size can be considered medium. These findings not only replicate existing research on the relationship between academic performance and social acceptance (Newcomb et al., 1993; Garrote, 2020; Wentzel et al., 2021) but also shed further light on the cause-and-effect relationship. Social rejection (i.e., low social acceptance) can be understood at least partially as the result of low academic performance. However, this does not exclude the possibility of a bidirectional relationship (Ladd et al., 2000; Chen et al., 2010).

The second and third hypotheses postulated the effect of teachers' feedback on social acceptance. In line with the second hypothesis, the results showed a significant medium-sized effect resulting from the feedback valence of the teacher on the social acceptance of the protagonist. In line with previous research (Huber et al., 2018; Nicolay and Huber, 2021), the present study found negative feedback to have a higher effect on social acceptance than positive feedback (Figure 3). Further, the positive feedback condition only slightly increased the social acceptance ($M\Delta = 0.11$, $SD\Delta = 1.22$, $d = 0.128$) compared to the decrease in the negative feedback condition ($M\Delta = -0.49$, $SD\Delta = 1.24$, $d = 0.584$). This might be partly explained by an initial social acceptance occurring above the theoretical average of the scale even after excluding participants with extreme ratings (see Results). However, these results can also be interpreted such that, due to the differences in effect sizes, negative feedback cannot simply be compensated by positive feedback. In line with previous research (Nicolay and Huber, 2021), comparing effect sizes for academic performance

and teacher feedback suggests that, overall, the effect of academic performance is stronger than the effect of teacher feedback.

The third hypothesis assumed that the focus of the teacher feedback moderates the influence of the feedback valence on social acceptance. Again, the results indicate a significant effect. Participants who saw the teacher giving the protagonist feedback with a focus on the task were less influenced in their social acceptance by positive or negative feedback than those who saw the same feedback with a focus on the person. However, pairwise comparisons between task- and person-focused feedback in the positive and negative feedback conditions were not significant. This might be related to the overall only weakly significant three-way interaction with a rather small effect size. Nonetheless, these results provide a first indication that the manner (choice of words and tone) in which teachers give feedback can make a difference in students' social status.

Limitations and future research

The present study has several limitations. In general, experimental studies show lower ecological validity. However, they also allow us to gain insight into the cause-and-effect relationship between variables, which are not easily studied or manipulated in a natural setting in an ethically defensible manner. Compared with earlier studies, the current study attempted to achieve a higher ecological validity by creating a more immersive experiment. Participants were able to witness a teacher giving feedback to a student. However, due to the animated nature of the video (see Figure 1), there are limitations regarding ecological validity.

One additional aspect concerns the operationalization that was used in the present study. The feedback provided by the teacher in the experimental video only targets academic performance. In everyday school life, negative feedback, especially, is often focused on students' behavior. Previous studies suggest that the effects on social acceptance might differ between feedback with a focus on academic performance and feedback with a focus on behavior (Wullschleger et al., 2020). Furthermore, for reasons of plausibility and methodology (see Method), we only used feedback that referred to an individual reference norm. Feedback referring to a social or criterial reference norm might have had a different effect on social acceptance.

In sum, there are four possible directions for future research on the influence of teacher feedback on social acceptance that should be addressed to better understand social referencing processes. First, in line with the above-mentioned limitation, research should be expanded on further types of feedback. Among others, feedback focused on behavior seems especially crucial, as other studies have shown that students rely on their teachers even more when judging students with behavioral problems (Chang, 2004; Hendrickx et al., 2017a). Second, while the general mechanism of social referencing seems to be a rather robust finding currently, individual differences between students in their susceptibility to influence by teacher feedback might be of interest. While social referencing theory emphasizes the importance of the relationship between two persons for referencing processes to occur (Zarbatany and Lamb, 1985;

Ruggeri et al., 2018), studies in the peer influence paradigm also point out that social anxiety (Prinstein et al., 2011) as well as mental disabilities (Egger et al., 2021) might moderate the susceptibility to influence by peers. Third, similar to most of the studies that investigate the influence of teacher feedback on social acceptance, the present study focused on primary school students. As the video and the specific operationalization of academic performance were specifically designed for this age group (see section 2.3.3), it was not possible to also include older students in the sample. Taking into account a developmental perspective, future research should investigate if teachers' influence decreases with increasing age and the growing importance of peers. Conceptually, this would also allow us to bridge the gap between research on social referencing and research on peer influence. Lastly, future studies could explore how feedback can be used to foster social participation. Although the results indicate a rather small effect of positive teacher feedback on social acceptance, it is important to keep in mind that avoiding giving negative feedback publicly might also be an opportunity to reduce social rejection.

Conclusion

The present study shows that teacher feedback can have an effect on how well students are socially accepted by their peers. This was established in this study, although participants only saw a short 5-min video with four instances of feedback from the teacher. In a natural setting, students witness far more feedback given to peers in everyday school life. Observing 36 school lessons in different classes, Huber (2021) found that teachers give, on average, approximately one instance of feedback per minute. Considering the results obtained in this study indicate that negative teacher feedback has a much stronger influence on social acceptance than positive feedback, teachers should attempt to avoid giving negative feedback publicly while emphasizing positive developments openly in front of the classroom. The results further hint at the importance of the words (and tone) teachers choose when giving feedback. Here, focusing on the specific task rather than the person of the specific student addressed could be a way to at least reduce the effect negative feedback has on the social acceptance of a student.

While earlier studies suggest that student's social status is rather stable (Cillessen et al., 2000), there is also support for teachers' ability to make a difference. A study by Hendrickx et al. (2020) showed that students facing social rejection became more socially accepted by their peers when teachers started to behave less negatively toward them. Overall, these findings indicate that teachers have an immense leverage to promote social participation and inclusion. Inclusive education reduces discrimination and increases the participation of students with special educational needs. Being not only present but also socially included in the classroom is a crucial part of this.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical approval was not required for the studies involving humans because we did not record any personal data of the subjects involved. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required from the participants or the participants' legal guardians/next of kin in accordance with the national legislation and institutional requirements because we did not record any personal data of the subjects involved.

Author contributions

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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