



# Exploring the Role of Teacher–Child Relationships in the Longitudinal Associations Between Childhood Shyness and Social Functioning at School: A Prospective Cohort Study

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## Abstract

The goal of this study was to explore longitudinally the protective role of relationships with early childhood and education care (ECEC) teachers for shy children's social functioning at age 5 and 8 years. Participants were  $N = 7343$  children from the *Norwegian Mother, Father and Child (MoBa)* study, a prospective longitudinal cohort study in Norway. Measures included maternal rating of child shyness at age 18 months, 3 and 5 years, ECEC teacher ratings of teacher–child relationships and maternal ratings of child peer play behaviors at age 5 years, and teacher ratings of child social competence at age 8 years. We conducted latent moderated-mediation analyses within a SEM framework. Among the results, childhood shyness was negatively associated with social functioning. However, significant indirect and moderation effects were also found, with a pattern suggesting that early positive teacher–child relationships have a buffering influence on shy children's risk for social difficulties.

**Keywords** Shyness · Social development · MoBa · Teacher–child relations · SEM

Shyness is a temperament trait characterized by a predisposition to feel wary, self-conscious, and awkward in the presence of others and in contexts of perceived social evaluation (Rubin et al., 2009). Shy children also tend to display withdrawn and reticent behaviors in social settings, such as watching other children playing but not joining (Coplan et al., 2004). Consequently, there is concern that shy children, due to their withdrawn demeanor and lack of play experiences, may have fewer opportunities to practice and develop socially relevant competencies, as this, in turn, may have long-term negative consequences for their social and emotional adjustment (Grose & Coplan, 2015; Jones et al., 2014). For this reason, it is of crucial importance to gain a better understanding of protective factors and processes

in key developmental contexts that may enhance the social competencies of shy children.

One such context may be the early childhood education and care (ECEC) setting, and particularly the affective quality of the relationship that children have with their teachers (Sabol & Pianta, 2012). To date, however, little research has examined the influence of positive teacher–child relationships in this setting for the long-term social functioning and development of shy children. Thus, with the purpose of early intervention efforts in mind, the aim of the present study was to explore the potential of teacher–child closeness as a protective factor in the longitudinal associations between childhood shyness, play behaviors with peers in the ECEC setting, and social competence in early elementary school, using moderated mediation SEM analyses. To this end, we use longitudinal data from more than 7000 children followed from age 18 months to age 8 years in the Norwegian Mother, Father and Child Cohort Study (MoBa), including both mother and teacher ratings.

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## Shyness in Early Childhood

Several constructs share considerable conceptual overlap with shyness, such as social reticence (Coplan et al., 1994), anxious solitude (Gazelle & Ladd, 2003), and behavioral inhibition (Kagan, 1997). These constructs are considered as functionally equivalent as they all refer to an underlying core related to social fear, wariness, and anxiety, and also because they tend to show relatively similar patterns of associations with adjustment outcomes (see Coplan et al., 2020; Rubin et al., 2009, for an overview). In this study, we use the classic conceptualization of shyness as a temperament trait characterized by heightened wariness, self-consciousness, anxiety, and discomfort in the face of social novelty and/or in situations of perceived social evaluation (Buss & Plomin, 1984; Coplan et al., 2004; Crozier, 1995).

An extant body of research has uncovered the physiological, behavioral, and psychosocial correlates of childhood shyness (for a review, see Rubin & Coplan, 2010). Physiologically, childhood shyness is suggested to involve greater sympathetic autonomic nervous system responses (Buss, 1986b) that are associated with heightened stress reactivity in response to social challenges, including elevated heart rates (Kagan et al., 1988) and increased cortisol levels (Schmidt et al., 1997). On a behavioral level, shyness can be expressed as avoidant, inhibited, awkward and/or withdrawn behaviors in social settings, including freezing behaviors and watching other children playing but not joining in (Bohlin et al., 2005; Coplan & Arbeau, 2008; Coplan & Armer, 2007; Coplan & Evans, 2009). Psychosocially, shyness is associated with lower self-esteem, peer difficulties, lower social competence, higher anxiety levels, and loneliness (Baardstu et al., 2019; Eggum-Wilkens et al., 2014; Grose & Coplan, 2015; Rubin et al., 2015). However, there is an important distinction between shyness as an inherent trait and its associated psychosocial expressions as compared to social competency which is a learned behavioral skill. Furthermore, according to the theoretical perspective of Asendorpf (1990), many shy children are also likely to experience an approach-avoidance conflict whereby their desire for social contact and interaction with others (i.e., high social approach motivation) is often simultaneously inhibited by feelings of unease and fear of social evaluation (i.e., high social avoidance motivation).

Temperamental shyness is relatively stable across development (i.e., mean-level stability; Denissen et al., 2008; Eisenberg et al., 1998; Karevold et al., 2012). At the same time, shyness may have different expressions and elicitors at different developmental stages. In early childhood, shyness primarily involves fearfulness and distress

that may manifest behaviorally as inhibited, anxious, and wary responses often elicited by strangers or social novelty (Buss, 1986b). With increasing age, maturation, and exposure to new social environments, shyness also increasingly comes to encompass self-conscious emotions and cognitions (i.e., shame, embarrassment), often elicited by a sense of being socially exposed or at the center or attention (Buss, 1986b; Eggum-Wilkens et al., 2015). Thus, as children mature, shyness is increasingly influenced by social contexts, and this change could perhaps be among the reasons for the salient increase in shyness levels typically observed after children enter the more formal educational context, such as kindergarten and preschool (Baardstu et al., 2019; Coplan & Arbeau, 2008; Karevold et al., 2012).

## The Social Functioning of Shy Children

A large body of research has shown that shy children are prone to struggle socially and to be at increased risk of interpersonal problems, such as peer exclusion, rejection, and victimization (Grose & Coplan, 2015; Rubin et al., 2015; Sette et al., 2019). The theoretical framework proposed by Rubin and colleagues (Rubin et al., 1990, 1991) emphasizes how transactional, dynamic processes between child characteristics and factors in the child's social environment may operate to connect early shyness with such social difficulties. According to this perspective, shy children's inherent characteristics and tendencies, such as inhibition, fear, and high reactivity, are likely to evoke caregiver's perceptions that the child is socially vulnerable. Such beliefs might elicit parental worry including a pattern of over-protective and controlling parenting, which may serve to reinforce shy children's feelings of social wariness and insecurity as well as a belief that the world is a scary place. Thus, when the shy child encounters novel social settings, such as a new peer group and the early education and care context, these feelings of unease and insecurity may lead the child to display socially withdrawn and fearful behaviors in the presence of others. These behaviors may then increasingly elicit negative responses from peers and other socializing agents because they violate age-related social norms and expectations about appropriate social conduct. As such, a negative feedback loop is created over time, whereby negative peer experiences intensify the shy child's negative feelings about the self and the social world, leading to increased social wariness and withdrawal, which further evokes negative peer experiences, and so on. Ultimately, these transactions may culminate in shy children developing low self-regard, feelings of loneliness, and poorer social competency.

Research has largely supported many of the assertions of this theoretical framework. For instance, studies have shown that shy children are less likely to initiate social interactions

with peers, they are more likely to withdraw from opportunities for peer engagement, and they tend to keep themselves on the periphery of the social play group, watching other children playing but not joining, compared to their more sociable peers (Bohlin et al., 2005; Coplan et al., 2004).

However, this lack of early play experiences with peers may have unfortunate consequences for shy children's social adjustment, particularly given the empirical evidence emphasizing the importance of peer play for the social development of all children (Ginsburg, 2007; Jarvis et al., 2014). More specifically, through play experiences, children are provided with opportunities to learn and acquire competencies that are necessary for healthy social functioning, such as how to solve problems, regulate themselves, share, and negotiate with others (Green & Reches, 2006). In this sense, there are speculations that shy children may suffer from fewer opportunities to develop and practice socially relevant competencies (Jones et al., 2014) which, in turn, could have both concurrent and long-term negative costs by increasing these children's risk of interpersonal and socio-emotional difficulties (Boivin & Hymel, 1997; Sette et al., 2019).

### Protective Factors: The Role of Teachers in the Early Education and Care Context

Despite the increased risk of shy children to experience a host of social and adjustment difficulties, it is important to stress that not all shy children necessarily experience such problems. On this background, several theoretical models have suggested a set of both individual and environmental protective factors that may move shy children off the negative pathway to adjustment difficulties (Coplan et al., 2020; Rubin et al., 2009, 2015). Following the theoretical and empirical work of Pianta and colleagues (e.g., Hamre & Pianta, 2001; Pianta, 1994; Sabol & Pianta, 2012) as well as the “*shy but getting by*” model proposed by Coplan and colleagues (2020), the present study focuses on the potentially influential role of *teachers*, or more specifically, the *quality* of children's relationships with teachers in the ECEC setting. Teacher–child relationship quality refers to the affective nature of a child's interactions with her or his teacher and is typically described in terms of the level of closeness (warmth, open communication) or conflict (tense, negative, and hostile communication) within the relationship (Hamre & Pianta, 2001).

In Norway, more than 90% of all children attend ECEC before school entry at age six, with most children entering ECEC around the age of one year (Statistics Norway, 2020). Since ECEC teachers spend an extensive amount of time with children during the early childhood years, they are likely to play a central role in shy children's social development in several respects. First, from an attachment point of

view, warm, sensitive, and caring teachers may provide a secure base from which shy children can safely explore their social surroundings and thereby start to feel secure around peers (Birch & Ladd, 1997). Second, by providing effective modelling and feedback, ECEC teachers may also actively enhance shy children's ability to handle the anxiety and fear that social situations tend to elicit (Coplan & Arbeau, 2008). In this sense, positive exchanges with teachers are likely to create a positive feedback loop for shy children that serves to encourage social interaction and lead to more social training and play experiences, and which ultimately may result in improved self-confidence and better social functioning for shy children (Coplan et al., 2020; Rydell et al., 2005).

There is empirical support for the influential role of positive teacher–child relations for the social competency of children in *general* (Zhang & Nurmi, 2012). There is also emerging research showing that closer teacher–child relations in early childhood and in the ECEC setting may be particularly beneficial for the social competencies of children considered “*at risk*” (i.e., children displaying internalizing and/or externalizing problems; Baardstu et al., 2021; Baker et al., 2008).

So far, however, most of the literature concerning the role of teacher–child relations for shy children has primarily focused on school-related adjustment and/or mental health outcomes. For instance, studies have shown higher levels of teacher–child closeness to attenuate the association between shyness and school avoidance among Chinese preschoolers (Wu et al., 2015), and to attenuate the association between shyness and school avoidance, anxiety, and social withdrawal in Canadian first graders followed over 9 months (Arbeau et al., 2010). Considerably less research has explored the protective role of positive teacher–child relations for shy children's *social* competency. An exception is the cross-sectional study by Sette et al. (2014) demonstrating that higher levels of teacher–child closeness attenuated the association between shyness and poor social competence in a sample of Italian preschoolers. However, to our knowledge, no studies have explored the nature of such associations longitudinally, spanning from early childhood and into the elementary school years. Thus, the potentially influential role of early teacher–child relationships in the ECEC setting for shy children's social competence development over time has yet to be explicitly explored.

### The Present Study

On this background, the aim of the present study was to examine longitudinally the associations between childhood shyness, social play behaviors with peers and teacher–child closeness in the ECEC context, and social competency in elementary school. More specifically, we expected childhood

shyness measured across age 18 months, 3 and 5 years to be negatively associated with social play behaviors with peers at age 5 years and with social competence at age 8 years. We also expected an indirect pathway from childhood shyness through poor social play behaviors at age 5 years to poor social competence at age 8 years. We further hypothesized that teacher–child closeness at age 5 years would influence the direct associations between childhood shyness and poor social play behaviors as well as the indirect and longitudinal pathway from early shyness to poor social competence via poor social play behaviors. Specifically, we expected these associations to be stronger at lower levels of closeness with teachers but weaker at higher levels of teacher–child closeness.

## Method

### Participants and Procedure

The present study uses data from a sub-cohort of participants in the Norwegian Mother, Father and Child Cohort Study [MoBa]. The MoBa is a prospective, population-based, pregnancy cohort conducted by the Norwegian Institute of Public Health (Magnus et al., 2006, 2016). Between 1999 and 2008, women pregnant in their second trimester from all over Norway were recruited for participation in the study. Among these women, 41% consented to participate. There were no exclusion criteria. Participants have been followed up by questionnaires (in Norwegian) administered during pregnancy and after birth up to child age 8 years and data collections are still ongoing. The cohort now includes 114,500 children, 95,200 mothers, and 75,200 fathers. Pregnancy and birth records from the Medical Birth Registry of Norway (MBRN) are linked to the MoBa database (Irgens, 2000).

The current study uses data from when the children were 18 months, 3, 5, and 8 years of age ( $N=7343$ ). The sub-cohort includes questionnaire data from mothers as well as ECEC teachers and elementary school teachers of children born between 2006 and 2009 that were invited to evaluate the children's functioning and development at an average child age of 5.5 (teacher response rate = 40%) and 8.5 years (available 43%), respectively. We use the twelfth version of the quality-assured dataset, which was released for research in 2019 (Norwegian Institute of Public Health, 2019).

The establishment of MoBa and initial data collection was based on a license from the Norwegian Data Protection Agency and approval from The Regional Committees for Medical and Health Research Ethics. The MoBa cohort is regulated by the Norwegian Health Registry Act. Written informed consent was obtained from all participants. The present research project is approved by the Regional

Committees for Medical and Health Research Ethics (REK) (2015/1324).

## Measures

### Shyness

Mothers assessed child shyness at child age 18 months, age 3, and 5 years via the shyness subscale of the *Emotionality, Activity, and Sociability Temperament Survey—Short Form* (EAS; Buss & Plomin, 1984). Previous studies have demonstrated satisfactory psychometric properties (i.e., factor structure, reliability, and validity) for the EAS subscales in Norwegian and international samples (Mathiesen & Tambs, 1999; Walker et al., 2017). The shyness subscale originally includes five items rated on a 5-point scale (from 1 = *not typical* to 5 = *very typical*), but only three questions from the shyness dimension have been included for use in the original MoBa study (“Is very social”, “Is very friendly with strangers”, both reversed, and “Takes a long time to warm up to strangers”). The Cronbach's alpha for the shyness subscales was 0.65 at age 18 months, 0.67 at age 3 years, and 0.71 at age 5 years.

### Teacher–Child Closeness

At child age 5 years, ECEC teachers rated the quality of the relationship with the target child using the closeness subscale from the *Student Teacher Relationship Scale-Short Form* (STRS; Pianta, 2001). The closeness subscale assesses the extent to which the teacher characterizes the relationship with the child as warm and affectionate (e.g., “If upset, this child will seek comfort from me”, “It is easy to be in tune with what this child is feeling”). In this study, six of the original eight items of the closeness subscale was used, leaving out two items more reflective of the child's communicative skills, with response options rated on a 5-point scale (from 1 = *not true at all* to 5 = *very true*). The STRS is previously shown to have satisfactory psychometric properties, including both good internal reliability and validity (Hamre & Pianta, 2001; Solheim et al., 2011). The Cronbach's alpha of this measure was 0.72 in the present study.

### Social Play Behaviors

At child age 5 years, mothers rated their child's play behaviors with peers using the social play subscale of the *Preschool Play Behavior Scale* (PPBS; Coplan & Rubin, 1998). The 5-item subscale assesses social play and taps the extent to which children engage in group interaction (e.g., “Plays in groups with (and not just beside) other children”) and peer conversation (“Engages in active conversations with other children during play”). Response categories reflect

frequency of occurrence ranging from 1 = *never* to 5 = *very often*. Coplan and Rubin (1998) reported the factor structure and acceptable psychometric properties of the original version of the PPBS. The social play subscale displayed high internal reliability ( $\alpha=0.96$ ) and as evidence of construct validity, significant correlations with classroom observations of preschool children's socially interactive play and conversations with peers during unstructured free play time ( $r$ 's = 0.45–0.62). Subsequently, the PPBS has been translated/back-translated and widely used in several different cultures, including Finland (Kesäläinen et al., 2019), Korea (Ho, 2021), Italy (Sette et al., 2022); Malaysia (Choo et al., 2012), Norway (Brandlistuen et al., 2021), Portugal (Monteiro et al., 2017), and Turkey (Aslan, 2020). Results from these studies indicated that the translated versions of the social play subscale of the PPBS continued to demonstrate good internal consistency ( $\alpha$ 's = 0.77–0.91) and provided additional evidence of validity. For example, Kesäläinen et al. (2019) reported significantly lower teacher ratings on the PPBS social play subscale for children with special needs than those without in integrated early childhood classrooms in Finland. Sette et al. (2022) reported that the social play subscale of the PPBS was significantly and negatively related to child shyness, as well as significantly and positively related to close teacher–child relationships in a sample of Italian preschoolers. In the present sample, internal reliability for the social play subscale was  $\alpha=0.76$ .

### Social Competence

Elementary school teachers rated the child's social competence at age 8 years using the social engagement subscale of the *Social Skills Improvement System* (SSIS; Gresham & Elliott, 2007). The seven-item subscale assesses the child's ability to participate and engage in social interactions with peers ("Interacts well with other children", "Makes friends easily") with response options ranging from 1 = *never* to 4 = *very often*. Previous studies have demonstrated that the SSIS has good validity and internal reliability, both in international and Norwegian samples (Gamst-Klaussen et al., 2016; Gresham et al., 2011). The Cronbach's alpha for the subscale in this study was 0.86.

### Covariates

Gender was included as a covariate in the analyses and was indexed using birth records of boys ( $n=3744$ , 50.1%) and girls ( $n=3723$ ) from the Medical Birth Registry of Norway.

### Statistical Analyses

All analyses were performed by using structural equation modelling in MPlus version 8.2 (Muthen & Muthen,

2017). Path estimates, indirect, and conditional indirect effects were evaluated using bias corrected confidence intervals based on 5000 bootstrap resamples with replacement (Hayes, 2015). Full information maximum likelihood with robust standard errors (MLR) was used to correct test statistics and standard errors for non-normality of the observations and to handle missing data (Lodder et al., 2019).

Analyses were carried out in several steps. First, measurement models were estimated through the means of confirmatory factor analyses (CFA) for the shyness, teacher–child closeness, social play behavior, and social competence measures by constructing one latent factor for each of these measures based on their respective indicators. All measurement models showed acceptable model fit as indexed by values of Root mean Square of Approximation (RMSEA) below 0.05, and Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) above 0.95 (Hu & Bentler, 1999). Prior to all analyses, we standardized the latent variables by setting their variances to 1.0 and freeing their first indicator loadings, following Little (2013). Second, following Widaman et al. (2010) and Ferrer et al. (2008), we tested measurement invariance of the shyness measure across the three time points (i.e., age 18 months, age 3 and 8 years) by comparing a baseline model (i.e., configural invariance) against a series of increasingly restricted models (i.e., weak and strong invariance). The model fit of the most restricted invariance model was not significantly worse than the less restricted models, indicating invariance over time for the shyness measure. This baseline measurement model was then used to construct a second order latent childhood shyness factor based on the three latent shyness factors. We established an approximate standard metric by constraining the first factor loading of the shyness factor to its specific value and by setting the variance of the latent shyness factor at the first time point to 1 and the mean of the factor to 0, following Ferrer et al.'s (2008) scaling approach. Third, we examined the direct associations between childhood shyness and the social and relational outcomes at child-age 5 and 8 years by using path analyses. Fourth, we examined an indirect model with social play behaviors as a putative mediator, again applying path analyses and by estimating the indirect paths and its confidence intervals by using bootstrapping (Hayes, 2009). Fifth, we explored whether teacher–child closeness moderated associations of childhood shyness with social play behaviors at age 5 years and with social competence at age 8 years by estimating two latent moderation structural equation models (LMS; Klein & Moosbrugger, 2000). Finally, to test our hypotheses that teacher closeness moderates the indirect prospective path from childhood shyness to social competence at age 8 years via children's social play behaviors at age 5 years, moderated mediation analyses

were conducted, following Hayes (2015). The full moderated mediator model is presented in its statistical form in Fig. 1.

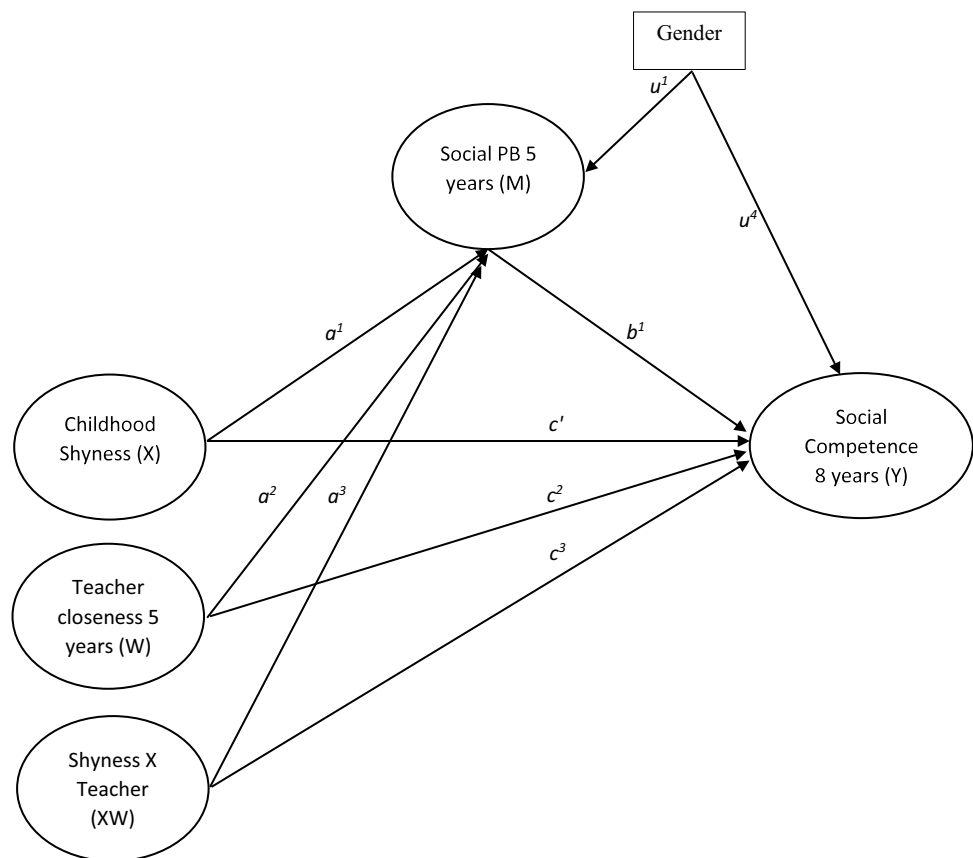
## Results

### Descriptive Statistics

Descriptive information and polychoric correlations among the study variables are presented in Table 1. Overall, childhood shyness was associated with poor social

play behaviors and lower teacher–child closeness at age 5 years, and with poor social competence with peers at age eight. An exception was shyness measured at age 18 months, which was not significantly associated with teacher–child closeness at age 5 years or with social competency at age 8 years. All shyness measures were positively associated with gender, indicating that girls were rated higher in shyness by mothers than boys. Further, social play behavior at age 5 years was positively related to teacher–child closeness at age 5 years, social competence at age 8 years, and gender. Teacher–child closeness at age

**Fig. 1** Statistical model of moderated mediation analysis with named paths



**Table 1** Intercorrelations, means, standard deviations, and range or scores of study variables

	1	2	3	4	5	6	M (SD)	Range
1. Shyness 1,5 yrs (m)							2.06 (.64)	1–5
2. Shyness 3 yrs (m)	.60**						2.23 (.68)	1–5
3. Shyness 5 yrs (m)	.48**	.68**					2.09 (.73)	1–5
4. Closeness 5 yrs (kt)	-.02	-.06**	-.09**				4.31 (.50)	1–5
5. Play Beh. 5 yrs (m)	-.12**	-.16**	-.27**	.10**			4.42 (.50)	1–5
6. Soc. skills 8 yrs (st)	-.02	-.07*	-.06*	.12**	.15**		3.03 (.55)	1–4
7. Gender	.10**	.08**	.03*	.16**	.20**	.21**		

*m* mother ratings, *kt* kindergarten teacher ratings, *st* schoolteacher ratings,  *yrs* years,  *closeness* teacher–child closeness,  *play beh.* play behaviors,  *soc. skills* social skills. Correlations are polychoric. \*\* $p < .001$ ; \* $p < .01$

5 years was positively associated with social competence at age 8 years, and with being a girl. Social competence at age 8 years was positively associated with being a girl.

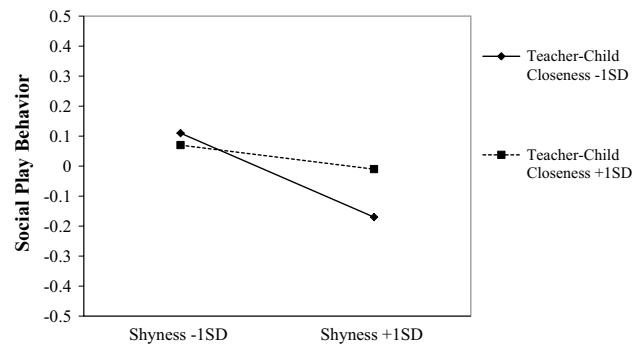
### Tests of Direct and Indirect Paths

Results from the path analyses showed that childhood shyness predicted lower teacher–child closeness and poorer social play behaviors at age 5 years but not social competence at age 8 years (see Table 2). Results from the indirect path analyses further showed that shyness was significantly associated with social play behaviors at age five, and that social play behavior, in turn, was significantly associated with social competence at age 8 years. Results also showed this indirect path to be significant (see path *ab* in Table 2).

### Tests of Moderation

To test whether teacher–child closeness at age 5 years moderated associations of childhood shyness with social play behaviors at age 5 years and social competence at age 8 years, we estimated two latent moderation structural equation models (LMS; Klein & Moosbrugger, 2000), one for each outcome variable. For this purpose, shyness, teacher–child closeness, and the product term of these variables were included simultaneously as predictors of the outcomes.

The shyness \* teacher–child closeness interaction effect was significant for social play behaviors at age five (see path *a*<sup>3</sup> in Table 2). The positive coefficient of the interaction term indicated that the negative association between shyness and social play behaviors become less negative as teacher–child closeness increases. Figure 2 illustrates the graphical plot of this interaction effect, demonstrating that when teacher–child closeness increases by one unit,



**Fig. 2** Interaction of child shyness and teacher–child closeness predicting children’s social play behavior as reported in standard deviations

the association between shyness and social play behavior becomes less negative, decreasing by 0.06 standard deviations. Results from the simple slopes follow-up analyses at different levels of the moderator (i.e., – 1 standard deviation, mean, and + 1 standard deviation) further showed that the strength of the negative association decreased with increasing levels of teacher–child closeness. No interaction effect of teacher–child closeness at age 5 years was found for the associations between childhood shyness and social competence at age 8 years.

### Tests of Moderated Mediation

Although the moderation effects of teacher–child closeness on the association between shyness and social competence at age eight was found nonsignificant, this does not preclude the possibility that teacher–child closeness could still influence the indirect association (Hayes, 2015). Thus, in a final

**Table 2** Regression coefficients and 95% confidence intervals (CI) for moderated mediation models including childhood shyness across age 18 months, three and 5 years, social play behaviors at age 5, and social competence at age 8 years

		Social play behaviors age 5 years			Social competence age 8 years			
		<i>b</i>	$\beta$	[95% CI]	<i>b</i>	$\beta$	[95% CI]	
Shyness	<i>a</i> <sup>1</sup>	– .10**	– .23**	[– .272, – .211]	<i>c</i> '	– .03	– .04	[– .060, .032]
Social play behav					<i>b</i> <sup>1</sup>	.30**	.16**	[.119, .203]
T-C closeness	<i>a</i> <sup>2</sup>	.02**	.09**	[.050, .106]	<i>c</i> <sup>2</sup>	.07**	.13**	[.086, .168]
Shyness*closeness	<i>a</i> <sup>3</sup>	.03**	.06**	[.032, .100]	<i>c</i> <sup>3</sup>	.02	.03	[– .024, .077]
Indirect effect ( <i>a</i> × <i>b</i> )					<i>ab</i>		– .04**	[– .051, – .024]
Total effect ( <i>c</i> ' + <i>a</i> × <i>b</i> )					<i>c</i>		– .08*	[– .124, – .026]
Index of moderated mediation					<i>a</i> <sup>3</sup> <i>b</i> <sup>1</sup>	.009**		[.004, .013]
Indirect effect at – 1 SD of moderator						– .040**		[– .052, – .027]
Indirect effect at the mean of moderator						– .031**		[– .041, – .022]
Indirect effect at + 1 SD of moderator						– .023**		[– .031, – .014]

95% CI 95% confidence interval; *Social Play Behav.* social play behaviors; *T-C closeness* teacher–child closeness; *Shyness\*Closeness* product term of shyness at age 3 × teacher–child closeness at age 5; \**p* < .05, \*\**p* < .001. All analyses controlled for gender

step, we tested this possibility by estimating a conditional process model where we calculated an index of moderated mediation ( $a^3b^1$ ) with social competence at age eight specified as the latent outcome. The index was created by multiplying the regression coefficients corresponding to the  $a^3$  and  $b^1$  paths (see Table 2). As such, this index reflects the change in the indirect effect of the predictor (X) on the outcome (Y) through the mediator (M) for a unit change in the moderator variable (W). A significant index (i.e., the 95% confidence intervals do not include zero) indicates that the indirect effect depends on conditional values of the moderator.

Results are displayed in Table 2. As the  $a^3b^1$  index shows, teacher–child closeness at age five significantly moderated the indirect effect from childhood shyness to social competence at age 8 years through social play behaviors at age five. More specifically, the significant index thus indicates that the negative indirect effect decreases with increasing teacher–child closeness.

## Discussion

The purpose of this present study was to explore the longitudinal associations between childhood shyness assessed from age 18 months to age 5 years, children’s social play behaviors and teacher–child closeness at age 5 years in the ECEC setting, and children’s later social competency assessed at age 8 years in elementary school. First, results showed a direct association from childhood shyness to poor social play behaviors at age five as well as an indirect association from childhood shyness to lower social competency at age 8 years via poor social play behaviors at age 5 years. Second, results further showed that a closer relationship with ECEC teachers at age 5 years influenced both the direct and indirect pathways such that the negative associations were stronger among children with less close teacher–child relationships but weaker among children with closer teacher–child relationships. The implications of these findings are further elaborated below.

### The Social Functioning of Shy Children: Direct and Indirect Pathways

With regard to the direct associations, childhood shyness was associated with both less close teacher–child relations and less social play behaviors with peers at age 5 years. These findings support the increasing body of research linking childhood shyness with social and interpersonal adjustment difficulties during the early education and care years (Rimm-Kaufman & Kagan, 2005; Sette et al., 2014). More specifically, they are in line with the notion that shy children’s predisposition to experience social anxiety and to feel

overwhelmed and uncomfortable around other children may result in displays of less competent social behaviors in peer play situations (Buss, 1986a; Eggum-Wilkens et al., 2015). They are also in line with previous studies finding negative associations between shyness and teacher–child closeness (Rydell et al., 2005; Wu et al., 2015).

One may speculate that shy children’s inhibited nature and tendency to avoid and withdraw from social interactions may preclude them from developing close relationships with others, including teachers. Similarly, it is possible that teachers do not fully engage in close relationships with shy children because these children often blend into the background and avoid drawing any attention to themselves. Together, these processes may serve to prevent the development of a close teacher–child relationship between shy children and their ECEC teachers.

With regard to the indirect pathways, our results showed a significant indirect association between childhood shyness and lower social competency at age 8 years through poor social play behaviors at age 5 years. This finding supports the notion that a lack of early play experiences with peers may have unfortunate consequences for shy children’s social competence development (Jones et al., 2014). Taken together, the direct and indirect findings of this study are suggestive of a negative feedback loop in line with the theoretical framework of Rubin and colleagues (1991). That is, a transactional and reciprocal degenerative cycle may take place where the predispositions of shy children initially inhibit successful engagement with others, including a lack of early play experiences with peers; which may lead to negative social feedback; which in turn may reinforce shy children’s social fears and increase their desire to withdraw from social interactions. Ultimately, this transactional cycle might have a negative influence on shy children’s social competence development. As such relative lack of social competence—in and of itself—is a risk factor for later socioemotional difficulties (Rubin et al., 2015), it is of great importance that caregivers, including ECEC teachers and other socializing agents, are aware of the potential perils and consequences of such negative developmental pathways for shy children.

### The Role of Teacher–Child Closeness for Shy Children’s Social Functioning

As was done by Arbeau et al. (2010) and Sette et al. (2014), we analyzed the moderating role of closeness in the teacher–child relationship in the association between childhood shyness and children’s social outcomes. In line with the results from these studies, we found that the negative association between childhood shyness and social outcomes, in our case social play behaviors at age 5 years, increased at lower levels of teacher–child closeness but decreased at higher



levels of teacher–child closeness. This finding is important considering research emphasizing the essential role of peer play for children’s social development in general (Ginsburg, 2007; Jarvis et al., 2014). It is also important because it adds empirical knowledge to the growing body of literature demonstrating the potentially buffering role of positive teacher–child relations for children considered “at risk” for maladjustment (Arbeau et al., 2010; Baardstu et al., 2021; Baker et al., 2008). Thus, although shy children generally tend to form less close teacher–child relationships, perhaps due to their inhibited and withdrawn tendencies (Rudasill et al., 2006; Wu et al., 2015), our finding indicates that this may certainly not be the case for all shy children. Rather, there is evidence to suggest that despite teachers’ proneness to pay less attention to shy children (Keogh, 2003), many teachers appear to be aware of and sensitive to these children’s social challenges and many are also more likely to provide support strategies to shy children than other children (Coplan & Prakash, 2003; Thijs et al., 2006).

However, there might also be alternative explanations for this finding. For instance, one may speculate that shy children who do engage in social play with peers are more likely to be socially competent, and thus better equipped to form closer relationship with their ECEC teacher. As such, it may be that teachers are better able to form closer relations with shy children who also demonstrate more positive social behaviors. In this sense, we underline that the direction of effect of this finding must be interpreted with caution.

In contrast with the Sette et al. (2014) study, we did not find significant moderation effects of teacher–child closeness in the direct association between childhood shyness and social competence at age 8 years. A possible explanation for this difference could be due to differences in the time intervals between assessments. While the Sette et al. (2014) study explored concurrent associations, the present study explored prospective associations spanning from early to middle childhood, and it is known that the possibility of finding significant prospective associations decline with longer time intervals between assessments.

Notwithstanding, the results from the moderated mediation analysis showed that higher teacher–child closeness served to attenuate the negative indirect association from childhood shyness via poorer peer play behaviors in the ECEC setting to lower social competence in elementary school. This finding is important, because it indicates that the early relations that shy children form with ECEC teachers may have a positive influence on these children’s social competence development over time, most likely through its’ positive influence on how shy children engage in social play behaviors with their peers in the ECEC setting. Yet, again, we must urge for caution in the interpretation of this result as there may be alternative explanations for the observed associations. For instance, it could be that other child or teacher

characteristics, or specific features of the ECEC setting, may have contributed to enhancing the social behaviors and competencies of shy children or to the formation of closer relationships with their teacher. For instance, research has shown that high levels of receptive language skills may help shy children to more easily engage in positive peer play and to receive more acceptance from peers compared to shy children with less receptive language skills (Jahng, 2018; Zhu et al., 2019). Thus, more longitudinal studies with additional variables and measurement points are necessary to explicate these results further.

## Limitations and Future Research

Despite its advantages of using longitudinal data, different raters, and a large sample size, this study also has some limitations. First, despite its longitudinal design, the correlational nature of this study precludes us from drawing solid conclusions with respect to the causal mechanisms that may underlie the observed associations.

Second, following Cohen (1988), the effect sizes for the associations between the study variables were small ( $r < 0.03$ ) and this warrants that our results should be interpreted with caution. The small effect sizes are problematic because although we demonstrate that most of our results are statistically significant, this does not necessarily mean that they have practical significance, and this is an important issue with regard to intervention purposes.

However, we did not expect large effect sizes in this study for several reasons. First, the assessment points expand over a long period of time for young children. Thus, it is likely that numerous experiences occurring within these formative years may have contributed to the children’s social competence development above and beyond the contribution from the included variables in this study. Second, another possibility is that the usage of different raters may have negatively influenced the strength of the relationship among the study variables as it is not uncommon to observe discrepancies between parents’ and teachers’ ratings of shy children’s behaviors (Rudasill et al., 2014; Valiente et al., 2012). In this study, we used teachers’ ratings of the teacher–child relationship at age 5 years and of children’s social competence at age 8 years but mothers’ ratings of children’s social play behaviors at age 5 years, which could result in smaller effect sizes than if we had used teacher-reports on all these variables. Yet, in this instance, we prioritized reducing the reporter bias as teachers’ characteristics and competences may influence how they rate the children’s behavior (Kokkinos & Kargiotidis, 2016). A final possibility is that the composition of the study sample, which is over-represented with well-educated and well-functioning families compared to the population in general (Biele et al., 2019), might lead to an underestimation of true effect sizes.

Finally, despite the strengths of using a population-based cohort study, the MoBa sample is limited by selection, non-response bias, and attrition. Possible self-selection bias in MoBa has been examined by investigating differences in prevalence estimates between MoBa participants and Norwegian mothers. MoBa participants tend to have better health and socioeconomic status compared to Norwegian mothers (Nilsen et al., 2009). Self-selection bias could therefore influence predictor-outcome estimates in our study (Biele et al., 2019). However, when tested using both actual data and simulations, even large selection bias may have little effect on the regression functions (Wolke et al., 2009).

## Conclusion

To summarize, the present study aligns with previous studies linking shyness with social competence difficulties by demonstrating a longitudinal pathway from early childhood shyness to poor social play behaviors in the ECEC setting to lower social competencies in elementary school. However, this study also sheds light on how ECEC teachers might play a potentially buffering role for this negative development. This finding is important given research showing that shy children often are lagging in the development of social competencies, which in turn may result in host of adjustment difficulties, including interpersonal and internalizing problems. By focusing on the role of teacher–child closeness in the ECEC setting for young shy children’s social behaviors and competencies, the results from this study contribute to extended knowledge about potential factors in children’s social environment that may serve to promote positive social development for shy children. Such knowledge is of clinical importance and value for the planning and successful implementation of intervention efforts aimed at improving the social adjustment and well-being of shy children.

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**Data Availability** The data are available for researchers upon request and through application to the MoBa Study.

**Code Availability** Data codes and syntax are available upon request to the researchers of this study.

## Declarations

**Conflict of interest** The authors have no conflicts of interest to declare that are relevant to the content of this article.

**Ethical Approval** The establishment of MoBa and initial data collection was based on a license from the Norwegian Data Protection Agency and approval from The Regional Committees for Medical and Health Research Ethics. The MoBa cohort is regulated by the Norwegian Health Registry Act. The present research project is approved by the Regional Committees for Medical and Health Research Ethics (REK) (2015/1324).

**Consent to Participate** Written informed consent was obtained from all participants above age 16 years and from the parents of all participants below age 16.

**Consent for Publication** All participants have provided consent for publication.

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