**Understanding the origins of child-teacher dependency:
Mother-child attachment security and temperamental inhibition as antecedents**

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Abstract

This study investigated the joint contribution of child-mother attachment quality and child temperamental inhibition to the development of child-teacher dependency. A sample of 237 kindergartners ($M_{\text{age}} = 60.2$ months) and their teachers from 36 classrooms participated. Preschool child-mother attachment quality was assessed using the Attachment Q-set. Behavioral inhibition was rated by the preschool teacher. Dependency was assessed at three waves during kindergarten, using observer and teacher reports. In line with assumptions from attachment theory, less securely attached children were observed to be more overly reliant on their teacher in class. For behavioral inhibition, a divergent picture emerged depending on the assessment of dependency: Classroom observations yielded less (overt) indications of dependency among more inhibited children, whereas teachers reported more (covert) expressions of dependency. These results suggest that different measures may capture different aspects of the multifaceted construct of dependency, thus calling for more conceptual and empirical work.

Keywords: teacher-child relationship, dependency, mother-child attachment, temperament, behavioral inhibition

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Child-teacher dependency refers to a developmentally inappropriate degree of reliance on the teacher as a source of approval, guidance, and support (Pianta, 2001; Spilt, Vervoort, & Verschueren, 2017). It has been conceptualized as indicating that the child fails to use the teacher as a secure base from which to explore (Verschueren & Koomen, 2012). Whereas longitudinal research has begun to show that high dependency on teachers may increase children's risk for later problems (Roorda, Zee, & Koomen, this issue), there is a dearth of research on the origins of child-teacher dependency. In this study, we sought to enhance our knowledge regarding the antecedents of child-teacher dependency, by focusing on (the interplay of) child temperamental inhibition and mother-child attachment quality as predictors.

Child-Teacher Dependency

Attachment researchers have argued that, although for most children the relationship with the teacher cannot be defined as an attachment *bond*, teachers can be regarded as '*ad hoc attachment figures*', providing children with a temporary secure base from which to explore and a safe haven to which they can return in times of stress (Verschueren & Koomen, 2012; Zajac & Kobak, 2006). As a consequence, notions and measures of parent-child attachment research have been applied successfully to increase our understanding of the nature and developmental significance of teacher-child relationships. The most widely used measure, the Student-Teacher-Relationship-Scale (STRS; Pianta, 2001) has focused on capturing three affective relationship dimensions from the teacher's perspective: closeness, conflict, and dependency (Koomen, Verschueren, van Schooten, Jak, & Pianta, 2012; Pianta, 2001).

Over the past years, numerous longitudinal studies, mostly using the STRS, have supported the proposition that the affective quality of the teacher-child relationship provides an important context for children's academic and psychosocial development (e.g., McGrath & Van Bergen, 2015; Roorda, Koomen, Spilt, & Oort, 2011; Sabol & Pianta, 2012). In general, these studies have shown that relational conflict puts the child at risk for increased behavioral, emotional and academic problems, whereas closeness protects children, particularly at-risk

children, from maladjusted trajectories (e.g., Doumen et al., 2008; McGrath & Van Bergen, 2015). Much less is known about the developmental sequelae of child-teacher dependency. Although findings are mixed (Spilt, Vervoort, & Verschueren, 2017), the limited longitudinal research that is available seems to suggest that when children are unduly reliant on their teacher for nurturance and support, this may increase their risk for negative developmental outcomes (e.g., Bosman, Roorda, van der Veen, & Koomen, 2018; Roorda, Verschueren, Vancraeyveldt, Van Craeyveldt, & Colpin, 2014). Also, when children constantly hover near the teacher and excessively bid for his or her attention and guidance, this may become a key source of burden and exhaustion for the teacher, increasing the risk for teacher stress and burn-out (Spilt, Koomen, & Thijs, 2011).

Because of these possible negative consequences for teacher and child, it is key to understand which factors contribute to the prediction of child-teacher dependency. There is theoretical ground to suggest that some child and family characteristics may increase the risk for developing dependent child-teacher relationships. In this study, we focus on mother-child attachment quality, children's temperamental inhibition, and their interplay as possible antecedents.

Mother-Child Attachment Quality as Predictor of Child-Teacher Dependency

One of the key assumptions of attachment theory states that children with secure parent-child attachments tend to develop more positive representations of self and others, which act as filters through which experiences with other caregivers are interpreted and created (Bowlby, 1969/1982). Considering the role of teachers as caregivers or ad hoc attachment figures, one may thus propose that a more secure attachment to the primary caregiver forecasts a higher quality of the relationship with the teacher. Specifically, securely attached children are assumed to be better equipped to maintain a smooth balance between seeking support, on the one hand, and independent exploration from teachers, on the other. Observation research among toddlers and preschoolers has indeed shown a significant concordance between the quality of attachment to the mother and to a professional caregiver (Ahnert, Pinquart, & Lamb, 2006). Studies using teacher perceptions of relationship quality have also revealed that securely attached children tend to have a closer relationship with their teacher (O'Connor & McCartney, 2007).

However, these studies have not focused on child-teacher dependency in particular. Given that high child-teacher dependency is assumed to reflect the child failing to use the teacher as a secure base (Verschuere & Koomen, 2012), there is theoretical ground to expect a linkage with insecure mother-child attachment. Based on Bowlby's hypothesis that secure attachment relationships are the foundation for the growth of self-reliance, Sroufe (2005) argued that all insecurely attached children would later manifest more dependency problems. Even avoidant children whose behavior might be interpreted as precociously independent, were assumed to lack the base they need for autonomous functioning (Sroufe, Fox, & Pancake, 1983). In a study among 40 preschoolers, Sroufe and his colleagues (Sroufe, 2005; Sroufe et al., 1983) indeed showed that, compared to securely attached children, children who were insecurely attached to their mother in infancy, were seen by their preschool teacher as being more dependent, and specifically as seeking more help in self- and social management and more attention in a negative way. In addition, teachers were observed to provide more guidance and discipline toward these children. Observations of child attention- and help-seeking behavior showed less clear and robust differences according to parent-child attachment histories. Sroufe's study only differentiated between avoidant and resistant insecure attachment. Similar or even more extreme problems in secure base use of teachers can be expected for children with disorganized attachment, because of their elevated risk for problematic stress management and an inability to effectively use attachment figures to manage intense negative emotions (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2005; Groh, Roisman, van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012).

As far as we know, no other study to date has examined the linkage between mother-child attachment and child-teacher dependency (but see Neuhaus, O'Connor, & McCormick, this issue). In this study we aim to fill this gap in the literature by investigating whether more secure mother-child attachment in preschool predicts less dependency on the teacher during kindergarten.

Behavioral Inhibition as Predictor of Child-Teacher Dependency

Behavioral inhibition has been described as a temperamentally-based, consistent tendency of children to show marked reticence, fearfulness, and avoidance to unfamiliar events, situations or people (Hirshfeld-Becker et al., 2007; Kagan, Reznick, Clarke, Snidman,

& Garcia-Coll, 1984). It has been found to show moderate heritability (DiLalla, Kagan, & Resnick, 1994), as well as moderate stability from the preschool to the middle childhood years (Hirshfeld-Becker et al., 2007). Research has revealed that inhibited preschoolers are at increased risk for developing later internalizing problems, such as social anxiety (Sanson, Hemphill, & Smart, 2004). Behavioral inhibition is not conceptually equivalent to shyness, a construct involving behavioral, affective, somatic, and cognitive reactions in social situations. However, both are positively related and are sometimes used as proxies (Van Ameringen, Mancini, & Oakman, 1998).

Considering the consequences of behavioral inhibition for children's social functioning, one may expect that it affects children's interactive behavior with teachers, and specifically their degree of dependency on teachers. On the one hand, one may argue that inhibited children tend to evoke less attention from their teachers, as they tend to withdraw more from interactions with them (Rudasill, Rimm-Kaufman, Justice, & Pence, 2006; Rydell, Bohlin, & Thorell, 2005). This may lead to lower dependency on teachers. Although the proposed linkage between higher behavioral inhibition and lower child-teacher dependency has not yet been supported directly, some indirect evidence has been gathered. Rudasill and Rimm-Kaufman (2009), for instance, found that higher shyness predicted lower closeness in teacher-child relationships in first grade, which was partly explained by the reduced frequency of child-initiated interactions. This supports the idea that shy children make fewer bids for attention of teachers, possibly also leading to less dependent behaviors. In addition, Rudasill and Rimm-Kaufman (2009) found that higher shyness also predicted lower conflict with teachers; as conflict and dependency relate positively (e.g., Koomen et al., 2012; Pianta, 2001), one may tentatively expect to find lower dependency too.

On the other hand, it may be argued that inhibited children tend to seek more excessive reassurance from their teachers, thereby increasing their level of dependency (Birch & Ladd, 1998). Indeed, because of their reticence in social interactions with peers and their fear of new and unfamiliar situations, inhibited children may be more likely to turn to the teacher for nurturance and attention, as a compensatory source of support and regulation (Birch & Ladd, 1998; Rydell et al., 2005). In support of this reasoning, a cross-sectional study in early childhood showed that teachers who rated children as more inhibited also perceived them as more dependent (Thijs & Koomen, 2009). Similarly, longitudinal research revealed that more parent-rated shyness predicted higher teacher-child dependency among first grade

children (Arbeau, Coplan, & Weeks, 2010). Finally, children who displayed more socially withdrawn behavior at age three were found to show higher levels dependency with their teachers at age six (Ladd & Burgess, 1999).

The Interplay between Temperament and Mother-Child Attachment

Contemporary temperament theories emphasize that the effects of temperamental traits on child development depend on variations in parenting, or reversely, that associations between parenting and child development depend on child temperamental traits (Slagt, Dubas, Deković, & van Aken, 2016). In general, research has provided mixed support for such parenting-by-temperament interactions (Slagt et al., 2016). With regard to parent-child attachment, scholars have similarly argued that some children may be more susceptible than others to differences in parent-child attachment quality (e.g., Bakermans-Kranenburg & van IJzendoorn, 2011). Regarding attachment and temperamental inhibition in particular, Bohlin, Hagekull and Andersson (2005) indeed found that mother-child attachment moderated the effect of infant behavioral inhibition on peer social competence at age 8, showing that infants with higher behavioral inhibition were more susceptible to differences in attachment quality. Similarly, we examined in this study whether mother-attachment quality would moderate the effects of behavioral inhibition on child-teacher dependency.

This study

In trying to shed light on the origins of child-teacher dependency, we examined the contribution of mother-child attachment and temperamental inhibition in preschool to children's later degree of dependency on their teacher during kindergarten. Following a sample of children from preschool to kindergarten, we tested the unique and joint predictive value of these antecedents. We expected that more securely attached children would show lower levels of dependency on their teachers. For more behaviorally inhibited children, no clear hypothesis was put forward. On the one hand, inhibited children may be expected to evoke less attention from their teachers as they withdraw more from interactions with them. On the other hand, they may seek more reassurance from their teachers given their reticence in peer interactions and their fear of unfamiliar classroom situations. In addition to additive

effects, the possibility of interactive effects between mother-child attachment quality and child behavioral inhibition was explored.

Adding to previous research that almost exclusively relied on teacher ratings of dependency, we used both teacher and observer ratings, allowing us to study the robustness of findings across informants and methods. Furthermore, by assessing dependency at the beginning, middle, and end of kindergarten, we were able to examine effects on the initial level as well as the growth of dependency across the school year. This allowed to explore whether inhibition may differentially relate to dependency at the beginning versus the end of the school year. Security or quality of mother-child attachment was assessed in a dimensional way, making no distinction between different types of insecure attachment. As dependency in a school setting may be influenced by children's cognitive abilities, a measure of cognitive ability was added as a control. Also, teacher-child closeness and conflict were added as controls, given the expected relations with dependency, as well as with attachment quality and inhibition (O'Connor & McCartney, 2007; Rudasill & Rimm-Kaufman, 2009).

Method

Sample

The total sample included 237 kindergarten children (49% boys; $M_{age} = 60.2$ months at the beginning of kindergarten) and their teachers from 36 classrooms in 26 schools. Sample selection took place in the prekindergarten school year. Schools in the neighborhood of Leuven, Belgium were contacted by phone in a random order. In the first 30 schools that agreed to participate, information letters and consent forms were sent to parents. Classrooms with at least six children who received parental permission for participation were selected. When children changed schools between receiving permission and the start of the data-collection, the new school was contacted and asked to participate as well. Because of children moving to other schools or classrooms, the number of participating children per kindergarten class varied between 1 and 14 (Median = 7). Kindergarten classroom size ranged between 8 and 39 ($M = 22$, $SD = 5.14$). Kindergarten teachers (all female) had 18.55 years of teaching experience on average ($SD = 10.49$).

Because of practical reasons, observer ratings of the teacher-child relationship were gathered for a subsample ($N = 169$), namely those who agreed to participate both in the home

and the school part of the study ($N = 140$, see further), complemented with randomly selected children (stratified by gender) that only received permission for the school part of the study ($N = 29$). Further reduction of the sample was due to non-response of teachers, item missingness, or children not being present at the time of the school observations. Because of children being absent at the day of the observation, the number of children for whom observational data could be collected varied between 145 and 161 across waves. There were no significant group differences between children with and without observational data on teacher-rated dependency across waves (ps between .49 and .77), on inhibition ($p = .68$), and on child cognitive ability ($p = .25$).

Home observations of attachment security (Attachment Q-set, see further) took place before the onset of kindergarten. Mother-child attachment security scores were available for 118 children. Missing data were due to observations not taking place because of time constraints or non-matching schedules of parents and observers ($N = 11$), father-child attachment being evaluated ($N = 2$), and children that could not be followed because of moving and changing schools ($N = 9$). There were no significant group differences between children with and without attachment scores on teacher-rated and observed dependency across waves (ps between .12 and .69), on inhibition ($p = .30$), and on child cognitive ability ($p = .47$).

Demographic information was available for 92 mothers. The mean age of the mothers was 35.8 years ($SD=4.7$). Maternal educational level was measured as an indicator of socioeconomic status (SES) ranging from low (primary school) to high (university degree). One mother completed primary school only, 4 mothers (4.3%) obtained a lower vocational degree, 10 mothers (10.9%) obtained a higher vocational degree, 40 mothers (43.5%) completed a professional bachelor study in higher education, and 37 mothers (40.2%) obtained a university degree.

Procedure

Temperamental inhibition and mother-child attachment quality were assessed before the children entered kindergarten. Teachers from the children's preschool classrooms rated the children's behavioral inhibition. The quality of mother-child attachment was assessed after a two and a half to three hours long semi-structured observation in the home

environment using the Attachment Q-sort (AQS). The structured episodes consisted of (a) an introduction of a bag with toys, brought along by the observer; (b) joint reading (mother and child) of a quite difficult story, not easily reproducible by preschoolers without support; (c) a frustrating task with block patterns (mother and child); (d) reconstruction of the story read before (see b) by the child, guided/helped by his/her mother; and (e) mother responding to some questions of the observer. Structured parts generally increase the opportunity to observe certain child behaviors which are only rarely observed in natural settings and it simultaneously limits the time needed to observe children's use of the parent as a secure base at home (van IJzendoorn, Vereijken, Bakermans-Kranenburg, & Riksen-Walraven, 2004). The remainder of the total observation period consisted of free observation (about 1 to 2.5 hours). After training (by dr. M. Bakermans-Kranenburg, Leiden University) and pilot testing in five families, two observers were involved in conducting the observations. They completed the AQS immediately after conducting the home observations.

At the beginning of kindergarten, a cognitive ability test was administered by research assistants in small groups of children. Teacher-child relationship quality in kindergarten was assessed at three measurement occasions: at the beginning (Trimester 1: October-December), middle (Trimester 2: January-March), and end (Trimester 3: April-June) of the kindergarten school year. One out of two observers rated teacher-child relationship quality for all participating children in a classroom after at least three hours of morning (unstructured) observations in classrooms. In general, the same observer rated the same children across all measurement waves.

Measures

Attachment Q-Set. Mother-child attachment security was assessed by means of the Dutch version of the Attachment Q-Set (AQS; van Bakel & Riksen-Walraven, 2002; Waters, 1987; 1995), a widely used measure of attachment quality for children between the ages of 1 and 5. The AQS consists of 90 descriptive statements or items, written on cards, about the child's behavior in interaction with his or her primary attachment figure, which are aimed at providing a characterization of the secure-base use of the caregiver by the child. The cards were sorted into nine categories of equal size, ranging from *least descriptive* (1) to *most descriptive of the child* (9). Based on these card sorts, a security score was obtained by correlating the individual Q-sort with the Q-sort of a prototypically securely attached child as

provided by experts (i.e., correlation between the respective item scores). The higher the security score, the more a given mother-child relationship resembles a prototypically secure attachment relationship. Items that are most indicative of secure attachment are “child keeps track of mother’s location” and “child clearly shows a pattern of using the mothers as a secure base from which to explore”.

Evidence for the reliability and validity of the (Dutch) AQS has been gathered in several studies (e.g., Cadman, Diamond, & Fearon, 2018). In the current study, the AQS was completed by one out of two observers. Their inter-coder reliability, based on ratings of 10 mother-child dyads, was excellent ($ICC = .79$).

Preschool teacher ratings of behavioral inhibition. To assess children’s behavioral inhibition, preschool teachers completed the subscale Inhibition of the Temperament Assessment Battery for Children-Revised (TABC-R; Martin & Bridger, 1998). The Inhibition subscale comprises nine items that assess the degree to which the child tends to demonstrate fear and withdrawal in novel situations. A sample item is: ‘This child takes a long time to become comfortable in a new situation’. Items are scored on a 7-point rating scale, ranging from ‘almost never’ to ‘almost always’. Several studies have provided evidence for the reliability and factorial validity of the TABC-R (Martin & Bridger, 1998; Mullola et al., 2014). In the current study, Cronbach’s alpha was .89.

Kindergarten teacher ratings of teacher-child relationship quality. An authorized Dutch translated and adapted version of the STRS (Koomen, Verschueren, & Pianta, 2007; Koomen et al., 2012) was used to assess the teacher’s perspective on the degree of closeness, conflict, and dependency in the teacher-child relationship. The Closeness subscale consists of 11 items, e.g., “I share an affectionate, warm relationship with this child.” Conflict consists of 11 items, e.g., “This child and I always seem to be struggling with each other.” Dependency is a 6 item-subscale and includes items such as “This child needs to be continually confirmed by me” or “This child reacts strongly to separation from me”. The original STRS-Dependency scale was adapted by Koomen and colleagues (2012) because of the suboptimal internal consistency found in previous research. Teachers respond to the items on a 5-point scale ranging from 1 (*definitely does not apply*) to 5 (*definitely applies*). Responses on each subscale are averaged to calculate a Conflict, Closeness, and Dependency subscore. Internal consistency of all three subscales in a large sample of preschool and elementary school

teachers was adequate and ranged between .78 and .90 (Koomen et al., 2012). In the current study, the Cronbach's alpha for Closeness ranged between .89 and .94, for Conflict between .84 and .88, and for Dependency between .75 and .82 across the three waves.

Observer reports of teacher-child relationship quality. Observed teacher-child relationship quality was measured by means of an adaptation of the Classroom Assessment Scoring System for Kindergarten (CLASS-K; La Paro, Pianta, & Stuhlman, 2004; see Doumen, Koomen, Buyse, Wouters, & Verschueren, 2012). Three of the CLASS subscales measuring the emotional component of the classroom climate (Positive Climate, Negative Climate, and Teacher Sensitivity) were adapted to tap dimensions of the individual teacher-child relationship quality. The adapted Positive Climate subscale measures the degree of enthusiasm, enjoyment, and respect displayed by the teacher in interactions with an individual child. The adapted Teacher Sensitivity subscale refers to the extent to which the teacher provides comfort, reassurance, and encouragement with respect to the child's academic and emotional functioning. The adapted Negative Climate scale refers to the degree of teacher negativity (e.g., anger and sarcasm) towards the individual child. Scores for Positive Climate and Sensitivity were averaged to obtain a single indicator of teacher-child Closeness. Across measurement occasions, Positive Climate and Teacher Sensitivity had moderate to high intercorrelations ($r = .63-.75, p < .001$), which supported this decision. Teacher negativity towards the child was used as an indicator of teacher-child Conflict. To measure dependency of a child towards his or her teacher, a Dependency subscale was constructed parallel to its teacher-rated counterpart: Observers rated children as being highly dependent on their teacher if they showed possessive and clingy behavior towards their teacher and strongly relied on his or her help (see Appendix for a full description of this rating scale).

Observers rated each of the subscales for each teacher-child dyad by means of a global rating on a 7-point Likert-type scale. Interrater agreement regarding the observer ratings of teacher-child relationship quality was continuously assessed throughout the data collection in kindergarten. At each measurement occasion, 22 to 25 children (13-15 %) of the observations were included in interrater agreement ratings. Intraclass correlation coefficients (ICC) between the ratings of two independent observers ranged between .62 and .82 for Closeness and between .71 and .82 for Conflict, indicating good to excellent interrater reliability for these two relationship dimensions (Cicchetti et al., 2006). For Dependency, interrater reliability was fair ($\rho_{ICC} = .46-.61$). Positive and moderate associations were found between

observer and teacher ratings (i.e., latent constructs with loadings from three measurement occasions), equaling .38 for Closeness, .41 for Conflict, and .43 for Dependency (Doumen et al., 2012).

Cognitive ability test. To assess children's cognitive ability, the Coloured Progressive Matrices test (CPM; Raven, 1956; Raven, Court, & Raven, 1977) was administered. The CPM (36 items) is a non-verbal intelligence test for children between ages 5 and 11. It assesses fluid reasoning, which highly relates with general intelligence scores. The CPM has adequate reliability, construct and criterion validity (e.g., Evers, van Vliet-Mulder, & Groot, 2000). In the current study Cronbach alpha was .75 (see Bossaert, Doumen, Buyse, & Verschueren, 2011 for more information).

Analyses

Growth trajectories of observed and teacher-rated Dependency were analyzed in Mplus 7 (Muthén & Muthén, 1998–2012) using the robust maximum likelihood (MLR) estimation method and controlling for cluster variance (children nested in classrooms). The growth models were built in three steps. First, intercept and slope were estimated. Intercept and slope were allowed to correlate. Second, intercept and slope were regressed on the covariates (Conflict at Trimester 1, Closeness at Trimester 1, child sex, child cognitive ability, maternal education). In the model predicting Teacher-rated Dependency teacher-rated Closeness and Conflict were included as covariates. In the model predicting observed Dependency observed Closeness and Conflict were included. Covariates with a $p > .10$ were removed to retain power. Third, the predictors (Attachment, Inhibition) and the interaction between the predictors (Attachment x Inhibition) were added. To ease interpretation, the predictors were standardized. In case of a non-significant interaction effect ($p > .10$, two-tailed), the interaction term was removed to interpret main effects. The models accounted for the correlations between the predictors, correlations between the covariates, and for the correlations of the covariates with the predictors. Correlations with a $p > .10$ (two-tailed) were fixed to zero in order to preserve power.

Mplus offers the advantage to accommodate incomplete data using full information maximum likelihood (FIML) estimation under the assumption of missing at random (MAR) in order to retain the full sample. Little's (1988) test was significant, indicating that data were not missing completely at random (Little's MCAR test: $\chi^2(232) = 278,535, p < .05$).

However, the normed chi-square test ($\chi^2/df = 1.20$) was smaller than 2 suggesting that the data were missing at random and that it is appropriate to use FIML to deal with missing data. The covariance coverage matrix of the final models (Table 4) ranged between .41 and .84 across all data points, which is well above the minimum threshold of .100 of Mplus.

Results

Descriptive statistics

Table 1 reports the descriptive statistics of the variables. Most variables showed a normal distribution (skewness ≤ 1). Only the distribution of teacher-rated conflict scores was somewhat right-skewed, which is typical in low-risk samples.

Table 2 reports the correlations within and between teacher-rated and observed dimensions of the teacher-child relationship within and between waves. Teacher-rated Conflict and Dependency correlated positively within waves, whereas Closeness correlated negatively with Conflict and Dependency. Observed Conflict and Dependency also correlated positively within waves, whereas Conflict and Closeness were negatively correlated (except at Trimester 3) and Dependency and Closeness uncorrelated (except at Trimester 3 where the correlation was positive). Correlations between observed and teacher-rated dimensions of the teacher-child relationship ranged from -.09 to .42 within waves. For Dependency, the correlations between observer ratings and teacher ratings varied between .17 and .24 across measurement points.

Table 3 presents the correlations of the predictors Attachment and Inhibition with Dependency. Inhibition was positively related to teacher-rated Dependency but negatively to observed Dependency. Attachment security was uncorrelated to teacher-rated and observed Dependency.

Prediction of Dependency

Teacher-rated Dependency. First, a growth model without predictors was estimated. Both intercept and slope were significant. Second, intercept and slope were regressed on the covariates. The effects of child sex, child cognitive ability, maternal education, and Closeness were non-significant. Only Conflict had a significant positive effect on the intercept and was retained in the model. Third, the predictors Attachment and Inhibition and the interaction between the predictors were added. Inhibition positively predicted teacher-rated Dependency. Furthermore, there was a marginally significant interaction effect on intercept ($p = .07$, two-

tailed), suggesting that children scoring high on both Inhibition and Attachment security demonstrated higher initial levels of Dependency. For inhibited children, the intercept is .17 above the sample average when security of attachment is high (+1 *SD*), .09 above average when security of attachment is average (0 *SD*), and at average when security of attachment is low (-1 *SD*). There were no significant effects on the slope. The final prediction model is reported in Table 4. The average intercept in the final model was 1.04 ($SE = .16$, $p < .001$) and the slope was $-.10$ ($SE = .03$, $p < .001$), indicating that, on average, teacher-rated dependency decreased across the school year.

Observed Dependency. The slope of observed dependency was non-significant, indicating no significant change over time. Therefore the three measurements were combined into a single latent variable of observed dependency. In the second step, the latent variable was regressed on the covariates. Observed Conflict, observed Closeness, and maternal education had positive effects on Dependency and were therefore retained in the model. Third, the predictors Attachment and Inhibition were added. In this model, the covariates observed Closeness and maternal education were no longer significant and therefore removed. The interaction effect was also non-significant and therefore removed. Both Attachment security and Inhibition negatively predicted observed dependency. The final model is reported in Table 4.

In follow-up analyses, we reran the models excluding the control variable Conflict to reduce model complexity. The regression coefficients remained largely similar and no effect on their significance was found.

Discussion

In trying to gain insight in the antecedents of child-teacher dependency, this study examined the unique and joint predictive role of child inhibition and quality of attachment to mother. Adding to previous research, child-teacher dependency was assessed at three measurement waves during the kindergarten school year, allowing to identify effects on initial level and on growth. Also, dependency was assessed using observations in the classroom in addition to teacher ratings. Although the use of multiple perspectives (i.e., inside and outside) is considered pivotal in a developmental systems approach to teacher-student relationships (Pianta, Hamre, & Stuhlman, 2003), studies that complement teacher reports with other perspectives and methods have been very scarce.

Using both observer and teacher ratings, our study showed that both assessments converged weakly to moderately. In specific, weak positive associations were found within waves and moderate positive associations were found when observations were aggregated across the three waves (cf. Doumen et al., 2012). Weak to moderate associations for Closeness and Conflict may partly be explained by the fact that, although both ratings assess dyadic interactions, observer ratings for Closeness and Conflict focus more on the teacher's interactive behavior instead of the child's. For Dependency both measures primarily focus on the child's interactive behavior toward the teacher. In general, the findings attest to the importance of including multiple perspectives, methods, and occasions for a comprehensive description of the teacher-student relationship (Pianta et al., 2003).

In line with their weak to moderate interrelations, teacher and observer perspectives also showed different correlates. Regarding observed dependency in kindergarten, we found additive effects of both mother-child attachment and child inhibition as assessed in preschool. In line with assumptions based on attachment theory, results showed that, when controlling for levels of inhibition, more securely attached preschoolers showed lower dependency on their kindergarten teacher in the classroom; in specific they were observed to demonstrate less clingy and demanding behavior or excessive reliance on teachers for help. These results corroborate early findings from Sroufe and colleagues (1983) on the linkage between infant attachment (Strange Situation) and preschoolers' dependency on the teacher, and extend them to another age period (i.e., preschool attachment and kindergarten dependency), another attachment assessment (i.e., AQS), and using a larger sample.

In addition to differences in child attachment history, temperamentally-based differences in inhibition were also predictive of differences in teacher-child dependency as observed in the classroom. Specifically, children who were rated by their preschool teacher as showing more avoidance, reticence and fear in novel situations, were less likely to show dependent behavior toward their kindergarten teacher according to external observers. These findings support the assumption that behaviorally inhibited children elicit less attention from their teacher and make fewer bids for interactions (Rudasill et al., 2006; Rydell et al., 2005), thus leading to lower observed dependency in interactions.

When teacher-child dependency was rated by teachers, a different pattern of correlates emerged. Not only was there no significant association with child-mother attachment, also we found that dependency was positively (albeit weakly) predicted by behavioral inhibition. In line with findings from other studies (Arbeau et al., 2010; Ladd & Burgess, 1999; Thijs &

Koomen, 2009), this indicates that when children have a tendency to show high reticence and fear in new situations and among unfamiliar persons, teachers tend to perceive them as more clingy and needy of their attention and help.

Our study did not reveal any significant effects of child inhibition on the growth of teacher-rated dependency, implying that initial differences between high and low inhibited children remained throughout the kindergarten year. In line with Ladd and Burgess (1999) our study did show that teacher ratings of dependency generally decreased over time, regardless of differences in child inhibited behavior. Taken together, these findings imply that from the beginning of kindergarten on, inhibited children rely more on their teacher for nurturance and reassurance, as a compensatory source of support. Given that this increased reliance on teachers seems unnoticed by external observers, one may hypothesize that these inhibited children either show more subtle signs of dependency or covert expressions of needing reassurance (e.g., following the teacher or keeping track of him/her without overtly interacting with him/her), or alternatively show infrequent but extreme signs that strongly impact the teacher's representation of the relationship but are rarely noticed by observers (e.g., strong emotional reactions to separations from the teacher). Overall, these divergent findings support a key assertion of a developmental systems perspective of teacher-student relationships, stating that relationships are more than the sum of overt interactions (as assessed by external observers), but also cover the insiders' representations (as reflected in insiders' responses to rating scales or interviews) (Pianta et al., 2003). When examining teacher-child dependency and its correlates, it is thus paramount to include these different perspectives.

With regard to the possible interactive influences of attachment quality and behavioral inhibition, our study did not show any robust significant effects. However, there was a trend that inhibition related more strongly to teacher-rated dependency when children were more securely attached to their mother. One could (tentatively) assume that a secure attachment history provides inhibited children with a stronger inclination to solicit attention and reassurance from their teacher as ad hoc attachment figure when they experience fear in new situations (see Rudasill et al., 2006 for a similar line of reasoning). These interpretations are, however, post-hoc and need further investigation.

Strengths, limitations, and future directions

Our study has a number of strengths, including its longitudinal design, the use of an observer's perspective on teacher-child dependency in addition to the teacher's perspective, and the inclusion of a well-validated observational assessment of attachment. Also, with regard to the linkage with behavioral inhibition, same-informant bias was prevented as different teachers (preschool vs. kindergarten) rated children's behavioral inhibition and their level of dependency. Considering these different methods and perspectives, and the control for other relationship dimensions and relevant background variables, even the relatively small effect sizes obtained can be considered of interest.

Nevertheless, a number of limitations call for further investigation. First, the AQS does not allow to differentiate between different types of insecure attachment, nor between organized and disorganized attachment, possibly explaining the less consistent associations of attachment security with dependency. Indeed, although Sroufe's pioneering study indicated that all insecurely attached children showed more dependency on teachers, avoidant and ambivalent children were found to show different expressions of dependency. Such differences may obscure associations between dimensional measures of attachment security and dependency.

Second, in line with current conceptualizations of child-teacher dependency, the instruments used in this study captured aspects of emotional dependency (e.g., child expressing hurt or jealousy when the teacher spends time with other children) and of excessive help-seeking (e.g., asking the teacher's help when this is not needed) (Vervoort, Doumen, & Verschueren, 2015). For future research, it may be interesting to differentiate between these aspects of dependency and examine possible differences in their correlates.

Third, this study only investigated child antecedents of child-teacher dependency. However, also (the interplay with) teacher or classroom factors may play a role (Pianta et al., 2003). Buyse, Verschueren and Doumen (2011), for example, found that insecurely attached children showed particularly low closeness in the relationship with their teacher when this teacher showed low sensitivity toward the class. Likewise, it is possible that linkages between early insecure attachment and child-teacher dependency are stronger when teachers show low sensitivity or low autonomy support.

Fourth, although the observational measure of dependency showed sufficient interrater reliability, it was not as high as interrater reliability for closeness and conflict. This may be due to the fact that in judging behavior to be more or less dependent subjective inferences and

standards play a larger role. Despite this lower interrater reliability, moderate convergence was found with teacher-rated dependency, attesting to its convergent validity.

Finally, our sample can be considered low-risk, considering the relatively high levels of parental education. Replications in more heterogeneous and/or high-risk samples are therefore recommended.

Conclusion

Investigating child antecedents of child-teacher dependency, this study revealed that more insecurely attached children were observed to be more overly reliant on their teacher, failing to use him or her as a secure base from which to explore. This finding was not reflected in teacher reports of dependency. With regard to behavioral inhibition two opposite patterns emerged: Whereas classroom observations yielded less (overt) indications of dependency among more inhibited children, teachers reported more (covert) expressions of dependency. Together, these findings highlight the importance of complementing the widely-used teacher ratings of dependency with observations of dependent behaviors in class. Also, they call for a deeper understanding of the multifaceted construct of dependency and how it is assessed by inside and outside observers. Finally, they call for more research into how parent-child attachment and inhibition may interact with other child, teacher, and classroom factors to predict child-teacher dependency.

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Tables

Table 1.
Descriptive statistics

	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>SD</i>	<i>Skewness</i>	<i>Kurtosis</i>
Teacher-rated							
Close_T1	198	2.58	5.00	4.26	.62	-.70	-.36
Conf_T1	198	1.00	4.27	1.54	.65	1.57	2.23
Dep_T1	198	1.00	4.17	1.78	.64	.94	1.10
Close_T2	182	2.08	5.00	4.32	.63	-.92	.36
Conf_T2	182	1.00	4.36	1.42	.61	1.97	4.27
Dep_T2	182	1.00	3.83	1.67	.67	1.06	.45
Close_T3	178	1.75	5.00	4.33	.68	-.99	.48
Conf_T3	178	1.00	4.18	1.48	.67	1.89	3.48
Dep_T3	178	1.00	3.50	1.59	.64	1.22	.97
Observed							
Close_T1	161	3.00	7.00	4.84	.81	-.07	-.53
Conf_T1	161	1.00	6.00	2.19	1.08	.96	.66
Dep_T1	161	1.00	6.00	2.33	1.08	.60	-.08
Close_T2	145	2.50	7.00	4.82	.97	-.03	-.31
Conf_T2	145	1.00	6.00	2.13	1.04	.96	1.36
Dep_T2	145	1.00	5.00	2.33	.95	.27	-.60
Close_T3	153	3.50	7.00	5.09	.82	.10	-.76
Conf_T3	153	1.00	4.00	1.84	1.00	.86	-.49
Dep_T3	153	1.00	5.00	2.15	1.11	.89	.15
Attachment	118	-.24	.74	.31	.23	-.15	-.47
Inhibition	235	.67	6.33	2.85	1.19	.64	.08
Intelligence	227	6.00	32.00	17.40	5.37	.12	-.64

ATTACHMENT, INHIBITION AND CHILD-TEACHER DEPENDENCY

Note. Close = Closeness, Conf = Conflict, Dep = Dependency; T1 = Trimester 1, T2 = Trimester 2, T3 = Trimester 3

Table 2

Correlations between Teacher-rated and Observed Dimensions of the Teacher-Child Relationship Within and Between Waves

		<u>Teacher-rated (n=198)</u>									<u>Observed (n=161)</u>							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Teacher-rated																		
1	Close_T1	1.00																
2	Conf_T1	-.49	1.00															
3	Dep_T1	-.22	.52	1.00														
4	Close_T2	.76	-.38	-.21	1.00													
5	Conf_T2	-.40	.78	.47	-.50	1.00												
6	Dep_T2	-.21	.43	.69	-.32	.53	1.00											
7	Close_T3	.73	-.30	-.29	.83	-.42	-.38	1.00										
8	Conf_T3	-.47	.69	.38	-.53	.81	.44	-.53	1.00									
9	Dep_T3	-.32	.50	.67	-.42	.54	.77	-.31	.52	1.00								
Observed																		
10	Close_T1	-.09	.03	.05	-.03	.04	-.01	.00	.04	-.05	1.00							
11	Conf_T1	-.04	.20	.05	-.02	.11	-.10	.00	.10	.02	-.31	1.00						
12	Dep_T1	.11	.08	.21	.07	.09	.17	.15	.05	.22	.01	.25	1.00					
13	Close_T2	.08	.10	.23	.04	.12	.21	-.02	.13	.26	.05	-.19	-.13	1.00				
14	Conf_T2	.08	.15	.00	.00	.16	.04	.10	.03	.03	.11	.30	.22	-.42	1.00			
15	Dep_T2	.03	.14	.15	.06	.14	.17	.03	.11	.22	.10	.18	.29	.09	.19	1.00		
16	Close_T3	.29	-.02	.00	.34	-.08	.01	.42	-.15	-.02	.34	-.03	.10	.27	.07	.19	1.00	

ATTACHMENT, INHIBITION AND CHILD-TEACHER DEPENDENCY

17	Conf_T3	-.04	.25	.21	.01	.27	.06	.05	.16	.00		.07	.27	.19	-.16	.40	.30	-.07	1.00
18	Dep_T3	.17	.14	.17	.18	.16	.23	.23	.02	.24		.15	.09	.26	.05	.24	.41	.32	.27

Note. Significant correlations in bold ($p < .05$, two-tailed); Close = Closeness, Conf = Conflict, Dep = Dependency; T1 = Trimester 1, T2 =

Trimester 2, T3 = Trimester 3

Table 3

Correlations between Predictors and Dependency

	<u>Teacher-rated (<i>n</i>=198)</u>			<u>Observed (<i>n</i>=161)</u>		
	Dep_T1	Dep_T2	Dep_T3	Dep_T1	Dep_T2	Dep_T3
Inhibition	.15*	.28**	.12	-.15	-.25**	-.25**
Attachment	-.06	-.06	-.02	-.16	-.17	.01

Note. * $p < .05$, ** $p < .01$ (two-tailed); T1 = Trimester 1, T2 = Trimester 2, T3 = Trimester 3; Dep = Dependency

Table 4Prediction of Dependency ($N = 237$)

	<u>Teacher-rated</u>		<u>Observed</u>
	<u>Dependency</u>		<u>Dependency</u>
	Intercept	Slope	
	<i>Est. (SE)</i>	<i>Est. (SE)</i>	<i>Est. (SE)</i>
Conf_T1	.48 (.09)**	-	.11 (.07)
Inhibition	.09 (.04)*	-.01 (.03)	-.18 (.07)**
Attachment	.01 (.06)	.01 (.03)	-.11 (.06)*
Inhibition x Attachment	.08 (.05) [†]	-	-

Note. * $p < .05$, ** $p < .01$, [†] $p = .069$ (two-tailed); the predictors Inhibition and Attachment were standardized; T1 = Trimester 1; Conf = Conflict