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Socialisation of Emotion Regulation in Preschool Classrooms: How Do Peers Matter?

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ABSTRACT

The development of emotional competence is an important milestone during early childhood. Beyond early experience within the family, the (preschool) classroom is a relevant socialisation context, and both teachers and peers may contribute to children's emotion-related outcomes. Tracking changes in the emotion regulation competence of $N = 173$ preschool children (age in months: $M = 43.3$, $SD = 6.6$, 45% girls) over 6 months, the current study investigated whether and how peers contribute to differences in the development of emotion regulation in preschool classrooms. The research questions were addressed by examining three different kinds of peer groups: Classroom-level peer group, friendship group, and high-status peers (social network centrality). Teachers rated children's emotion regulation competence and empathic co-regulation behaviour—referring to preschoolers' supportive responses to their peers' emotional expressions—at three assessment points. Multilevel growth modelling provided evidence that friendship-group empathic co-regulation (empathy, helping, and comforting behaviour) predicted changes in preschoolers' emotion regulation over time, confirming that friendship groups influence young children's emotional development.

1 | Introduction

The development of emotional competence (i.e., emotion expression, emotion knowledge, and emotion regulation) is a major milestone for children of preschool age (Denham 2007; Denham et al. 2003; Hay, Payne, and Chadwick 2004). Emotional competence is essential for healthy child development and is associated with a child's successful functioning in many areas. In contrast, deficits in emotional competence, especially emotion regulation, have been identified as having a long-term negative impact on children's well-being, social-emotional adjustment, and educational success (for a review, see Valiente et al. 2020). Emotion regulation refers to the modulation of an emotional experience or the behaviour or situation linked with that emotional experience (Eisenberg and Fabes 1992). It is a process that

occurs when the experience or expression of emotion potentially undermines the goals and expectations of both the individual and social partners, resulting in alterations in the intensity, duration, or nature of the emotion (Denham 2023). Hence, emotion regulation can be understood as a skill that enables a child to cope adaptively with situational challenges. Young children who often show intense negative emotions and are unable to regulate them successfully are likely to experience social relationship difficulties (Bierman, Kalvin, and Heinrichs 2015; Denham 2018; Ramani, Brownell, and Campbell 2010), and are also more likely to be excluded from interactions and activities (Howes and Leach 2018). Emotionally dysregulated children may therefore lack the opportunity to have positive experiences with peers and to learn skills they will need to participate successfully in social life.

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Summary

- Peers play a significant role in preschoolers' emotion regulation development.
- Compared to general classroom-level peer competencies, the emotion-related competencies of children's friends exert a stronger influence on a child's emotional development.
- The results indicate that friends' supportive responses to emotional expressions are beneficial for the development of emotion regulation in the early years.

Preschool age is considered to be a sensitive period in the development, in which young children generally undergo substantial improvements in emotion regulation. However, from early on, we can observe considerable interindividual differences in emotion regulation skills influenced by many internal and environmental factors, such as a child's temperament, or experience of socialisation. Following the developmental model of emotion regulation proposed by Holodyski, Hermann, and Kromm (2013), children acquire appropriate and increasingly sophisticated strategies for regulating their emotions (self-regulation) through the experience of receiving external support and input from primary caregivers and other interaction partners (i.e., co-regulation; Silkenbeumer et al. 2016; Silkenbeumer, Schiller, and Kärtner 2018). A few studies have emphasised that, in addition to parental emotion socialisation, the (preschool) classroom is a significant socialisation context where both teachers and peers contribute to children's emotion-related outcomes (Valiente et al. 2020). Caregivers and teachers are role models for their students, setting standards for appropriate social behaviour, teaching important skills through their intervention and support, and influencing the classroom's emotional climate. Research has often linked social relationships and the quality of interactions with peers to both short- and long-term social, emotional, and academic outcomes in children (Denham 2007; Deynoot-Schaub and Riksen-Walraven 2006; Ladd and Troop Gordon 2003; Perren et al. 2015; Wentzel 2009), indicating that peers also provide a powerful context for the development of young children's social-emotional competence. However, parents and teachers as socialising agents are the subject of much more research than peers (Fabes, Hanish, and Martin 2003; Valiente et al. 2020).

The current study aimed to provide initial insights into the role peers play in the development of preschoolers' emotion regulation, distinguishing between different peer-group types. This was achieved by examining peers' emotion-related competencies, including emotion regulation skills and empathic co-regulation, which refers to supportive responses to children's emotional expressions.

1.1 | Influence of Peer Effects on Learning Outcomes and Social Behaviour

Literature on learning outcomes provides evidence that peer effects in classroom settings are empirically significant. Researchers have traditionally focused on the role peers play in

early childhood language development (e.g., Chen et al. 2020; Justice et al. 2011; Mashburn et al. 2008; Ribeiro, Zachrisson, and Dearing 2017). For example, Henry and Rickman (2007) investigated the effects of peer abilities on the development of children in preschool. They reported that the peers' ability level when starting preschool has positive effects on 4-year-olds' cognitive skills, pre-reading skills, and language skills after the end of preschool, even after controlling for family characteristics and preschool resources (Henry and Rickman 2007). As found by Skibbe et al. (2012), peers' self-regulation skills predicted first graders' increase in comprehension of written passages, as well as the growth of their vocabulary. However, less is known about the influence of peer effects with regard to children's social-emotional development, especially during the preschool years (Fabes, Hanish, and Martin 2003; Wittmer 2008). The few existing studies of the role of peers in childcare settings have suggested that social behaviour is "contagious" (Dishion and Tipsord 2011; Goldstein et al. 2001), and that specific characteristics of interaction partners affect a child's behaviour. Studies have specifically demonstrated that spending time with aggressive peers results in more aggressive behaviour (Hanish et al. 2005; Hektner, August, and Realmuto 2003; Snyder, Horsch, and Childs 1997), particularly when aggressive acts produce a positive outcome (Goldstein et al. 2001). As reported by Ribeiro and Zachrisson (2019), changes in exposure to peer aggression predicted changes in child physical aggression across ages 2, 3, and 4. Research has also shown that the mean level of classroom aggression predicted increases in the aggression level of individual children from kindergarten to second grade (Thomas et al. 2011). In contrast, affiliation with prosocial children led to a decrease in negative peer interactions and an increase in positive peer relationships among 4-year-olds (Fabes et al. 2012). Importantly, the non-cognitive competencies of preschool children were influenced by the competence level of their interaction partners, even after accounting for various child-related factors (e.g., gender and age) and family factors (e.g., parents' education level) (DeLay et al. 2016).

1.2 | Peer Emotion Socialisation Among Adolescents

Studies addressing socialisation of emotion regulation through peers have typically focused on adolescents, since adolescents spend increasing amounts of time with peers and become more susceptible to their influence (Delios, Kehoe, and Pizarro-Campagna 2023). Reindl, Gniewosz, and Reinders (2016) have demonstrated that best friends' adaptive emotion strategies positively influenced the change of adolescents' adaptive strategies for anger and fear, emphasising the role of friends and their influence on the development of adolescents' emotion regulation. In general, studies that found peer effects on adolescent emotion regulation referred to "best friends" as compared to studies that defined peers more generally (Delios, Kehoe, and Pizarro-Campagna 2023), indicating that the closeness of friendship in adolescents is a decisive factor in how influential peers are. Accordingly, research into the role that peers play in the socialisation of emotion regulation during adolescence particularly investigated the way in which adolescents' best friends respond to their emotional expression (for a review, see Delios, Kehoe, and

Pizarro-Campagna 2023). Although parents were observed to engage in more emotion coaching than friends (Miller-Slough and Dunsmore 2020), parents' and peers' emotion socialisation is expected to be largely similar (Miller-Slough and Dunsmore 2016, 2023). Compared with parents' responses to their teenage children's emotion expressions, peer responses are usually categorised as supportive (reward and override) and unsupportive (magnify, neglect, and punishment) (Delios, Kehoe, and Pizarro-Campagna 2023; Miller-Slough and Dunsmore 2019). While supportive peer responses have been found to predict more adaptive or less dysfunctional regulation of negative emotions, unsupportive responses seem to be associated with less adaptive or more dysfunctional emotion regulation, including suppression and internalisation of difficult emotions (Delios, Kehoe, and Pizarro-Campagna 2023). Importantly, research indicates that family and peers contribute independently to adolescent emotion regulation (Miller-Slough and Dunsmore 2019, 2020, 2022), and emphasises the significance of adolescent gender and age in this association (Delios, Kehoe, and Pizarro-Campagna 2023; Klimes-Dougan et al. 2014; Miller-Slough and Dunsmore 2016, 2022).

1.3 | Measurement Issue

The more common, traditional approach described in previous research on peer effects in preschool settings uses classroom-level peer scores, which are defined as the average score of each child's peers, excluding the target child. Studies applying this principle have shown that peer abilities and skills influence inter-individual differences in children academic gains and in their social development (Justice et al. 2011; Henry and Rickman 2007; Mashburn et al. 2008; Ribeiro and Zachrisson 2019; Thomas et al. 2011). Chen et al. (2020) emphasised in their work that the intensity and the amount of peer interactions differ considerably between specific children, and that this should be considered when examining peer effects on children's development. Research on peer effects on school-age children and adolescents has additionally shown that individuals are more strongly influenced by their friends (Delios, Kehoe, and Pizarro-Campagna 2023; Ryan 2001). For example, strong and positive friendships were found to increase the motivation for schooling, and to enhance the efficacy of peer learning (Riese, Samara, and Lillejord 2012). Even at ages 3- to 4, children engage more frequently and intensively with specific playmates and show clear preferences for certain peers, which can already be stable over time (Howes 1983). Further, Vandell, Nenide, and Van Winkle (2006) demonstrated a greater frequency of proximity seeking, positive affect, and sharing during interactions with friends compared to non-friends. Consequently, findings on peer influence among older children and adolescents, which highlight the particular role of friendships, may also be relevant for younger children. Gradassi et al. (2023) have also highlighted the value of the social network approach in understanding social learning in the classroom. They argue that the transfer of knowledge is influenced by the social relationship between peers, and their relative positions in the social network. In a behavioural experiment, they demonstrated that the likelihood of pupils aged 11–19 to use social information from their peers decreases strongly with increasing distance in the social network. The results supported previous research showing that pupils are

most likely to learn from their friends than from non-friends (Gradassi et al. 2023). Above and beyond the effects of network distance, the peers' network centrality, which measures individual popularity or social status within the classroom (Farmer and Rodkin 1996), significantly predicted the tendency for social information use from peers (Gradassi et al. 2023). High-status peers have further been found to draw children's attention more frequently and thus to be more influential than low-status peers (Santos, Vaughn, and Bost 2008).

1.4 | Mechanisms of Peer Socialisation

It is evident that children have different experiences with peers than with adults. The content of what children learn from their peers and the way they do it is very different from how and what they learn from adults (Parker et al. 2015). While adults mainly contribute to a child's development as "coaches" by explicitly teaching and instructing them (e.g., social rules and behaviour expectations) (Fabes, Gaertner, and Popp 2006), young children mostly learn implicitly from other children through everyday interactional experiences. Referring to behaviour-oriented models of peer influence (Bukowski, Laursen, and Rubin 2018), we expect young children to be motivated to imitate each other. Accordingly, children can either learn problem behaviour or adopt positive social behaviours by observing and imitating their peers. Peers can also actively shape each other's behaviour through their responses to a child's specific actions and expression of emotions. Denham and Grout (1993) observed peer reactions to displays of emotion in an everyday preschool setting, including reinforcing emotion, helping, care/concern, sustained neutral attention, and ignoring. Based on these findings and developmental considerations, we suggest that peer responses to emotions are already relevant at preschool age, and may be supportive (helping, comforting, empathic concern) or unsupportive (avoiding, ignoring, escalating). It therefore follows that modelling and responding to a child's behaviour are two main mechanisms for how peers can influence preschoolers' social functioning (Denham 2007). In contrast, explicit emotion socialisation through emotion coaching is expected to become more relevant in older children.

1.5 | The Current Study

Although studies focusing on school age and adolescence provide strong evidence that peers are important and influential socializers of emotions (Delios, Kehoe, and Pizarro-Campagna 2023), there has so far been no research on peers' role in *young* children's emotional competence (Eisenberg 2020). The current study aimed to fill this gap and to gain insights into whether and how peers act as emotion socialisation agents in preschool classrooms. The main aim of this study was to examine whether peer effects found in previous research on schoolchildren and adolescents would be found in preschool age and with regard to young children's development of emotion regulation. More specifically, we investigated in a short-term longitudinal study whether preschoolers develop differently in their emotion regulation competence depending on their peers' emotion-related skills. Drawing on the two primary mechanisms, through which peers can shape and influence young children's social-emotional development,

we examined both peers' emotion regulation competence and their supportive responses to children's emotion-related behaviour (empathic co-regulation). Our hypotheses were based on the general finding of a linear change in children's emotion regulation from 3 to 4 years of age (Sala, Pons, and Molina 2014). Accordingly, first, we hypothesized that the higher the level of a child's peers' emotion regulation, the greater the increase in emotion regulation competence of individual children over time would be (H1). Second, we hypothesized that the higher the level of peers' empathic co-regulation, the higher the increase in emotion regulation competence of individual children over time would be (H2). To test our hypotheses, we combined different approaches to measuring peer effects used in previous studies: (1) classroom-level peer competences, (2) friendship-group competences, and (3) high-status peers' competences (social network centrality).

2 | Methods

2.1 | Sample and Procedure

The research questions were addressed using data from the ReleFant-Study, a randomised-controlled intervention study with three assessment points and time intervals of approx. 15 weeks. The data were collected in two waves (2017/2018 and 2018/2019) in Swiss playgroups. Playgroups are educational institutions open to children aged 3 to 5, giving children the opportunity to play with peers under the supervision of a trained playgroup educator. Playgroup sessions take place regularly, once or twice a week, and one session usually lasts between 2 and 3 h.

In the first recruitment step, 171 randomly selected playgroup educators from a mostly rural region in the northeast of Switzerland with a predominantly middle-class population were asked to participate in the study. Of these, 29 playgroups confirmed their participation. Two playgroups were excluded after the pre-test due to the relatively low number of participants (total $n=6$ children). In the remaining 27 playgroups, parents of 215 children gave written permission to include their child in the study. For three children, permission was only given for the collection of intervention material, and they were therefore excluded from the analysis. One further child refused to participate in the study and was therefore not considered in the analysis either. Finally, only playgroups with a participation rate of at least 70% (range 72%–100%; $M=86%$) were included in the current study to measure peer competences reliably.

In conclusion, $N=173$ children (45% girls) from 20 playgroups participated in the study, with a median of 10 (range 4–16) children per classroom. At the first assessment point, children were aged between 27 and 61 months ($M=43.3$, $SD=6.6$).

For the present analysis, we used data obtained from playgroup educators on children's emotion regulation, empathy, and prosocial behaviour (helping and comforting others). At each assessment point, playgroup educators received a link to the online questionnaire with a unique login for each participating child, and rated children's competences on a 5-point Likert scale (0 = *not at all true* to 4 = *definitely true*). At t2 and t3, one

playgroup educator did not provide the questionnaires for personal reasons ($n=12$ children).

2.2 | Measures

2.2.1 | Child Individual Scores

Children's *emotion regulation* competence was assessed using items from the BIKO questionnaire (Bildung im Kindergarten organisieren; Seeger, Holodynski, and Souvignier 2014), which was developed to screen competences in four main developmental areas (social-emotional, language, motor, and numerical) of children aged 3 to 6 years. For the present study, we used five items of the subscale *behavioural and emotional regulation*, referring to emotion regulation competence. Items covering behavioural regulation skills were not considered in the analyses (for an overview of study measurements and items, see Table 1). Mean scores of emotion regulation competence were computed for each child and assessment point.

To evaluate supportive responses to their peers' emotion-related behaviour, we assessed children's *empathic co-regulation*, using items from the HAS (Holistic Student Assessment; Malti and Noam 2016) and the SOCOMP (self- and other-oriented social competences; Perren 2007) (see Table 1). The HAS is a tool for evaluating social-emotional development on individual and classroom level through child or teacher report (Malti and Noam 2016). In the present study, we used three items of the *empathy* dimension. The SOCOMP questionnaire assesses young children's self-related social skills, such as sociability and assertiveness, and other-oriented social skills aiming to satisfy the goals and needs of another person (i.e., prosocial and cooperative behaviour). In the current study, we considered three items on the prosocial behaviour scale assessing *helping* and *comforting others*. Children's empathic co-regulation scores were built by averaging the rating scores of the six items at each assessment point.

2.2.2 | Construction of Peer Scores

Peer scores were calculated based on preschoolers' individual scores. Drawing on previous research, we used three different strategies to create peer scores. First, we computed the mean level of peer-group emotion regulation and empathic co-regulation by aggregating playgroup educator ratings of all children enrolled in the classroom, excluding the target-child score. To take differences regarding individual choices for interaction partners into account, we identified preschoolers' friendship groups, based on playgroup educator reports on the single friendships. As demonstrated by Gest (2006), teacher report is a valid measurement of children's friendships and social group affiliations. To gain information about affiliation patterns in each playgroup, at each assessment point educators nominated up to three peers with whom each child typically plays in the classroom (range of possible nominations 0–9). The order of nominations did not consider the closeness of the friendship, so that each nomination was weighted equally. We therefore calculated the mean level of children's friends' emotion regulation and empathic co-regulation by aggregating their ratings. This method

TABLE 1 | Overview of study scales, items and instruments.

Study Scale	Items	Origin	Internal consistency (McDonald's ω /Cronbach's α)		
			t1	t2	t3
Emotion regulation ^a			0.77/0.74	0.75/0.76	0.73/0.75
	Is not able to give in to dispute resolution, cries, defies, or becomes aggressive.	BIKO			
	Is difficult to be calmed down by adults when faced with everyday annoyances or grief ^c	BIKO			
	Is able to act out/express strong feelings but cannot express them verbally.	BIKO			
	When experiencing strong negative feelings, the child is able to talk about them.	BIKO			
	Can express his/her anger appropriately without physically attacking others.	BIKO			
Empathic co-regulation ^b			0.87/0.93	0.92/0.92	0.92/0.93
	When he/she sees another child who is hurt or upset, he/she feels sorry for them.	HSA			
	Other people's feelings matter to him/her.	HSA			
	Feels bad for other children who are sad or have problems.	HSA			
	Often helps others voluntarily.	SOCOMP			
	Is helpful when others are hurt, sick, or sad.	SOCOMP			
	Is considerate.	SOCOMP			

Abbreviations: BIKO, Bildung im Kindergarten organisieren; HAS, Holistic Student Assessment; SOCOMP, self- and other-oriented social competences questionnaire.

^aThree items of the original BIKO behavioural and emotional regulation scale were excluded from the analyses as they focus on behavioural regulation.

^bTwo items of the original HSA empathy scale were excluded from the study as they are too difficult for 3- to 4-year-olds (e.g., "I feel sorry for people who don't have the things that I have").

^cThis item was found to have a small loading on the overall scale and was therefore removed from the model.

allowed us to assess the combined influences of all friends over 6 months and accounted for possible changes within friendship groups between assessment points. Finally, we used playgroup educators' information about children who typically play together to determine the network centrality of each child within the classroom. We were especially interested in identifying children with the highest social position in their classrooms, since high-status peers have been found to be more influential than low-status peers (Gradassi et al. 2023; Santos, Vaughn, and Bost 2008). In our study, peers' network centrality scores were equal to individual emotion regulation and empathic co-regulation scores of the child with the highest social position in his or her classroom, aggregated across three assessment points. In three playgroups, two children were nominated the same number of times. In these cases, the mean of two scores was used as the network centrality score (for emotion regulation and empathic co-regulation, respectively). For one playgroup, high-status peers were not determinable.

2.2.3 | Control Variables

Driven by interest for group processes, and previous results showing positive associations between children's mean age

and their functioning in the group (Aarts, Burk, and Riksen-Walraven 2016), we controlled for the peer-group mean age. Peers' mean age was computed by aggregating the age of all children enrolled in the classroom at the initial assessment point, excluding the individual's age. Research has found gender differences in responsiveness to peer influences (Delios, Kehoe, and Pizarro-Campagna 2023; Klimes-Dougan et al. 2014; Miller-Slough & Dunsmore 2022). Accordingly, child gender was also included as a control variable in the analysis.

As mentioned above, the original study was an interventional one and playgroups were randomly allocated to one of three experimental conditions (play tutoring, material condition, and control condition after the pre-test to manipulate children's social pretend play quality (for more details, see Kalkusch et al. 2021)). From the 20 playgroups included in the current study, $n=7$ playgroups including 65 children were participants in the play tutoring condition, $n=8$ playgroups including 64 children participated in the material condition, and $n=5$ playgroups including 44 children were assigned to the control condition. Although the intervention effects are the subject of other studies that reported no differences between intervention and control groups for children's emotional skills, we controlled for the experimental condition in the analyses.

3 | Data Analytic Approach

The data analysis was conducted in two steps. First, we tested the factor structure and measurement invariance of the two scales (emotion regulation and empathic co-regulation) via confirmatory factor analyses and adapted the scales where indicated. Multilevel growth models with cross-level interaction were then run to test the study hypotheses, using the manifest scores of the approved scales.

3.1 | Confirmatory Factor Analysis and Measurement Invariance

Confirmatory factor analyses were performed using R (Version 3.5.1) with the *lavaan* package (Rosseel 2012). The two different outcome measures were each modelled individually as latent variables to examine the factorial validity of the newly built scales. We used the full information maximum likelihood approach to account for missing values and robust standard errors to account for non-normality. The effect coding method was used to identify these latent variables (Little 2013). In the *emotion regulation* subscale, item 5 was found to have a small loading size on the overall scale ($\lambda_{11}=0.45$, $\lambda_{12}=0.35$, $\lambda_{13}=0.41$), and was therefore removed from the measurement model (Awang, 2014). After these minor adjustments, the models were found to fit the data well, and the scales showed good internal consistency (see Tables 1 and 2). For each outcome measure, we then tested for measurement invariance across the three measurement points as a prerequisite for comparing mean scores across measurement points (Putnick and Bornstein 2016). Due to the complexity of models and subsequent statistical limitations, the study questions were tested using manifest variables. Table 1 therefore additionally reports the reliability coefficients (Cronbach's alpha) of the manifest scales.

3.2 | Model Specifications of Multilevel Growth Models With Cross-Level Interaction

The data of the present study are clustered in such a way that repeated measures (assessment points, within level/level 1) are nested in children (between level/level 2), who are nested

in playgroup classrooms (between level/level 3). To test the study hypotheses, two multilevel growth models with cross-level interaction were calculated using MPlus 8.9 (Muthén and Muthén 1998–2017). Multilevel growth modelling is an approach to analysing longitudinal data that allows researchers to evaluate how individual outcomes change over time, taking the nested data structures into account (Moerbeek 2014) and therefore separating within-group effects from between-group effects (Ryan 2001).

The first analytical step evaluated whether there is substantial variance in children's development in their emotion regulation between classrooms, testing an initial model with assessment point as predictor of children's emotion regulation (both specified at level 1) for random intercepts and slopes. Additionally, intra-class correlation coefficients (ICCs) for individual emotion regulation were computed to examine the clustered nature of the data. Intra-class correlations are calculated by dividing single-level variance by total variance (the sum variances on each nested level).

In the final step, we analysed whether differences in the development of emotion regulation can be explained by our hypotheses. For both hypotheses, at within level (level 1), the assessment point (coded as 0, 1, 2) was included as a predictor of emotion regulation scores of individual children, to test for linear change in children's emotion regulation competence over time. Variables measuring peer competences were all grand-mean centered and then added at between-level (level 2) as predictors of individual child's emotion regulation. The models specified individual and classroom levels to account for the three-level nature of the data.

Accordingly, to test the first hypothesis (Model A), classroom-level peer emotion regulation, friendship-group emotion regulation, and peers' network centrality score in emotion regulation (between-level) and cross-level interaction terms between each of the three variables (between-level) and assessment points (within-level) were added as predictors of the emotion regulation competence of individual children. Peer-group mean age, child gender (coded as 1=female, 2=male), and experimental condition (coded as 0=control condition, 1=material condition, 2=play tutoring) were additionally included at the between-level as control variables.

TABLE 2 | Model fit indices for the three levels of measurement invariance.

Study scale	Model	χ^2	df	$p(\chi^2)$	CFI	RMSEA (90% CI)
Emotion regulation	Full configural ^a	148.62	72	0.00	0.93	0.08 (0.05, 0.10)
	Configural	71.57	39	0.00	0.97	0.07 (0.03, 0.10)
	Metric ^b	74.29	45	0.00	0.98	0.06 (0.00, 0.09)
	Scalar ^c	79.78	51	0.00	0.98	0.05 (0.00, 0.08)
Empathic co-regulation	Configural	233.91	115	0.00	0.95	0.09 (0.07, 0.10)
	Metric ^b	253.23	125	0.00	0.95	0.08 (0.07, 0.10)
	Scalar ^c	253.23	135	0.00	0.95	0.08 (0.07, 0.10)

^aInitial scale model before removing item 5.

^bFactor loadings set equally among time points.

^cFactor loadings and item intercepts set equally among time points.

To test the second hypothesis (Model B), classroom-level peer empathic co-regulation, friendship-group empathic co-regulation, and peers' network centrality score in empathic co-regulation (between-level) and cross-level interaction terms between these variables (between-level) and assessment points (within-level) were added as predictors of emotion regulation competence of individual children. Here also, we added peer-group mean age, gender, and experimental condition as control variables in the model.

To ensure that the sample was as large as possible, all children with questionnaire data from at least one measurement point were included in the analysis. All models were run using the full information maximum likelihood approach (assuming missing at random) to account for missing values.

4 | Results

4.1 | Preliminary Results

Overall, the measurement models were found to fit the data well. The measurement invariance analyses confirmed scalar measurement invariance for both of our outcome measures, with good model fit indices higher than 0.95 for comparative fit index (CFI) and lower than 0.09 for root mean square error of approximation (RMSEA). An overview of the model fit indices and model comparisons can be found in Table 2.

4.1.1 | Change Over Time and ICCs

First of all, we explored whether children enrolled in different playgroups varied in their development of emotion regulation. The regression coefficient ($b=0.194$, $p<0.001$) of the established initial three-level model indicates a significant increase in emotion regulation competence across three assessment points. Intra-class correlations (ICCs) for children's emotion regulation indicate furthermore that 50% of the total variance is due to individual differences and 19% is due to variation between classrooms. The residual variances were defined as follows: $\sigma^2=0.511$, $p<0.01$ (of the intercepts) and $\sigma^2=0.017$, $p=0.42$ (of the slopes) at the individual level, versus $\sigma^2=0.180$, $p=0.07$ (of the intercepts) and $\sigma^2=0.013$, $p<0.05$ (of the slopes) at the classroom level. Figure 1 shows empirical growth trajectories of children's average emotion regulation scores, visualising substantial differences in the interindividual development of children's emotion regulation between playgroups: There was variation in classroom-level emotion regulation at the first assessment point and in developmental trajectories among playgroups.

4.1.2 | Descriptive Statistics and Bivariate Associations

Table 3 provides descriptive statistics (means scores, standard deviations, and ranges) of the study variables and Table 4 presents bivariate correlations among all study variables. Descriptive statistics indicate once again that ratings of both children's individual emotion regulation and aggregate peer emotion regulation and empathic co-regulation varied from low to very high. At the same time, the mean scores suggest that the level

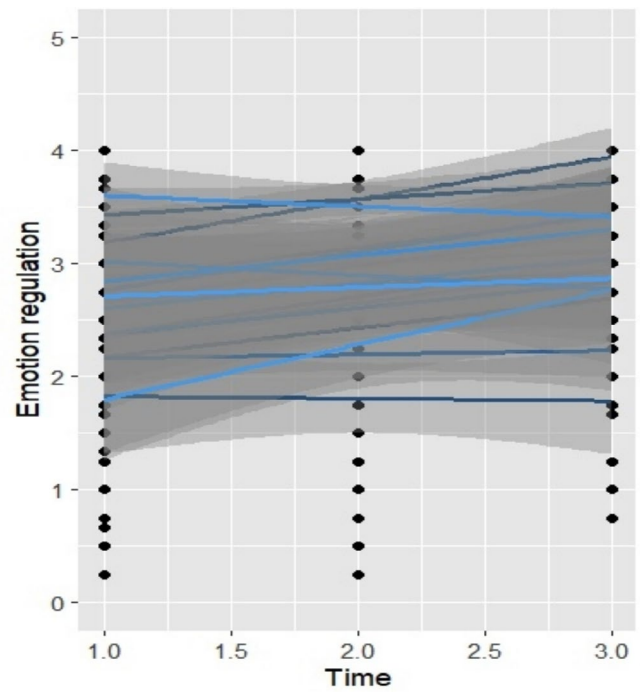


FIGURE 1 | Average empirical growth trajectories of children's in-

TABLE 3 | Descriptive statistics for the study variables.

	Variable	MW	SD	Range	
				Min.	Max.
1	Emotion regulation (individual score) ^a	2.83	0.76	0.42	4.00
2	Classroom-level peer ER ^b	2.77	0.39	1.65	3.57
3	Friendship-group ER	2.95	0.54	1.50	4.00
4	Peers' network centrality (ER)	3.22	0.52	2.33	3.92
5	Classroom-level peer EC ^c	2.77	0.45	1.99	3.53
6	Friendship-group EC	3.00	0.55	1.00	4.00
7	Peers' network centrality (EC)	3.26	0.33	2.61	4.00
8	Peer-group mean age ^d	42.83	3.84	30.50	51.60

Note: $N_{\text{children}} = 173$.

^aAverage score across three assessment points.

^bER = emotion regulation.

^cEC = empathic co-regulation.

^dAge in months.

dividual emotion regulation scores between classrooms. $N_{\text{children}} = 173$, $N_{\text{classrooms}} = 20$.

of individual and classroom emotion regulation competence and social behaviour were relatively high on average. Although differences in values have not been tested statistically, peers'

TABLE 4 | Bivariate Pearson correlations among all study variables.

	Variable	2	3	4	5	6	7	8	9	10	11
1	Emotion regulation (individual score)	0.33***	0.46***	0.28***	0.26***	0.31***	0.07	0.02	−0.11*	0.17***	0.17***
2	Classroom-level peer ER ^a		0.66***	0.58***	0.63***	0.45***	0.22***	0.19***	0.03	0.30***	0.00
3	Friendship-group ER			0.60***	0.41***	0.51***	0.30***	0.08	−0.06	0.23***	0.00
4	Peers' network centrality (ER)				0.25***	0.30***	0.45***	−0.02	−0.10*	0.17***	0.00
5	Classroom-level peer EC ^b					0.73***	0.32***	0.27***	0.04	0.14**	0.00
6	Friendship-group EC						0.32***	0.03	−0.06	0.23***	0.00
7	Peers' network centrality (EC)							0.08	−0.03	−0.19***	0.00
8	Peer-group mean age								−0.02	−0.31***	0.00
9	Male ^c									0.02	0.00
10	Experimental condition										0.00
11	Assessment point										

^aER = emotion regulation.

^bEC = empathic co-regulation.

^cMale = gender with “1 = female” and “2 = male”.

*** $p < 0.001$.

** $p < 0.01$.

* $p < 0.05$.

network centrality scores are obviously higher than all other peer-related scores. This suggests that children with the highest social position in the classroom generally showed higher levels of emotion regulation and empathic co-regulation.

Bivariate associations show that children's emotion regulation competence was strongly associated with the level of peer competences. The higher both classroom-level peer emotion regulation and empathic co-regulation, the higher individual emotion regulation scores were ($r = 0.33$, $p < 0.001$ and $r = 0.26$, $p < 0.001$, respectively). The same applies to children's closest friends: The higher friendship-group emotion regulation and empathic co-regulation, the higher individual emotion regulation scores were ($r = 0.46$, $p < 0.001$ and $r = 0.31$, $p < 0.001$, respectively). Peers' network centrality score of emotion regulation also positively correlated with individual emotion regulation scores ($r = 0.46$, $p < 0.001$). Gender was weakly related to emotion regulation scores ($r = -0.11$, $p < 0.05$), suggesting that educators rated girls as having a tendency to be more skilled than boys. Peer-group mean age was not related to individual emotion regulation scores; however, it was found to correlate positively with aggregate emotion regulation ($r = 0.19$, $p < 0.001$) and empathic co-regulation ($r = 0.27$, $p < 0.001$). These findings suggest that the higher the mean age in the playgroup, the higher children's overall emotion-related skills will be. Individual scores

of emotion regulation significantly and positively correlated with assessment points ($r = 0.17$, $p < 0.001$), indicating that children's emotion regulation competence had increased over time. Finally, the experimental condition was also found to be positively associated with individual emotion regulation ($r = 0.17$, $p < 0.001$), and correlated with any peer-related competences, indicating differences in children's emotion regulation between experimental groups. We therefore had to consider the experimental grouping in our further analysis.

4.2 | Multilevel Growth Model With Cross-Level Interaction

Table 5 shows the results of the multilevel growth models conducted to investigate the impact of peers' emotion regulation (Model A) and empathic co-regulation (Model B) on the development of individual emotion regulation competence in preschool classrooms. In accordance with these results, assessment points were associated with emotion regulation scores, supporting the improvement of children's emotion regulation competence over time. As expected, friendship-group emotion regulation was positively related to individual emotion regulation scores, with $b = 0.795$, $p < 0.05$. Furthermore, considering different characteristics of the peer group, there was the expected significant

TABLE 5 | Results of multilevel growth modelling analysis for associations between development of individual emotion regulation competence and peers' emotion regulation (Model A) and empathic co-regulation (Model B).

Predictor variable	Model A (Peers' emotion regulation)	Model B (Peers' empathic co-regulation)
	<i>b</i> (SD)	<i>b</i> (SD)
Within level		
Intercept	2.551*** (0.214)	2.524*** (0.220)
Assessment point (time)	0.171*** (0.043)	0.182*** (0.040)
Between level ^a		
Classroom-level peer ER	0.269 (0.481)	
Friendship-group ER	0.795* (0.322)	
Peers' network centrality (ER)	-0.323 (0.260)	
Classroom-level peer EC		0.778 (0.466)
Friendship-group EC		-0.202 (0.375)
Peers' network centrality (EC)		0.076 (0.441)
Peer-group mean age	0.000 (0.017)	0.010 (0.029)
Male ^b	-0.114 (0.131)	-0.195 (0.131)
Experimental condition	0.070 (0.079)	0.198 (0.114)
Cross-level interactions		
Classroom-level peer ER × time	0.002 (0.182)	
Friendship-group ER × time	-0.073 (0.102)	
Peers' network centrality (ER) × time	0.121 (0.119)	
Classroom-level peer EC × time		-0.180 (0.119)
Friendship-group EC × time		0.168* (0.083)
Peers' network centrality (EC) × time		0.028 (0.156)
Variance components		
Within-level variance	0.192*** (0.038)	0.190*** (0.037)
Intercept variance	0.443* (0.206)	0.562** (0.222)
Slope variance	0.019 (0.024)	0.019 (0.024)
Intercept-slope covariance	-0.060 (0.068)	-0.069 (0.071)

Note: $N_{\text{repeated measures}} = 519$, $N_{\text{children}} = 173$, $N_{\text{classrooms}} = 20$.

Abbreviations: EC, empathic co-regulation; ER, emotion regulation.

^aAll predictor variables were specified at the child level.

^bMale = gender with "1 = female" and "2 = male". Unstandardized coefficients are presented.

*** $p < 0.001$.

** $p < 0.01$.

* $p < 0.05$.

interaction between friendship-group empathic co-regulation scores and assessment points ($b = 0.168$, $p < 0.05$). This finding implies that friendship-group empathic co-regulation predicted *changes* in preschoolers' emotion regulation over time, indicating that friends' supportive responses to emotional expressions emerged as a significant predictor of preschoolers' emotion regulation, albeit at only a modest level. Contrary to our expectations, we found neither classroom-level peer competences nor peers' network centrality to be associated with children's emotion regulation. Also contrary to our expectations, preschoolers'

emotion regulation was not predicted by their gender or peer-group mean age. Replicating the results of our intervention study (Jaggy et al. 2023), there were no intervention effects on children's emotion regulation.

5 | Discussion

Despite evidence that (preschool) classrooms are important and unique socialisation settings, and that peers contribute

to children's outcomes, the role of peers in the development of emotion regulation had not yet been studied. The present study makes a unique contribution to the body of literature examining peer effects by providing differentiated insights into the role of peers in children's development of emotion regulation competence during their early years. This issue was addressed by investigating whether peers' emotion regulation and empathic co-regulation (i.e., supportive responses to preschoolers' emotional expressions, such as empathy, helping, and comforting behaviour) contribute to increasing children's emotion regulation competence.

Bivariate analysis suggested that different kinds of peer-group characteristics—classroom-level peer competences, friendship-group competences, and peers' social network centrality—are positively associated with individual emotion regulation scores. These findings supported previous research, which has shown that peers' abilities and characteristics constitute social influences (Fabes et al. 2012; Goldstein et al. 2001; Hanish et al. 2005; Hektner, August, and Realmuto 2003; Snyder, Horsch, and Childs 1997; Thomas et al. 2011). However, multivariate analysis provided evidence that only friendship-group competences predict preschoolers' emotion regulation. This suggests that the general level of peer competences in the classroom seems to be no more significant when explicitly considering emotion-related competences of children's friends. This finding supports the idea that friends are more influential than non-friends (Gradassi et al. 2023; Ryan 2001), and emphasise the role of the friendship group in early development of emotion regulation. Multilevel growth models have shown that, for one thing, friendship-group emotion regulation was positively related to children's emotion regulation scores. This result implies that preschoolers having friends characterised by overall high levels of emotion regulation were more skilled in their own emotion regulation. However, since there was no significant interaction between friendship-group emotion regulation and time, no causal interpretations can be made. It is thus possible that the relationship between friendship-group and individual emotion regulation scores might be due to the processes of selection, and just reflects children's preference to interact and play with peers who are similar to them. For another thing, however, friendship-group empathic co-regulation predicted changes in preschoolers' emotion regulation over time, over and above children's similarity to their friends, confirming that friendship groups can influence children's emotional development. Our findings align with previous research on the role of peer responses to adolescent expression of emotions (Delios, Kehoe, and Pizarro-Campagna 2023; Klimes-Dougan et al. 2014; Miller-Slough and Dunsmore 2016, 2019, 2020, 2023), and extend it by showing that peer responses to emotions contribute to the development of emotion regulation already at preschool age. Spending time and playing with empathic and caring friends who are able to provide help and comfort in challenging situations, young children seem to benefit in the long term with regard to their emotion regulation. In line with the theoretical background (Bukowski, Laursen, and Rubin 2018) and results from previous research (Delios, Kehoe, and Pizarro-Campagna 2023; Denham 2007), these results together do suggest that both imitating and, even more, responding to preschoolers' emotions and emotion-related behaviours are possible and relevant mechanisms for social influences among peers in preschool classrooms. An important next step is thus to

gain more details about processes underlying peer influences in early childhood by conducting observational and experimental studies. Contrary to our expectations, we were not able to show any relevance of network centrality for social learning in preschool classrooms. We presume that network centrality becomes more relevant for older children, when the importance of popularity, social status in the classroom, and the desire to fit in the social group increase. The impact of peers' emotion-related competences was not found to differ according to children's gender and age. It may be that the sample size of this study and therefore its statistical power was too small to be able to show gender and age effects. Finally, the promotion of social pretend play quality had no positive impact on preschoolers' emotion regulation. This finding is in line with our results that specifically focused on intervention effects for children's social development (Jaggy et al. 2023). As discussed by Jaggy et al. (2023), promoting social pretend play quality through brief interventions and, more importantly, without a specific focus on emotional competences seems not to foster preschoolers' emotion regulation.

5.1 | Study Strengths, Limitations and Future Directions

The present study provides some first insights into the role of peers in the development of emotion regulation in young children and offers a promising starting point for further research. The study combined multiple measurement strategies mentioned in the existing literature, distinguishing between different kinds of peer groups, and used a reasonable method for analysing longitudinal, nested data. However, it is not without limitations. The main methodological limitation is informant bias, as playgroup educators evaluated children's competences at each assessment point, and served as informants for individual whose data were then used to build peer scores. The operationalization and aggregation methods used limit the interpretation of the study results, as the effects found (or not found) might be overestimated due to playgroup educators' individual tendencies to evaluate children's competences more positively or less. It should be also noted that playgroup educators were not blind to the experimental condition and could have been additionally biased in their reporting. Further high-quality research focusing on peer influences on preschoolers' emotion regulation should follow a multi-method, multi-informant approach to evaluate individual and peer-related scores. Future research should also consider family and teacher effects when investigating peers as socializers of emotion regulation. Finally, our findings may be partly explained by homophily effects, which are based on the assumption that children show differences regarding choices for social interaction partners. Children with high social-emotional skills prefer to interact and play with other skilled children, while children with deficits in emotion regulation may tend to interact with peers who also have difficulties regarding their emotion-related behaviour. The study results should thus be interpreted with caution and explored in further research.

6 | Conclusion

Our research has shown empirically that peers can shape children's development—already at preschool age—and that young

children can help each other acquire emotional competence. In particular, friendship group's supportive responses to emotional expressions in the classroom had a positive influence on children's emotion regulation. In accordance with the study results, friendship group competences significantly contribute to individual development of emotion regulation. Young children who typically interact and play with emotionally competent peers showed more positive developmental trends. The present study shows that it is essential to consider social relationships when examining peer effects. The study's results should encourage researchers to generate new scientific knowledge on fundamental mechanisms through which peers affect each other's development of emotion regulation competence, and also sensitise policymakers and practitioners to the potentials (and risks) for young children's development that their peers provide in (pre-school) classrooms. Teaching young children emotion understanding, expression and effective regulation strategies, and motivating them to give supportive responses (empathy, helping, and comforting reactions) to their peers when they find coping with strong emotions difficult, may be an effective strategy for promoting emotion regulation in classrooms.

Author Contributions

Tatiana Diebold: conceptualization, data curation, formal analysis, writing – original draft, writing – review and editing. **Ann-Kathrin Jaggy:** conceptualization, data curation, formal analysis, investigation, methodology, writing – original draft, writing – review and editing. **Sonja Perren:** conceptualization, data curation, funding acquisition, methodology, project administration, supervision, writing – review and editing.

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Ethics Statement

The study has been conducted in accordance with APA ethical guidelines.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data used for analysis are available in an open repository (<https://osf.io/5px3d/>).

Peer Review

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