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Peer influence on primary school children's social judgment-making: an experimental study

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Introduction: Peer influence is often studied with regard to the development of specific behaviors (e.g., maladaptive behavior, prosocial behavior) in adolescents. Following a broader understanding of peer influence, this study investigated if children at primary school age are also influenced by peers when making social judgments about other students and to what degree social anxiety is associated with greater susceptibility to peer influence.

Methods: A total of 103 ($M_{age} = 9.18$ years) primary school children participated in a computer-based experiment. Participants made social judgments regarding 22 pictures of potential exchange students in three consecutive trials (T1, T2, T3). For T1 and T2, general variability in participants' ratings was assessed without experimental manipulation. For T3 (manipulation), participants were introduced to social-judgments allegedly made by peers that contradicted their earlier ratings. They were then asked to rate the 22 pictures again.

Results: Random-Intercept linear mixed models were used to analyze the data. Findings indicate that participants' social judgments aligned significantly more with manipulated peer ratings than in the absence of manipulation. This shift toward the peer ratings was higher when peers' social judgments were more negative than participants' ratings compared to cases where peers made more positive social judgments than participants. Social anxiety did not predict how much participants' social judgments shifted toward those made by peers. However, a significant interaction between social anxiety and the direction of the manipulation (positive vs. negative) was found. Greater social anxiety was associated with a stronger effect of peer influence toward more positive social judgments.

Discussion: Findings suggest that peer influence as a process is relevant in the primary school context and in regard to everyday decision-making as to

whom individual children want to interact with. While this effect was particularly pronounced for peer influence toward more negative social judgments, social anxiety moderated this effect. Implications for research and practice are discussed.

KEYWORDS

peer influence, social judgment-making, social anxiety, experimental design, primary education

1 Introduction

Social acceptance and the ability to form friendships are essential for fulfilling the human need to belong (Baumeister and Leary, 1995). The quality of relationships is crucial for general well-being and adaptive development. Experiences of social exclusion are associated with lower academic performance (Wentzel et al., 2021) and psychosocial problems (Bagwell et al., 1998) as well as reduced social-cognitive information processing (Syrjämäki and Hietanen, 2019), less social skills (Frostad et al., 2007) and a greater likelihood to develop mental disorders (Reinhard et al., 2020).

How well children are accepted depends on the social judgments made by their peers. However, children don't form their social judgments solely based on their individual perception of others' characteristics. Besides influence by teachers and their behavior toward students (Endedijk et al., 2022; Farmer et al., 2011; Nicolay and Huber, 2023), social judgments are also highly likely to be influenced by an individual's peers and their judgment. It is therefore important to investigate the extent to which children adapt to peers' opinions in their social judgments of others, and to what extent this tendency depends on individual characteristics (e.g., social anxiety, social status).

In this context, an individual's peers initially play the role of the integrating party. Through their acceptance of the individual, they convey a feeling of social acceptance and can therefore satisfy the basic need to belong. Nevertheless, the role of peers is not exclusively one of bestowing acceptance; they also occupy an important position by influencing each other in terms of social interactions (Egger et al., 2020; Laursen and Faur, 2022; Nenniger, 2022; Prinstein and Dodge, 2008).

This study aims to examine the impact of peers' opinions on children's social judgment-making and thus shed more light on the processes underlying the development of social acceptance and, ultimately, social networks. In this regard factors that influence one's susceptibility to peer influence in social judgment-making should also be considered. Based on other research on susceptibility to peer influence or peer pressure and social anxiety (e.g., Anderson et al., 2011), we hypothesized that children would be more impressionable when they feel insecure; thus, the focus is placed on social anxiety as a moderating factor.

To this end, we first looked at peer influence as an underlying process to subsequently embed the phenomenon of social judgment-making in the framework of social acceptance. Secondly, we analyzed the role of social anxiety in the context of peer influence on social acceptance processes.

Taking peers' opinions into account and adapting to it is considered a natural process and an indicator for children's adaptability vis-à-vis their peers (Laursen and Veenstra, 2023); however, it can have serious consequences for children who tend to be rejected in snap judgments, as they have to endure the consequences of a lack of social acceptance. Thus, it seems necessary to examine the exclusion processes that occur particularly quickly and therefore seemingly unstoppably: What are the individual characteristics that promote peer influence in social judgments? In the following, the role of social anxiety will be examined in relation to this aspect.

1.1 Peer influence

Peer influence describes a process in which individuals change their behavior or attitudes based on interactions or observational experiences with peers (Laursen and Veenstra, 2023). Especially in unfamiliar situations, for example, when being introduced to an unfamiliar person, children often rely on the opinion of others when making social judgments (Nicolay and Huber, 2023). This process is not necessarily conscious or controlled by the individual (Brown et al., 2008). It is often associated with the negative connotations of peer pressure and peer contagion. From this perspective, peer influence at least partly can explain the development of delinquent, aggressive and risk-taking behaviors (Müller and Zurbriggen, 2016). Meanwhile, further situational factors determine how likely one may be influenced, and individual factors determine one's susceptibility to peer influence (Brown et al., 2008; Laursen and Faur, 2022). Thus, peer influence is subject to both situational and individual factors.

In the model developed by Brown et al. (2008) it is assumed that peer influence depends on several factors and processes: The individual's *openness to influence* is one of the key features. Peer influence can occur only in the case that an individual is receptive to the actions and opinions of their peers and does not rigorously reject them off hand. It is further assumed that the event that triggers peer influence is apparent to the individual. The *salience of influencers* plays an important role, as do *relationship dynamics*. For example, the individual's desire to conform to peers' opinions is relevant here. Last but not least, the individual's *ability to perform* the perceived peer behavior is key for peer influence to occur. Following Brown et al. (2008), this component is particularly important when considering competence alignment and behaviors and less so in the development of attitudes.

The process of peer influence has often been investigated in adolescents, because it is associated with the desire to distance oneself from the parental home during adolescence (Lam et al., 2014). In contrast, research on influence processes in children at primary school age tends to often focus on the parental home and the role of the teacher as a social referent influencing peer relationship dynamics (Endedijk et al., 2022; Nicolay and Huber, 2023). Nevertheless, earlier research suggests that peers already play an important role in childhood (for an overview, see Giletta et al., 2021) and more insights on peer influence at primary school age is required.

Research on peer influence furthermore is often conducted in the context of antisocial behavior, associating the process with the terms peer contagion and peer pressure (Laursen and Veenstra, 2023; Müller, 2010). However, Laursen and Veenstra (2023) argue in favor of broadening the view to consider peer influence as a resource and an opportunity that can be shaped and possibly even be deliberately targeted by teachers (Farmer et al., 2011). From this perspective, it has been shown that individual prosocial behavior improves when children are taught in a prosocial environment (Busching and Krahé, 2020). Furthermore, results by Hank and Huber (2024) suggest that peers can be considered a resource for developing social skills through teaching methods such as cooperative learning.

Similarly, peers may have the potential to positively influence each others' social judgment-making, thereby helping to raise other individuals' social acceptance among the peers. In this sense, the present study, as a supplement to previous peer influence research, examines the development of social judgments and thus how individual children allow themselves to be influenced by their peers in deciding upon which other children to interact with. In their peer-influence model, Brown et al. (2008) emphasize that peer influence and the accompanying changes are partly decision-based. These decisions might lead to the rejection or acceptance of peer behavior or peer opinions. Variables that promote or prevent the adoption of peer behavior or peer opinions could thus provide information about the extent to which peer influence plays a role in the social acceptance of other children.

To date, peer influence was studied in particular with regard to numerous specific aspects of social learning (e.g., prosocial behavior, various forms of risk behavior, aggressive behavior). However, research on social acceptance—according to Garrote et al. (2017)—has so far been theoretically based on intergroup contact experiences (Pettigrew and Tropp, 2006), teacher feedback (Huber et al., 2018) as well as social skills (Asher et al., 1982). This study brings together both lines of research and further examines the role of social anxiety for the susceptibility to peer influence when making initial social judgments that precede the development of social acceptance.

1.2 Peer influence on social judgment-making

Social judgments are an everyday occurrence as people have to decide with whom to spend time with or whom to trust. Initial social judgments about others are often made based on heuristics or minimal information, such as clothing or facial

expressions (Naumann et al., 2009; Zebrowitz, 2017). In situations where people need to make quick social judgments, they draw on their personal social experience and affective state (Egger, 2021). Social judgments are made and become biased—partly based on minimal information—especially when the opinions of peers are available and can influence one's own judgments (Sherman et al., 2016).

While peer influence on social judgments has been widely studied in adolescents, so far there are only a few studies investigating peer influence on social judgment-making in preadolescent children. An experimental study by Sun and Yu (2016) found that, while 6-year-olds were indeed influenced by their peers when rating the attractiveness of faces, 5-year-olds were not. This indicates that peer influence might be of importance even for young children's social judgments. Similarly, two studies that considered slightly older children ($M_{age} = 7.78$ and $M_{age} = 7.88$) as a mental age-matched control group for the experimental group of with intellectual disabilities found that those children shifted their social judgments toward peers when rating the “coolness” of other children (Egger et al., 2020; Egger et al., 2021).

With regard to social judgments explicitly related to the social acceptance of other children, to our knowledge, research so far has focused mainly on the role of teachers as a reference for primary school children. In this context, teachers appear to influence the opinions of their students toward other children through their feedback behavior (Nicolay and Huber, 2023; Spilles et al., 2024). Based on social referencing theory (Feinman, 1992), this research suggests that children gather information about teachers' like or dislike for a specific child through the feedback given to this child and subsequently change their opinion accordingly. Based on these earlier findings, the present study assumes that peers influence each others' social judgment-making.

1.3 Social anxiety and peer influence susceptibility

Individual factors may influence the extent to which individuals are open to peer influence when forming social judgments (Brown et al., 2008). For example, it is known that adolescents with intellectual disabilities tend to make more extreme judgments of others than mental age-matched children in tasks where they are confronted with opposing peer opinions (Egger, 2021; Wagemaker et al., 2020). Also, for children with increased levels of social anxiety, it has been shown that they are more likely to consider the judgments of others. Cohen and Prinstein (2006) showed that socially anxious adolescents are influenced by their peers regardless of the peers' social status, while less socially anxious adolescents were more likely influenced by peers with a high social status. Relatedly, in terms of the influence of teacher feedback (Nicolay et al., in press), a recent study suggests that children with social anxiety are more likely to use negative teacher feedback as a social reference for their own social judgments than children with less social anxiety. However, it should be noted that socially anxious children are at risk of social exclusion themselves, even though they have a similar desire to connect with peers (Weber et al., 2023). This finding further suggests that socially anxious children may be more

susceptible to peer influence in order to prevent negative evaluation (Cohen and Prinstein, 2006).

1.4 The present study

The present study aims to investigate peer influence on social judgment-making and the moderating role of social anxiety among children at primary school age. In particular, two hypotheses are examined.

Hypothesis 1 (H1): Previous studies show that primary school children's social judgments about their classmates are influenced by their teachers' feedback (Nicolay and Huber, 2023) and behavior toward classmates (Hendrickx et al., 2017). However, as being accepted by peers is important even for younger children, H1 expects that primary school children are also influenced by peers in their social judgment-making.

Hypothesis 2 (H2): Research on peer influence indicates that adolescents differ in how susceptible they are to peer influence (Prinstein et al., 2011). One factor associated with an overall higher susceptibility to peer influence is social anxiety (Cohen and Prinstein, 2006). These findings are in line with an increase in conformity associated with social anxiety (Bicã, 2023). Therefore, H2 predicts that peer influence on social judgment-making is moderated by the level of social anxiety.

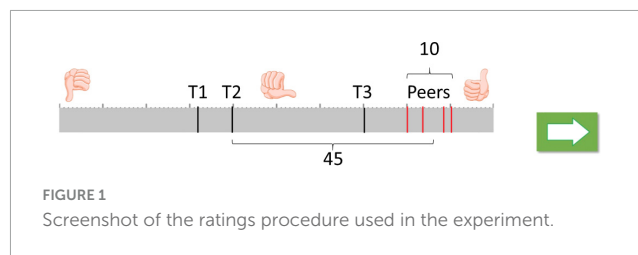
2 Materials and methods

2.1 Sample

A total of $N = 103$ third- and fourth-graders participated in the experimental study. Approximately 54% of the children were girls. The mean age of the participants was $M = 9.18$ years ($SD = 0.71$). Participants were recruited by four students of the University of (Wuppertal) from 6 classes in schools in the German state of North-Rhine-Westphalia. Written consent by parents was required for children to participate in the study. A positive ethics vote was given by the university ethics committee. Data collection took place throughout 2023.

2.2 Procedure and experimental design

The experiment used a repeated-measures design with three measurement points (T1, T2, T3). All parts of the experiment were conducted on tablet computers using the software E-Prime® 3.0. The experiment was developed by the authors and is a modified version of an experiment used in earlier research (Egger et al., 2020, 2021). The experiment took place in the participants' classrooms and the supervising students ensured that the participants did not distract each other.



Participants were initially shown how to use the tablet computers. All further instructions relevant to the experiment were included in the experimental software and given to the participants over headphones. They were first introduced to the concept of a student exchange and told that they would see pictures of several children (items) who might join their class during a fictional student exchange. They were told that for each child they have to indicate how much they would like to sit next to him or her. This method was inspired by sociometric methods (Cillessen, 2009) often used to measure social acceptance in primary schools (Huber et al., 2018; Nicolay and Huber, 2023). They were further informed that all their ratings would be kept anonymously.

Participants were subsequently introduced to a visual analog scale used for the ratings (see Figure 1). The scale was a 1000px wide gray bar with three thumbs marking the areas “not so much,” “maybe” and “very much.” Ratings were given by touching the scale and submitting the rating with a green button. The rating was then calculated as a score (0–100). Participants' understanding was tested by showing them two different ratings for which they had to indicate whether the respective rating corresponded to a positive (“very much”), negative (“not so much”) or in-between (“maybe”) response. Later analysis showed that all participants correctly answered these questions. Introduction to the visual analog scale further continued with participants rating two training items that were followed by auditory feedback about the rating (e.g., “You would like it very much to sit next to this child”).

The experiment was divided into three measurement points (T1, T2, T3) and an experimental manipulation at T3.

Before the start of the first measurement (T1) participants were shown a collage of all 22 pictures of children they would subsequently rate for 20 s to minimize the risk of sequence effects. Participants then rated each picture of the 22 children (11 male, 11 female) that were presented in randomized order. The pictures were taken from the Colourbox stock photo database, and all showed children approximately the same age as the participants.

For the second measurement (T2) participants were told to rate all 22 pictures of children again, because sometimes a first impression can be misleading. The ratings at T2 were used to assess the variability in participants' ratings ($|T1 - T2|$) and to calculate the position of the peer-rating manipulation at the third measurement (T3).

The manipulation consisted of four lines similar to the line shown for the participants' ratings but red instead of black. While the pattern of the four lines changed, the range was always over 10 units of the scale indicating a certain homogeneity of the ratings. If participants' T2 ratings were >50 , the direction of the manipulation was negative; if participants' T2 ratings were ≤ 50 ,

the direction of the manipulation was positive (see example in Figure 1). The distance between the T2 rating and the center of the four manipulation lines was always 45.

For T3 (manipulation) participants were told that they would now see how other children at their school rated the children in the pictures. They were explained that the red lines represent ratings by children their age, and their understanding was again tested similar to the test items. They were then asked to rate the 22 pictures of children again, but before each rating, the manipulated ratings of the four other children were shown accompanied by the auditory message “Other children rated this child like this.”

After the experiment, participants answered 18 items of a social anxiety questionnaire (see below). The whole session took ~25 min for each participant. At the end participants were debriefed by the supervising students.

The experiment was set up to measure *openness to peer influence* and in doing so covered the three related factors. The *salience of peer influence* was ensured through the auditory instruction that the peer judgments of the exchange students come from peers at their own school, as the peer judgments presented at T3 were made explicit. Furthermore, this frame of reference established, at least approximately, the participants’ connection to these peers; hence, the *relationship dynamics* were addressed. In addition, participants were given the opportunity to express a new, possibly changed opinion of the exchange students—the *opportunity to perform* was thus also given. Thus, with regard to the peer influence model by Brown et al. (2008), the experimental design should have adequately induced peer influence despite limitations in ecological validity.

2.3 Material

2.3.1 Social anxiety

Social anxiety was self-reported using the German translation (Melfsen, 1998) of the Social Anxiety Scale for Children (SASC-R-D; La Greca and Stone, 1993). The SASC-R-D consists of 18 items (e.g., “I worry about what other kids think of me”) that are answered on a five-point Likert scale (1 = not at all, 5 = all the time). In line with results from a recent validation study (Nicolay et al., 2021), an overall mean was calculated for all 18 items. Girls ($M = 3.15$, $SD = 0.70$) reported significantly higher social anxiety than boys ($M = 2.63$, $SD = 0.86$; $t(88.88) = -3.36$, $p = 0.001$, $d = 0.68$). Classes did not differ in their average social anxiety ($F(5, 97) = 0.571$; $p < 0.722$). Conducting a Shapiro-Wilk test no deviation from normality was found ($W = 0.98$, $p = 0.23$). Internal consistency was sufficient ($\omega = 0.90$). Model fit indices of a confirmatory factor analysis indicated acceptable fit: $\chi^2(135) = 238.59$, $p < 0.001$, CFI = 0.92, TLI = 0.91, RMSEA = 0.087, SRMR = 0.094.

2.4 Data preparation and statistical analyses

To test H1 on susceptibility to peer influence, absolute change in social judgments was predicted and compared between the first and second measurement point (no manipulation; | T1 - T2|) as well as the second and third measurement point (manipulation; | T2 - T3|). Absolute change in social judgments between T2 and T3 did not strictly indicate a shift toward the peers’ opinion. Because the judgments did not necessarily converge (i.e., in cases of shifts away from the peers’ opinions), the change between T1 and T2 (T2 - T1)

was further compared with the shift toward the peer opinion (45 - |Peers - T3|). Finally, an interaction term between the direction of the peer manipulation (positive vs. negative) and the condition (T2 - T1 vs. shift toward peers) was included in the model. This allowed to test for differences in susceptibility to peer influence depending on whether peers’ opinions were more positive or negative than the participant’s own opinion.

To test H2 on the role of social anxiety, shift toward peers was predicted and social anxiety was included as a predictor. Change in social judgments between T1 and T2 (| T1 - T2|) was also included as a control variable to account for differences in the variability of social judgments. Next, an additional interaction effect between the direction of the manipulation and social anxiety was added to the model to test whether differences in susceptibility to peer influence associated with social anxiety differ depending on the direction of the manipulation.

The data is nested with different cross-classified grouping structures. Variance in change in social judgments might be explained by the same item being rated multiple times by the same participant as well as multiple items being rated by the same participant. Furthermore, variance in change in social judgments might also be explained by item characteristics, i.e., the same item being rated by different participants. Therefore, random-intercept linear mixed models were used to test the hypotheses. The specific grouping structure was initially tested for each model and only taken into account if a significant proportion of variance was attributed to it ($\rho > 0.05$) to avoid computation problems¹.

All statistical analyses were conducted using R 4.3.0 (R Core Team, 2021) and the packages lme4 1.1.33 (Bates et al., 2015) and lmerTest 3.1.3 (Kuznetsova et al., 2017). Effect sizes were calculated using the package effect size (Ben-Shachar et al., 2020). All models controlled for age and gender. Variables on the individual level (age, sex, social anxiety) were group mean centered on the classroom level (Enders and Tofighi, 2007). There was no missing data.

3 Results

Descriptive statistics of participants’ ratings are shown in Table 1. It became evident that 46.82% of the ratings at T2 were over a score of 50 on the rating scale, leading subsequently to 46.82% of the peer ratings being more negative than participants’ ratings at T2, and 53.18% of the peer ratings being more positive than participants’ ratings at T2.

3.1 H1: primary school children are influenced by peers in their social judgment-making

To test H1, first, the absolute change from T1 to T2 (no manipulation) was compared to the absolute change between

¹ Due to the small number ($n = 6$), classrooms weren’t considered as an additional grouping structure. However, exploratory analysis indicates no variance being explained by multiple participants being part of the same class ($\rho < 0.001$).

TABLE 1 Descriptive statistics of participants' ratings.

MP	<i>M</i> (<i>SD</i>)	<i>SE</i> (<i>CI</i>)	Min	Max	<i>n</i>
T1	49.1 (32.2)	0.7 (47.8–50.4)	0	100	2266
T2	48.8 (33.8)	0.7 (47.4–50.2)	0	100	2266
T3	44.1 (33.2)	0.7 (42.8–45.5)	0	100	2266
T2-T1	12.8 (15.9)	0.3 (12.1–13.4)	0	97	2266
T3-T2	18.4 (19.0)	0.4 (17.6–19.2)	0	99	2266

MP, measurement point.

ratings at T2 and T3 (manipulation). An initial analysis of intra-class correlation coefficients (ICC) indicates that a significant proportion of variance in the change of social judgments is explained by participants rating the same item multiple times ($\rho = 0.100$) and multiple items being rated by the same participant ($\rho = 0.147$) but not by the same item being rated by different participants ($\rho = 0.002$). Results of Model 1a (see Table 2) show that on average participants changed their rating more after being shown their peers' ratings than without any manipulation ($\beta = 5.60$, $p < 0.001$, $\eta_p^2 = 0.07$). The effect can be considered of medium size.

To test whether the change in participants' social judgments followed their peers' ratings, the change from T1 to T2 (T2 - T1) was compared to how much participants shifted their social judgments toward their peers (45 - |Peer - T3|) in Model 1b. Again, ICCs were initially analyzed indicating a significant proportion of variance in the change of social judgments being explained by multiple items being rated by the same participant ($\rho = 0.084$) but not by participants rating the same item multiple times ($\rho < 0.001$) and multiple items being rated by the same participant ($\rho < 0.001$). Results of Model 1b indicate that compared with changes in ratings between T1 and T2, participants' social judgments overall shifted significantly more with a medium effect size ($\beta = 10.13$; $p < 0.001$, $\eta_p^2 = 0.07$) to align with their peers' opinions. Furthermore, as the non-significant intercept (-0.27 , $p = 0.700$) indicates, there was no clear trend toward more positive or negative ratings of the presented pictures at T2 compared to T1.

Finally, the direction of the manipulation (positive vs. negative) as well as an interaction term between the direction of the manipulation (positive vs. negative) and the condition (manipulation vs. no manipulation) were included. Results of Model 1c show a significant medium-sized main effect for the direction of the manipulation ($\beta = -13.34$; $p < 0.001$, $\eta_p^2 = 0.07$) as well as a significant interaction with a small effect size between the direction of the manipulation and the condition ($\beta = 5.17$; $p < 0.001$, $\eta_p^2 = 0.01$). As Figure 2 illustrates, this suggests that from T1 to T2, positive ratings ($T2 > 50$) became slightly more positive, and negative ratings ($T2 \leq 50$) became slightly more negative; meanwhile, the change in social judgments toward the peers' rating was more pronounced when the peer manipulation was more negative than the rating at T2.

Of note, as can be seen in Table 2, all three models explained some of the variance in the change of social judgments of participants' ratings over the three measurement points—but only a small proportion ($0.011 \leq R^2_m \leq 0.136$).

3.2 H2: peer influence on social judgment-making is moderated by the level of social anxiety

To test H2, if children's social anxiety is related to their susceptibility to peer influence, we first considered at whether social anxiety was associated with differences in ratings at T1 and T2. Results showed that participants' ratings were not associated with their social anxiety score on average, neither at T1 ($r = 0.048$, $p = 0.633$) nor at T2 ($r = 0.049$, $p = 0.623$).

Subsequently, the degree of shift toward peers was predicted (see Table 3). An initial analysis of intra-class correlation coefficients (ICC) indicates that a significant proportion of variance in the shift of social judgments toward peers is explained by multiple items being rated by the same participant ($\rho = 0.251$) but not by the same item being rated by different participants ($\rho < 0.001$). As Model 2a reveals, a higher variability between the ratings at T1 and T2 was significantly associated with an increased shift toward the peers' rating ($\beta = 0.09$, $p < 0.001$, $\eta_p^2 = 0.01$). However, the effect size can be considered small. This means that less consistency in participants' ratings was associated with a higher susceptibility to peer influence. The direction of the manipulation also had a significant effect on the shift toward the peers' rating: A peer rating manipulated to be more positive than the participants' T2 rating was associated with a smaller shift toward the peer rating ($\beta = -6.87$, $p < 0.001$, $\eta_p^2 = 0.03$) than a peer rating being more negative than participants' T2 rating. However, no effect of social anxiety on participants shift toward the peer ratings was found ($\beta = 0.32$, $p = 0.802$).

An interaction term between social anxiety and the direction of the manipulation was added to Model 2b. The interaction effect was significant with a very small effect size ($\beta = 2.44$, $p = 0.012$, $\eta_p^2 = 0.003$), indicating that an increase in social anxiety is associated with a decrease in the difference between the positive and negative conditions of the direction of the manipulation. Figure 3 shows that with increasing social anxiety the shift toward peers in the T3 ratings is less dependent on whether peer ratings were more positive or more negative than participants' T2 ratings.

In line with the small effect size, the inclusion of the interaction term only slightly increased the explained variance ($\Delta R^2_m = 0.003$).

4 Discussion

The present study aimed to investigate peer influence on social judgment-making and the role of social anxiety herein among preadolescent children using an experimental setup.

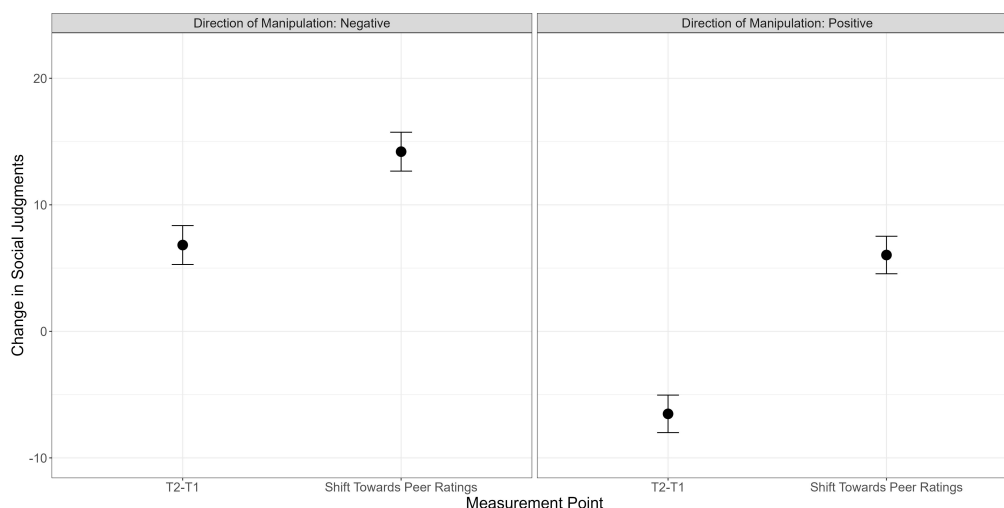


FIGURE 2

Average change in social judgments between T1 to T2 compared with the average shift toward peer ratings from T2 to T3 depending on the direction of the peer manipulation.

Results regarding H1 indicate that the influence of the peer manipulation was stronger than the variability occurring between ratings without any manipulation. This was the case for both overall variability in ratings (Model 1a) as well as when contrasting change without manipulation with the shift toward the manipulated peer ratings (Model 1b). Moreover, Model 1b shows that the absolute change (Model 1a) in social judgments occurring between T1 and T2 was rather random (see Intercept in Model 1b), while after the manipulation participants overall shifted in the direction of manipulated peer ratings. The direction of the manipulation, i.e., whether the peer ratings were more positive or more negative than participants' T2 ratings, further suggests that participants were more susceptible to negative influence than they were to positive influence. Therefore, the test of H1 clearly shows that primary school children are indeed influenced by peers in their social judgment-making.

H2 was related to the role of participants' level of social anxiety in their susceptibility to peer influence. While the level of social anxiety proved neither to be related to more positive or negative social judgments at T1 or T2 nor to an increased susceptibility to peer influence in general, an increase in social anxiety was associated with a higher susceptibility to peer ratings that were more positive than their initial judgments. This finding suggests that participants with higher levels of social anxiety shifted their opinions to align with their peers' in a manner that was far less dependent on whether the peer ratings were more positive or more negative than the initial T2 rating.

The present results overall indicate that processes underlying the determination of social acceptance in children are not only dependent on teacher feedback and contact experiences (Huber, 2019), but are also shaped by peer-influence processes. Children do not seem to form their social judgments of other children by forming their own opinions exclusively. In contrast, they appear to also rely on what they perceive to be the opinions of their peers on this subject. On the basis of the available results, we cannot make an assessment as to whether the underlying processes here are more likely to be peer influence or peer pressure and the associated perceived pressure to conform (Laursen and Faur, 2022).

Results of H2 further support that there are interindividual differences in the extent to which children are susceptible to peer influence (Cohen and Prinstein, 2006). Children with higher levels of anxiety appear to be more susceptible to the opinions of peers. In this respect, the results were consistent with those of Cohen and Prinstein (2006). One underlying mechanism may be that socially anxious children have an increased fear of social exclusion (Weber et al., 2023). In view of the consequences for children at higher risk of exclusion due to social anxiety, it seems necessary to take this mechanism of action into account when shaping the classroom community.

When interpreting the results against the theoretical background of peer influence, the question arises as to whether the participants actually adapted their social judgment (in terms of an actual change of social acceptance) or whether it was momentary conformity pressure (Laursen and Faur, 2022) that made them change their ratings (without changing their actual social acceptance). In the latter case, the primary motive would have been to conform to one's environment and not a fundamental change in attitude.

Since individuals with a low social status are particularly susceptible to conformity pressure, and social anxiety is associated with social exclusion (Weber et al., 2023), it will be important to further investigate these aspects in future research. However, pressure to conform becomes less of a factor when peers cannot observe one's own behavior (Kim et al., 2021). As the experimental setup used in this study ensured that participants knew their ratings would remain anonymous, social pressure to conform may have been less at work than other processes, such as social referencing. Accordingly, the results can be cautiously interpreted to mean that the children's actual social acceptance did indeed converge with that of their peers. The present study thus links the theories of social referencing (Feinman, 1992) with the assumptions of peer influence in the context of social judgment-making and social acceptance. Thus, we have shed some light on the complex set of conditions in the context of social-inclusion processes, and this research also indicates a further departure point for interventions with the aim of encouraging children's social participation (Garrote et al., 2017).

TABLE 2 Results of the linear mixed model for change in social judgments.

Predictors	Model 1a			Model 1b			Model 1c		
	Estimates	SE	p	Estimates	SE	p	Estimates	SE	p
(Intercept)	12.77	0.75	<0.001	−0.27	0.71	0.700	6.82	0.78	<0.001
Age	1.90	1.32	0.150	0.41	1.20	0.729	0.59	1.09	0.589
Gender	−0.57	1.46	0.697	−2.16	1.32	0.103	−0.88	1.21	0.466
Measurement point (T3-T2)	5.60	0.44	<0.001						
Measurement point (shift toward peers)				10.13	0.56	<0.001	7.38	0.71	<0.001
Direction of manipulation (positive)							−13.34	0.82	<0.001
Measurement point (shift toward peers) *Direction of manipulation (positive)							5.17	1.09	<0.001
N	2266 Items			2266 Items			2266 Items		
Observations	103 Participants			103 Participants			103 Participants		
	4532			4532			4532		
Marginal R ²	0.028			0.064			0.136		

Reference category for both measurement point variables, |T1-T2|. Reference category for direction of manipulation, negative. * = Interaction effect; bold = $p < .05$.

4.1 Limitations and future research

While expanding earlier research, some limitations of our study should be considered.

First of all, the sample in this study was comparatively small and consisted of children from only six classes. Although this is appropriate for experimental designs, taking into account the classroom level was only possible to a limited extent (see footnote 1), but might have been beneficial in terms of data nesting. Particularly in the context of peer influence, it is conceivable that differences in class composition, such as the habits of accepting new children present in any given class, might have an influence on peer dynamics (Müller and Zurbriggen, 2016). However, in the current sample, the classroom level explained almost no variance in participants' social judgment making. In this respect, the present study should be seen as an impetus for further research that allows class-level variables to be integrated into multilevel analytic approaches (Hox et al., 2018) and considers the role of class composition. The same applies for the inclusion of further variables on the individual level. All models analyzed explained only a small proportion of variance in children's change of social judgments. In light of the rather high ICCs of the individual level, other factors aside social anxiety should be considered in future research.

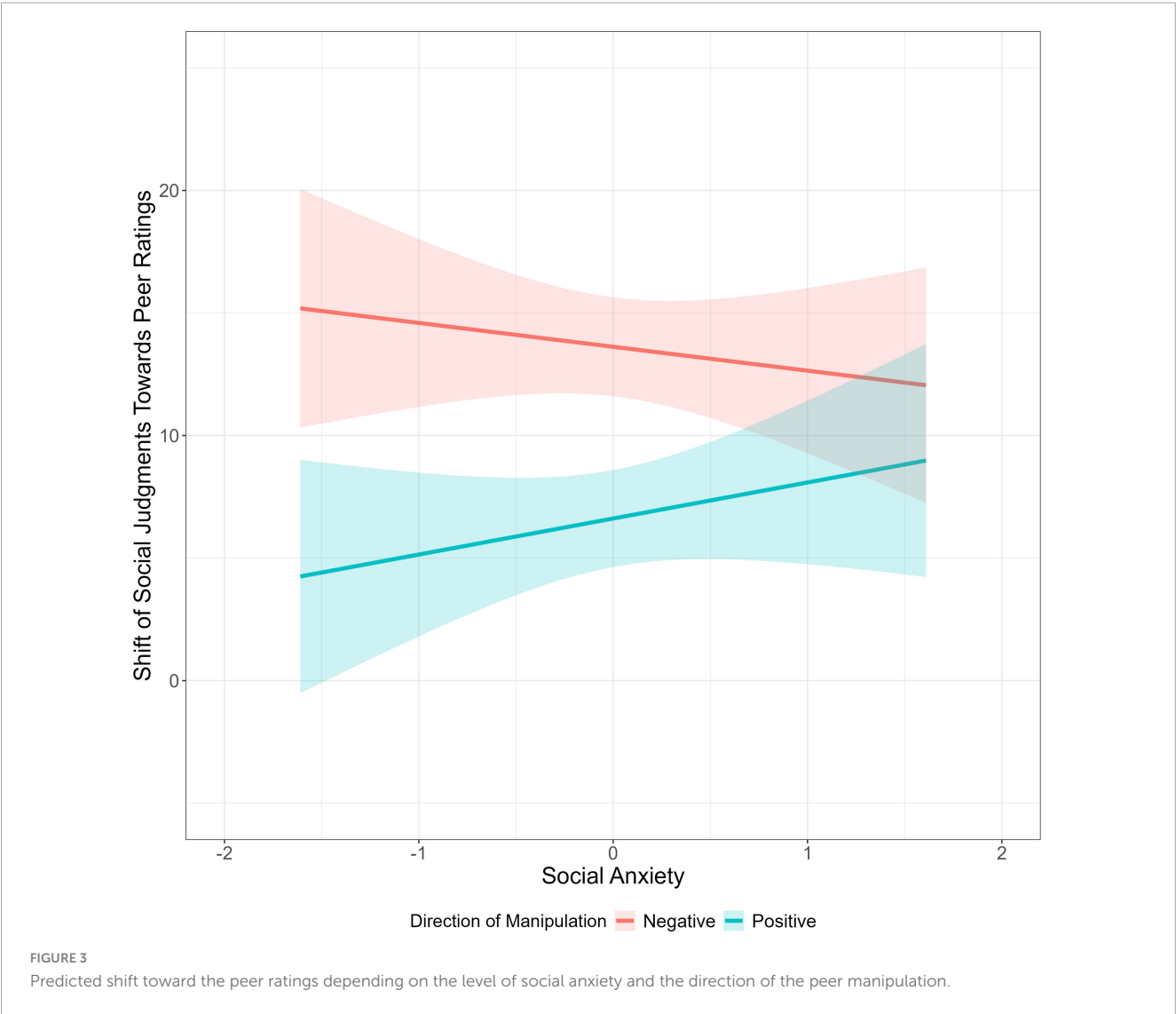
Furthermore, when interpreting the results, it should be taken into account that the experimental design lacked an independent control group, using instead repeated measurements. This limitation stems from the design of the experiment, but it could be circumvented with the help of other operationalizations in future research. An independent control group, for example, could be supplemented by a condition in which only visual, non-social stimuli are shown. In principle, it is conceivable that the depicted effect of peer influence is due to the repeated presentation of stimuli. However, this is an unlikely scenario given the change in ratings from T1 to T2 to T3. Nevertheless, it cannot be ruled out that the effect of the four ratings presented as those of similar-aged peers at T3 would have been the same if the task would have been framed as the teacher's opinions or given without specific context at all. Egger et al. (2021) found that the influence of a non-social manipulation was of equal size or even greater (Egger et al., 2020). However, the interindividual variance in change of social judgments due to social anxiety shown in the test of H2 suggests that social information was processed cognitively beyond a mere visual processing.

Finally, it should be emphasized that not all aspects of peer influence processes as described by Brown et al. (2008) could be incorporated in this study. While interindividual differences in *openness to peer influence* were apparent, the consideration of detailed *relationship dynamics* was not included in the experimental task. For example, in the task used, we did not record whether the peer ratings were perceived as a realistic scenario. Since it is known, for example, that socially well accepted children have a greater influence (Gommans et al., 2017; Nenniger, 2022), the addition of information on how the children perceive the presented peers could have allowed a differentiated view of the effects. Future research could enrich the experimental task by varying the peer status of the presented peers. In general, the experimental design might lack ecological validity. To ensure that the experimental results are also relevant in the classroom environment, additional longitudinal

TABLE 3 Results of the linear mixed model for shift in social judgments toward peers.

Predictors	Model 2a			Model 2b		
	Estimates	SE	p	Estimates	SE	p
(Intercept)	12.37	1.07	<0.001	12.49	1.07	<0.001
T1 – T2	0.09	0.02	<0.001	0.09	0.02	<0.001
Direction of manipulation (positive)	−6.87	0.79	<0.001	−7.01	0.79	<0.001
Age	1.64	1.79	0.358	1.68	1.79	0.346
Gender	−1.49	2.03	0.463	−1.40	2.03	0.491
Social anxiety	0.32	1.29	0.802	−0.97	1.39	0.484
Direction of manipulation (positive) *Social anxiety				2.44	0.98	0.012
N	2266 Items			2266 Items		
	103 Participants			103 Participants		
Observations	4532			4532		
Marginal R ²	0.045			0.048		

Reference category for direction of manipulation, negative. * = Interaction effect; bold = $p < .05$.



studies investigating the role of peer influence in the formation of friendship networks and its subsequent effect on socio-emotional development are necessary.

5 Conclusion

The present study examined peer influence on social judgment-making. Insights into this question may help to uncover conditions for children's social acceptance, because the latter depends directly on how peers form their opinion about other individuals. With regard to implications for classroom settings, our results point to several opportunities for teachers. Given that peer influence processes can be targeted by teachers (Farmer et al., 2011), it is important information for teachers to understand that children do not necessarily form a completely independent opinion of other children; rather, they appear to rely, to some extent, on opinions of their peers even at a younger age. Therefore, a goal for teachers may be to provide classrooms with conditions that allow children to form their own social judgments of others. This could involve pre-structuring contact experiences in line with an intergroup contact theory (Pettigrew and Tropp, 2006) informed approach to cooperative learning (Hank and Huber, 2024) as well as creating space for informal and safe contact. For children at risk of exclusion, a careless approach to the organization of social contacts may result in fewer chances of getting to know other children with whom they have not previously had contact, even though they would have the chance to build a relationship. Furthermore, the investigated mechanism provides opportunities. In the case of social exclusion, it might be sufficient to convince individual children to make the group more inclusive in order to substantially improve the situation for excluded kids.

With a particular focus on children with increased social anxiety, one perspective to be investigated in future research may be how teachers can support positive peer influence or counteract negative peer influence with regards to social judgment-making through their feedback processes (Nicolay and Huber, 2023). Especially when peers are used as a social reference to form one's own peer judgments, teachers could raise another social reference norm by openly conveying feedback.

Overall, our study confirms that peer influence is not exclusively limited to adolescence but is already relevant in the social lives of primary school students. We also found interindividual differences in susceptibility to peer influence with regards to social anxiety. By shedding light on the processes underlying individual social judgments, we also added significant knowledge on how children's social acceptance among the peers is determined in classrooms. Our findings suggest that when aiming to foster children's social acceptance, more traditional approaches, such as social skills training, teacher-based approaches and interaction-based teaching methods, could be supplemented by taking the role of peers in determining individual social judgments into account. This study enriches the existing study landscape with new insights into peer-influenced social judgments. Further field studies could sensitize teachers for the importance to know about the peer relationships in their class using the vast possibilities of visualizing sociometric techniques and the fact that the opinion of the class can lead to individual children experiencing social

exclusion, even from those children who do not actively contribute to this exclusion. This also offers opportunities: More diverse contact constellations could counteract prejudice-based and peer-influenced rejection. It also aims to encourage people to recognize that the interindividual differences, in this case in regard to social anxiety, indicate a higher susceptibility to peer influence.

Data availability statement

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

Ethics statement

The studies involving humans were approved by Ethikkommission der Bergischen Universität Wuppertal. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

PN: Writing – original draft, Writing – review and editing. CH: Writing – original draft, Writing – review and editing. SE: Writing – original draft, Writing – review and editing. CM: Writing – original draft, Writing – review and editing. ChH: Writing – original draft, Writing – review and editing.

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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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