

The Development of Adolescents' Internalizing Behavior: Longitudinal Effects of Maternal Sensitivity and Child Inhibition

Anja van der Voort · Mariëlle Linting ·
Femmie Juffer · Marian J. Bakermans-Kranenburg ·
Christie Schoenmaker · Marinus H. van IJzendoorn

Received: 25 March 2013 / Accepted: 19 June 2013 / Published online: 5 July 2013
© Springer Science+Business Media New York 2013

Abstract Internalizing symptoms such as withdrawn and anxious-depressed behavior are common in adolescence. This prospective longitudinal study helps to gain insight into the development of internalizing behavior, focusing on the role of early parent–child interaction while ruling out genetic similarity as a confounder. More specifically, the central question addressed in this study was whether parental sensitivity and child inhibited temperament predict children's withdrawn and anxious-depressed behavior in middle childhood and adolescence. We followed 160 early-adopted children (53 % girls) from infancy to adolescence. Structural equation modeling was used to test relationships both prospectively and concurrently. The results revealed that more sensitive parenting in infancy and middle childhood predicted less inhibited behavior in adolescence, which in turn predicted fewer internalizing problems in adolescence. The findings suggest that maternal sensitivity lowers adolescents' inhibited behavior and decreases the

risk for adolescents' internalizing problem behavior indirectly through lower levels of inhibition. Supporting sensitive parenting in the years before adolescence may protect children from developing inhibited behavior and internalizing behavior problems in adolescence.

Keywords Withdrawn behavior · Anxious-depressed behavior · Internalizing problems · Sensitive parenting · Inhibition · Adoption · Adolescence

Introduction

Internalizing behavior problems often have been associated with biological origins because of their considerable degree of stability over time (Burgess et al. 2005) and high heritability estimates in behavioral genetic studies (e.g., Boomsma et al. 2005; Hoekstra et al. 2008). However, stability and heritability estimates are far from perfect and environmental factors such as parenting seem to contribute to developmental changes in internalizing behavior problems as well. The mechanisms underlying the relationship between parenting and internalizing problems have not yet been uncovered completely, and longitudinal research may shed more light on the direction of the effects, and time lapse between them. Importantly, in such studies one should take into account that genetic similarity of biological parent–child dyads could act as a confounding variable (see for reviews Rubin et al. 2009; Wood et al. 2003). In the current longitudinal study covering the time span from infancy to adolescence, we investigated the development of children's internalizing behavior, including early as well as concurrent child temperamental inhibition and maternal sensitivity. By examining adoptive families we ruled out shared genetics between parents and children.

A. van der Voort · M. Linting · F. Juffer (✉) ·
M. J. Bakermans-Kranenburg · C. Schoenmaker ·
M. H. van IJzendoorn
Centre for Child and Family Studies, Leiden University,
P.O. Box 9555, 2300 RB Leiden, The Netherlands
e-mail: juffer@fsw.leidenuniv.nl

A. van der Voort
e-mail: avoort@fsw.leidenuniv.nl

M. Linting
e-mail: linting@fsw.leidenuniv.nl

M. J. Bakermans-Kranenburg
e-mail: bakermans@fsw.leidenuniv.nl

C. Schoenmaker
e-mail: c.schoenmaker@fsw.leidenuniv.nl

M. H. van IJzendoorn
e-mail: vanijzen@fsw.leidenuniv.nl

Internalizing symptoms are common in childhood and tend to increase in adolescence (Buck and Dix 2012; Degnan et al. 2010). Children with high levels of internalizing behavior are characterized by anxious, shy, withdrawn and depressed behavior and are at risk for developing serious adaptational problems in later life (Colman et al. 2007). Two categories of internalizing behavior often are distinguished: withdrawn behavior and anxious-depressed behavior (Achenbach 1991; Verhulst et al. 1997). The former denotes more shy and detached behavior, the latter points to fearfulness and feelings of sadness. Previous research has demonstrated that it is beneficial to study these specific types of internalizing problems separately (e.g., Booth-LaForce and Oxford 2008; Lamb et al. 2010). Therefore, in order to better understand the development of internalizing problems of adolescents, we decided to investigate withdrawn and anxious-depressed behavior independently instead of using a broadband measure of internalizing behavior.

Predictors of Internalizing Problems: Temperamental Inhibition

One way to shed light on the development of withdrawn and anxious-depressed behavior is the examination of associations with specific temperamental traits (e.g., Klein et al. 2012). Behavioral inhibition is the temperamental disposition to be wary and fearful when encountering unfamiliar situations. It is a relatively broad construct that encompasses inhibition toward unfamiliar children and adults, in situations of separation, and in unfamiliar situations and environments (Kagan 2012; Zentner and Bates 2008). Behavioral inhibition is one of the most stable individual characteristics in personality development and may be a precursor of withdrawn and anxious behavior later in life. Behaviorally inhibited children seem to be at risk for developing anxiety disorders (see for a review Degnan et al. 2010). However, studies unraveling the role of temperament in the development of anxiety and mood disorders during adolescence are scarce (Fox et al. 2005). In the current study, we examined the role of behavioral inhibition in the development of internalizing problems in adolescence.

Predictors of Internalizing Problems: Parental Sensitivity

In addition to temperamental characteristics, environmental factors may contribute to the development of children's internalizing behavior problems. Parenting is one of the most salient environmental factors in a child's life, and in particular (in-)sensitive parenting may be of interest when studying the development of internalizing problems.

Sensitive caregivers are able to perceive their child's signals in an accurate way and react promptly and adequately, and thereby promote a secure attachment relationship with their child (Ainsworth et al. 1987). Sensitive parenting has been shown to predict positive developmental outcomes in the social-emotional domain (Jaffari-Bimmel et al. 2006; Roisman and Fraley 2012a; Sroufe et al. 2005) and in the cognitive domain (Roisman and Fraley 2012a) and has been associated with fewer internalizing problems in children (Kok et al. 2013). Sensitive parents may buffer the development of children's internalizing behavior by helping their child cope with feelings of anxiety and the tendency to withdraw in threatening situations (Gilissen et al. 2007). In addition, children with insensitive parents are more likely to form an insecure attachment relationship with their parents. They tend to develop negative self-perceptions and are more unpredictable in their future relationships (Sroufe et al. 2005). The continuous quality of the relationship with the parent and the child's internal working model of that relationship both may consolidate the development of internalizing problems (Booth-LaForce and Oxford 2008).

Although results from pertinent studies confirm an association between less optimal parenting and lower levels of children's internalizing behavior problems, the strength of this association seems to be modest. In two meta-analyses, parenting explained 4 % of the variance of childhood anxiety (McLeod et al. 2007a) and 8 % of the variance of childhood depression (McLeod et al. 2007b), and the relationship between internalizing problems and parenting varied between different parenting dimensions. Research that focused on the effects of sensitive parenting found small to modest associations with internalizing problems (Kok et al. 2013; Roisman and Fraley 2012b). It is important to shed more light on the relationship between sensitive parenting and internalizing problems and to unravel underlying mechanisms that explain this association.

Predictors of Internalizing Problems: The Interplay Between Sensitivity and Temperamental Inhibition

Inhibited temperament and parenting can be seen as two separate factors that contribute to the development of children's internalizing behaviors, but their interplay also may be important (Burgess et al. 2005). It seems plausible that parenting does not affect children's internalizing problems directly, but indirectly through behavioral inhibition that is a precursor of more serious internalizing problems. Although inhibited behavior is a relatively stable personality trait, it has become clear that it is open to change over time, and that environmental factors such as parenting do affect child inhibition (Bates et al. 2012;

Kagan 2012; Rubin et al. 2009). One of the main challenges for children with a history of behavioral inhibition is to learn to regulate their emotions (Fox et al. 2005). Sensitive parents support the process of emotion regulation in their children (Kawabata et al. 2011). On top of that, sensitive parents show their children that communication is a reciprocal and responsive process. They model interactional skills (Weinfield et al. 2008) that are essential for preventing or overcoming inhibited behavior. Although sensitive parenting is associated with less child inhibition, over-solicitous parenting behavior may maintain the inhibited behavior of a child. The bottom line seems to be that sensitive parents are aware that it is important to stimulate children to master their environment whenever possible and appropriate, and to support and structure their behavior when needed. In doing exactly this, sensitive parents encourage and support their child and stimulate the child's independence (Degnan et al. 2010; Fox et al. 2005).

Apart from indirect effects from parental sensitivity to internalizing behavior through behavioral inhibition, transactional processes starting early in life should be considered (Sameroff and MacKenzie 2003; Sroufe et al. 2005). The inhibited behavior of a child may evoke more (often well-intended) high-control parenting strategies such as over-involved, insensitive and over-controlling parenting, which reinforces the insecurity of the child (Burgess et al. 2005; Rubin et al. 2009). Therefore, it is essential to include the interplay between parenting behaviors and temperamental inhibition in studies of the development of internalizing behavior problems.

The Present Study

The aim of the Leiden Longitudinal Adoption Study is to examine the effects of the early parent–child relationship on the development of children. By studying parent–child dyads without a biological relation, we are able to rule out genetic resemblance as a confounder. All children in our sample were adopted at a very young age (mean age at arrival 10.76 weeks; $SD = 5.53$), which means that effects of early deprivation are minimized. A previous study conducted on this sample focused on developmental outcomes in middle childhood (Stams et al. 2002). This study reported that early mother–infant interactions predicted later social-emotional and cognitive development, over and above the effect of infant temperament. In more recent work, we focused on developmental outcomes in adolescence, such as social development (Jaffari-Bimmel et al. 2006) and externalizing problems (Van der Voort et al. 2013). The aim of the current study is to expand this body of research by examining the precursors of internalizing behavior in adolescence. We specifically focus on the

contributions of children's temperamental inhibition and observed sensitive parenting.

The unique contribution of our study is that three important methodological challenges are met. First, the longitudinal design covering early infancy to adolescence allows for the inclusion of transactional processes between preceding and concurrent parenting and child factors. Second, because the adopted children in our study are not genetically related to their adoptive parents, associations between parenting and child behavior are not confounded with common genetic make-up. Third, maternal sensitivity is measured through behavioral observations, which means that we were able to exclude rater covariance between parenting behavior and child behavior.

We hypothesize that higher levels of children's behavioral inhibition are associated with concurrent and future higher levels of withdrawn as well as anxious-depressed behavior. We also expect that more maternal sensitivity predicts lower levels of withdrawn and anxious-depressed child behavior, and that this prediction is partly explained by an indirect effect through the ameliorating effect of maternal sensitivity on behavioral inhibition.

Methods

Participants

We followed 160 internationally adopted children, 75 boys and 85 girls, from infancy to adolescence. The children and their families originated from two samples of early-adopted children. The first sample involved 90 families without biological children (Juffer 1993), the second sample involved 70 families who already had one or more biological or adopted children (Rosenboom 1994).

All adoptive families were randomly recruited through Dutch adoption organizations. The children were born in Sri Lanka ($N = 86$), South Korea ($N = 49$), or Colombia ($N = 25$). In Korea and Colombia children were in private children's homes prior to adoption, children from Sri Lanka remained with their birth mother until the adoption. The children's mean age at arrival was 10.76 weeks ($SD = 5.53$). For 124 children the health condition at arrival was good, 29 children displayed a mediocre health, and seven children were in poor health (Juffer 1993; Rosenboom 1994).

All children were placed in Caucasian families with predominantly middle-class or upper-class backgrounds with the adoptive mother as the primary caregiver (for more details, see Juffer 1993; Rosenboom 1994; Stams et al. 2002). When the children were between 6 and 9 months of age, 50 randomly selected families received a short-term intervention that promoted maternal sensitivity

(Juffer et al. 2005) and predicted fewer internalizing behavior problems at 7 years (Stams et al. 2001). In the current analyses we controlled for the short-term intervention effects on maternal sensitivity and internalizing behavior as we did in previous reports on this sample (e.g., Van der Voort et al. 2013).

Procedure

During infancy, we visited the families at home to administer questionnaires, and implement the intervention for the intervention group. The participants came to the laboratory and we assessed maternal sensitivity during mother–child interaction. At age 7 years, we visited families at home to observe mother–child interaction, to interview the mother, and to administer questionnaires. At age 14 years, we visited the families at home again to observe mother-adolescent interaction, to interview the adolescent and the adoptive parent, and to administer tasks and questionnaires. Ethical guidelines were followed throughout the study.

Attrition

Of the 160 families that participated in infancy 146 families participated in middle childhood and 146 families participated in adolescence. Only three families participated neither in middle childhood nor in adolescence. Lack of time, death of the adoptive mother, lack of interest, and health problems in the family were amongst the reasons for attrition (for details see Jaffari-Bimmel et al. 2006; Stams et al. 2002). Bonferroni corrected tests confirmed the absence of selective attrition with respect to background variables and core constructs such as temperament and sensitivity (see Jaffari-Bimmel et al. 2006).

Measures

Maternal Sensitivity

At 12, 18, and 30 months, mother's sensitive behavior was assessed during structured tasks with the child (building a tower or solving puzzles) in the laboratory. The Egeland/Erickson 7-point sensitivity rating scales (Egeland et al. 1990; Erickson et al. 1985) were used to rate supportive presence, intrusiveness, sensitivity and timing, and clarity of instruction. The averaged Cohen's kappa's for agreement within one scale point were .91 (12 months), .90 (18 months), and .97 (30 months) (Stams et al. 2002). For the current study on children's withdrawn and anxious-depressed behavior we were interested in maternal supporting and structuring behavior represented by the scales supportive presence, sensitivity and timing, and clarity of

instruction (see also Van der Voort et al. 2013). All scales were based on the average of the raw scores at 12, 18, and 30 months.

To ensure age-appropriateness of the sensitivity assessments at 7 and 14 years we used more difficult tasks (e.g., Tangram puzzles) and took into account the more verbal nature of the interaction between mother and child at these ages, compared to the more physical interaction in infancy (Jaffari-Bimmel et al. 2006; Stams et al. 2002). Kappas ranged from .92 to .96 at 7 years (Stams et al. 2002), intraclass correlations ranged from .91 to .95 at 14 years (Jaffari-Bimmel et al. 2006). To control for the intervention effect (Juffer et al. 2005) we regressed maternal sensitivity on the experimental variable (experimental vs. control group). The residual sensitivity scores centered at the original mean were used in further analyses.

Behavioral Inhibition

At 12, 18, and 30 months, temperament was assessed with the Dutch Temperament Questionnaire (Kohnstamm 1984), an adaptation of the Infant Characteristics Questionnaire (Bates et al. 1979). Mothers rated their child's behavior on 19 seven-point rating scales. For this study we were especially interested in the three items that focused on inhibited behavior: (a) being shy in reaction to unfamiliar people, (b) being shy in reaction to a novel environment without the presence of mother or father, and (c) finding it difficult to adapt to new circumstances. For each of these three items, we used the average of the raw scores from the 12, 18, and 30 month measurements. Cronbach's alpha for behavioral inhibition in infancy was .83.

At 7 and 14 years, mothers completed age-adapted versions of the DTQ, consisting of 27 items. At these ages, the three items that measured behavioral inhibition were: (d) is friendly to, and easily approaches unfamiliar visitors (reversed), (e) easily approaches unfamiliar children/youth (reversed), and (f) is shy in the presence of unfamiliar children/people. Cronbach's alphas for the inhibition scales were .72 at 7 years and .84 at 14 years. In our model the individual items of behavioral inhibition were used as indicators, with high scores representing high levels of inhibited behavior. In the case of three adolescents, mother report was not available, but father report was, and therefore father report was used.

Internalizing Behavior

When the children were 7 and 14 years old, mothers completed the child behavior checklist (CBCL). The CBCL contains 113 descriptions of problem behavior that are rated on a three-point scale (Achenbach 1991; Verhulst et al. 1997). Two syndromes were derived from the CBCL:

withdrawn behavior (sum of 9 items) and anxious-depressed behavior (sum of 14 items). The CBCL internalizing scales differed from the inhibition scales. The items of behavioral inhibition point to reactions to unknown persons or novel situations, for example: ‘easily approaches unfamiliar children’ (reversed). The withdrawn and anxious items of the CBCL point to internalizing behavior in general, for example: ‘prefers to be alone’. Cronbach’s alphas for withdrawn and anxious-depressed behavior were .59 and .81, respectively, at 7 years, and .76 and .87 at 14 years. According to the CBCL manual, one item (feeling sad and unhappy) belonged to the withdrawn as well as the anxious-depressed scale (Verhulst et al. 1997). We decided to keep the item in both syndrome-scales for comparability with other studies. In the case of five adolescents, mother report was not available, but father report was, and therefore father report was used. In our study, boys showed significantly more internalizing problems than girls in middle childhood (Stams et al. 2000). We did not find significant mean differences between adolescent boys and girls, $p > .05$.

CBCL scale scores were log-transformed to reduce skewness. The transformed scores of withdrawn behavior ranged from 0 to 0.95 ($M = 0.41$, $SD = 0.27$, $N = 146$) at 7 years and from 0 to 1.04 ($M = 0.43$, $SD = 0.32$, $N = 146$) at 14 years. The transformed scores of anxious-depressed behavior ranged from 0 to 1.34 ($M = 0.51$, $SD = 0.34$, $N = 146$) at 7 years and from 0 to 1.30 ($M = 0.49$, $SD = 0.37$, $N = 146$) at 14 years.

To control for the intervention effect on internalizing problems (Stams et al. 2001), we regressed internalizing problems on the experimental variable (experimental vs. control group). The residual scores were used in further analyses.

Statistical Analyses

We tested structural equation models for maternal sensitivity, behavioral inhibition and internalizing behavior with EQS 6.1 for Windows (Bentler 1995). We first tested the basic model for maternal sensitivity and child behavioral inhibition. Based on this model, we then formulated two separate models for children’s withdrawn behavior and anxious-depressed behavior. All models were tested in two stages. In the first stage, full models were tested with predictive relations between all constructs and, if applicable, concurrent predictions from maternal sensitivity and behavioral inhibition to problem behavior. In the second stage, non-significant structural paths were removed and the more parsimonious models were tested.

The key predictors of the model were latent variables with multiple indicators. When comparable indicators were used over time we allowed the residuals of these variables

to correlate. To avoid the specification of a too large model in relation to our sample size, we analyzed withdrawn and anxious-depressed behavior as manifest variables (sum scores across items) instead of using separate items as indicators. The data did not show significant multivariate kurtosis; therefore regular ML estimation was used. Any meaningful difference in significance of paths between robust estimation and regular ML estimation is reported. To assess model fit, the χ^2 and the ratio between χ^2 and degrees of freedom are reported. A ratio smaller than 2.0 indicates a good model fit (Tabachnick and Fidell 2001). Also the NNFI and the CFI are reported. If the values of these indices exceed .95 the data fit the model well. Lastly, the root mean square error of approximation (RMSEA) and its 90 % confidence interval are reported. RMSEA values $< .05$ indicate good model fit (Byrne 2006; Tabachnick and Fidell 2001). To compare nested models, we used the χ^2 difference test, p values $> .05$ indicate that there is no significant difference between two nested models (Byrne 2006; Tabachnick and Fidell 2001).

Missing data on indicator-level were handled with ML imputation in EQS. To ensure the appropriate parameter estimates for the sample size we used observed values to estimate standard errors instead of expected values (Savalei 2010). The percentage of missing data for the final models ranged from 0 % (measures in infancy) to 20 % (sensitivity in adolescence) (see Table 1).

Results

Preliminary Analyses

Table 1 represents the descriptive statistics of all main model variables. Preliminary analyses were performed to check for outliers and examine skewness and kurtosis. Prior to analyses we detected one multivariate outlier that was however retained because it was no longer an outlier after missing imputation. Final analyses performed with and without this participant revealed similar results. Before performing the central analyses we inspected the correlation matrix of all variables (Table 2) and tested the measurement models. All indicators loaded on the latent variables of interest and model fit was satisfactory. To test for possible moderator effects of gender and level of behavioral inhibition in infancy, we calculated Box’s M statistics. Results did not indicate any differences in covariance matrices for anxious-depressed behavior for boys and girls, $p = .66$, nor for more and less inhibited children (median split on behavioral inhibition in infancy) $p = .65$. Covariance matrices for withdrawn behavior were not different for boys and girls, $p = .052$, nor for more and less inhibited children, $p = .61$.

Table 1 Descriptives of model variables $N = 160$

	Infancy			Middle childhood			Adolescence		
	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>
Sensitivity									
Supportive presence	3.60	1.16	160	2.48	1.63	136	4.76	1.19	128
Clarity of instruction	3.45	1.06	160	2.91	1.62	136	4.09	1.22	128
Sensitivity and timing	3.71	1.09	160	2.71	1.72	136	4.31	1.19	128
Temperament									
Item A shy reaction strangers	3.11	1.07	160						
Item B shy reaction novel environment	3.84	1.21	157						
Item C difficult to adapt to new circumstances	2.17	0.87	160						
Item D ^a easily approaches strangers				2.90	1.67	146	3.18	1.64	137
Item E ^a easily approaches unfamiliar children/youth				3.37	1.67	144	3.58	1.67	138
Item F shy in presence of unfamiliar people				3.30	1.61	143	3.45	1.75	138
Problem behavior									
Withdrawn behavior				2.04	1.85	146	2.49	2.64	146
Anxious depressed behavior				3.37	3.46	146	3.45	4.00	146

Descriptives for sensitivity and problem behavior are based on original (untransformed and uncorrected) values

^a Reversed for sake of interpretation

Model Testing

Behavioral Inhibition

With Model 1 (Fig. 1) the relationships between maternal sensitivity and child behavioral inhibition were tested without the modeling of internalizing behavior. Standardized factor loadings for the latent variables sensitivity and behavioral inhibition ranged from .51 to .97. The independence model that tested the hypothesis that the variables were uncorrelated was rejected. Fit indices (Table 3) indicated that the full model fitted the data well, $\chi^2 (df = 109, N = 160) = 126.91, p = .12, \chi^2/df = 1.16, NNFI = .96, CFI = .97, RMSEA = .05, CI (RMSEA) = .04-.07$. The final model with all non-significant paths removed also fitted the data well, $\chi^2 (df = 115, N = 160) = 133.86, p = .11, \chi^2/df = 1.16, NNFI = .96, CFI = .97, RMSEA = .05, CI (RMSEA) = .04-.07$ (Table 3). The analysis revealed that there was no significant difference in fit between the two models, $\chi^2 \text{ dif } (6) = 6.95, p = .33$, and therefore the more parsimonious model was preferred. The final model showed that higher levels of maternal sensitivity in adolescence were predicted by higher levels of maternal sensitivity in infancy and middle childhood. Behavioral inhibition showed stability: behavioral inhibition in infancy predicted behavioral inhibition in middle childhood which in turn predicted behavioral inhibition in adolescence. Furthermore, more maternal sensitivity in infancy and more maternal sensitivity in middle childhood predicted less behavioral inhibition in adolescence, although in the robust solution the former path was not significant, $p = .061$. All direct standardized paths

are displayed in Fig. 1. In addition, more behavioral inhibition in infancy indirectly predicted more behavioral inhibition in adolescence through more behavioral inhibition in middle childhood, $\beta = .26, p < .001$.

Withdrawn Behavior

In Model 2 (Fig. 2), we tested the relationships between maternal sensitivity, child behavioral inhibition, and withdrawn behavior in middle childhood and adolescence. The independence model that tested the hypothesis that the variables were uncorrelated was rejected. The full model represented the data well, $\chi^2 (df = 133, N = 160) = 150.01, p = .15, \chi^2/df = 1.13, NNFI = .95, CFI = .97, RMSEA = .05, CI (RMSEA) = .03-.07$ (Table 3). The more parsimonious model with all non-significant paths removed also represented the data well, $\chi^2 (df = 147, N = 160) = 164.81, p = .15, \chi^2/df = 1.12, NNFI = .96, CFI = .97, RMSEA = .05, CI (RMSEA) = .03-.07$ (Table 3), and revealed no significant difference of fit compared with the full model, $\chi^2 \text{ dif } (14) = 14.80, p = .39$. All paths between maternal sensitivity and behavioral inhibition that were found in Model 1 were still significant in Model 2. The path from sensitivity in infancy to inhibition in adolescence was significant not only in the normal solution but also in the robust solution. Withdrawn behavior showed moderate stability over time. More behavioral inhibition in middle childhood and adolescence predicted more concurrent withdrawn behavior. More withdrawn behavior in middle childhood predicted more maternal sensitivity and more

Table 2 Correlation matrix of model variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
<i>Maternal sensitivity^a</i>																							
Infancy																							
1 SP																							
2 CI	.77**																						
3 ST	.75**	.86**																					
Middle childhood																							
4 SP	.12	.09	.03																				
5 CI	.11	.13	.05	.69**																			
6 ST	.09	.15	.08	.73**	.85**																		
Adolescence																							
7 SP	.31**	.30**	.21*	.16	.19*	.14																	
8 CI	.26**	.31**	.24*	.19*	.26**	.20*	.82**																
9 ST	.28**	.27**	.21*	.17	.21*	.17	.87**	.89**															
<i>Behavioral inhibition</i>																							
Infancy																							
10 A	.00	.03	-.03	-.00	.01	.02	.14	.22*	.20*														
11 B	.03	.01	-.04	-.05	-.01	-.05	.06	.12	.05	.75**													
12 C	-.06	-.08	-.11	-.08	-.07	-.08	.17	.18*	.11	.53**	.60**												
Middle childhood																							
13 D ^b	.06	-.01	.04	-.14	-.20*	-.16	.05	.08	.08	.37**	.33**	.12											
14 E ^b	.05	.10	.09	.02	.05	-.01	.17	.10	.06	.35**	.31**	.10	.40**										
15 F	.05	-.00	-.01	-.09	-.05	-.04	.09	.03	.04	.32**	.29**	.13	.40**	.61**									
Adolescence																							
16 D ^b	-.11	-.10	-.08	-.24*	-.26**	-.24**	-.01	.01	-.06	.21*	.22*	.16	.40**	.38**	.42**								
17 E ^b	-.06	-.09	-.02	-.20*	-.19*	-.22*	.09	.08	.03	.11	.14	.08	.32**	.42**	.40**	.60**							
18 F	-.15	-.18*	-.09	-.18*	-.19*	-.18	-.03	.04	-.03	.10	.11	.10	.29**	.30**	.40**	.65**	.68**						
<i>Withdrawn behavior^{a,c}</i>																							
19 Middle childhood	.14	.07	.06	.06	.01	.02	.21*	.25**	.23*	.16*	.18*	.13	.24**	.18*	.29**	.23**	.29**	.35**					
20 Adolescence	.05	.03	.02	-.11	-.03	-.07	.18*	.22*	.19*	.11	.07	.13	.10	.14	.20*	.35**	.45**	.42**	.56**				
<i>Anxious depressed behavior^{a,c}</i>																							
21 Middle childhood	.05	.07	.01	.05	.07	.01	.14	.19*	.17	.15	.15	.14	-.01	.11	.14	.14	.11	.25**	.66**	.46**			
22 Adolescence	.03	.00	.01	.01	-.00	.01	.11	.16	.14	.05	.01	.23*	-.01	.04	.10	.29**	.28**	.38**	.47**	.64**	.45**		

SP supportive presence, CI clarity of instruction, ST sensitivity and timing

* $p < .05$; ** $p < .01$; matrix is based on non-imputed data

^a Variables were corrected for the intervention

^b Items were reversed for the sake of interpretation

^c Problem behavior scores are log-transformed

behavioral inhibition in adolescence (all direct standardized paths are displayed in Fig. 2).

Withdrawn behavior in adolescence was predicted indirectly in more than one way. First, more maternal sensitivity in infancy and middle childhood predicted less withdrawn behavior in adolescence through less behavioral inhibition in adolescence, $\beta = -.06, p < .05$ and $\beta = -.09, p < .05$. The indirect path from sensitivity in infancy to withdrawn behavior in adolescence was significant in the regular ML solution, $p = .041$, but not in the robust solution, $p = .071$. Second, more behavioral inhibition in infancy and middle childhood predicted more withdrawn behavior in adolescence through behavioral inhibition at later points in time and withdrawn behavior in middle

childhood, $\beta = .16, p < .01$ and $\beta = .34, p < .001$. To conclude, in the robust solution withdrawn behavior in middle childhood predicted more withdrawn behavior in adolescence through behavioral inhibition in adolescence, $\beta = .06, p < .05$. This path was not significant in the regular ML solution, $p = .059$. The final model explained 41 % of the variance in withdrawn behavior in adolescence.

Anxious-Depressed Behavior

In Model 3 (Fig. 3), we tested the relationships between maternal sensitivity, child behavioral inhibition, and anxious-depressed behavior in middle childhood and adolescence. The independence model that tested the hypothesis that the variables were uncorrelated was rejected. The full model represented the data well, $\chi^2 (df = 133, N = 160) = 155.27, p = .09, \chi^2/df = 1.17, NNFI = .95, CFI = .96, RMSEA = .05, CI (RMSEA) = .04-.07$ (Table 3). The more parsimonious model with all non-significant paths removed represented the data moderately well, $\chi^2 (df = 149, N = 160) = 176.43, p = .06, \chi^2/df = 1.18, NNFI = .95, CFI = .96, RMSEA = .06, CI (RMSEA) = .04-.07$ (Table 3), and revealed no significant difference of fit with the full model, $\chi^2 dif (16) = 21.16, p = .17$. All paths between sensitivity and behavioral inhibition that were found in Model 1 were also significant in Model 3. Anxious-depressed behavior in adolescence was predicted directly and positively from anxious-depressed behavior in middle childhood and behavioral inhibition in adolescence. More behavioral inhibition in middle childhood predicted less anxious-depressed behavior in adolescence (all standardized direct paths are displayed in Fig. 3). In contrast, indirectly, more behavioral inhibition in middle childhood predicted

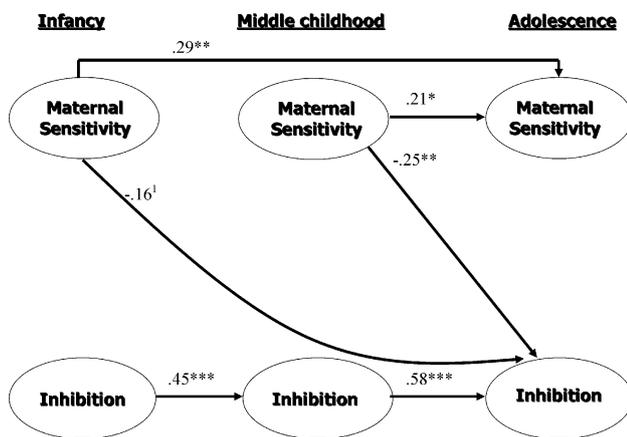


Fig. 1 Final structural equation model 1 for sensitivity and behavioral inhibition ($N = 160$). Only significant standardized coefficients are shown. For the sake of clarity indicators and error covariances are not presented. ¹This path was significant ($p < .05$) in the regular solution, but not in the robust solution of the final model. * $p < .05$; ** $p < .01$; *** $p < .05$ (two-tailed)

Table 3 Fit indices for three structural equation models; behavioral inhibition, withdrawn behavior, and anxious depressed behavior

Model	df	χ^2	χ^2/df	NNFI	CFI	RMSEA	RMSEA 90 % CI	$\Delta\chi^2$ ^a
Model 1: behavioral inhibition								
Independence model	153	1,750.34						
Full model	109	126.91	1.16	.96	.97	.05	.04–.07	
Parsimonious model	115	133.86	1.16	.96	.97	.05	.04–.07	6.95 (6), $p = .33$
Model 2: withdrawn behavior								
Independence model	190	1,877.02						
Full model	133	150.01	1.13	.95	.97	.05	.03–.07	
Parsimonious model	147	164.81	1.12	.96	.97	.05	.03–.07	14.80 (14), $p = .39$
Model 3: anxious-depressed behavior								
Independence model	190	1,842.40						
Full model	133	155.27	1.17	.95	.96	.05	.04–.07	
Parsimonious model	149	176.43	1.18	.95	.96	.06	.04–.07	21.16 (16), $p = .17$

NNFI non-normed fit index, CFI comparative fit index, RMSEA root mean square error of approximation

^a Compared to full model

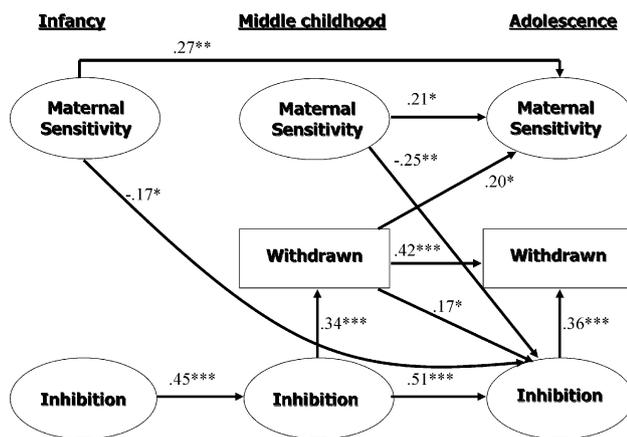


Fig. 2 Final structural equation model 2 for sensitivity, behavioral inhibition and withdrawn behavior ($N = 160$). Only significant standardized coefficients are shown. For the sake of clarity indicators and error covariances are not presented. * $p < .05$; ** $p < .01$; *** $p < .05$ (two-tailed)

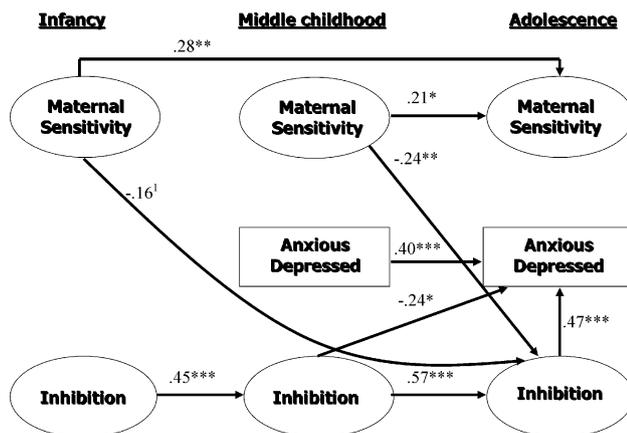


Fig. 3 Final structural equation model 3 for sensitivity, behavioral inhibition and anxious-depressed behavior ($N = 160$). Only significant standardized coefficients are shown. For the sake of clarity indicators and error covariances are not presented. ¹This path was significant ($p < .05$) in the regular solution, but not in the robust solution of the final model. * $p < .05$; ** $p < .01$; *** $p < .05$ (two-tailed)

more anxious-depressed behavior in adolescence through behavioral inhibition in adolescence, $\beta = .27, p < .001$. The total effect of behavioral inhibition in middle childhood on anxious-depressed behavior in adolescence was not significant. Finally, more maternal sensitivity in middle childhood predicted less anxious-depressed behavior in adolescence indirectly through less behavioral inhibition in adolescence, $\beta = -.11, p < .05$.

The indirect path from maternal sensitivity in infancy to anxious-depressed behavior through inhibition in adolescence was not significant, $p = .057$. The final model

explained 31 % of the variance in anxious-depressed behavior in adolescence.

Discussion

In this longitudinal study covering infancy to adolescence, we investigated the interplay between children's inhibited temperament and maternal sensitivity on the development of children's withdrawn and anxious-depressed behavior. By examining adoptive families we ruled out shared genetics between parents and children. We found that child inhibition was an important predictor of anxious-depressed behavior in adolescence and of withdrawn behavior in middle childhood and adolescence. More maternal sensitivity in infancy and middle childhood predicted less inhibited behavior in adolescence and had a small, protective, indirect effect on withdrawn behavior in adolescence through reduced inhibited behavior. Anxious-depressed behavior also was predicted indirectly by maternal sensitivity in middle childhood but not by maternal sensitivity in infancy.

Maternal sensitivity showed a direct protective effect on children's inhibited behavior and an indirect protective effect on children's internalizing problems. The finding that sensitive parenting has a direct effect on the supposedly more constitutionally based inhibited behavior of a child is supported by previous research. Inhibited behavior is a personality trait that is affected by environmental factors such as parenting (Bates et al. 2012; Fox et al. 2005). Sensitive parenting reinforces the secure-base behavior of children. Children with sensitive parents feel free to explore the world, knowing that their attachment figure is available when needed (Bowlby 1973; Cassidy 2008). Sensitive parenting has proven to be of importance for the development of emotion regulation (Kawabata et al. 2011; Weinfeld et al. 2008), which is an important challenge for inhibited children. Emotion regulation capacities serve as a protective factor for the development of later psychopathology (Carlson 1998; Groh et al. 2012). Also, children with sensitive parents experience communication as a reciprocal and responsive process, and may develop behavioral reciprocity and more optimal interaction skills (Weinfeld et al. 2008). The lack of these specific skills may form the foundation of inhibited behavior that, in turn, forms the foundation for internalizing problems. Although the indirect effect of maternal sensitivity on internalizing behavior in our study is small, it supports this line of reasoning. In previous research, comparably small effect sizes have been found, even in genetically related samples that were followed for a shorter period of time (Kok et al. 2013). Also, it should be realized that indirect effects are based on a multiplication of direct effects and therefore

often will be small in magnitude. Qualifications of effect sizes are open to debate and small effect sizes may have important implications for large populations (McCartney and Rosenthal 2000).

In this study, we did not find strong transactional processes in which children's behavior at different points in time elicited parental behavior and vice versa. First, we found that sensitive parenting in infancy and middle childhood predicted less inhibited behavior in adolescence, but not inhibited behavior in middle childhood. In previous research, it has been suggested that some children display inhibited, withdrawn behavior in adolescence as a reaction to the specific stresses of this period, and that this behavior may be a risk factor for depression (Buck and Dix 2012). Sensitive parenting may protect specifically against the development of these age-specific sequelae of inhibited temperament. Second, we found that children who showed more withdrawn behavior in middle childhood tended to have more sensitive mothers at age 14. Mothers may respond to their children's withdrawn behavior by supporting them with more sensitive parenting. Yet, we did not find evidence for a stronger transactional process starting in earlier years. This is in line with our previous study on the development of externalizing behavior (Van der Voort et al. 2013). It should be noted that the lack of genetic ties between the children and their adoptive mothers in the current study might have decreased the associations between parenting and child outcomes compared to studies on genetically related families (Kok et al. 2013; Roisman and Fraley 2012b).

Bögels and Perotti (2011) argue that we should be careful to interpret transactional processes only in light of the mother–child dyad. Increase in maternal care may be not only a function of mother–child interaction, but also can be affected by the father: paternal socially anxious behavior elicits child socially anxious behavior, in which case mothers try to compensate for the anxious paternal role model by increasing their own care. It is argued that this increase in care might reinforce the child's anxious behavior (Bögels and Perotti 2011), but we did not find evidence for this idea. Nevertheless, in future studies paternal sensitivity should be assessed to examine the influence of the parental interplay on the development of internalizing behavior.

We found a negative direct relationship between inhibition in middle childhood and anxious-depressed behavior in adolescence. Statistically, this path may be explained by the very strong indirect positive path between these constructs. The fact that the total effect of inhibition in middle childhood on anxious-depressed behavior in adolescence was not significant supports this conclusion. In theory, it is possible that children who do not show stability in inhibition and anxious depressed behavior are the children who learn to deal with their wariness in middle childhood and

this accomplishment may enhance their later self-esteem and confidence.

In line with earlier studies (Booth-LaForce and Oxford 2008; Groh et al. 2012; Verhoeven et al. 2012), we did not find evidence for differential developmental models of internalizing behavior for boys and girls. Neither did we find that the development of internalizing behavior differs between children with low levels versus children with high levels of inhibition. In several studies, temperamental differences were found to be of importance when examining relationships between parenting and child behavior (e.g., Belsky et al. 1998; Mesman et al. 2009). However, we should keep in mind that in our study differences that we looked at were based on the level of inhibited behavior and that most effects in other studies have been found for higher order traits such a difficult temperament (e.g., Van Zeijl et al. 2007) or negative emotionality (e.g., Belsky et al. 1998).

Several limitations of this study should be mentioned. First, internalizing behavior problems and child temperament were reported by the mother, which may artificially increase correlations between these constructs. On the other hand, mothers seem to be a more reliable source of information on internalizing problems than for example teachers, because internalizing behaviors are not always readily observable (Stanger and Lewis 1993). Also, mothers' reports may be a better indicator of long-term poor outcome than teachers' reports (Ferdinand et al. 2006). Second, we modeled concurrent relationships from temperament and maternal sensitivity to internalizing problems. However, the effects actually might be in the opposite direction; internalizing behavior may have an effect on children's inhibition, comparable to the effect we found from withdrawn behavior in middle childhood to inhibited behavior in adolescence. We argue that this direction of concurrent effects is less plausible because temperamental inhibition as a constitutional trait is more likely a precursor of internalizing problems than a consequence (Degnan et al. 2010; Klein et al. 2012). Finally, our sample size was rather small for the models that were tested, potentially limiting the generalization of our results. Our results seem, however, consistent with earlier findings, and future replications may document the robustness of our models.

Conclusions and Practical Implications

Internalizing behavior problems are less visible and often less readily acknowledged than externalizing problems, but they may cause serious adaptational problems in later life. In this study, we examined the development of adolescent internalizing problems. We observed genetically unrelated

mother–child dyads in order to disentangle environmental and genetic effects. We conclude that children’s inhibited temperament and sensitive parenting are both predictors of adolescent internalizing behavior. First, inhibited temperament is an important predictor of withdrawn and anxious-depressed behavior. This supports the idea that inhibited behavior may be a risk factor for the development of internalizing disorders (see also Degnan et al. 2010). Second, early parental sensitivity is an important protective factor against the development of adolescent behavioral inhibition. Inhibited behavior may be especially salient in adolescence (Buck and Dix 2012). Early sensitive parenting seems to promote the interpersonal skills that children need in order to cope with the vicissitudes of adolescence and to protect them from developing withdrawn and anxious-depressed behavior. Parent training to promote sensitive parenting in the years before adolescence may thus contribute to protect children from developing inhibited behavior in their adolescent years and decrease the risk of internalizing problems. This knowledge may support social workers, clinicians and counselors, and policy makers in serving all parents and adolescents.

Acknowledgments Support from the Netherlands Organization for Scientific Research to the fourth author (NWO VIDI and VICI grant) and to the sixth author (NWO SPINOZA Prize) is gratefully acknowledged. Femmie Juffer is supported by Wereldkinderen.

Author contributions All authors have contributed to the manuscript in a meaningful way. F.J., M.J.B.K., and M.H.v.I.J. conceived of the study and its design and performed the measurements; M.L., F.J., M.J.B.K., and M.H.v.I.J. participated in the coordination of the study; A.v.d.V., M.L., M.H.v.I.J., M.J.B.K., and F.J. participated in the statistical analysis and the interpretation of the data; A.v.d.V., M.L., F.J., M.J.B.K., and M.H.v.I.J. drafted the manuscript; C.S. supported the interpretation of the data and the drafting of the manuscript. All authors read and approved the final manuscript.

References

- Achenbach, T. M. (1991). *Manual for the child behavior checklist and 1991 profiles*. Burlington, VT: University of Vermont, Department of Psychiatry.
- Ainsworth, M. D., Blehar, M., Waters, E., & Wall, S. (1987). *Patterns of attachment*. Hillsdale, NJ: Erlbaum.
- Bates, J. E., Freeland, C. A. B., & Lounsbury, M. L. (1979). Measurement of infant difficulty. *Child Development*, *50*, 794–803.
- Bates, J. E., Schermerhorn, A. C., & Petersen, I. T. (2012). Temperament and parenting in developmental perspective. In M. Zenter & R. L. Shiner (Eds.), *Handbook of temperament*. New York: Guilford Press.
- Belsky, J., Hsieh, K. H., & Crnic, K. (1998). Mothering, fathering, and infant negativity as antecedents of boys’ externalizing problems and inhibition at age 3 years: Differential susceptibility to rearing experience? *Development and Psychopathology*, *10*, 301–319.
- Bentler, P. M. (1995). *EQS structural equations program manual*. Encino, CA: Multivariate Software.
- Bögels, S. M., & Perotti, E. C. (2011). Does father know best? A formal model of the paternal influence on childhood social anxiety. *Journal of Child and Family Studies*, *20*, 171–181.
- Boomsma, D. I., Van Beijsterveldt, C. E. M., & Hudziak, J. J. (2005). Genetic and environmental influences on anxious/depression during childhood: A study from the Netherlands Twin Register. *Genes Brain and Behavior*, *4*, 466–481.
- Booth-LaForce, C., & Oxford, M. L. (2008). Trajectories of social withdrawal from grades 1 to 6: Prediction from early parenting, attachment, and temperament. *Developmental Psychology*, *44*, 1298–1313.
- Bowlby, J. (1973). *Separation*. New York: Basic Books.
- Buck, K. A., & Dix, T. (2012). Can developmental changes in inhibition and peer relationships explain why depressive symptoms increase in early adolescence? *Journal of Youth and Adolescence*, *41*, 403–413.
- Burgess, K. M., Rubin, K. H., Cheah, C. S. L., & Nelson, L. J. (2005). Behavioral inhibition, social withdrawal, and parenting. In W. R. Crozier & L. E. Alden (Eds.), *The essential handbook of social anxiety for clinicians*. New York: Wiley.
- Byrne, B. M. (2006). *Structural equation modeling with EQS, basic concepts, applications and programming* (2nd ed.). Thousand Oaks, CA: Sage.
- Carlson, E. A. (1998). A prospective longitudinal study of attachment disorganization/disorientation. *Child Development*, *69*, 1107–1128.
- Cassidy, J. (2008). The nature of the child’s ties. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 552–598). New York: Guilford Press.
- Colman, I., Wadsworth, M. E. J., Croudace, T. J., & Jones, P. B. (2007). Forty-year psychiatric outcomes following assessment for internalizing disorder in adolescence. *American Journal of Psychiatry*, *164*, 126–133.
- Degnan, K. A., Almas, A. N., & Fox, N. A. (2010). Temperament and the environment in the etiology of childhood anxiety. *Journal of Child Psychology and Psychiatry*, *51*, 497–517.
- Egeland, B., Erickson, M. F., Clemenhagen-Moon, J., Hiester, M. K., & Korfmacher, J. (1990). *24 months tools coding manual*. Project STEEP-revised 1990 from mother–child project scales.
- Erickson, M. F., Sroufe, L. A., & Egeland, B. (1985). The relationship between quality of attachment and behavior problems in preschool in a high-risk sample. *Monographs of the Society for Research in Child Development*, *50*, 147–166.
- Ferdinand, R. F., Van der Ende, J., & Verhulst, F. C. (2006). Parent-teacher disagreement regarding psychopathology in children: A risk factor for adverse outcome? *Acta Psychiatrica Scandinavica*, *115*, 48–55.
- Fox, N. A., Henderson, H. A., Marshall, P. J., Nichols, K. E., & Ghera, M. M. (2005). Behavioral inhibition: Linking biology and behavior within a developmental framework. *Annual Review of Psychology*, *56*, 235–262.
- Gilissen, R., Koolstra, C. A., Van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., & Van der Veer, R. (2007). Physiological reactions of preschoolers to fear-inducing film clips: Effects of temperamental fearfulness and quality of the parent–child relationship. *Developmental Psychobiology*, *49*, 187–195.
- Groh, A. M., Roisman, G. I., Van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., & Fearon, R. P. (2012). The significance of insecure and disorganized attachment for children’s internalizing symptoms: A meta-analytic study. *Child Development*, *83*, 591–610.
- Hoekstra, R. A., Bartels, M., Hudziak, J. J., Van Beijsterveldt, T. C. E. M., & Boomsma, D. I. (2008). Genetic and environmental influences on the stability of withdrawn behavior in children: A longitudinal, multi-informant twin study. *Behavior Genetics*, *38*, 447–461.

- Jaffari-Bimmel, N., Juffer, F., Van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., & Mooijaart, A. (2006). Social development from infancy to adolescence: Longitudinal and concurrent factors in an adoption sample. *Developmental Psychology*, *42*, 1143–1153.
- Juffer, F. (1993). *Verbonden door adoptie. Een experimenteel onderzoek naar hechting en competentie in gezinnen met een adoptiebaby [Attached through adoption. An experimental study on attachment and competence in families with an adopted baby]*. Amersfoort, The Netherlands: Academic Press.
- Juffer, F., Bakermans-Kranenburg, M. J., & Van IJzendoorn, M. H. (2005). The importance of parenting in the development of disorganized attachment: Evidence from a preventive intervention study in adoptive families. *Journal of Child Psychology and Psychiatry*, *46*, 263–274. doi:10.1111/j.1469-7610.2004.00353.x.
- Kagan, J. (2012). The biography of behavioral inhibition. In M. Zenter & R. L. Shiner (Eds.), *Handbook of temperament*. New York: Guilford Press.
- Kawabata, Y., Alink, L. R. A., Tseng, W. L., Van IJzendoorn, M. H., & Crick, N. R. (2011). Maternal and paternal parenting styles associated with relational aggression in children and adolescents: A conceptual analysis and meta-analytic review. *Developmental Review*, *31*, 240–278.
- Klein, D. N., Dyson, M. W., Kujawa, A. J., & Kotov, R. (2012). Temperament and internalizing disorders. In M. Zenter & R. L. Shiner (Eds.), *Handbook of temperament*. New York: Guilford Press.
- Kohnstamm, G. A. (1984). Bates' Infant Characteristics Questionnaire (ICQ) in the Netherlands. In *Paper presented at the fourth biennial international conference on infant studies*, New York, NY.
- Kok, R., Linting, M., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., Jaddoe, V.W.V., Hofman, A., et al. (2013). Maternal sensitivity and internalizing problems: Evidence from two longitudinal studies in early childhood. *Child Psychiatry & Human Development*. doi:10.1007/s10578-013-0369-7.
- Lamb, D. J., Middeldorp, C. M., Van Beijsterveldt, C. E. M., Bartels, M., Van der Aa, N., Polderman, T. J. C., et al. (2010). Heritability of anxious-depressive and withdrawn behavior: Age-related changes during adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry*, *49*, 248–255.
- McCartney, K., & Rosenthal, R. (2000). Effect size, practical importance, and social policy for children. *Child Development*, *71*, 173–180.
- McLeod, B. D., Weisz, J. R., & Wood, J. J. (2007a). Examining the association between parenting and childhood depression: A meta-analysis. *Clinical Psychology Review*, *27*, 986–1003.
- McLeod, B. D., Wood, J. J., & Weisz, J. R. (2007b). Examining the association between parenting and childhood anxiety: A meta-analysis. *Clinical Psychology Review*, *27*, 155–172.
- Mesman, J., Stoel, R., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., Juffer, F., Koot, H. M., et al. (2009). Predicting growth curves of early childhood externalizing problems: Differential susceptibility of children with difficult temperament. *Journal of Abnormal Child Psychology*, *37*, 625–636.
- Roisman, G. I., & Fraley, R. C. (2012a). A behavior-genetic study of the legacy of early caregiving experiences: Academic skills, social competence, and externalizing behavior in kindergarten. *Child Development*, *83*, 728–742.
- Roisman, G. I., & Fraley, R. C. (2012b). The legacy of early interpersonal experience. In J. B. Benson (Ed.), *Advances in child development and behavior* (Vol. 42, pp. 79–112). Burlington: Academic Press.
- Rosenboom, L. G. (1994). *Gemengde gezinnen, gemengde gevoelens? Hechting en competentie van adoptiebaby's in gezinnen met biologisch eigen kinderen (Mixed families, mixed feelings? Attachment and competence of adopted babies in families with biological children)*. Doctoral dissertation, Utrecht University, Utrecht, The Netherlands.
- Rubin, K. H., Coplan, R. J., & Bowker, J. C. (2009). Social withdrawal in childhood. *Annual Review of Psychology*, *60*, 141–171.
- Sameroff, A. J., & MacKenzie, M. J. (2003). Research strategies for capturing transactional models of development: The limits of the possible. *Development and Psychopathology*, *15*, 613–640.
- Savalei, V. (2010). Expected versus observed information in SEM with incomplete normal and nonnormal data. *Psychological Methods*, *15*, 352–367.
- Sroufe, L. A., Egeland, B., Carlson, E. A., & Collins, W. A. (2005). *The development of the person: The Minnesota study of risk and adaptation from birth to adulthood*. New York, NY: Guilford.
- Stams, G. J. J. M., Juffer, F., Rispen, J., & Hoksbergen, R. A. C. (2000). The development and adjustment of 7-year-old children adopted in infancy. *Journal of Child Psychology and Psychiatry*, *41*, 1025–1037.
- Stams, G. J. J. M., Juffer, F., & Van IJzendoorn, M. H. (2002). Maternal sensitivity, infant attachment, and temperament in early childhood predict adjustment in middle childhood: The case of adopted children and their biologically unrelated parents. *Developmental Psychology*, *38*, 806–821. doi:10.1037//0012-1649.38.5.806.
- Stams, G. J. J. M., Juffer, F., Van IJzendoorn, M. H., & Hoksbergen, R. A. C. (2001). Attachment-based intervention in adoptive families in infancy and children's development at age 7: Two follow-up studies. *British Journal of Developmental Psychology*, *19*, 159–180.
- Stanger, C., & Lewis, M. (1993). Agreement among parents, teachers, and children on internalizing and externalizing behavior problems. *Journal of Clinical Child Psychology*, *22*, 107–115.
- Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics*. Boston: Allyn & Bacon.
- Van der Voort, A., Linting, M., Juffer, F., Bakermans-Kranenburg, M. J., & Van IJzendoorn, M. H. (2013). Delinquent and aggressive behaviors in early-adopted adolescents: Longitudinal predictions from child temperament and maternal sensitivity. *Children and Youth Services Review*, *35*, 439–446.
- Van Zeijl, J., Mesman, J., Stolk, M. N., Alink, L. R. A., Van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., et al. (2007). Differential susceptibility to discipline: The moderating effect of child temperament on the association between maternal discipline and early childhood externalizing problems. *Journal of Family Psychology*, *21*, 626–636.
- Verhoeven, M., Bögels, S. M., & Van der Bruggen, C. C. (2012). Unique roles of mothering and fathering in child anxiety: Moderation by child's age and gender. *Journal of Child and Family Studies*, *21*, 331–343.
- Verhulst, F. C., Van der Ende, J., & Koot, H. M. (1997). *Handleiding voor de child behavior checklist-CBCL*. Manual for the Teacher's Report Form-TRF, Dutch version. Rotterdam, The Netherlands: Erasmus University Rotterdam.
- Weinfield, N. S., Sroufe, A., Egeland, B., & Carlson, E. (2008). Individual differences in infant-caregiver attachment: Conceptual and empirical aspects of security. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 552–598). New York: Guilford Press.
- Wood, J. J., McLeod, B. D., Sigman, M., Hwang, W. C., & Chu, B. C. (2003). Parenting and childhood anxiety: Theory, empirical findings, and future directions. *Journal of Child Psychology and Psychiatry*, *44*, 134–151.
- Zentner, M., & Bates, J. E. (2008). Child temperament: An integrative review of concepts, research programs, and measures. *European Journal of Developmental Science*, *2*, 7–37.

Author Biographies

Anja van der Voort is a lecturer at Leiden University in the Netherlands. She received her MA in Child and Family Studies from the University of Amsterdam. Her major research interests include adoption, child temperament, and parent–child interaction.

Mariëlle Linting is an Associate Professor of Research Methods and Statistics at Leiden University in the Netherlands. She received her Doctorate in Psychometrics at Leiden University. Her major research interests include research methodology, childcare, noise and environmental chaos, and adoption.

Femmie Juffer is a Professor of Adoption Studies at Leiden University in the Netherlands. She received her Doctorate in Child and Family Studies from Utrecht University, the Netherlands. Her major research interests include adoption, foster care, sensitive parenting, attachment, and the effectiveness and implementation of attachment-based video-feedback interventions.

Marian J. Bakermans-Kranenburg is a Professor of Child and Family Studies at Leiden University in the Netherlands. She received her Doctorate in Child and Family Studies from the Leiden University. Her major research interests include attachment, intervention, behavioral and molecular genetics, emotion regulation, meta-analysis, and differential susceptibility.

Christie Schoenmaker is a doctoral student at Leiden University in the Netherlands. She received her Research Master in Developmental Psychopathology in Educational and Child Studies from Leiden University. Her major research interests include adoption, malnutrition, attachment, secure base script and cognitive development.

Marinus H. van IJzendoorn is a Professor of Child and Family studies at Leiden University in the Netherlands, and a Research Professor of Human Development at Erasmus University Rotterdam in the Netherlands. He received his Doctorate in Human Development from the Free University Berlin. His major research interests include attachment, adoption, meta-analysis, moral development, GxE, epigenetics, differential susceptibility.