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Temperament, parental personality and parenting stress in relation to socio-emotional development at 51 months

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Abstract

This study examined the relevance of infant temperament, parent personality and parenting stress for children's socio-emotional development, looking in addition for any differences between mothers and fathers. Participants, from a community sample, were 410 mothers and fathers reporting their personality (NEO Personality Inventory), child temperament in the first (Infant Characteristics Questionnaire) and second (Toddler Behavior Assessment Questionnaire) years, parenting stress to 36 months (Parenting Stress Index Short Form) and child behaviour at 51 months (Strengths and Difficulties Questionnaire). Difficult toddler temperament was associated with more externalizing and internalizing problems. Higher paternal extraversion was associated with more prosocial behaviour whereas lower maternal extraversion was associated with more internalizing problems. For both parents, describing a dysfunctional parent-child relationship was related to more externalizing problems and to less prosocial behaviour, for fathers also to more internalizing problems, which associated for mothers with more parental distress.

Keywords: Parental personality; parental stress; child temperament; externalizing problems; internalizing problems; prosocial behaviour

Introduction

Many studies have established that early temperamental disposition, understood to be a precursor of personality (Chen & Schmidt, 2015), is relevant for understanding children's responsivity to their environment and the development of children's internalizing and externalizing problems and prosocial behaviour (Eisenberg et al., 2001, 2005; Ellis, Boyce, Belsky, Bakermans-Kranenburg & van IJzendoorn, 2011; Gallitto, 2015; Gartstein, Putnam, & Rothbart, 2012; Kiff, Lengua, & Zalewski, 2011; Kim & Kochanska, 2012; Lahey et al., 2008; Miner, & Clarke-Stewart 2008; Oldehinkel, Hartman, Winter, Veenstra, & Ormel, 2004; Propper & Moore, 2006). Infants who are anxious, shy, and emotionally reactive tend subsequently to be less socially competent and exhibit higher rates of social problems (Baer et al., 2015; Mun, Fitzgerald, Von Eye, Puttler & Zucker, 2001). Infant and toddler anger, irritability and low self-regulation have been related to more externalizing problems at a later age (Eisenberg et al., 2009; Moffitt et al., 2011).

The transactional theory of development (Sameroff & Fiese, 2000; Sameroff, 2009) has emphasised that the individual characteristics and behaviour of child and parent interact in a continuous dynamic manner together over time to explain children's development. Parent personality is said to represent a relatively stable construct that can be used to predict vulnerability to relationship difficulties or to parenting style, which in turn is related to children's socio-emotional development (Belsky, Crnic & Woodworth, 1995; Koenig, Barry & Kochanska, 2010). Maternal extraversion (i.e., sociable, talkative, energetic) has been linked with an authoritative parenting style characterized by high support and control (Belsky & Barends, 2002). However, maternal extraversion has also been associated in US studies with more power assertive and forceful parenting in discipline situations, indicating that extraversion may be multi-factorial, some facets related to positive parenting while assertiveness may contribute to dysfunctional parenting (Clark, Kochanska & Ready, 2000;

Kochanska, Aksan & Nichols, 2003). Mothers high in agreeableness (i.e., cooperative, compassionate, and friendly) tend also to be more authoritative and less authoritarian in their parenting (Eryigit-Madzwamuse, & Barnes, 2013; Metsäpelto & Pulkkinen, 2003) and are likely to promote positive child emotional regulation (Thompson, & Meyer, 2007). Mothers with a more neurotic personality (i.e., anger, anxiety, depression, vulnerability) have been found to use more negative parenting (Wahl & Metzner, 2012). However, the relevance of parental personality and related parenting behaviour for children's socio-emotional development are not always studied in conjunction with child temperament. The transactional model of development (Sameroff, 2009) would suggest that this is a useful strategy.

In addition, much of the personality research is based on mothers and there is much less information about paternal personality in relation to parenting or child outcomes (Achtergarde, Postert, Wessing, Romer, & Müller, 2015). Investigation of the relevance of paternal characteristics is particularly important since fathers may not interact with children in the same way as mothers (e.g. Lamb, 2010; Malmberg et al., 2007). In addition, some studies have found different associations between personality and parenting for mothers and fathers. For instance, Kochanska, Fresenborg, Lange and Martel (2004) and Koenig and colleagues (2010) found that fathers higher on extraversion and agreeableness were likely to be more responsive and warm. But Kochanska et al. (2004) also found that fathers high on extraversion were likely to be lower on attentiveness to their infants, supporting the idea that extraversion is not a homogeneous trait, including warmth and expressivity and also assertiveness and the use of power (Achtergarde et al., 2015). Thus, it is of interest to look in detail at the associations between parental extraversion and their children's socio-emotional development, including in analyses information about both mothers' and fathers' personality.

Temperament and parent personality are both likely to be relevant to development, but the ecological model of development highlights the multiple influences within the individual

and the immediate context that may be associated with child outcomes (Bronfenbrenner & Morris, 2006). At the individual level, in addition to temperament, child gender should be taken into account since girls have been found to have fewer externalizing behaviour problems than boys do and are more likely to exhibit prosocial behaviour (Miner & Clarke-Stewart 2008; NICHD ECCRN 2004). Girls are also likely to have more internalizing problems such as fear, anxiety or depression although gender differences tend to be less marked for preschool children than for those of school age (Bongers, Koot, van der Ende, & Verhulst, 2003). Again, at the individual level, apart from parental personality, age and education have been consistently found to be associated with children's developmental outcomes (Barnes, Gardiner, Sutcliffe & Melhuish, 2014; Dubow, Boxer & Huesmann, 2009; Nagin & Tremblay, 2001; Sutcliffe, Barnes, Belsky, Gardiner & Melhuish, 2012). In general, younger parental age and fewer parent educational qualifications are associated with more child behaviour and emotional problems.

At the next level of potential influence (microsystems), the extent of stress experienced by parents in undertaking their parental role is likely to be related to their parenting behaviour (Deater-Deckard 1998; Gutman, McLoyd, & Tokoyawa, 2008; Kohen, Leventhal, Dahinten, & McIntosh, 2005). Parenting stress has in turn been related both directly and indirectly to maladaptive child outcomes and child behaviour problems (Abidin, 1986; Benzies, Harrison & Magill-Evans, 2004; Crnic, Gaze, & Hoffman, 2005; Deater-Deckard & Scarr, 1996; Mackler et al., 2015; Morgan, Robinson & Aldridge, 2002; McCartney et al., 2010).

Transactional theory and ecological theory suggest that parenting stress is multiply determined by child, parent, and ecological characteristics reciprocally influencing one another and contributing to outcomes (Abidin, 1990; Crnic & Acevedo, 1995). In particular, difficult infant or child behaviour can have an impact on parental stress and on parenting

(Lengua & Kovacs, 2005; Mackler et al. 2015; Neece, Green & Baker, 2012; Woodman, Mawdsley & Hauser-Cram, 2015). Depending on the resources and supports available to parents and their own attributes (such as personality, education or age), they may be more or less able to cope with a child who presents challenges. Thus, it is of interest to investigate whether any associations between infant temperament or parent personality and children's socio-emotional development remain after taking into account parental reports of stress.

The current study was designed to investigate the extent to which child early temperamental characteristics and parental personality are pertinent to children's subsequent socio-emotional development, taking relevant demographic covariates and then parenting stress into account. It was designed to address some limitations of previous research by including information about both mothers and fathers. Hypotheses were that (1) child temperamental characteristics up to 18 months will be related to children's emotional and behavioural problems and prosocial behaviour at 51 months, taking parental demographic characteristics, parental personality and parenting stress into account; (2) parental personality will be related to child emotional and behavioural problems and prosocial behaviour taking demographic characteristics, infant temperament and parenting stress into account. Specifically, parental neuroticism will be associated with more child socio-emotional problems and less prosocial behaviour, agreeableness with fewer problems and more prosocial behaviour, but associations between parental extraversion and child socio-emotional behaviour cannot be predicted on the basis of existing studies; and (3) the relevance of parental personality for children's socio-emotional development will differ for mothers and fathers.

Methods

Participants

The participants were drawn from a large community sample participating in the Families Children and Child Care study (FCCC), a longitudinal investigation into the possible effects of childcare on child development, which received ethical approval from the Royal Free and University College Medical School and from Oxford University. The study ran from 1998 to 2002. All participants provided written informed consent. Eligibility criteria were: mother over 16 at time of birth and sufficiently fluent for interview in English and child a singleton with no congenital abnormalities (for full details see Malmberg et al., 2005). Of 1,201 participants 1,085 were families with a father in the home, either married (N = 814) or cohabiting (N = 271). Complete data at all time points were available for 807/1201 mothers (67%) and 483/1085 (45%). Complete data for both mother and father at all time points for all measures, included in the analyses for this study, was 410/1085 (38%). Characteristics of mothers and fathers included in the regression analyses, with complete information from both mother and father at all time points (N = 410), are shown in Table 1. Due to the non-random nature of non-completion of questionnaires, imputation was not used. Mothers included in regression analyses were older ($t = 4.38, p < .000$), with more education ($t = 8.24, p < .000$), more agreeable ($t = 3.12, p < .01$), with less parental distress ($t = 3.17, p < .01$) or dysfunctional parent-child interaction ($t = 2.56, p < .01$). They described infants as more difficult ($t = 3.84, p < .01$), and 51 month olds as having fewer internalizing problems ($t = 2.66, p < .01$). Fathers with complete information and included in analyses had more education ($t = 5.01, p > .000$), were more agreeable ($t = 2.28, p < .05$) and less neurotic ($t = 2.01, p < .05$).

Table 1 about here

Procedure

Families were contacted for home visits when children were three, 10, 18, 36 and 51 months. Mothers completed interviews and questionnaires with interviewers. Father

questionnaires were left after maternal interviews so that fathers could return them by post. Two reminders were sent requesting the return of father questionnaires.

Measures

Demographic characteristics. During 3-month interviews, mothers provided information about child gender, parental ages at the time of the child's birth and parental levels of education.

Child temperament. The Infant Characteristics Questionnaire (ICQ; Bates, Freeland, & Lounsbury, 1979) designed to document difficultness was completed at three and 10 months. At three months the questionnaire consists of 16 items using a 7-point Likert scale (1 representing easy temperament with higher scores indicating more difficulty), covering fussy behaviour (e.g. how often fussy per day), unadaptability (e.g. reaction to a new place), persistence (e.g. how excited when people play with or talk to him/her) and unpredictable or unsociable behaviour (e.g., how easy to predict when infant will be hungry) to create a total difficulty score (Cronbach α : mothers .80; fathers .82). At 10 months, 22 items cover the same domains to make a total difficulty score with similar internal consistency (Cronbach α : mothers .82; fathers .81). The total difficulty scores at three and 10 months were significantly associated (mother $r = .39$; fathers $r = .41$) so a mean infant (first year) temperament score was created from both scores.

The Toddler Behavior Assessment Questionnaire (TBAQ; Goldsmith, 1996) was completed at 18 months, with 59 items using a 7-point Likert scale from 1 (never) to 7 (always) covering activity level (10 items), anger (10 items), social fear (9 items), pleasure (10 items), sadness (10 items) and soothability (10 items). For this study three scales (anger, e.g. when time for bed physically resists or struggles; sadness, e.g. becomes sad when somebody they like has to leave; and social fear, e.g. cries or struggles when approached by a stranger) that were most closely associated with each other in correlational analysis were

added to produce total score representing toddler difficult behaviour with good internal consistency (Cronbach α : Mothers .83; Fathers .78).

Parental personality. At 18 months, parents completed 36 items from the NEO Personality Inventory (NEO PI; Costa & McCrae, 1992) measuring three dimensions: extraversion, agreeableness and neuroticism using a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Extraversion identifies individuals who are sociable, active and optimistic (e.g. I really enjoy talking to people) (Cronbach α : mothers .76, fathers .76); agreeableness describes a preference for positive interactions (e.g. I'd rather cooperate with others than compete with them) (Cronbach α : mothers .72, fathers .73); and neuroticism reflects anxiety, nervousness and depression (e.g. I often feel tense and jittery) (Cronbach α : mothers .85; fathers .85).

Parenting stress Two 12-item scales from the Short Form Parenting Stress Index (Abidin, 1995), parental distress (e.g. I feel trapped by my responsibilities as a parent) and parent-child dysfunctional interaction (e.g. my child rarely does things for me that make me feel good), were completed at 10 and 36 months. The third scale – difficult child- was not used, as the content was too similar to temperament items. The questions use a 5-point Likert scale ranging from 5 (strongly agree, representing more distress) to 1 (strongly disagree).

Reliability was good: parental distress (Cronbach α : 10 months, mothers .84, fathers .85; 36 months, mothers .86; fathers .86) and parent-child dysfunctional interaction (Cronbach α : 10 months, mothers .89; fathers .92; 36 months, mothers .89; fathers .89). Scores at 10 and 36 months were moderately related (parental distress, mothers $r = .60$ fathers $r = .54$; parent-child dysfunctional interaction, mothers $r = .51$, fathers $r = .40$) so mean scores combining the two time points were used in analyses to avoid collinearity and to avoid over-representing parenting stress in the analyses.

Emotional and behavioural development. The Strength and Difficulties Questionnaire (SDQ; Goodman 1997, 2001) was completed at 51 months with 25 items describing child behaviour using a 3-point Likert scale from 0 (not true) to 2 (certainly true). Five subscales each have five items: conduct problems (e.g. often fights with other children, Cronbach α : mothers .54, fathers .55); hyperactivity (e.g. constantly fidgeting or squirming, Cronbach α : mothers .75, fathers .75); emotional symptoms (e.g. has many worries, Cronbach α : mothers .62, fathers .54); peer problems (e.g. rather solitary, tends to play alone, Cronbach α : mothers .51, fathers .51); and prosocial behaviour (e.g. helpful if someone is hurt, Cronbach α : mothers .66, fathers .66). Given the variable internal consistency of some subscales and using the scoring guidelines for community samples (Goodman & Goodman, 2009), conduct problems and hyperactivity scores were combined to create externalizing problems (Cronbach α : mothers .73, fathers .75) and peer problems and emotional symptoms were combined to create internalizing problems (Cronbach α : mothers .64, fathers .62).

Data analysis strategy

All statistical analyses were performed using IBM SPSS Version 22.0 taking missing data into account by list-wise deletion. Pearson correlations were calculated between parental and child characteristics and child outcomes separately for mothers and fathers (see Table 2). For all child characteristics (infant and toddler temperament and SDQ outcomes) mean scores were created for entry into regression analyses, combining maternal and paternal reports (see Table 1). Then regression analyses were completed using the enter method with two steps to determine significant predictors of the three outcomes, externalizing problems, internalizing problems, and prosocial behaviour. The first step included child gender, maternal and paternal demographic characteristics, maternal and paternal personality and child temperament in infancy and toddlerhood (mean of mother and father ratings) to allow examination of associations between temperament and parent personality with socio-

emotional outcomes before parenting distress was included. Next, maternal and paternal parental distress and parent-child dysfunctional interaction were added.

Table 2 about here

Results

All proposed maternal characteristics (education, personality, parenting distress and parent-child interaction) were significantly associated with all SDQ outcomes except maternal education with prosocial behaviour. There were fewer significant associations between paternal variables and SDQ outcomes (see Table 2). In particular, paternal agreeableness was unrelated to all three outcomes, extraversion significantly associated only to prosocial behaviour and paternal age only to externalizing problems. Maternal and paternal extraversion and agreeableness were negatively associated, and neuroticism positively associated, with parental distress and parent-child dysfunctional interaction (see Table 2)

The total variance explained to predict externalizing behaviour problems was 11.9% in the first step of the analysis and 24.2% in the second step (see Table 3). Child gender (boys) and fewer maternal educational qualifications were associated with more externalizing problems. Neither maternal nor paternal personality was significantly associated with externalizing problems in either the first or second step of the analysis, but being described as a difficult toddler was related to more externalizing behaviour at 51 months in both steps. More difficulty as an infant was significant in the first step of the analysis but not once parenting stress variables were included. Other factors associated with more externalizing behaviour were more parent-child dysfunctional interaction, as reported by either parent, and more parental distress according to mothers (see Table 3).

Table 3 about here

The total variance explained to predict internalizing problems was 10.7% in the first step of the analysis and 15.2% in the second step (see Table 4). Less maternal education and

less maternal extraversion were associated with more child internalizing problems and being described as a difficult toddler in both steps. Other factors associated with more internalizing problems at 51 months were more preceding maternal parental distress and more earlier paternal dysfunctional parent-child interaction (see Table 4).

Table 4 about here

The total variance explained to predict prosocial behaviour was 10.5% in the first step of the analysis and 18.1% in the second step (see Table 5). More prosocial behaviour was associated with being a girl, more maternal education, and more paternal extraversion in both steps of the analysis. Less mother-child or father-child dysfunctional interaction in the preschool years were also significantly associated with more prosocial behaviour (see Table 5). More maternal agreeableness and less difficulty as a toddler were significant in the first step of the analysis, but not after the parenting stress variables were included.

Table 5 about here

Discussion

The main purpose of this study was to investigate the relevance of parents' judgements about early child temperament and of their personality characteristics for predicting and understanding their reports of children's socio-emotional and behavioural development at 51 months, controlling for demographic factors known to be relevant, then also controlling for parental stress and looking for any differences between mothers and fathers.

The first hypothesis, predicting the relevance of temperament, was only partially confirmed. Although parents' reports of more difficult infant temperament were positively associated with them noting that children had more externalizing problems in the first stage of the analysis, after taking parenting stress factors it was no longer significant. The most significantly factors were parent reports of a difficult parent-child relationship and (for

mothers) general distress about parenting. This contrasts with previous research (Baer et al., 2015; Belsky & Pluess, 2009; Eisenberg et al., 2009; Miner & Clarke-Stewart, 2008; Moffitt et al., 2011). The relevance of parental distress in predicting externalizing problems suggests that knowing about the stress parents experience as they cope with fussy, difficult or unadaptable infants and pre-schoolers is important. Some parents may be able to cope more effectively with a difficult infant than others, though their personality characteristics appear not to have been relevant in this study. Nevertheless, supporting the first hypothesis, a more difficult temperament in the second year was predictive of parent reports of later externalizing and internalizing problems in both stages of the analysis, suggesting that that behaviour in toddlerhood may reflect a more entrenched style of responding to the environment.

There was mixed support for the second hypothesis, predicting the relevance of parental personality. Neuroticism was not associated with parent reports of more child problems or less prosocial behavior in either stage of the analyses. However, it is worth noting that correlation coefficients indicated that neuroticism of both mothers and fathers was significantly associated with more parental distress, suggesting that the manner of coping with parenthood may have been affected by parents' inherent anxious and nervous characteristics. So children may develop socio-emotional problems more often when a neurotic parent does not cope well with the demands of parenting. Similarly there was no confirmation that parental agreeableness was associated with parents' judgements of children having fewer socio-emotional problems or more prosocial behavior. Maternal agreeableness was associated with them describing their children as having more prosocial behavior until parenting stress was taken into account, suggesting again that any relevance of this aspect of parental personality for the development of prosocial behavior is moderated by the more immediate circumstances of parenting. Nevertheless, the parents who formed the sample

had, on average, higher scores on the agreeableness subscale than those who did not complete all questionnaires, so is it possible that there was insufficient variance to identify significant associations.

Due to inconsistency in previous research, no predictions were made about the potential relevance of parental extraversion. One of only two significant findings was that more paternal extraversion was associated with more prosocial behaviour. This suggests that outgoing fathers may be particularly instrumental in modelling positive interactions with other children or adults, which could provide more opportunities for the development of empathy and cooperativeness. Extraversion was not associated at all with externalizing problems but mothers with low extraversion were likely to have children with more internalizing problems, reflecting previous research finding low extraversion can have a negative effect in child behaviour (Belsky & Barends, 2002). These results would both suggest that more parental extraversion is likely to be a positive influence in the family, in contrast with some research suggesting that extraversion is multi-dimensional, having a more negative impact if it is associated with a more rigorous and power assertive style of discipline (Clark et al., 2000; Kochanska et al., 2003). Possibly, in the UK the level of extraversion, or its translation to disciplinary behaviour, is not completely comparable with that for parents in the USA, where most of the research has taken place.

It was hypothesized that associations between parental personality and child development would differ for mothers and fathers and this was true to a certain extent; only (low) maternal extraversion was associated with more internalizing problems and only (high) paternal extraversion was associated with prosocial behavior. But the larger picture was that neither maternal nor paternal personality could be linked strongly with children's socio-emotional behavior in this study.

It was predicted, based on previous research, that parenting stress would be relevant to children's socio-emotional behaviour, and these associations did differ to a certain extent between mothers and fathers. The scale documenting general distress in the parental role was relevant mainly for mothers, more distress related to more child externalizing and internalizing problems, reflecting previous research (Gutman, McLoyd, & Tokoyawa, 2008), with no relationships for fathers. Perhaps mothers identify themselves more strongly in the role of caregiver, especially with young children. Experiencing the parent-child relationship as difficult was relevant for both mothers and fathers. Reporting a more dysfunctional parent-child relationship was associated with children being said to demonstrate more externalizing and internalizing problems and less prosocial behaviour. This suggests that, as proposed by the early temperament theorists (Chess & Thomas, 1999), the 'goodness of fit' between parent and child, reflected by whether or not the parent finds their relationship to be challenging or different to expectations, is relevant to later development.

Conclusions

To set the results into context the study limitations should to be considered. The first is the likely bias in the sample. Compared to study participants without complete information, both mothers and fathers had more educational qualifications, were more likely to be slightly older, and mothers were more agreeable. These biases are in a sample that was over-represented in terms of higher socio-economic status (Malmberg et al., 2005). Different results might be identified with a more disadvantaged population. Secondly, the outcomes are based on information from the mothers and fathers, who also completed all the other questionnaires describing their own personality, child temperament, and parenting distress. The analyses could have taken as outcomes questionnaires completed by a different informant (such as the teacher) but the specific aim of this study was to investigate how parents' perceptions of their child were linked with their own perceptions of themselves.

Nevertheless other research might usefully examine the relevance of parental personality in predicting reports of behaviour from a non-family caregiver or from independent measures of child behaviour such as observations, which might also be able to cover parents' use of discipline or involvement in their child's activities. Reports of stress experienced in being a parent or interacting with their child would have been more compelling if accompanied by independent measures of parenting behaviour.

With those reservations in mind this study has shown that parental personality, not so frequently examined in developmental studies as characteristics such as depression or stress, has some minor relevance for predicting child behavioural and socio-emotional outcomes. The differing results for mothers and fathers highlight the need for an ongoing focus on research that investigates the role of fathers with young children. Future studies could include direct observations of fathers as they interact with their children so that better comparisons of the relevance of maternal and paternal characteristics for child development could be assessed. Information about their activities with children, such as how much they play, what type of play or other activities and how much caregiving, especially during infancy, would also be useful. Studies that have been able to observe and compare mother and fathers with infants have identified differences between them in their interactions (e.g. Malmberg et al., 2007). Much is now known about fathers (Lamb, 2010) but longitudinal studies need to develop even more ways to engage fathers and to observe them directly so that the relevance of their behaviour and characteristics can be clarified further.

Finally, the main conclusion from this study is that, when parents experience stress by finding their relationship with their children difficult, or by finding the parental role distressing, it is more likely that their children will develop socio-emotional or behavioural problems, and less likely that they will be positive and prosocial in their interactions with other children and teachers. Thus support for families, such as that offered by health visitors

or by agencies providing volunteers, may be most effective if there is a focus on encouraging parents who experience stress to develop sufficient coping strategies while children are young, before the start of school. It would also be important to provide training for primary care practitioners who see families in their homes, such as health visitors, to identify temperamentally difficult toddlers and indications of parental stress. This should enable them to be more effective in offering appropriate preventive interventions to avoid the development of either parental mental health difficulties, marital problems or child developmental problems.

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Table 1. Characteristics of mothers and fathers (N=410) included in regressions (standard deviations in brackets).

	Mothers	Fathers	Parent mean
	Mean (SD)	Mean (SD)	
Parental age at time of child's birth	31.81 (4.63)	34.39 (5.81)	
Parental level of education (range 1 to 6)	4.63 (1.22)	4.52 (1.29)	
Parental Extraversion (NEO)	3.36 (.46)	3.33 (.47)	
Parental Agreeableness (NEO)	3.86 (.38)	3.61 (.43)	
Parental Neuroticism (NEO)	2.46 (.63)	2.24 (.60)	
Difficult infant (ICQ 3,10m. mean)	2.95 (.49)	3.11 (.50)	3.03 (.43) r = .46
Difficult toddler (TBAQ 18m.)	3.41 (.63)	3.28 (.65)	3.34 (.56) r = .52
Parental distress (PSI 10m., 36m. mean)	2.10 (.59)	2.09 (.54)	
Parent-child dysfunctional interaction (PSI 10m., 36m. mean)	1.36 (.36)	1.41 (.38)	
Externalizing problems (51m. SDQ)	1.50 (.31)	1.54 (.32)	1.52 (.28) r = .60
Internalizing problems (51m. SDQ)	1.23 (.21)	1.24 (.21)	1.23 (.18) r = .53
Prosocial behaviour (51m. SDQ)	2.54 (.34)	2.50 (.35)	2.52 (.30) r = .48

ICQ Bates Infant Characteristics Questionnaire; NEO Costa and McCrea Personality Inventory; PSI Abidin Parenting Stress Index; SDQ Goodman Strengths and Difficulties Questionnaire; TBAQ Goldsmith Toddler Behavior Assessment Questionnaire

Table 2. Associations (correlation coefficients) between covariates, predictors and outcomes at 51 months. Mothers above and fathers below the diagonal (N=410).

	1	2	3	4	5	6	7	8	9	10	11	12
1. Externalizing (SDQ)	-	.27**	-.32**	-.11*	-.17**	-.12**	-.16**	.19**	.11*	.14**	.28**	.35**
2. Internalizing (SDQ)	.31**	-	-.22**	-.03	-.08	-.18**	-.15**	.21**	.15**	.24**	.29**	.25**
3. Prosocial (SDQ)	-.36**	-.23**	-	-.11*	.03	.17**	.10*	-.13**	-.09*	-.08	-.17**	-.22**
4. Parental age	-.11**	-.11*	-.02	-	.30**	-.07	.09*	-.06	.05	.01	-.02	-.06
5. Parental education	-.19**	-.07	.02	.14**	-	.00	.05	-.05	.02	.06	.05	.05
6. Extraversion (NEO)	-.01	-.08	.19**	-.16**	-.02	-	.29**	-.44**	-.16**	-.07	-.33**	-.25**
7. Agreeableness (NEO)	-.08	-.09	.03	.02	.01	.18**	-	-.36**	-.10*	-.11*	-.28**	-.30**
8. Neuroticism (NEO)	.10*	.18**	-.06	.01	.00	-.40**	-.23**	-	.15**	.23**	.55**	.38**
9. Difficult infant (ICQ)	.20**	.10*	-.15**	.01	.04	-.26**	-.12**	.18**	-	.32**	.21**	.33**
10. Difficult toddler (TBAQ)	.17**	.16**	-.08	.01	.01	-.19**	-.24**	.27**	.31**	-	.18**	.16**
11. Parental distress (PSI)	.13**	.13**	-.15**	.08	.08	-.35**	-.28**	.52**	.26**	.26**	-	.57**
12. Parent-child dysfunctional interaction (PSI)	.27**	.22**	-.27**	-.01	-.05	-.21**	-.21**	.22**	.35**	.23**	.42**	

Note: * $p \leq .05$; ** $p \leq .01$; ICQ Bates Infant Characteristics Questionnaire; NEO Costa and McCrea Personality Inventory; PSI Abidin Parenting Stress Index; SDQ Goodman Strengths and Difficulties Questionnaire; TBAQ Goldsmith Toddler Behavior Assessment Questionnaire

Table 3. Result of regression analysis to predict externalizing problems (SDQ) at 51 months

		<i>B</i>	<i>SE</i>	<i>Standardized β</i>
	(Constant)	1.434	.31	
Step 1	Gender (boy 0, girl1)	-.068	.027	-.121*
	Maternal age	-.003	.004	-.043
	Paternal age	-.001	-.003	-.014
	Maternal education	-.032	.013	-.139*
	Paternal education	-.018	.012	-.081
	Maternal Extraversion (NEO)	-.005	.032	-.009
	Paternal Extraversion (NEO)	.027	.033	.045
	Maternal Agreeableness (NEO)	-.066	.038	-.090(*)
	Paternal Agreeableness (NEO)	-.015	.032	-.023
	Maternal Neuroticism (NEO)	.032	.024	.071
	Paternal Neuroticism (NEO)	.016	.025	.034
	Difficult infant (M+F, ICQ)	.092	.033	.140**
	Difficult toddler (M+F, TBAQ)	.077	.026	.154**
F 5.259*** [df 13,397] ΔR^2 .119				
Step 2	(Constant)	.891	.300	
	Gender (boy 0, girl1)	-.058	.025	-.099**
	Maternal age	-.003	.003	-.043
	Paternal age	.000	.003	-.006
	Maternal education	-.034	.012	-.150**
	Paternal education	-.013	.011	-.061
	Maternal Extraversion (NEO)	.023	.030	.040
	Paternal Extraversion (NEO)	.039	.031	.064

	Maternal Agreeableness (NEO)	-.016	.036	-.022
	Paternal Agreeableness (NEO)	.005	.030	.007
	Maternal Neuroticism (NEO)	-.029	.025	-.065
	Paternal Neuroticism (NEO)	.007	.024	.015
	Difficult infant (M+F, ICQ)	.017	.032	.026
	Difficult toddler (M+F, TBAQ)	.062	.024	.125**
	Maternal Parental distress (PSI)	.066	.031	.135*
	Paternal Parental distress (PSI)	.011	.027	.023
	Maternal Parent-child dysfunctional interaction (PSI)	.249	.049	.295***
	Paternal Parent-child dysfunctional interaction (PSI)	.071	.031	.112*
F 8.680*** [df 17,393] ΔR^2 .242				

Note: df degrees of freedom; ΔR^2 Adjusted R Squared; (*) $p < .10$, * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$;
ICQ Bates Infant Characteristics Questionnaire; NEO Costa and McCrea Personality Inventory; PSI
Abidin Parenting Stress Index; SDQ Goodman Strengths and Difficulties Questionnaire; TBAQ
Goldsmith Toddler Behavior Assessment Questionnaire

Table 4. Results of regression analysis to predict internalizing behaviour problems (SDQ) at 51 months

		<i>B</i>	<i>SE</i>	<i>Standardized β</i>
	(Constant)	1.247	.207	
Step 1	Gender (boy 0, girl1)	.000	.018	.001
	Maternal age	.002	.002	.048
	Paternal age	-.003	.002	-.108
	Maternal education	-.020	.008	-.134*
	Paternal education	-.001	.008	-.006
	Maternal Extraversion (NEO)	-.054	.021	-.139**
	Paternal Extraversion (NEO)	.006	.022	.016
	Maternal Agreeableness (NEO)	-.024	.025	-.049
	Paternal Agreeableness (NEO)	.008	.021	.019
	Maternal Neuroticism (NEO)	.021	.016	.071
	Paternal Neuroticism (NEO)	.028	.016	.090
	Difficult infant (M+F, ICQ)	.016	.022	.036
	Difficult toddler (M+F, TBAQ)	.060	.017	.184***
F 4.770*** [df 13, 397] ΔR^2 .107				
Step 2	(Constant)	1.056	.208	
	Gender (boy 0, girl1)	.005	.017	.012
	Maternal age	.002	.002	.038
	Paternal age	-.003	.002	-.097
	Maternal education	-.021	.008	-.139*
	Paternal education	.002	.008	.014
	Maternal Extraversion (NEO)	-.045	.021	-.117*
	Paternal Extraversion (NEO)	.009	.021	.023

	Maternal Agreeableness (NEO)	-.010	.025	-.021
	Paternal Agreeableness (NEO)	.019	.021	.044
	Maternal Neuroticism (NEO)	-.005	.017	-.019
	Paternal Neuroticism (NEO)	.030	.017	.097
	Difficult infant (M+F, ICQ)	.010	.022	-.024
	Difficult toddler (M+F, TBAQ)	.053	.017	.163**
	Maternal Parental distress (PSI)	.056	.021	.174**
	Paternal Parental distress (PSI)	-.028	.018	-.090
	Maternal Parent-child dysfunctional interaction (PSI)	.041	.034	.075
	Paternal Parent-child dysfunctional interaction (PSI)	.067	.022	.163**
F 5.314*** [df 17,393] ΔR^2 .152				

Note: df degrees of freedom; ΔR^2 Adjusted R Squared; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$; ICQ Bates Infant Characteristics Questionnaire; NEO Costa and McCrea Personality Inventory; PSI Abidin Parenting Stress Index; SDQ Goodman Strengths and Difficulties Questionnaire; TBAQ Goldsmith Toddler Behavior Assessment Questionnaire

Table 5. Results of regression analysis to predict prosocial behavior (SDQ) at 51 months

		<i>B</i>	<i>SE</i>	<i>Standardized β</i>
	(Constant)	1.762	.336	
Step 1	Gender (boy 0, girl1)	.112	.029	.187***
	Maternal age	-.003	.004	-.050
	Paternal age	.002	.003	.030
	Maternal education	.027	.013	.113*
	Paternal education	-.013	.013	-.055
	Maternal Extraversion (NEO)	.054	.034	.086
	Paternal Extraversion (NEO)	.134	.035	.209***
	Maternal Agreeableness (NEO)	.108	.041	.139**
	Paternal Agreeableness (NEO)	-.037	.034	-.055
	Maternal Neuroticism (NEO)	.010	.026	.021
	Paternal Neuroticism (NEO)	.027	.026	.054
	Difficult infant (M,F, ICQ)	-.035	.035	-.051
	Difficult toddler (M,F, TBAQ)	-.060	.027	-.114*
F 4.696 *** [df13,397] ΔR^2 .105				
Step 2	(Constant)	2.232	.330	
	Gender (boy 0, girl1)	.099	.027	.166***
	Maternal age	-.004	.004	-.056
	Paternal age	.002	.003	.038
	Maternal education	.030	.013	.124*
	Paternal education	-.014	.012	-.061
	Maternal Extraversion (NEO)	.048	.033	.076
	Paternal Extraversion (NEO)	.112	.034	.175**
	Maternal Agreeableness (NEO)	.068	.040	.088

	Paternal Agreeableness (NEO)	-.055	.033	-.081
	Maternal Neuroticism (NEO)	.030	.028	.063
	Paternal Neuroticism (NEO)	.048	.027	.096
	Difficult infant (M+F, ICQ)	.012	.035	.017
	Difficult toddler (M+F, TBAQ)	-.040	.026	-.076
	Maternal Parental distress (PSI)	.010	.034	.019
	Paternal Parental distress (PSI)	-.050	.029	-.100
	Maternal Parent-child dysfunctional interaction (PSI)	-.151	.054	-.169**
	Paternal Parent-child dysfunctional interaction (PSI)	-.127	.035	-.191***
F 6.317 [df 17, 393] ΔR^2 .181				

Note: df degrees of freedom; ΔR^2 Adjusted R Squared; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$; ICQ Bates Infant Characteristics Questionnaire; NEO Costa and McCrea Personality Inventory; PSI Abidin Parenting Stress Index; SDQ Goodman Strengths and Difficulties Questionnaire; TBAQ Goldsmith Toddler Behavior Assessment Questionnaire.