The Additive and Interactive Effects of Parenting and Children’s Personality on Externalizing Behaviour

P. PRINZIE*, P. ONGHENA, W. HELLINCKX, H. GRIETENS, P. GHEQUIERE and H. COLPIN

Abstract

Parenting practices have been previously linked to childhood externalizing behaviour. However, little attention has been given to the potential effect of individual personality differences among children on this relation. The current study assesses the additive effects of children’s personality characteristics and explores the moderating effects of children's personality on relations between parenting practices and childhood externalizing behaviour using a proportional stratified sample of 599 nonclinical elementary-school-aged children. Multiple regression analyses reveal that in the mother data as well as in the father data, dysfunctional parenting and the children's personality characteristics Benevolence, Conscientiousness, and Extraversion were directly related to outcomes consistent with an additive model of their effects. Significant interactions indicate that children with low scores on Benevolence who were exposed to overreactive discipline practices exhibited higher levels of externalizing behaviour. Children characterized by low scores on Conscientiousness who were exposed to coercive parenting behaviour showed elevated levels of externalizing behaviour. These results suggest that integrating children's personality characteristics within parenting models can improve the understanding of the aetiology of childhood externalizing problem behaviour. The implications of such integrations for intervention are discussed. Copyright © 2002 John Wiley & Sons, Ltd.

INTRODUCTION

Theoretical models debate about the relative contribution of parenting behaviour versus child individual differences to the development of externalizing behaviour in young children (Bell, 1968; Coie & Dodge, 1998; Lytton, 1990). Rather than simply comparing parenting effects with child effects, transactional models recognize that both are influential, and that integrating parent and child effects into one theoretical model may better explain the development of problem behaviour in young children (Sameroff, 1995). In a transactional model, not only would parenting be expected to influence children’s

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adjustment, but child characteristics are viewed as affecting parenting and adjustment as well. Thus, parenting may have varying effects on children with different personality characteristics (Holmbeck, 1997). Thomas and Chess (1977) summarized these interactive processes in terms of goodness-of-fit between a child’s temperament and the expectations and resources of the child’s home and schools. There are however few empirical studies that detail models of developmental interplay between specific temperamental characteristics and environment (see e.g. Bates, Pettit, Dodge, & Ridge, 1998; Colder, Lochman, & Wells, 1997; Eisenberg et al., 2001; Lengua, Wolchik, Sandler, & West, 2000). Studies reporting interaction effects of parenting and young children’s personality characteristics measured by instruments consistent with the comprehensive Big Five model (Goldberg, 1990) are lacking.

The present study integrated similarly parenting and child effects. Moreover, the exacerbating or protective effects of personality dimensions on the relation between negative parenting and externalizing problem behaviours were investigated. Personality characteristics were studied because in the nature–nurture debate, behaviour genetic studies provide increasing evidence for the complex interplay between parent and child effects (Lytton, 1990; Miles & Carey, 1997; Moffitt, Caspi, Rutter, & Silva, 2001; Reiss & Neiderhiser, 2000; Rutter, 1997, 2002).

Relation between parenting practices and childhood externalizing behaviour

For many years, parenting practices have been recognized to be among the most powerful predictors of externalizing behaviour (Dishion, French, & Patterson, 1995; Kiesner, Dishion, & Poulin, 2001; Loeber & Dishion, 1983; Patterson, Reid, & Dishion, 1992; Shaw & Bell, 1993). From a social learning perspective, Patterson and his colleagues (Patterson, 1997; Patterson et al., 1992) examined the linkage between parent and child behaviours. Two parallel theories at very different but interrelated levels were built (Patterson, 1997; Snyder, 1995). One theory is based on observations of parent–child interactions and used to explain in detail how parents and children change each other’s behaviour over time (Eddy, Leve, & Fagot, 2001; Patterson, 1982; Patterson et al., 1992). This theory specifies that early starters begin training for externalizing behaviour as young children, as a result of coercive family processes (Dishion & Patterson, 1997; Patterson, 1982, 1996; Patterson et al., 1992). The coercive training the young child receives at home results in massive social-skills and academic deficits. At the core of this coercion model is the idea that externalizing behaviours, resulting in benefits for the child by controlling unpleasant interactions (e.g. work demands) or promoting pleasant interactions (e.g. laughter with friends), are more likely to occur in the future (Dishion & Patterson, 1997). A child’s externalizing behaviour, therefore, is seen as a social adaptation within the immediate microsocial environment. The child learns certain social responses through reinforcement, which set the child on a course for either social adaptation or maladaptation. These reinforcing contingencies embedded in social interactions are actually the direct determinants of children’s aggression.

The second level consists of a multimethod- and multiagent-defined macromodel that describes in very general terms how parenting practices control the contingent parent–child interactions (Forgatch, Patterson, & Ray, 1996; Patterson et al., 1992; Patterson & Yoerger, 1997; Snyder, 1995). A strong correlation was found between harsh, abrasive, and inconsistent parental discipline, parental monitoring, and child externalizing behaviour (Patterson, 1986; Patterson & Stouthamer-Loeber, 1984). According to this model, the impact of contextual variables (social disadvantage, divorce, parental stress, parental
depression, parental antisocial behaviour) and of children’s characteristics on child adjustment is mediated by the impact on parenting practices (Patterson, 1997). However, in contrast to the contextual variables (Patterson et al., 1992), the impact of children’s personality characteristics has not yet been empirically validated.

Relation between personality and childhood externalizing behaviour

Temperament frequently is proposed to be an etiological factor in the development of behaviour disorders in childhood (Rothbart & Bates, 1998). Temperament is often defined as a substrate for personality development, consisting of simple, basic styles that emerge early and that are closely tied to later personality dimensions (Buss & Plomin, 1984; Hartup & van Lieshout, 1995). Several empirical studies have revealed that temperamental characteristics of children (Eisenberg et al., 2001; Sanson & Prior, 1999) and adolescents (Romero, Luengo, & Sobral, 2001) are related in predictable ways to social development (see Rothbart & Bates, 1998, for a review). Most of these studies have considered direct, linear effects, where the contribution of a particular temperament trait to the development of an adjustment pattern is investigated. Temperamental measures of ‘difficultness’ appear to predict both externalizing and internalizing behaviour problems (Guerin, Gottfried, & Thomas, 1997). Difficultness includes negative emotional expression, impulsivity, restlessness, and distractibility. However, the integration of the various results is hampered by the use of different temperament scales. Moreover, there exist no general consensus on the number and nature of temperamental dimensions and the dimensions do not consistently emerge from factor analytic studies (see e.g. Mervielde & De Fruyt, 1999).

With regard to personality traits, considerable progress has been made over the past decade toward the development of a more generally accepted taxonomy (Caspi, 1998). The repeated identification of the Big Five factors in personality ratings has led to the view that most personality traits can be described in terms of five broad content domains labelled as follows: (I) Extraversion (or Surgency), (II) Agreeableness, (III) Conscientiousness (or Dependability), (IV) Emotional Stability (versus Neuroticism), and (V) Openness to Experience (or Intellect, Culture) (see Caspi, 1998; Goldberg, 1990). The Big Five has proven useful as a framework for organizing findings on individual differences in adulthood. In addition, the Big Five factors were found in clinical ratings of children and adults (McCrae, Costa, & Busch, 1986). Moreover, the Big-Five model has been extended to ratings of nonclinical children and adolescents (Digman, 1994; Halverson, Kohnstamm, & Martin, 1994; Robins, John, & Caspi, 1994; van Lieshout & Haselager, 1994) and related to early temperament (Rothbart, Ahadi, & Evans, 2000; Rothbart & Bates, 1998) and to spontaneous person descriptions by parents of their children (De Fruyt, Van Hiel, & Buyst, 1998). A very comprehensive personality inventory today, assessing individual differences in children, is the HiPIC (Mervielde & De Fruyt, 1999). The HiPIC as a personality scale is based on an extensive analysis of free parental descriptions (Kohnstamm, Halverson, Mervielde, & Havill, 1998). Recently, De Fruyt, Mervielde, Hoekstra, and Rolland (2000) showed that—for a self-report version of the HiPIC administered to a sample of adolescents (12–17, mean age 13.6)—a joint principal component analysis of HiPIC and NEO-PI-R (Costa & McCrae, 1992) facets clearly demonstrated the close relationship between the 18 HiPIC facets and the adult FFM as operationalized by the NEO-PI-R. Hence the HiPIC evolved from a variant of the lexical approach but its facets load the corresponding factors of the adult FFM, at least for adolescents.
An advantage of the FFM is that it serves as a framework to conduct systematic research and that it advances an integration of the diversity of individual personality measures (McCrae & Costa, 1996). In addition, given these uses of the FFM for exploring adult personality, extension of the FFM into childhood and adolescence can facilitate comparisons across developmental periods.

Few studies have investigated possible relations between the five factor dimensions and adjustment behaviour. John, Caspi, Robins, Moffitt, and Stouthamer-Loeber (1994) suggested that the personality traits in young adolescents are differentially implicated in the expression of psychopathology, providing evidence for the discriminative power of the Big Five. Externalizing problem behaviour was more prevalent among boys who were extraverted, not agreeable, and not conscientious. Krueger, Caspi, Moffitt, Silva, and McGee (1996) have linked externalizing behaviour to lower scores on Conscientiousness and Agreeableness. These findings are consistent with the three replicable personality types that emerged in some studies in regular samples (Asendorpf, Borkenau, Ostendorf, & van Aken, 2001; Asendorpf & van Aken, 1999; Block & Block, 1980; Caspi, 1998; Van Lieshout, 2000). These personality types vary in their flexible and resourceful adjustment and control of impulses and they consistently show characteristic profiles on the Big-Five personality factors. One type is well adjusted and functioning well in various domains, called resilient. The other two types differ in their impulse control. The second type is labelled overcontrollers, consisting of more shy, inhibited, restraint, and inward looking individuals. The vulnerable overcontrollers tend to internalizing problems and score particularly low on Extraversion and Emotional Stability. The third type is labelled undercontrollers. Undercontrollers tend to be more impulsive, restless, and distractible. The antisocial undercontrollers, the great majority of them being boys, tend to be disagreeable, antagonistic, and hostile; they score high on Extraversion, but particularly low on Agreeableness and Conscientiousness (Robins, John, Caspi, Moffitt, & Stouthamer-Loeber, 1996). The personality subtypes reveal slightly different personality profiles, but very distinctive adjustment patterns that seem highly similar across middle childhood, adolescence, and adulthood. Recently, De Fruyt, Mervielde, and Van Leeuwen (2002) showed that, using the HiPIC in a sample aged 7–15 and a longitudinal sample aged 5–13, three types resembling resilient, overcontrollers, and undercontrollers could be recovered. In both samples HiPIC Benevolence and Conscientiousness consistently marked one of the three clusters.

Objectives of the study

In the current study, the additive effects of parenting practices and children’s personality characteristics were examined in a proportional stratified sample of 599 nonclinical elementary school-aged children. The focus was on three negative parenting variables: coercive parental discipline, overreactivity, and laxness, which are consistently associated with aggressive or externalizing behaviour (Patterson, 1982; Patterson et al., 1992; O’Leary, Slep, & Reid, 1999). Based on past research (John et al., 1994; Krueger et al., 1996; Robins et al., 1996), we hypothesized that Agreeableness, Conscientiousness, and Extraversion have an additive effect beyond the parenting effects.

Moreover, children’s personality characteristics were explored as potential moderators of the effects of parenting on childhood externalizing behaviour. The great majority of investigations into the role of parenting behaviour in the subsequent development of behaviour problems has focused on simple bivariate relationships. Parenting effects have
been demonstrated to be quite consistent but often modest in size (Chaplin, 1997; Rothbaum & Weisz, 1994). This suggests the possible importance of moderator variables. Certain personality characteristics may increase a child’s vulnerability to poor parenting practices that provoke coercive processes in the home and disrupted parent–child relationships, and in turn externalizing behaviour (Miles & Carey, 1997; Rutter, 2002). We expect that low levels of Agreeableness (i.e. high levels of hostility and irritability) can strengthen the relation between coercive, overreactive parenting and externalizing behaviours. Irritable or stubborn children may be less able to regulate their emotional and behavioural responses. This in combination with the disruption of parental regulation of children’s reactions may result in more adjustment problems.

Finally, we also investigated whether the direct and moderating effects were the same for the mother and the father data.

METHOD

Subjects
A proportional stratified sample of elementary-school-aged children attending regular schools was randomly selected (i.e. the names of the children who have had their birthday before 31 March were arranged alphabetically; the second and the last child but one were selected). Strata were constructed according to geographical location (province), sex and age. Participants were 599 families (92.5% two-parent families) with an elementary-school-aged child. Target children in these families ranged in age from 5 to 11 years ($M = 7$ years $10$ months, $SD = 1.16$). There were 304 boys ($M = 7$ years $10$ months, range: 5 years $9$ months–10 years $10$ months, $SD = 1.16$) and 295 girls ($M = 7$ years $10$ months, range: 5 years–10 years $5$ months, $SD = 1.16$). From 555 families, both parents provided data. From 39 children only the mother and from five children only the father agreed to complete the questionnaires. All parents had the Belgian nationality. Due to missing values the data of 581 mothers and 535 fathers were retained. The mean age of the mothers was 36 years $11$ months (range 27 years $1$ month–52 years) and of the fathers 39 years (range 27 years $11$ months–61 years $10$ months). Number of children living at home ranged from one to seven (mean 2.4). Percentages of mothers (M) and fathers (F) with various educational levels were as follows: elementary school, M 0.9, F 3.0; secondary education, M 41.1, F 43.3; non-university higher education M 45.2, F 34.4; university M 12.8, F 19.2.

Measures

Overreactive and lax parenting
Participants completed the Dutch translation of the Parenting Scale (Arnold, O’Leary, Wolff, & Acker, 1993). The Parenting Scale was originally developed as a parent-report measure of parenting assessing overreactivity, laxness, and verbosity. Participants responded using a seven-point Likert scale where 7 indicates a high probability of making the discipline mistake and 1 indicates a high probability of using an effective, alternative discipline strategy. The items are constructed as hypothetical situations, whereby the best answer is not always obvious, so that parental ratings of the frequency or severity of child behaviours are less likely to be biased. The Overreactivity and Laxness factor have adequate test–retest reliability, distinguish clinical from nonclinical samples, and have been validated against behavioural observations of parenting (Arnold et al., 1993;
Locke & Prinz, 2002). An exploratory factor analysis of the translated version revealed two interpretable factors corresponding with the overreactivity and laxness factors identified in previous studies of the parenting scale.1 With the oblique rotation promax, the two factors correlated 0.38. The Laxness factor contains 11 items and measures the extent to which parents follow through with consistent and suitable consequences for their children’s behaviour (e.g. item 16, ‘When my child does something I don’t like . . . ’ ‘I do something about it every time it happens’ versus ‘I often let it go’; item 8, ‘I’m the kind of parent that . . . ’ ‘sets limits on what my child is allowed to do’ versus ‘lets my child do whatever he/she wants’). The Overreactivity factor contains nine items and measures the tendency exhibited by parents to respond with irritation and anger or to react impatiently and aversively to problematic behaviour of their children (e.g. item 25, ‘When my child misbehaves . . . ’ ‘I rarely use bad language or curse’ versus ‘I almost always use bad language’; item 10, ‘When my child misbehaves . . . ’ ‘I speak to my child calmly’ versus ‘I raise my voice or yell’). Cronbach’s alpha’s for the mother data (n = 581) were 0.79 for the new Overreactivity scale and 0.81 for the new Laxness scale. For the father data (n = 535) Cronbach’s alphas were 0.76 for the new Overreactivity scale and 0.83 for the new Laxness scale. The correlations between Overreactivity and Laxness scores were $r = 0.36$, $p < 0.001$, in the mother and $r = 0.28$, $p < 0.001$, in the father data. Mother and father Overreactivity and Laxness scores was correlated $r = 0.27$, $p < 0.001$, and $r = 0.23$, $p < 0.001$, respectively.

Coercive parenting
Further, both parents rated the ‘Leuvens Instrument voor Coöercief Opvoedingsgedrag’ (LICO; Leuvens Instrument of Coercive Parenting Behaviour; Hellinckx et al., 2000). This new self-report questionnaire assesses coercion as described by Patterson et al. (1992). This instrument is novel in that it is based on the outcome of entire conflict sequences rather than on immediate reactions to particular individual behaviours. The LICO contains ten situations in which the child is confronted with a demand by the parents (e.g. clear away toys, go to bed). For each situation, parents rated at maximum six items, i.e. three sequences of actions of the child (e.g. when you ask your child to go to bed, how will your child usually act?) and reactions of the parent (e.g. given that your child acts like that . . . how do you usually react?). The answer categories of the child behaviour range on a continuum from 1 (obey) to 4 (get angry, hit). Parent behaviours range from 1 (give in) to 5 (punish severely). If the child complies during the first or second sequence, parents go on with the next situation. If on the other hand the parents capitulate to the child, a coercion score is calculated taking the duration of the conflict (i.e. the longer the child resists the request, the higher the coercion score) and the intensity of the aversive child behaviour (i.e. the more aversively the child reacts, the higher the coercion score) into account. The total score for coercion is summed over the ten situations. Cronbach’s alphas for the LICO were in the mother and father data 0.88 and 0.91, respectively. Mother and father coercion scores were correlated $r = 0.29$, $p < 0.001$. In the mother data as well as in the father data, the coercion score correlated $r = 0.19$, $p < 0.001$ with the Overreactivity score and $r = 0.23$ with the Laxness score.

1 As in the studies of Harvey, Danforth, Ulaszek, and Eberhardt (2001), Irvine, Biglan, Smolkowski, and Ary (1999), and Reitman et al. (2001), a confirmatory factor analysis did not replicate the three factors found by Arnold et al. (1993).
The Hierarchical Personality Inventory for Children (HiPIC)
To measure personality characteristics both parents rated the Hierarchical Personality Inventory for Children (HiPIC: Mervielde & De Fruyt, 1999). The HiPIC is designed to describe individual differences among children aged 6–12 years. This instrument includes 144 items, hierarchically organized under five higher order domains, which can be conceptually linked to the adult Big Five. The items in this questionnaire are all brief statements referring to overt behaviour that is observable for peers, parents, or others. All items are formulated in the third person singular, avoid negations, do not include trait adjectives and refer to overt behaviour. Parents rated children’s behaviour on a five-point scale, anchored as follows: 1, almost not characteristic; 2, little characteristic; 3, more or less characteristic; 4 characteristic; and 5, very characteristic. The following domain scales were distinguished with number of items and Cronbach’s alphas for the mothers and fathers, respectively, between parentheses. (i) Extraversion–Introversion (32 items; 0.91; 0.91). This scale contrasts emotional, social, and verbal expressiveness with shyness, inhibition, self-isolation, withdrawal, and non-assertiveness. (ii) Benevolence (40 items; 0.93; 0.92). This scale covers the broad area of prosocial versus antisocial interactions. The scale contrasts a warm, empathic consideration of other people’s needs, emotions, and interests, and open, trustful, interpersonal orientations with dominance, irritation, and antisocial exploitation of others. The items of this dimension are more evaluative and negative in nature, referring to characteristics of the ‘easy versus difficult child’ as conceived in the temperament literature. To distinguish the broader content from the adult Agreeableness factor, this factor was labelled as Benevolence. (iii) Conscientiousness (32 items; 0.92; 0.93). This scale refers to conscientiousness in worklike situations. The scale combines a concentrated, planful, reliable, and competent high achievement orientation in work situations with high levels of involvement and perseverance. (iv) Emotional Stability (16 items; 0.88; 0.86). In this scale, self-reliance, emotional balance, and being easy-going are opposed to being fearful, anxious, and emotionally disorganized under stress, and having low self-esteem. (v) Imagination (24 items; 0.92; 0.92). The items of this scale emphasize openness to new ideas and experiences in terms of creativity, fantasy, curiosity, imagination, humour, and resourcefulness in initiating activities. Findings concerning structural replicability, convergent and discriminant validities, temporal stability, and construct validity have recently been reported by Mervielde and De Fruyt (2002). In our sample, the correlation between mother and father scores ranged from $r = 0.64$, $p < 0.001$, for Extraversion to $r = 0.74$, $p < 0.001$, for Conscientiousness.

Externalizing behaviour problems
The Dutch translation of the Child Behaviour Checklist (CBCL: Achenbach, 1991; Verhulst, Van der Ende, & Koot, 1996) was used to obtain parental reports of the children’s behavioural and emotional problems. This widely used instrument has two parts, one part measuring children’s competencies and a second part consisting of 120 items describing a broad range of problems. Only the latter part of the CBCL was used in this study. The parents were instructed to circle a 0 if the item is not true for the child, a 1 if the item is somewhat or sometimes true, and a 2 if it is very true or often true.

The Child Behaviour Checklist (CBCL: Achenbach, 1991) is an extensively validated instrument that has adequate reliability and validity for describing child behaviour (Achenbach, 1991; Vignoe, Bérubé, & Achenbach, 2000). The CBCL is designed to measure children’s psychological and behavioural functioning, and includes two scales—Aggression and Delinquent Behaviour—that are combined to form an Externalizing scale.
The delinquency subscale is made up of 13 items including more covert behaviours such as having no guilt, stealing at home and elsewhere, lying, cheating, being truant, and using drugs and alcohol. The aggression subscale contains 20 items, including overt aggressive behaviours such as arguing a lot, destroying one’s own and other’s belongings, being disobedient at home and at school, fighting with other children, attacking others, and threatening others. For correlation and regression analyses, the raw Externalizing score was analysed, as recommended by Achenbach (1991). Cronbach’s alpha was 0.86 for both the mother and the father data. Of the 581 children rated by the mother, 470 were in the normal range, 44 in the borderline range, and 67 exhibited clinical levels of externalizing behaviour. Of the 535 children rated by the father, 460 were in the normal range, 29 in the borderline range, and 46 exhibited clinical levels of externalizing behaviour. The correlation between the mother and father scores was $r = 0.69; p < 0.001$.

**RESULTS**

**Preliminary analyses**

First, the assumptions of multiple regression analysis were checked. Least-squares regression inference assumes normality in the distribution of the variables. The coercion variable had in the mother and father data a skewness of 2.78 and 3.65 and a kurtosis of 8.95 and 19.26, respectively. Therefore, as recommended by Cohen and Cohen (1983), a square root transformation was performed. After transformation of the coercion variable, absolute values of skewness ranged in both samples from 0.00 to 0.99 and absolute values of kurtosis ranged from 0.01 to 2.01. The means, standard deviations, and intercorrelations between the variables are reported in Table 1. Large to moderate correlations (Cohen, 1988) were found among the personality dimensions. Smaller but significant correlations were found between the parenting variables. These correlations suggest that the variables within each domain (i.e. personality and parenting) are correlated but not redundant.

**Additive and interactive effects**

Moderator analyses were performed to examine the interactive effects of parenting and personality in predicting externalizing behaviour. In these multiple regression analyses, the continuous-level predictors were centred (i.e. put in deviation score form so that their means are zero), and the centred predictor terms were multiplied to form the interaction term. This procedure is recommended by Aiken and West (1991) to reduce problems with multicollinearity and to make the interpretation of significant interaction effects clear. Also as outlined by Aiken and West (1991), a step-down hierarchical examination was performed. This approach starts with the full equation containing all linear effects, curvilinear effects, and all possible interactions between the parenting and the personality variables. Nonsignificant terms were then omitted sequentially in stages beginning with the highest order terms in the equation (Freund & Littell, 2000).

In the mother data, the final reduced regression model accounted for 54% of the variance of CBCL Externalizing scores, $F(10, 570) = 67.94, p < 0.001$. Regression diagnostics were conducted prior to further tests. First, the presence of outliers and influential cases was assessed using the Studentized residual, leverage, DFFITS, DFBetas, Cook’s $D$, and Press statistics (Bollen & Jackman, 1990; Freund & Littell, 2000). In the mother data, Studentized residuals of ten observations (1.7%) exceeded 2.5 in absolute value and also
Table 1. Pearson correlations, mean scores, and standard deviations of the predictor variables and the criterion variable for the mother data (N = 581) and the father data (N = 535)

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<td>-0.03</td>
<td>-0.07</td>
<td>-0.13**</td>
<td>-0.04</td>
<td>0.04</td>
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<td>1.16</td>
<td>7.87</td>
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<td>—</td>
<td>-0.01</td>
<td>0.10*</td>
<td>-0.07</td>
<td>0.12***</td>
<td>-0.01</td>
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<td>0.03</td>
<td>0.12***</td>
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<td>0.04</td>
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<td>—</td>
<td>0.12***</td>
<td>0.47***</td>
<td>0.14***</td>
<td>0.57***</td>
<td>-0.12***</td>
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<td>19.81</td>
<td>137.54</td>
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<td>0.12**</td>
<td>0.10*</td>
<td>—</td>
<td>0.28***</td>
<td>0.38***</td>
<td>0.16***</td>
<td>-0.39***</td>
<td>-0.19***</td>
<td>-0.23***</td>
<td>-0.63***</td>
<td>55.66</td>
<td>10.01</td>
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<td>0.21***</td>
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<td>0.31***</td>
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<td>—</td>
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<td>-0.17***</td>
<td>-0.25***</td>
<td>-0.15***</td>
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<td>-0.22***</td>
<td>-0.17***</td>
<td>-0.19***</td>
<td>-0.20***</td>
<td>0.36***</td>
<td>—</td>
<td>0.20***</td>
<td>0.04</td>
<td>2.14</td>
<td>0.65</td>
<td>6.15</td>
<td>10.03</td>
</tr>
<tr>
<td>10. Coercion</td>
<td>-0.03</td>
<td>-0.01</td>
<td>-0.02</td>
<td>-0.26***</td>
<td>-0.14***</td>
<td>-0.08</td>
<td>-0.02</td>
<td>0.19***</td>
<td>0.19***</td>
<td>—</td>
<td>0.24***</td>
<td>7.38</td>
<td>6.67</td>
<td>6.57</td>
<td>6.17</td>
</tr>
<tr>
<td>11. Externallizing</td>
<td>-0.11**</td>
<td>-0.20***</td>
<td>0.07</td>
<td>-0.67***</td>
<td>-0.16***</td>
<td>-0.34***</td>
<td>-0.00</td>
<td>0.35***</td>
<td>0.08</td>
<td>0.22**</td>
<td>—</td>
<td>7.38</td>
<td>6.67</td>
<td>6.57</td>
<td>6.17</td>
</tr>
</tbody>
</table>

Correlations for the mother data are below the diagonal; correlations for fathers are above.

*p < 0.05; **p < 0.01; ***p < 0.001.
had critical DFFITS. Also in the father data, ten outliers (1.9%) were identified. To assess the degree to which the findings were influenced, these observations were dropped and the regression analysis was conducted without the possible outliers. No changes in the pattern of significant effects were found. Because of the consistency in the results, all observations were retained in all subsequent analyses. Next multicollinearity among the predictors was assessed using the variance inflation factor (VIF) statistic. The VIF ranged from 1.02 to 1.50 in the mother data and from 1.04 to 1.84 in the father data, all within the acceptable range (Stevens, 2002).

The final reduced models are presented in Table 2. In the mother data, a significant gender and age effect was found such that boys and younger children showed higher levels of externalizing behaviour. Further, the first-order effect of Coercion and Overreactivity significantly predicted Externalizing scores, such that high levels of Coercion and Overreactivity predicted externalizing behaviour. Low levels of Laxness predicted significantly higher levels of externalizing problem behaviour. In addition and beyond the parenting effects, also the personality dimensions Extraversion, Conscientiousness and Benevolence contributed to the prediction of externalizing behaviour. Higher scores on Extraversion and lower scores on Conscientiousness predicted higher scores for Externalizing behaviour. The first-order effect of Overreactivity was further qualified by a significant interaction of Benevolence and Overreactivity (Figure 1). The conditional effect (Aiken & West, 1991) of Benevolence indicates that on average, the regression of Externalizing on Overreactivity is positive across the range of Benevolence. The two-way Overreactivity × Benevolence interaction was probed by testing the simple slopes for significance as presented by Aiken and West (1991). As suggested by Cohen and Cohen

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Mothets ($N = 581$)</th>
<th>Fathers ($N = 535$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$b$</td>
<td>SE</td>
</tr>
<tr>
<td>Age</td>
<td>$-0.40^*$</td>
<td>0.16</td>
</tr>
<tr>
<td>Sex</td>
<td>$1.49^{***}$</td>
<td>0.38</td>
</tr>
<tr>
<td>Overreactivity</td>
<td>0.77^{**}</td>
<td>0.25</td>
</tr>
<tr>
<td>Laxness</td>
<td>$-1.04^{**}$</td>
<td>0.32</td>
</tr>
<tr>
<td>Coercion</td>
<td>0.25^{*}</td>
<td>0.11</td>
</tr>
<tr>
<td>Extraversion</td>
<td>0.05^{***}</td>
<td>0.01</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>$-0.42^{***}$</td>
<td>0.01</td>
</tr>
<tr>
<td>Benevolence</td>
<td>$-0.18^{***}$</td>
<td>0.01</td>
</tr>
<tr>
<td>Overreactivity ×</td>
<td>$-0.02^{*}$</td>
<td>0.01</td>
</tr>
<tr>
<td>Benevolence</td>
<td>0.002^{***}</td>
<td>0.00</td>
</tr>
<tr>
<td>Coercion ×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conscientiousness</td>
<td></td>
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</tr>
</tbody>
</table>

Traditional standardized solutions do not permit accurate comparisons of the regression coefficients because the regression terms are not scale invariant when higher-order terms are included in the model. The Friedrich procedure (Friedrich, 1982) addresses this problem of scale invariance, and was used to calculate the standardized solution (beta coefficients).

*p < 0.05; **p < 0.01; ***p < 0.001.
(1983), we used the values of Benevolence_M, Benevolence_H, and Benevolence_L, corresponding to the mean of Benevolence, one standard deviation above, and one standard deviation below the mean respectively. The simple slope of Overreactivity was significant at low levels (1 SD under the mean) of Benevolence, \( b = 1.26, t(580) = 3.95, p < 0.001 \), significant at moderate (the mean) levels of Benevolence, \( b = 0.77, t(580) = 3.08, p < 0.01 \), and not significant at high levels (1 SD above the mean) of Benevolence, \( b = 0.28, t(580) = 0.82, p = 0.42 \). The simple slopes are plotted in Figure 1.

Finally, for Benevolence, a curvilinear effect was found (Figure 2). The decreasing concave curve indicates that the effect of Benevolence was strongest for children with the lowest scores on Benevolence. To compute standardized regression coefficients the guidelines described by Friedrich (1982) and by Jaccard, Turrisi, and Wan (1990) were followed. First each of the predictors was standardized and their crossproducts were computed. These values were entered in a regression analysis with \( z_{\text{externalizing}} \) as dependent variable. The beta coefficients are presented in Table 2. The child’s score on Benevolence was clearly the most important predictor for externalizing behaviour.

In the father data, the final model accounted for 53% of the variance of CBCL Externalizing scores \( F(11, 520) = 52.60, p < 0.001 \). A significant gender effect was found such that boys showed higher levels of externalizing behaviour. In contrast to the mother data, no age effect was found. Further, the first-order effect of Coercion significantly predicted Externalizing scores, such that high levels of Coercion predicted externalizing behaviour. Also the first-order effect of Laxness was significant. Lower levels of Laxness predicted higher scores on Externalizing. A quadratic effect was found for Overreactivity. The predominantly positive concave downward curve suggests a ceiling effect. Overreactivity scores more then one standard deviation above the mean do not seem to predict further increases in Externalizing (Figure 3). In addition, and beyond the parenting effects, a linear effect was found for the personality dimensions Extraversion and...
Conscientiousness. Higher scores on Extraversion and lower scores on Conscientiousness predicted externalizing behaviour. The first-order effect of Overreactivity was further qualified by a significant interaction Overreactivity \times Benevolence. The conditional effect of Benevolence indicates that, on average, the regression of Externalizing on Overreactivity is positive across the range of Benevolence. The two-way Overreactivity \times Benevolence interaction was probed by testing the simple slopes for significance (Figure 4). The simple slope of Overreactivity was significant at low levels (1 SD under the mean) of Benevolence, $b = 2.19$, $t(534) = 5.95$, $p < 0.001$, significant at moderate

Figure 2. The relation between Benevolence and externalizing behaviour in the mother data.

Figure 3. The relation between Overreactivity and externalizing behaviour in the father data.
The simple slope of overreactive parenting predicting child externalizing behaviour at varying levels of children’s Benevolence score (B) in the father data. B\text{high} = 1 SD above the mean. B\text{low} = 1 SD below the mean. B\text{mean} = 0. Simple slope for B\text{high} = 0.25, n.s.; for B\text{mean} = 1.22; \( p < 0.001 \); for B\text{low} = 2.19; \( p < 0.001 \). Simple slopes are unstandardized regression coefficients.

The first-order effect of Coercion was further qualified by a significant interaction Overreactivity × Conscientiousness. The two-way Coercion × Conscientiousness interaction was probed by testing the simple slopes for significance (Figure 5). The simple slope of Coercion was significant at low levels (1 SD

Figure 4. The simple slope of overreactive parenting predicting child externalizing behaviour at varying levels of children’s Benevolence score (B) in the father data. B\text{high} = 1 SD above the mean. B\text{low} = 1 SD below the mean. B\text{mean} = 0. Simple slope for B\text{high} = 0.25, n.s.; for B\text{mean} = 1.22; \( p < 0.001 \); for B\text{low} = 2.19; \( p < 0.001 \). Simple slopes are unstandardized regression coefficients.

Figure 5. The simple slope of coercive parenting predicting child externalizing behaviour at varying levels of children’s Conscientiousness score (C) in the father data. C\text{high} = 1 SD above the mean. C\text{low} = 1 SD below the mean. C\text{mean} = 0. Simple slope for C\text{high} = −0.10, n.s.; for C\text{mean} = 0.23, \( p < 0.05 \); for C\text{low} = 0.56, \( p < 0.001 \). Simple slope are unstandardized regression coefficients.
under the mean) of Conscientiousness, $b = 0.56$, $t(534) = 4.12$, $p < 0.001$, significant at moderate (the mean) levels of Conscientiousness, $b = 0.23$, $t(534) = 2.07$, $p < 0.05$, and not significant at high levels (1 SD above the mean) of Conscientiousness, $b = -0.10$, $t(534) = -0.58$, $p = 0.56$. For Benevolence, a curvilinear effect was found. The predominantly negative concave upward curve indicates that the effect of Benevolence was strongest for children with the lowest scores who were difficult to manage (Figure 6). The standardized regression coefficients are presented in Table 2. Also in the father data the child’s score on Benevolence was the most important predictor for externalizing behaviour.

**DISCUSSION**

Personality–environment interactions have figured especially in theories of development and in diathesis theories of psychopathology but they have seldom been examined in empirical work. Using a cross-sectional design, this study tested the hypothesis that parenting and children’s personality have both additive and interactive effects on children’s adjustment in a stratified proportional sample of non-clinical elementary school-aged children. As far as we know, this was the first personality–environment study that described children’s personality in terms of the Big Five.

Consistent with past research, dysfunctional parenting disciplines and children’s personality (Colder et al., 1997; Bates et al., 1998) were directly related to children’s externalizing problem behaviour. In addition, a relatively profound exploration of the role of children’s personality characteristics in changing the relationship between important indicators of dysfunctional parenting and problem behaviours supported moderating effects between children’s individual differences and parenting. These results indicate that
children differ in risk for developing externalizing problem behaviours in the presence of dysfunctional parenting practices (Miles & Carey, 1997; Rutter, 2002).

**Direct effects of parenting and children’s personality**

Consistent with previous findings, parenting was directly related to children’s externalizing problem behaviour in both the mother and the father data (Kiesner et al., 2001; Patterson et al., 1992). However, these effects do not speak to the mechanisms by which such parenting causes externalizing problem behaviour in children. Several mechanisms are possible. Overreactive and coercive parenting behaviour might lead to inconsistent behavioural contingencies, an unpredictable and erratic environment, and a reduced sense of control. This in turn might increase the likelihood of externalizing problem behaviours. As described in the coercion theory of Patterson (Patterson et al., 1992), the negative reinforcement of externalizing behaviour may increase the frequency and intensity of this problem behaviour. A more direct explanation is offered by Bandura (see e.g. Bandura & Huston, 1961), who showed that children readily imitate the aggressive behaviour of adults. Much overreactive parenting behaviour, such as verbal and psychological aggression, arguing, and overt expressions of anger, have direct parallels among the externalizing CBCL-items. Higher scores on Laxness predicted lower levels of externalizing problem behaviour. A possible explanation is that lax and permissive parents tolerate more difficult behaviour or do not perceive some child behaviour as problematic.

Personality characteristics were also directly associated with externalizing behaviour problems. Consistent with previous studies (Huey & Weisz, 1997; John et al., 1994; Rothbart & Bates, 1998), high levels of Extraversion, low levels of Conscientiousness, but especially low levels of Benevolence predicted higher levels of externalizing problem behaviour in children. Moreover, a curvilinear effect between Benevolence and Externalizing was found. This pattern of personality scores is similar to that found by Robins and his colleagues (1994) in adolescents. Ego undercontrol is primarily expressed in energetic, yet antagonistic and undependable behaviour that reflects high Extraversion, low Agreeableness (Benevolence), and low Conscientiousness. Several mechanisms are put forward to explain the association between personality and adjustment problems. For example, specific personality dimensions may operate as a diathesis, predisposing an individual to develop adjustment problems under specific conditions. Personality characteristics may also shape an individual’s environment or experiences by biasing information processing (Rothbart & Bates, 1998).

A general problem of validity of psychological research is measurement confounding (Lemery, Essex, & Smider, 2002). The content overlap between the HiPIC Benevolence items and the CBCL externalizing items may have contributed to the strong effect of Benevolence. However, in the discussion of the construction of the HiPIC, Mervielde and De Fruyt (1999) suggested that the large Benevolence factor is broader in content than the traditional Agreeableness factor of the FFM. On the one hand they pointed to the possible similarity in content of the Egocentrism, Dominance, and Irritability facets and the CBCL Aggressive behaviour scale, but on the other hand they stressed that the Delinquent syndrome scale items such as ‘sets fires, steals, truancy, alcohol and drug use’ have no clear counterparts in the HiPIC. Hence, to examine the possible impact of item overlap on our findings, separate regression analyses were performed with the Aggression syndrome score and the Delinquent syndrome score as dependent variable. For the Aggression
variable, findings were identical to the analyses on the Externalizing score. For the Delinquent variable, Benevolence was also the strongest predictor, but some interaction effects were no longer significant.²

The effect of the personality dimensions is a unique effect, controlling for the parenting variables. These findings are consistent with theoretical models that state that both parenting and personality characteristics independently predict children’s adjustment. Analogous results were presented by investigations with regard to temperament and parenting effects (Bates et al., 1998; Colder et al., 1997; Lengua et al., 2000). These variables appear to have an effect above and beyond the parenting variables in predicting children’s externalizing problem behaviour. This emphasizes the importance of taking both parenting behaviours and child characteristics into account when predicting children’s adjustment (Sanson & Rothbart, 1995).

Although the parenting and personality variables predicted problem behaviours directly and independently, the presence of significant interaction effects suggests that some of the effects of parenting variables may depend on child personality characteristics or vice versa.

**Parenting and personality interactions**

Investigation of interaction effects makes it possible to identify children at greatest risk for developing externalizing problem behaviours in the presence of dysfunctional parenting practices.

In the mother data as well as in the father data, Benevolence moderated the relations between Overreactivity and externalizing problems. Overreactivity was more strongly related to externalizing behaviours for children with low scores on Benevolence than those with high scores on Benevolence who were more agreeable and sociable. The personality dimension Benevolence appears to function as a protective factor, buffering the impact of maternal or paternal Overreactivity. Children who are agreeable and empathic, submissive, good-humoured, and cheerful may be better able to obey their parents, which may result in a positive, favourable rearing climate. In addition, children with these characteristics may have more positive interactions or supportive relationships with others that might further diminish the impact of parental Overreactivity. Overreactivity was more strongly related to Externalizing in children with the opposite characteristics. Irritable and dominant children may be more vulnerable to the effects of overreactive parenting because, unlike less irritable children, they have difficulty regulating their own emotions and behaviours on their own. This may in turn lead to more aversive interactions with others. For irritable

²The final reduced regression model accounted in the mother data for 55% of the variance of CBCL Aggression syndrome scores, \( F(10, 570) = 68.77, p < 0.001 \). In the father data, the final model accounted for 52% of the variance, \( F(11, 523) = 52.50, p < 0.001 \). All first order and interaction effects of the final Externalizing model significantly predicted Aggression scores. For the CBCL Delinquent syndrome scores, the final reduced regression model accounted for 32% of the variance in the mother data, \( F(10, 570) = 26.52, p < 0.001 \), and for 27% of the variance in the father sample, \( F(11, 523) = 17.15, p < 0.001 \). Benevolence was still the strongest predictor in the mother data (\( b = -0.03, p < 0.001 \)) as well as in the father data (\( b = -0.02, p < 0.001 \)). In the mother data, the first order age, Laxness, and Coercion effects and the Overreactivity × Benevolence interaction effect were no longer significant. In the father sample, the Overreactivity × Benevolence and the quadric Overreactivity effects could not be replicated. The limited prevalence of extreme behaviours covered by the Delinquent syndrome scale may explain the decline in explained variance. Of the 13 items, two items (item 101, ‘truancy’, and item 105, ‘alcohol and drugs’) had a prevalence of 0% in the mother as well as in the father ratings. In addition, six items had a prevalence less than 2% in the mother ratings as well as in the father ratings (i.e. item 67, ‘runs away’, 0.8%, 0.2%; item 72, ‘fire setting’, 0.3%, 0.5%; item 81, ‘stealing at home’, 1.7%, 0.9%; item 82, ‘stealing outside the home’, 0.8%, 0.5%; item 106, ‘vandalism’, 1.8%, 0.2%). Complete results of the regression analysis can be requested by email from the first author.

children, effective parental control may play a particularly important role in facilitation of self-regulation, without which impulsive children may be at greater risk for developing externalizing problems. In addition, highly impulsive children may provoke more negative interactions with parents, teachers, peers, and their environment, which in the long run can lead to low self-esteem and depressions (Patterson et al., 1992). These results are also in accordance with Gray’s (1982, 1987, 1991) psychobiological model of personality. Individual differences in sensitivity to reward and punishment may lead to different learned reactions to objectively identical social reinforcements. Children with different personality characteristics may learn different things in apparently identical situations. A child with a high score on Benevolence, punished for performing an undesirable act, may be more likely to inhibit future performance of the act because memory of the aversive consequence overrides the immediate reward of performing the act. For children with low scores on Benevolence, potential punishment is less likely to inhibit undesirable behaviour. Psychophysiological processes also affect children’s approach and avoidance tendencies, including the child’s tendency to choose risky or dangerous situations. These children may be more vulnerable to coercive and overreactive parenting. Over time, difficulties in learning from punishment and inept parenting may promote overreactive interchanges between parent and child, and subsequently externalizing behaviour.

In addition, in the father data a significant Coercion × Conscientiousness effect was found. Conscientiousness moderated the relation between coercion and externalizing conduct problems. Coercion was more strongly related to externalizing problems for children with low scores on Conscientiousness than for children with moderate or high scores on Conscientiousness. Empirical investigations have linked externalizing behaviour to attentional problems (e.g. restless, fidgety, lacking concentration) and insufficient impulse control (Rothbart & Bates, 1998; Snyder, Schrepferman, & St Peter, 1997). The lower end of the Conscientiousness factor reflects these characteristics. In addition, children who are reliable and planful, with high levels of involvement, may be better able to focus on positive aspects of their environments. This is consistent with studies reporting that attention control predicts lower adjustment problems or positive adjustment (Eisenberg et al., 1997).

None of the Extraversion × Parenting interactions was statistically significant. Although Extraversion uniquely predicted externalizing problem behaviour, it did not appear to exacerbate the effects of overreactive or coercive parenting on children’s externalizing problems. Extraversion was identified as a general risk factor for adjustment problems in children (Rothbart & Bates, 1998) and appears to predict adjustment problems independently of dysfunctional parenting. The absence of significant interactions may be explained by the use of a general extraversion measure in this study. It is possible that specific facets of Extraversion would interact differently with parenting. For example, the measure of Extraversion in this study includes the facets shyness, optimism, expressiveness, and energy. Interactions between children’s energy and parental overreactivity may be more likely to predict conduct problems.

Furthermore, no significant gender × parenting or gender × personality interactions were present. This means that significant effects on children’s externalizing behaviour were not differentially patterned for boys and girls. Recently, Shaw, Winslow, Owens, Vondra, Cohn, and Bell (1998) also reported relatively few gender differences in developmental antecedents of externalizing problem behaviours. The consistent gender difference in externalizing scores is in accordance with other empirical studies (Dunn, 2001; Loeber & Hay, 1993). A possible explanation is that girls’ faster development during
early childhood may partially account for the differences on aggression. Fast language development and better self-regulation skills may result in parents finding girls easier to manage, promote a more positive parent–child relationship, and thus generate fewer behaviour problems (Sanson, Prior, Smart, & Oberklaid, 1993).

The small magnitude of interaction effect sizes may have two reasons. First, the interaction between Overreactivity and Benevolence is ordinal (noncrossover) rather than disordinal (Aiken & West, 1991; Jaccard et al., 1990); that is, the strength but not the direction of the relation between parenting and problem behaviours is modified by personality characteristics. Second, the reliability of the product term will be less than or equal to the less reliable of the two first-order predictors (Aiken & West, 1991). Consequently, the magnitude of the observed effect size of the interaction can be expected to be an underestimate of the true effect size.

The findings of this study are consistent with findings of the few previous studies investigating the moderating effects of temperamental characteristics. These studies showed that negative emotionality (Lengua et al., 2000) or difficult temperament (van den Boom, 1994) slightly increased the likelihood that children would develop adjustment problems in the presence of dysfunctional parenting disciplines. The contribution of the present study is that the broadband personality characteristics were measured in a large proportional stratified sample of nonclinical elementary school-aged children.

Implications for intervention

The current findings of moderating effects suggest that integrating the effects of children’s individual differences with parenting effects can improve our understanding of the development of externalizing behaviour. This integration may have important implications for intervention programmes or parent training programmes (Johnson & Sheeber, 1999; Sheeber & McDevitt, 1998). It is important that such programmes are conceptually based on a goodness-of-fit model, which assumes that optimal child development is determined by the degree to which the demands of the environment are congruent with the child’s personality characteristics. Overreactive discipline of a child characterized by low levels of Benevolence may be a mismatch that produces a tendency to aggress, which in turn may elicit more overreactive discipline. Helping parents of these children develop and maintain effective behaviour management techniques, and specifically teaching them to implement management techniques in a way that complements the child’s personality characteristics may be a particularly effective intervention strategy. It is probable that parents may benefit from learning social reinforcements, such as praise and ignoring, to facilitate performance of desired behaviours. Also the contingent use of positive reinforcement for appropriate behaviour and the use of gentle, nonpower, assertive discipline practices are important ‘parenting tools’. Another component of such programmes can involve support and assistance for problems that result from specific personality characteristics. Sheeber and Johnson (1994) reported the efficacy of a temperament focused, psychoeducational intervention for mothers with temperamentally difficult children. Mothers who participated in the parent-training programme demonstrated increased satisfaction with parent–child relationships and perceived parenting competence, as well as improved affect.

Limitations and future directions

Although we consider the moderator effects robust and meaningful, this study has also several limitations.
The absolute reliance on questionnaire measures increases the likelihood of method bias or item overlap among the measures. Self-reports of parenting were found to correlate only modestly with observer and child reports (Patterson et al., 1992). Therefore, a multimethod measurement strategy (e.g., inclusion of observational measures) may more accurately assess parenting and children’s individual differences and hence further strengthen the results.

This study revealed that some personality characteristics and dysfunctional discipline practices can both be viewed as ‘risk factors’ that are often conditional upon each other. However, other unmeasured parenting behaviours may also have an important influence for such individuals. In the present study, the focus was on negative parenting. Future research is necessary to test the possible direct and interactive (or protective) effects of positive parenting (gentle, nonpower) on children’s behaviour.

Further, parenting practices, personality characteristics, and externalizing behaviour were assessed concurrently. This precluded inferences about directionality. Moreover it is unclear whether low levels of Benevolence and Conscientiousness were also present in early childhood, whether these individual differences already formed a mismatch as suggested by the goodness-of-fit theory, and whether parent and child behaviour reciprocally influence each other. Future longitudinal research is necessary to compare change over time in parenting practices and the course of early childhood behaviours to elucidate the nature of interactive effects between parenting practices and children’s individual differences.

REFERENCES


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