Child Personality and Parental Behavior as Moderators of Problem Behavior: Variable- and Person-Centered Approaches

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Parenting × Child Personality interactions in predicting child externalizing and internalizing behavior were investigated in a variable-centered study and a person-centered study. The variable-centered study used data from a 3-year longitudinal study of 600 children 7 to 15 years old at Time 1 and 512 children 10 to 18 years old at Time 2. Parents rated child personality (five factor model), negative control, positive parenting, and child problem behavior, whereas children rated parental behavior. Hierarchical moderated regression analyses showed significant Parenting × Child Personality (benevolence and conscientiousness) interactions, principally for externalizing behavior. The interactions were largely replicable across informants and across time. The person-centered study, which classified participants into 3 types, showed that negative parental control was more related to externalizing behavior for undercontrollers than for resilients. Negative parental control enhanced internalizing behavior for overcontrollers.

From an ecological or contextual perspective, the child is nested in a complex network of interconnected systems (cf. Belsky, 1984; Bronfenbrenner, 1986; Dishion, French, & Patterson, 1995; Sameroff, 2000), and therefore multiple sources may contribute to the development of (problem) behavior in children. Besides individual risk and protective factors such as intelligence, neuropsychological deficits, and temperament, variables such as parenting, family climate, the marital relationship, relationships with peers, and contextual factors (e.g., neighborhood, socioeconomic status) have been taken into account as determinants of problem behavior (Deater-Deckard, 2001; Deković, 1999; Frosch & Mangelsdorf, 2001; Harris, 1998; Jessor, Van Den Bos, Vanderryn, Costa, & Turbin, 1995; Stouthamer-Loeber et al., 1993). Deater-Deckard, Dodge, Bates, and Pettit (1998) demonstrated that child factors uniquely explain up to 19% of the variance in externalizing behavior, peer-related factors explain up to 13%, parenting factors explain up to 6%, and sociocultural factors explain up to 4%.

Although the main effects of child personality and parental behavior on child problem behavior have been extensively documented in past research, some of which is reviewed briefly below, relatively few studies have addressed the combined or interactive effects of personality and parental behavior as determinants of internalizing and externalizing behavior (Barber, 1992; Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000; O'Connor & Dvorak, 2001). However, ignoring personality–environment interactions and considering only main effects can lead to spurious

correlations with problem behavior. As O'Connor and Dvorak (2001) pointed out, bivariate relationships may be hiding associations that are conditional and not universal. For example, negative parental control is related to externalizing behavior, but this overall relation can hide the fact that the relationship holds in particular for children with a difficult temperament but not for resilient children. Hence, ignoring this interaction may lead to unwarranted conclusions about the detrimental effects of parenting behavior. In the present study, we aimed to examine the role of interactions between parenting and child personality variables as predictors of child and adolescent externalizing and internalizing behavior. The study is innovative because it is one of the first to use the five factor model to assess the child's personality, adopting a longitudinal as well as a cross-sectional perspective to predict the effect of interactions. Furthermore, in order to ensure sufficient power for the tests of interaction effects, the study was conducted with a moderately large sample. In addition, it is the first study to examine Child Personality × Parenting interactions from a person-centered approach, searching for reliable interaction effects between parenting and the resilient, undercontrolled, and overcontrolled personality types.

Personality and Temperament as Predictors of Child Problem Behavior

Both temperament and personality refer to individual differences that evince some stability over time, presumably because they have a biological basis (Eisenberg, Fabes, Guthrie, & Reiser, 2000). *Temperament* refers to "the constitutionally based individual differences in emotional, motor and attentional reactivity and self-regulation" (Rothbart & Bates, 1998, p. 109), whereas the construct of *personality* refers to "individual differences in the tendency to behave, think, and feel in certain consistent ways" (Caspi, 1998, p. 312). Temperamental differences in infancy are assumed to be precursors of later personality differences (Caspi & Silva, 1995; Eisenberg et al., 2000); however, they include only a subset of personality differences in late childhood and adulthood (Shiner & Caspi, 2003). Several reviews have linked the traditional

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dimensions of temperament to the five factor model (Caspi, 1998; Mervielde & Asendorpf, 2000; Shiner, 1998; Shiner & Caspi, 2003). Recent developments in personality research show a growing consensus about how individual differences in children's personality can be mapped in a comprehensive taxonomic system, usually referred to as the Big Five personality factors or the five factor model of personality. The five broadband dimensions forming the top level of this hierarchical system, Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness, are derived from lexical studies of the personality-descriptive language of adults and from the analysis of free parental descriptions of child personality (Kohnstamm, Halverson, Mervielde, & Havill, 1998).

Main-effect-type studies show relations between temperament and problem behavior, with negative emotionality as a general risk factor (Eisenberg et al., 2000). Externalizing behavior, which includes hyperactivity, attention problems, antisocial behavior, and conduct disorder, has been related to lack of control (Caspi, Henry, McGee, Moffitt, & Silva, 1995; Eisenberg et al., 2000). Other studies have found evidence for an association between personality and delinquency (Krueger et al., 1994; Ruchkin, Eisemann & Hägglöf, 1999). Internalizing behavior, indicating anxiety and depression, has been associated with behavioral inhibition (Eisenberg et al., 2000), flat affect, and passivity (Caspi et al., 1995). Finch and Graziano (2001) showed that the influence of temperament on depression in adolescents is entirely mediated by the personality dimensions of agreeableness, extraversion, and neuroticism.

Child Personality From Variable- and Person-Centered Perspectives

Mervielde and Asendorpf (2000) identified and compared two empirical approaches to studying individual differences in children's dispositions to behave, think, and feel. The *variable-centered approach* distinguishes replicable broad categories of variables across individuals, such as the dimensions of the five factor model of personality. Variable-centered research assesses the correlational structure of the variables *across persons* within a particular population. The *person-centered approach* studies "types," identifying clusters of individuals with similar personality patterns. The person-centered approach delineates typical configurations of variables *within the person* and hence assesses the common within-person structure of variables. Mervielde and Asendorpf (2000) attempted to clarify the distinction between the two approaches by referring to a card game as an analogue. The variable-centered approach delineates the features (e.g., color, suit, and values) of the cards that are used in the game, whereas the person-centered approach studies the typical hands that are received by the players. From this analogue it is clear that variable- and person-centered methodologies should be conceived not as competing approaches but rather as complementary methods that together provide a more comprehensive picture of how individual differences can and should be addressed. The detection of reliable and replicable types depends on the identification of adequate dimensions to represent individual differences. Hence, the growing consensus about the utility of the five factor model as a model to represent individual differences from childhood to adulthood sets the stage not only for the discovery of reliable personality types but also for the study of the interaction between types and dimen-

sions on the one hand and environmental variables (e.g., parenting) on the other hand.

Several researchers studied the replicability of three personality types: resilients, overcontrollers, and undercontrollers (cf. Asendorpf, Caspi, & Hofstee, 2002). In terms of five factor model scores, the three types can be described as follows: (a) Resilients receive average scores on the characteristics of benevolence, extraversion, openness to experience, and conscientiousness and score below the mean on neuroticism; (b) overcontrollers receive high ratings on neuroticism and low ratings on extraversion; and (c) undercontrollers receive scores below the mean on agreeableness and conscientiousness. So far, attempts to replicate the three types across heterogeneous samples, time, informants, methods, and variables for clustering have produced mixed results (for an overview, see Asendorpf, Borkenau, Ostendorf, & van Aken, 2001, and Asendorpf et al., 2002). This has led to the conclusion that although the three prototypes are frequently recovered, they are not necessarily the prototypes that best describe each particular sample (Asendorpf, 2003; Van Leeuwen, De Fruyt, & Mervielde, 2004).

The use of personality types in developmental psychology has several benefits. Instead of considering different features independently, types specify a more parsimonious configuration or combination of characteristics. As such, types facilitate communication among researchers and clinicians interested in describing personality in applied settings and in identifying types at risk for developing psychopathology (Asendorpf et al., 2001; Costa, Herbst, McCrae, Samuels, & Ozer, 2002). Types have utility as predictors of child and adolescent (mal)adaptive development. Several studies have provided evidence for the link between externalizing behavior and the undercontrolled type, and between internalizing behavior and the overcontrolled type (Asendorpf et al., 2001; De Fruyt, Mervielde, & Van Leeuwen, 2002; Van Leeuwen et al., 2004).

Parental Behavior and Child Problem Behavior

Although they are often used as interchangeable concepts, it should be noted that *parental behavior* is distinct from *parenting styles* as defined by, for example, the typology of Maccoby and Martin (1983), in which authoritarian, authoritative, permissive, and indifferent parenting are based on two dimensions, demandingness and responsiveness. Parenting styles can be regarded as the general context, or the climate, in which the more specific parenting practices or behaviors are expressed (Darling & Steinberg, 1993).

Most studies on risk and protective factors for the development of problem behavior have focused on externalizing behavior, probably because it is more visible and has more negative social consequences (Deković, 1999). The relationship of parenting to child externalizing behavior has been documented both in clinical and nonreferred samples (Belsky, Hsieh, & Crnic, 1998). Lack of parental involvement or poor acceptance or responsiveness, lack of supervision or poor parental monitoring, harsh and inconsistent punishment, and insufficient rewarding of positive behavior have been identified as predictors of externalizing behavior (Deater-Deckard & Dodge, 1997; Forehand, Miller, Dutra, & Chance, 1997; Haapasalo & Tremblay, 1994; Loeber & Dishion, 1983; Loeber & Stouthamer-Loeber, 1986; Patterson & Stouthamer-Loeber, 1984; Rothbaum & Weisz, 1994; Ruchkin et al., 1999;

Stormshak, Bierman, McMahon, Lengua, & Conduct Problems Prevention Research Group, 2000; Wakschlag & Hans, 1999; Weiss, Dodge, Bates, & Pettit, 1992). Parenting has also been associated with child internalizing behavior, such as anxiety (Gruner, Muris, & Merckelbach, 1999; Siqueland, Kendall, & Steinberg, 1996) and depression (Muris, Schmidt, Lambrichs, & Meesters, 2001; Richter, 1994).

Child Personality and Parental Behavior as Moderators of Child Problem Behavior

According to Thomas and Chess's (1977) goodness-of-fit-theory, the development of problem behavior has its origins in the child's temperament and in its interaction with the socializing environment. When there is a mismatch between a difficult temperament and parenting practices, behavioral disturbances may develop. In theory, temperament does not lead to behavioral problems by itself; it only has an effect in conjunction with particular environments (Bates, Pettit, Dodge & Ridge, 1998). At present, there is some empirical evidence underscoring the importance of interactions between child characteristics and parenting in the prediction of child problem behavior. These studies vary in (a) design, that is, cross-sectional versus longitudinal (e.g., Bates et al., 1998; Belsky et al., 1998; Rubin, Burgess, Dwyer, & Hastings, 2003; Stoolmiller, 2001) versus experimental (e.g., Anderson, Lytton, & Romney, 1986); (b) sample composition, that is, non-referred versus referred (e.g., Anderson et al., 1986; Colder, Lochman, & Wells, 1997); (c) age, that is, preschool (e.g., Paterson & Sanson, 1999; Rubin et al., 2003), school-age (e.g., Lengua, Wolchik, Sandler, & West, 2000; Stoolmiller, 2001; Wootton, Frick, Shelton, & Silverthorn, 1997), and adolescent (e.g., Carlo, Roesch, & Melby, 1998; Olweus, 1980); and (d) gender, that is, some studies include only boys (e.g., Anderson et al., 1986; Belsky et al., 1998; Colder et al., 1997; Olweus, 1980; Stoolmiller, 2001). The studies also differ in how parental behavior and child temperament are assessed. Most studies linking parenting and child characteristics have been restricted to the assessment of the child's temperament, leading to the general conclusion that children with a difficult temperament are particularly vulnerable when also exposed to punitive parenting or negative control. Few studies have examined personality–environment interactions from the perspective of the five factor model. O'Connor and Dvorak (2001) showed that parental behaviors matter only for some kinds of children and not for others and hence that specific combinations of personality characteristics and parenting variables operate as protective or risk factors. Prinzie et al. (2003) also used the five factor model in their investigation of interaction effects between personality and parenting on externalizing behavior. They showed (a) that benevolence functions as a protective factor, buffering the effect of maternal or paternal overreactivity, that is, the tendency of parents to respond with irritation and/or anger to the problematic behavior of their children, and (b) that coercive parental behavior is more strongly related to externalizing problems for children low on conscientiousness. In the present study, we extended previous research on child personality and parental behavior as moderators of child problem behavior by (a) adopting the five factor model for the assessment of child personality in the prediction of problem behavior, instead of examining temperament; (b) including both a more affective and positive component of parenting as well as a control dimension, whereas most previous studies concentrated

solely on a detrimental form of parenting; (c) investigating both internalizing and externalizing behavior as the outcome variables, whereas past research has focused predominantly on externalizing behavior; (d) using a large population sample including both boys and girls; and (e) adopting a longitudinal design as well as a cross-sectional design for assessment of the effects of Parenting × Child Personality interactions.

The Current Research

Interactions between parenting and child personality as predictors of child and adolescent externalizing and internalizing behavior were investigated in two studies. In the first study, the Parenting × Personality interaction was examined from a variable-centered approach. In order to ensure a comprehensive test of the role of various personality traits as moderators of problem behavior, a broadband five factor model instrument was used to assess children's personality. Moreover, to guarantee sufficient power to detect interaction effects, the hypotheses were verified on a large sample and checked for cross-rater and cross-time stability. In line with the variable-centered methodology, both parenting and personality were entered as (continuous) quantitative variables predicting child and adolescent problem behavior. As the variable-centered approach emphasizes interactions between variables and does not take into account the within-person personality structure, the first study was supplemented with a second study that adopted a person-centered approach. In the second study, which used a classic analysis of variance (ANOVA) design, we looked for interaction effects between the personality types of resilient, undercontrolled, and overcontrolled (derived from clustering participants on the basis of their five factor personality profiles) and discrete categories of parents with high and low levels of positive parenting and negative parental control.

Study 1

Method

Participants

Study 1 was based on data from a longitudinal study that investigated parenting, parental and child personality characteristics, and children's problem behavior at two assessment periods separated by a 3-year interval. Participants were parents (both mothers and fathers) and one nonreferred child per family. At Time 1, 600 families were included (mothers, $N = 596$; fathers, $N = 533$). The target children, 281 boys and 319 girls, had a mean age of 10.9 years ($SD = 1.8$; range = 7–15). The age distribution was as follows: 1.3% of the children were 7 years old, 11.5% were 8 years old, 12.5% were 9 years old, 15.8% were 10 years old, 11.8% were 11 years old, 22.3% were 12 years old, 19.7% were 13 years old, 4.5% were 14 years old, and 0.5% were 15 years old. Of the families, 9.8% were not the original family, and 8.2% included a single parent. The mothers' mean age was 38.6 years ($SD = 4.7$; range = 20–68), and the fathers' was 40.6 years ($SD = 5.0$; range = 26–63). Both mothers and fathers had representative levels of education: The highest level of education was elementary school for 12.9% of the mothers and 7.9% of the fathers; 48.5% of the mothers and 49.5% of the fathers completed secondary education; 29.7% of the mothers and 29.4% of the fathers finished higher education; and 8.7% of the mothers and 13.3% of the fathers obtained a university degree. Of the mothers, 75.2% were employed, whereas 95.3% of the fathers were employed.

At Time 2, 512 families, or about 85% of the families, continued the collaboration (mothers, $N = 501$; fathers, $N = 443$). The remaining 244

boys and 268 girls had a mean age of 13.9 years ($SD = 1.8$; range = 10–18). The age distribution was as follows: 0.8% of the children were 10 years old, 10.6% were 11 years old, 13.7% were 12 years old, 16.8% were 13 years old, 13.3% were 14 years old, 22.3% were 15 years old, 18.0% were 16 years old, 3.9% were 17 years old, and 0.6% were 18 years old. The ratios of boys to girls, $\chi^2(1, N = 1,112) = 0.07, p > .05$, and of mothers to fathers, $\chi^2(1, N = 2,073) = 0.03, p > .05$, were equal across the two assessment times. Chi-square analyses showed no significant differences between the Time 1 and Time 2 samples for family characteristics, $\chi^2(2, N = 1,112) = 2.91, p > .05$; social indices for mothers, $\chi^2(5, N = 1,102) = 2.24, p > .05$, and fathers, $\chi^2(5, N = 998) = 1.42, p > .05$; and employment status for mothers, $\chi^2(2, N = 1,099) = 2.36, p > .05$, and fathers, $\chi^2(2, N = 997) = 0.24, p > .05$. Hence, it can be concluded that the Time 2 sample characteristics did not differ from the Time 1 sample characteristics as a consequence of attrition.

Measures

Parental behavior. The Ghent Parental Behavior Scale (GPBS; Van Leeuwen & Vermulst, in press) is a questionnaire designed to assess parenting behavior that is based on concepts from social learning theory (Capaldi & Patterson, 1989; Patterson, Reid, & Dishion, 1992). This theoretical framework organizes parenting into five well-defined constructs derived from observable parental behavior. Validation of a pilot version led to the conclusion that the five Patterson et al. constructs (positive involvement, monitoring, problem solving, structure, and positive reinforcement) appeared to be too heterogeneous. Refinement of the constructs resulted in a new questionnaire with nine scales: Autonomy, Discipline, Positive Parental Behavior, Harsh Punishment, Monitoring, Rules, Ignoring Unwanted Behavior, Material Rewarding, and Inconsistent Discipline. Evidence for the factorial validity and for a moderate to good internal consistency of the majority of the scales is provided by Van Leeuwen and Vermulst (in press). Participants rate the frequency of each behavioral item on a 5-point Likert scale ranging from *never* to *always*. The parent version provides self-ratings for parental behavior, and the child version, which has the same items as the parent version, allows children and adolescents to rate the parental behavior of their mothers and/or fathers.

In order to reduce the number of scales of the GPBS, we conducted factor analyses with principal axis factoring and oblimin rotation for four groups of raters: mothers, fathers, children rating their mothers, and children rating their fathers. A two-factor solution was most appropriate. Because the Monitoring, Material Rewarding, and Inconsistent Discipline scales did not consistently load on the same dimensions for each of the groups, they were dropped. In each of the four groups of raters, two

dimensions consistently emerged: Positive Parenting (consisting of the Positive Parental Behavior, Teaching Rules, and Autonomy scales), and Negative Control (consisting of the Discipline, Ignoring of Unwanted Behavior, and Harsh Punishment scales). These factors are analogous to two dimensions of parenting that are regularly mentioned in the literature (Gallagher, 2002), the first describing the affective nature of the parent–child relationship, as indicated by involvement and providing support (Warmth or Responsiveness) and the second referring to efforts of parents to influence their child's behavior, such as setting and enforcing standards of behavior (Control or Demandingness) (Maccoby & Martin, 1983). Table 1 shows factor loadings, percentages of explained variance, and Cronbach's alphas for the two dimensions. The intercorrelations between the two factors were .03 and .13 for Time 1 and Time 2, respectively, indicating the independenc of the two parenting dimensions. The correlations between the ratings provided by parents and children on the two parenting dimensions were all positive and significant at $p < .01$, ranging from .19 to .38 for Time 1 and ranging from .21 to .42 for Time 2.

Child personality. The Hierarchical Personality Inventory for Children (HiPIC; Mervielde & De Fruyt, 1999) was used to assess the child's personality. The inventory measures five personality domains based on 18 facets hierarchically organized under the five domains: Extraversion (based on the facets of Shyness, Optimism, Expressiveness, and Energy), Benevolence (based on Egocentrism, Irritability, Compliance, Dominance, and Altruism), Conscientiousness (based on Achievement Motivation, Concentration, Perseverance, and Orderliness), Emotional Stability (based on Anxiety and Self-Confidence), and Imagination (based on Creativity, Curiosity, and Intellect). Parents rated the 144 items on a 5-point Likert scale. The factor structure has proven to be highly replicable across both childhood and adolescence (Mervielde & De Fruyt, 2002). In our study, Cronbach's alphas (for maternal and paternal ratings at the two measurement times) ranged from .93 to .94 for Benevolence (40 items), from .94 to .94 for Conscientiousness (32 items), from .86 to .88 for Emotional Stability (16 items), from .89 to .91 for Extraversion (32 items) and from .91 to .92 for Imagination (24 items).

Child problem behavior. The Dutch version of the Achenbach Child Behavior Checklist (CBCL; Verhulst, Van der Ende, & Koot, 1996) is used as an instrument for screening children with behavioral and emotional problems. Parents rate the frequency of 113 problematic behaviors on a 3-point Likert scale. Two broadband syndromes can be derived: Internalizing, with items referring to somatic complaints, social withdrawal, and anxiety/depression, and Externalizing, including items indexing aggression, hyperactivity, and delinquency. Cronbach's alphas for the Internalizing Behavior scale (31 items) ranged from .86 to .88 for maternal and

Table 1

Factor Pattern Matrix for the GPBS Dimensions of Positive Parenting and Negative Control Across a 3-Year Interval

	Time 1								Time 2							
	M		F		CM		CF		M		F		CM		CF	
GPBS scale	Pos	Con	Pos	Con	Pos	Con	Pos	Con	Pos	Con	Pos	Con	Pos	Con	Pos	Con
Positive Parental Behavior	**.69**	−.12	**.78**	−.11	**.73**	−.07	**.73**	−.12	**.56**	−.18	**.65**	−.22	**.56**	.16	**.53**	−.22
Setting Rules	**.72**	.17	**.75**	.11	**.76**	.09	**.81**	.17	**.81**	.18	**.78**	.13	**.87**	−.26	**.88**	.11
Autonomy	**.33**	.02	**.53**	−.01	**.63**	.00	**.61**	.01	**.28**	−.03	**.55**	.01	**.51**	.01	**.63**	.07
Discipline	.15	**.60**	.17	**.66**	.09	**.73**	.09	**.65**	.19	**.34**	.27	**.44**	.19	**.67**	.15	**.50**
Ignoring Unwanted Behavior	−.05	**.45**	.00	**.44**	−.12	**.76**	.02	**.49**	−.11	**.52**	−.18	**.40**	−.05	**.61**	−.03	**.25**
Harsh Punishment	−.08	**.63**	−.14	**.50**	.04	**.62**	−.11	**.73**	−.15	**.59**	−.01	**.53**	−.11	**.31**	−.11	**.72**
% variance	35.47		39.94		50.69		47.07		32.06		35.67		39.82		39.54	
Cronbach's α	.86	.80	.91	.80	.90	.87	.90	.82	.86	.77	.90	.75	.90	.91	.81	.80
No. of items	21	14	21	14	20	14	20	14	21	14	21	14	20	14	20	14

Note. Primary factor loadings are indicated by boldface type. GPBS = Ghent Parental Behavior Scale; M = mothers; F = fathers; CM = children rating mothers; CF = children rating fathers; Pos = Positive Parenting; Con = Negative Control.

paternal ratings over the two measurement times and from .90 to .91 for the Externalizing Behavior scale (33 items).

Procedure

Families were recruited via stratified random sampling of elementary and secondary schools. For elementary schools, the sample was stratified by province (East and West Flanders), region (rural or urban), school type (public vs. private vs. Catholic schools), and grade (third, fourth, fifth, and sixth years of elementary school). For secondary schools, sampling was based on province (East and West Flanders), type of curriculum (vocational, technical, and general education), and grade (first and second years of secondary school). A letter addressed to the parents informed them about the goal and the procedures of the research project. The response rate was 41% for parents with children in primary schools and 39% for parents with children in secondary schools. Given this modest response rate, we compared the socioeconomic status of the present sample with the characteristics of a representative general community sample ($N = 1,789$ families) used to investigate the quality of life in Flemish school-age children (Van den Bergh, 1997). The family composition was somewhat different, $\chi^2(2, N = 1,840) = 11.95, p < .01$, mainly because of the higher proportion of single-parent families in the present study. The educational level differed for mothers, $\chi^2(5, N = 1,741) = 12.37, p < .05$, and fathers, $\chi^2(5, N = 1,635) = 25.46, p < .05$, but not as a consequence of an overrepresentation of the higher educational levels in the present study. There was a difference in employment status for mothers, $\chi^2(2, N = 1,797) = 9.75, p < .01$, but not for fathers, $\chi^2(2, N = 1,735) = 1.16, p > .05$. Although small differences between the two samples can be observed, it can be concluded that the present sample represents the broad socioeconomic strata. With regard to the presence of problem behavior, we compared the prevalence of children scoring above the 90th percentile (T score > 63) on the Total Problem Behavior Scale with an epidemiological study in Flanders that investigated emotional and behavioral problems in children ages 6 to 12 (Hellinckx, De Munter, & Grietens, 1991). In the present study, the percentage of children showing serious emotional and/or behavioral problems was 13.8, whereas the percentage in the epidemiological study was 15.4. Hence it can be concluded that the sample in the present study does not consist of children with less problem behavior than might be observed in the target population. Moreover, the present study did not focus on assessment of mean levels or prevalence rates but rather on the relationships among variables, and hence the issue of representative sampling carries less weight.

At each assessment period, a trained psychology student visited the families at home and instructed the mother, father, and child to independently complete a series of questionnaires. Both parents filled out the HiPIC, the GPBS, and the CBCL, whereas children were administered the GPBS at both measurement times. In addition, teachers filled out the Dutch version of Achenbach's Teacher Report Form (TRF; Verhulst, Van der Ende, & Koot, 1997a) at Time 1, and children completed the Dutch version of the Youth Self Report (YSR; Verhulst, Van der Ende, & Koot, 1997b) and a Dutch shortened version of Goldberg's (1992) hundred adjectives entitled the Questionnaire Big Five (QBF; Gerris et al., 1998) at Time 2, to provide self-ratings of problem behavior and personality, respectively. In this study, we only used measures that were presented at both measurement occasions in order to facilitate comparison of the results. We did not opt to query the children about their problem behavior and personality at Time 1 (a) because the YSR is intended to assess self-reported problem behavior from age 11 onward, but almost half of the children were younger than 11 years at the first assessment period; (b) because at present there is little evidence for the validity, and in particular for the discriminant validity, of self-rated personality measures for elementary school children in general; and (c) for practical reasons, that is, we did not want to overload the children with questionnaires at the first assessment given their age and the length of the questionnaires (e.g., the HiPIC consists of 144 items). The GPBS was specifically designed to obtain ratings from both parents and from children with reading abilities (ages 7–8 years and older).

Statistical Analyses

Although interaction effects are frequently reported in experimental studies, field researchers often find that moderator effects are extremely difficult to detect (McClelland & Judd, 1993). This can be attributed in part to statistical problems with moderated multiple regression (MMR) research (cf. Aguinis, 1995; Chaplin, 1991; McClelland & Judd, 1993). In general, tests of hypotheses regarding the effects of moderators often have very low statistical power and a high risk of Type II errors. This leads researchers to prematurely dismiss theoretical models that include moderating effects. Several precautions were taken in the present study to reduce statistical problems with MMR. First, we used reliable measures. Both personality and parenting measures are second-order factors. To reduce measurement error, we used a cross-rater strategy (Chaplin, 1991) and created aggregated scores based on ratings provided by different informants (see the following section on *Constructing Composite Scores*).

Second, a nonrestricted large general population sample ($N = 600$) was used. The size of this sample approximates the range of N required to produce power of .80 at $\alpha = .05$ for small effect sizes and a reliability of .80 (cf. Aiken & West, 1991, p. 164). To eliminate multicollinearity, we centered the predictors, which also provides interpretational advantages (Cohen, Cohen, West, & Aiken, 2003, p. 267). Finally, to reduce the likelihood of capitalizing on chance, we checked for cross-rater stability (i.e., parent vs. child ratings of parental behavior) and for cross-sample stability (i.e., by replicating the findings across a 3-year interval). We also investigated whether the interaction effects assessed at Time 1 predicted Time 2 problem behavior.

Parallel cross-sectional hierarchical multiple regressions were carried out on the Time 1 and Time 2 data in order to detect significant interactions between child personality and parenting. In order to check cross-rater stability, we conducted, at both times, analyses for (a) the parent sample, with parental self-ratings of Negative Control and Positive Parenting, and (b) the child sample, with child ratings of Negative Control and Positive Parenting. Child sex (boy was coded as 1, and girl was coded as 2) and age were consistently entered in Step 1 as control measures. In Step 2, one of the five child personality domains (i.e., Benevolence, Conscientiousness, Emotional Stability, Extraversion, and Imagination) and one of the two parenting construct variables (i.e., Positive Parenting and Negative Control) were entered, and in Step 3 the cross-product of the personality variable and the parenting variable was entered. Multiplying the two centered predictors produced the interaction term. Evidence for a moderator effect is found when there is a significant increase in the multiple R^2 after entering the interaction term, as indicated by a significant incremental F test. In order to prevent chance capitalization in finding moderator effects, we applied the Bonferroni correction. In this study, the alpha level was set at .05, with 40 tests explaining externalizing behavior and 40 tests explaining internalizing behavior. Application of the Bonferroni correction indicated that the alpha level for each individual test needed to be lowered to .001 in order to adjust the overall alpha level to .05.

For testing and interpreting interactions, we followed the guidelines proposed by Aiken and West (1991) and Cohen et al. (2003). First, significant interactions were interpreted by plotting simple regression lines for high (1 *SD* above the mean), mean, and low (1 *SD* below the mean) values of the moderator variables. Second, the significance of the slopes for these simple regression lines and the difference between the slopes were tested with *t* tests. Finally, interaction patterns were identified, based on the signs of the regression coefficients of the two independent variables (B_1 and B_2) and the interaction (B_3). Three theoretically meaningful interaction patterns can be distinguished (Cohen et al., 2003, pp. 285–286): (a) *synergistic* or *enhancing interactions,* in which all three regression coefficients have the same sign, indicating that combining predictors produces an incremental effect beyond the additive effects; (b) *buffering interactions,* in which the two predictors have regression coefficients with opposite signs, meaning that one predictor weakens the effect of the other predictor (for buffering interactions, one predictor represents a risk factor, whereas the other predictor acts as a protective factor); and (c) *interference*

or *antagonistic interactions*, in which both B_1 and B_2 have the same sign and B_3 is of the opposite sign, indicating a compensatory or either-or effect of B_1 and B_2 on the criterion. Interactions are sometimes described as ordinal (noncrossing) or disordinal (crossing). This distinction is less useful because it is mainly determined by the strength of the first-order effects.

Constructing Composite Scores

For the present analyses, aggregated scores for predictor and criterion variables were created to reduce the potential number of analyses generated by the numerous combinations of types of raters (i.e., mothers, fathers, children rating mothers, and children rating fathers), parenting variables (i.e., Positive Parenting and Negative Control), personality domains (i.e., Benevolence, Conscientiousness, Emotional Stability, Extraversion, and Imagination), dependent variables (Internalizing and Externalizing Behavior), and measurement occasions. This was accomplished by extracting a common factor score from each pair of ratings provided by two different informants by means of principal-components analyses: for mother and father ratings of their own parental behavior, for mother and father ratings of child personality and problem behavior, and for child ratings of maternal and paternal behavior. The score of the other rating substituted the missing value in case only one of the two ratings was available (e.g., in single-parent families). Thus, the common factors reflect (a) self-reported parenting by two different informants (mother and father), (b) other-reports of child personality and problem behavior by two different informants (mother and father), and (c) other-reports of maternal and paternal behavior by one informant (the child). The use of composite scores is supported by the meaningful and significant ($p < .001$) correlations between the paired ratings composing the aggregated scores: The correlation between mothers and fathers was .75 for Externalizing Behavior, .59 for Internalizing Behavior, .70 for Benevolence, .81 for Conscientiousness, .69 for Emotional Stability, .69 for Extraversion, .69 for Imagination, .22 for Positive Parenting, and .44 for Negative Control. The correlation between child ratings for mothers' and fathers' Positive Parenting was .74, and the corresponding correlation for Negative Control was .70. The explained variances across the two time points ranged from 79.50% to 87.63% for the two dependent variables, from 82.46% to 90.76% for the five personality variables, and from 61.17% to 89.53% for the two parenting variables.

Parent and child ratings of parental behavior were not aggregated because principal-components analyses at both measurement occasions distinguished two separate factors for Positive Parenting, that is, a factor including ratings of mothers and fathers and a factor including child ratings of maternal behavior and child ratings of paternal behavior. Not aggregating scores of parents and children also enables the cross-validation of interaction effects across ratings of parents and children. Moreover, using child ratings of parenting in analyses with parent measures of problem behavior and personality decreases shared method variance.

The use of factor scores is valuable because they reflect the common core of variables, reduce measurement error, and hence increase the power of statistical tests for interaction (Chaplin, 1991; Jaccard & Wan, 1995). In addition, they center the predictor variables, as the mean equals zero and the standard deviation equals one.

Shared Method Variance

The present study partially controlled for shared method variance by combining parental ratings of personality and child problem behavior with child ratings of parenting in Study 1. We acknowledge that it would be more appropriate to use ratings supplied by different informants for each of the measures and that extracting the common component from multiple ratings ignores the unique information provided by a particular informant. However, we prefer to use ratings that were made at both measurement occasions in order to (a) limit the potential number of analyses (given that

ratings were provided by both mothers and fathers), (b) reduce measurement error, and (c) facilitate comparison of the results. A possible way to address the problem of shared method variance is to assess the convergent validity of the data supplied by the informants against external criteria. Correlations between Time 1 TRF and CBCL ratings were all significant at $p < .001$, with values of .44 (father–teacher) and .46 (mother–teacher) for externalizing behavior and .18 (father–teacher) and .16 (mother–teacher) for internalizing behavior. Correlations between Time 2 CBCL and YSR ratings were all significantly correlated at $p < .001$, with values of .41 (father–child) and .41 (mother–child) for Externalizing Behavior and .35 (father–child) and .40 (mother–child) for Internalizing Behavior. Correlations between Time 2 parental and adolescent QBF ratings were all significant at $p < .001$, with $r = .20$ for Benevolence, $r = .46$ for Conscientiousness, $r = .37$ for Neuroticism, $r = .46$ for Extraversion, and $r = .34$ for Imagination. This type of analysis illustrates that the data provided by the informants exhibit a reasonable degree of convergent validity and hence that the results of the present study are not seriously encumbered by problems of shared method variance.

Results

Cross-Sectional Analyses at Time 1

Sex and age effects. Results of the hierarchical regression analyses are shown in Tables 2 and 3. Of the two control measures, sex and age, entered in Step 1, sex accounted for a significant proportion of the variance in Externalizing Behavior ($R^2 = .039$).

Interaction effects. Three moderator effects were predictive of child externalizing behavior when parents supplied ratings of their own parental behavior. Significant interactions for Negative Control were found with the personality domains of Benevolence, $R^2 = .025$ and $F_{change}(1, 577) = 30.61$, $p < .001$, and Conscientiousness, $R^2 = .014$ and $F_{change}(1, 577) = 11.95$, $p < .001$. A significant interaction between Positive Parenting and Benevolence predicted child externalizing, $R^2 = .010$ and $F_{change}(1, 577) = 11.17$, $p < .001$. No interactions significantly predicted child internalizing behavior.

Testing and interpreting interaction effects. The tests on the significance of the difference between simple slopes (see Table 4) show that the slopes for children rated low (1 *SD* below the mean) or around the mean on the personality characteristics of benevolence and conscientiousness are significant. For these children, parenting has a significant effect on child problem behavior. When rated high (1 *SD* above the mean) on one of these personality domains, the slopes are not significant. This indicates that for children characterized by highly adaptive personality characteristics, parenting does not predict externalizing behavior.

From the signs of the regression coefficients (see Tables 2 and 3), two interaction patterns can be identified: (a) buffering interactions and (b) interference or antagonistic interaction patterns. For the Negative Control × Personality interactions (see Figure 1), the coefficients of the independent predictors have opposite signs, indicating that one predictor diminishes problem behavior and the other predictor enhances it. Hence, negative control can be considered as a risk factor for externalizing behavior in particular for children rated low or around the mean on benevolence and conscientiousness. On the other hand, the impact of low scores on benevolence and conscientiousness will be diminished for children experiencing low parental negative control. Benevolence and conscientiousness can be regarded as protective factors: Children scoring high on these personality domains do not show problem behavior at all, even when faced with negative parental control.

Table 2
Moderators of Externalizing Behavior

| | Time 1 | | | | Time 2 | | | |
| | Parental ratings of parenting | | Child ratings of parenting | | Parental ratings of parenting | | Child ratings of parenting | |
Variable	ΔF	B	ΔF	B	ΔF	B	ΔF	B
				Negative Control				
Sex, Age	11.63***	−.13**, .02	11.70***	−.16**, .02	8.14***	−.07, .00	8.10***	−.11, .00
BE, CON	271.23***	−.57***, .21***	238.44***	−.64***, .08**	294.03***	−.66***, .12***	280.61***	−.69***, .06
BE × CON	30.61***	−.15***	8.44**	−.08**	51.60***	−.18***	28.15***	−.15***
Sex, Age	11.63***	−.19**, .00	11.70***	−.20**, .02	8.14***	−.10, .01	8.10***	−.13, .01
CO, CON	105.14***	−.35***, .30***	76.50***	−.40***, .18***	101.81***	−.42***, .25***	85.19***	−.41***, .16***
CO × CON	11.95***	−.12***	8.74**	−.11**	14.13***	−.14***	21.84***	−.18***
Sex, Age	11.63***	−.32***, .03	11.70***	−.34***, .05*	8.14***	−.29***, .02	8.10***	−.31***, .03
ES, CON	58.73***	−.15***, .37***	26.44***	−.18***, .23***	45.08***	−.17***, .33***	33.93***	−.19***, .27***
ES × CON	0.05	.01	0.03	−.01	0.04	−.01	0.13	.01
Sex, Age	11.63***	−.30***, .03	11.70***	−.32***, .04*	8.14***	−.24**, .03	8.10***	−.25**, .03
EX, CON	49.85***	.03, .37***	15.32***	.04, .21***	36.02***	.02, .35***	22.82***	.02, .29***
EX × CON	0.01	.00	0.04	.01	0.04	.01	0.41	−.03
Sex, Age	11.63***	−.31***, .01	11.70***	−.33***, .02	8.14***	−.26**, .01	8.10***	−.28***, .01
IM, CON	56.59***	−.13***, .37***	23.41***	−.17***, .21***	41.84***	−.14***, .33***	30.86***	−.16***, .27***
IM × CON	1.71	−.05	2.94	−.07	0.71	−.03	2.26	−.06
				Positive Parenting				
Sex, Age	11.63***	−.18**, .02	11.85***	−.19**, .02	8.14***	−.11, −.01	8.10***	−.13, −.01
BE, POS	232.02***	−.65***, −.03	233.18***	−.67***, .02	277.42***	−.73***, .04	275.07***	−.73***, .02
BE × POS	11.17***	.10***	0.54	−.02	0.82	.02	0.71	.02
Sex, Age	11.63***	−.24***, .01	11.85***	−.25***, .01	8.14***	−.15, .00	8.10***	−.15, .01
CO, POS	64.47***	−.40***, −.09*	60.78***	−.42***, .02	74.82***	−.49***, −.07	72.61***	−.48***, .00
CO × POS	7.58**	.10**	0.33	.02	8.65**	.11**	4.59*	.09*
Sex, Age	11.63***	−.39***, .03	11.85***	−.39***, .04	8.14***	−.42***, .02	8.10***	−.39***, .03
ES, POS	20.20***	−.16***, −.19***	9.00***	−.17***, −.03	17.49***	−.19***, −.13**	13.72***	−.21***, −.07
ES × POS	0.01	.00	0.63	−.03	1.49	−.05	2.02	−.06
Sex, Age	11.63***	−.38***, .04	11.85***	−.39***, .04	8.14***	−.36***, .03	8.10***	−.32***, .03
EX, POS	15.51***	.11**, −.22***	1.46	.07, −.02	8.17***	.06, −.18***	2.30	.04, −.09*
EX × POS	0.09	−.01	3.85*	.08*	0.40	−.03	0.03	−.01
Sex, Age	11.63***	−.37***, .02	11.85***	−.39***, .01	8.14***	−.36***, .00	8.10***	−.34***, .01
IM, POS	17.11***	−.13***, −.18***	8.25***	−.17***, −.01	14.42***	−.17***, −.14**	11.30***	−.19***, −.06
IM × POS	4.74*	.09*	0.59	.03	3.57	.08	0.64	.03

Note. With multiplicative terms, neither traditional unstandardized nor standardized regression coefficients are appropriate to report. However, when the cross-product is based on *z* scores, which is known as Friedrich's procedure, it is appropriate to use the unstandardized solution with interaction terms (Aiken & West, 1991, pp. 43–44). In our study, all predictors are standardized, because they are factor scores. BE = Benevolence; CO = Conscientiousness; ES = Emotional Stability, EX = Extraversion; IM = Imagination; POS = Positive Parenting; CON = Negative Control.
* $p < .05$. ** $p < .01$. *** $p < .001$.

An interference or antagonistic interaction is found for the Positive Parenting × Benevolence interaction (see Figure 2). Here, the interaction term has the sign opposite to that of both predictors. This suggests that both positive parenting and child personality are negatively related to externalizing behavior but that the importance of positive parenting is lessened by benevolence, or vice versa.

Figures 1 and 2 show that most interactions are *ordinal*: The rank order of the outcomes of one predictor is maintained across all levels of the other predictor, within the observed range of the second predictor. This appearance is influenced by the strength of the first-order effects (cf. Cohen et al., 2003, p. 286). In this study, the strongest independent effects were found for the personality variables.

Effect sizes and statistical power of interactions. In order to permit comparison across studies, effect size measures are reported in Table 4. Effect sizes for the interactions at Time 1 range from .01 to .05 and can be regarded as small (Aiken & West, 1991, p. 158). The statistical power for the interaction terms does not equal, but approximates, the standard of .80. Taking the Negative Control × Benevolence interaction as an example, we note reliabilities

Table 3
Moderators of Internalizing Behavior

| | Time 1 | | | | Time 2 | | | |
| | Parental ratings of parenting | | Child ratings of parenting | | Parental ratings of parenting | | Child ratings of parenting | |
Variable	ΔF	*B*	ΔF	*B*	ΔF	*B*	ΔF	*B*
				Negative Control				
Sex, Age	2.17	.01, .03	2.20	−.03, .03	1.34	.12, .03	1.49	.10, .03
BE, CON	24.38***	−.22***, .09*	23.70***	−.28***, −.08*	36.56***	−.32***, .08	33.91***	−.34***, .01
BE × CON	9.44**	−.12**	1.00	−.04	2.27	−.06	3.15	−.07
Sex, Age	2.17	.00, .02	2.20	−.03, .02	1.34	.11, .03	1.49	.10, .03
CO, CON	23.84***	−.23***, .11**	20.49***	−.26***, −.04	22.14***	−.23***, .13**	17.94***	−.23***, .05
CO × CON	2.55	−.06	0.56	−.03	0.01	.00	2.41	−.07
Sex, Age	2.17	−.15*, .05**	2.20	−.17*, .05**	1.34	−.17*, .04	1.49	−.17*, .04*
ES, CON	160.73***	−.57***, .12***	150.31***	−.58***, .01	175.83***	−.63***, .09*	170.95***	−.63***, .06
ES × CON	0.26	−.02	0.27	.02	0.10	.01	2.72	.05
Sex, Age	2.17	−.03, .01	2.20	−.06, .02	1.34	.05, .01	1.49	.04, .01
EX, CON	54.59***	−.36***, .19***	40.98***	−.35***, .02	59.58***	−.41***, .18***	52.76***	−.41***, .13**
EX × CON	0.25	−.02	0.06	.01	1.52	−.05	0.06	−.01
Sex, Age	2.17	−.09, .00	2.20	−.13, .01	1.34	.01, .01	1.49	−.01, .01
IM, CON	28.67***	−.26***, .14***	22.93***	−.28***, −.03	24.84***	−.25***, .14***	21.45***	−.26***, .09*
IM × CON	1.32	−.04	1.09	−.04	0.04	−.01	2.87	−.07
				Positive Parenting				
Sex, Age	2.17	−.03, .03	2.23	−.03, .03	1.34	.09, .02	1.49	.10, .02
BE, POS	25.56***	−.24***, −.10*	22.09***	−.27***, −.01	35.45***	−.34***, −.05	34.32***	−.35***, −.04
BE × POS	1.08	.04	1.09	−.04	0.11	.00	0.20	.02
Sex, Age	2.17	−.03, .02	2.23	−.02, .02	1.34	.07, .02	1.49	.10, .03
CO, POS	23.38***	−.23***, −.10**	19.89***	−.26***, .00	19.59***	−.25***, −.10*	17.75***	−.25***, −.05
CO × POS	1.31	.04	0.13	.02	1.19	.05	1.51	.05
Sex, Age	2.17	−.17**, .05**	2.23	−.17**, .05**	1.34	−.17*, .04*	1.49	−.18**, .04*
ES, POS	23.38***	−.58***, −.13***	150.16***	−.58***, −.02	171.47***	−.64***, −.04	169.51***	−.63***, −.04
ES × POS	1.31	.06	0.02	−.01	5.93*	.08*	2.53	.05
Sex, Age	2.17	−.07, .02	2.23	−.07, .02	1.34	−.01, .01	1.49	.01, .01
EX, POS	44.26***	−.33***, −.09*	40.92***	−.35***, .01	48.82***	−.39***, −.06	48.14***	−.39***, −.05
EX × POS	0.20	.02	2.03	.06	2.61	.07	3.47	.08
Sex, Age	2.17	−.12, .01	2.23	−.12, .01	1.34	−.04, .01	1.49	−.02, .01
IM, POS	26.66***	−.25***, −.11**	22.56***	−.27***, .00	21.31***	−.25***, −.08	20.14***	−.26***, −.05
IM × POS	0.07	−.01	0.78	.04	1.74	−.05	1.97	.06

Note. BE = Benevolence; CO = Conscientiousness; ES = Emotional Stability, EX = Extraversion; IM = Imagination; POS = Positive Parenting; CON = Negative Control.
* $p < .05$. ** $p < .01$. *** $p < .001$.

of .80, an interpredictor correlation of −.30, and a squared multiple correlation of .50 for the main effects. According to Aiken and West (1991, p. 164), these values correspond with a power of .39–.44 at $N = 392$. A power of .80 with these values requires a sample size between 909 and 1,056.

Replication of the Cross-Sectional Analyses at Time 2

Sex and age effects. The control measure sex, entered in Step 1, significantly explained about 3% of the variance of externalizing behavior.

Interaction effects. The significant interactions with Negative Control at Time 1 for externalizing behavior were replicated at Time 2 (see Table 2) with both Benevolence, $R^2 = .042$ and $F_{change}(1, 501) = 51.60$, $p < .001$, and Conscientiousness, $R^2 = .019$ and $F_{change}(1, 501) = 14.13$, $p < .001$. In addition, the Negative Control × Benevolence interaction, $R^2 = .024$ and $F_{change}(1, 498) = 28.15$, $p < .001$, and the Negative Control × Conscientiousness interaction, $R^2 = .030$ and $F_{change}(1, 498) = 21.84$, $p < .001$, were also replicated when children rated parenting behavior. At Time 1, these interactions were significant only when the alpha level was set at .01. The Positive Parenting ×

Table 4
Tests of Significance of Difference Between Simple Slopes (T Values) and Effect Sizes of Interactions

	Time 1							Time 2						
	t values				Effect size			t values				Effect size		
	Simple slopes							Simple slopes						
Externalizing behavior	BFM + 1 SD	BFM M	BFM − 1 SD	Interaction	$r^2_{Y.MI}$	$r^2_{Y.M}$	f^2	BFM + 1 SD	BFM M	BFM − 1 SD	Interaction	$r^2_{Y.MI}$	$r^2_{Y.M}$	f^2
Negative Control: Parental ratings														
Negative Control × Benevolence	1.30	6.95***	8.80***	−5.53***	0.529	0.504	0.05	−1.62	3.88***	7.87***	−7.18***	0.596	0.554	0.10
Negative Control × Conscientiousness	3.72***	8.57***	8.66***	−3.46***	0.309	0.295	0.02	1.98*	6.53***	7.48***	−3.76***	0.330	0.311	0.03
Negative Control: Child ratings														
Negative Control × Benevolence	−0.02	2.58**	4.21***	−2.90***	0.481	0.474	0.01	−2.08*	1.76	5.19***	−5.31***	0.568	0.544	0.06
Negative Control × Conscientiousness	1.32	4.95***	5.76***	−2.96***	0.252	0.240	0.02	−0.26	4.17***	6.48***	−4.67***	0.308	0.278	0.04
Positive Parenting: Parental ratings														
Positive Parenting × Benevolence	1.51	−0.99	−3.13**	3.34***	0.477	0.467	0.02							

Note. Effect size (f^2) = ($r^2_{Y.MI} − r^2_{Y.M}$)/(1 − $r^2_{Y.MI}$) (Aiken & West, 1991, p. 156); $r^2_{Y.MI}$ = the squared multiple correlation from combined predictors by two sets of variables, M (main effects) and I (interaction effect); $r^2_{Y.M}$ = the squared multiple correlation resulting from prediction by set M. BFM = Big Five measure.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Benevolence interaction was not replicable. No interaction terms significantly predicted child internalizing behavior at Time 2 (see Table 3).

Testing and interpreting interaction effects. The interaction patterns found at Time 1 were replicated at Time 2. The Negative Control × Benevolence and the Negative Control × Conscientiousness interactions were of the buffering type. The effect sizes of the interaction terms were also small, ranging from .01 to .10.[1]

Time 1 Variables Predicting Time 2 Problem Behavior

Table 5 reports the results of a hierarchical multiple regression (HMR) analysis with Time 1 variables predicting Time 2 externalizing and internalizing behavior. When parents provided self-ratings of parental behavior, the Negative Control × Benevolence interaction, $R^2 = .024$ and $F_{change}(1, 465) = 18.84$, $p < .001$, and the Negative Control × Conscientiousness interaction, $R^2 = .022$ and $F_{change}(1, 465) = 13.95$, $p < .001$, predicted Time 2 child externalizing behavior. The results also show that Time 1 child personality—in particular, benevolence and conscientiousness—is a predictor for Time 2 externalizing behavior. Time 2 internalizing behavior is predicted by each of the Big Five personality dimensions, with emotional stability and extraversion as the strongest predictors. Examination of the parenting variables shows that Time 1 Negative Control is a predictor of both Time 2 externalizing behavior and Time 2 internalizing behavior for parental self-ratings and also a predictor of externalizing behavior when child ratings are used in the analyses. Time 1 Positive Parenting is not a strong predictor of Time 2 child problem behavior.

Discussion

In this study, we investigated Parenting × Child Personality interactions for the prediction of child and adolescent problem behavior. Study 1 examined interactions that have been detected in previous studies, for example, between negative parental control and low agreeableness, as predictors of externalizing behavior

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[1] We also checked for nonlinear relationships between independent and dependent variables, although (a) the inclusion of curvilinear relationships in this study is not driven by theoretical assumptions and (b) there is an ongoing debate over whether one should include curvilinear effects if the central interest is in the interaction term. Curvilinear effects show lower reliability than the cross-product terms, and the inclusion of multiple higher order terms introduces multicollinearity and instability of the regression equation (Cohen et al., 2003, pp. 299–300). Testing quadratic relationships was limited to models with significant Parenting × Personality interactions. For the Time 1 data, significant quadratic relationships were present for benevolence and conscientiousness in the prediction of child externalizing behavior and for benevolence predicting child internalizing behavior. These quadratic effects did not influence the Parenting × Personality interactions for the majority of the models, indicating that the interactions were not the result of the curvilinear nature of the regression model. Only two interactions could be attributed to the curvilinear effects: the Benevolence × Positive Parenting (parental ratings) interaction and the Benevolence × Negative Control (child ratings) interaction in the prediction of externalizing behavior. For the Time 2 data, the Conscientiousness × Positive Parenting (child ratings) interaction was not a significant predictor of externalizing behavior when the quadratic effect of conscientiousness was included in the regression model.
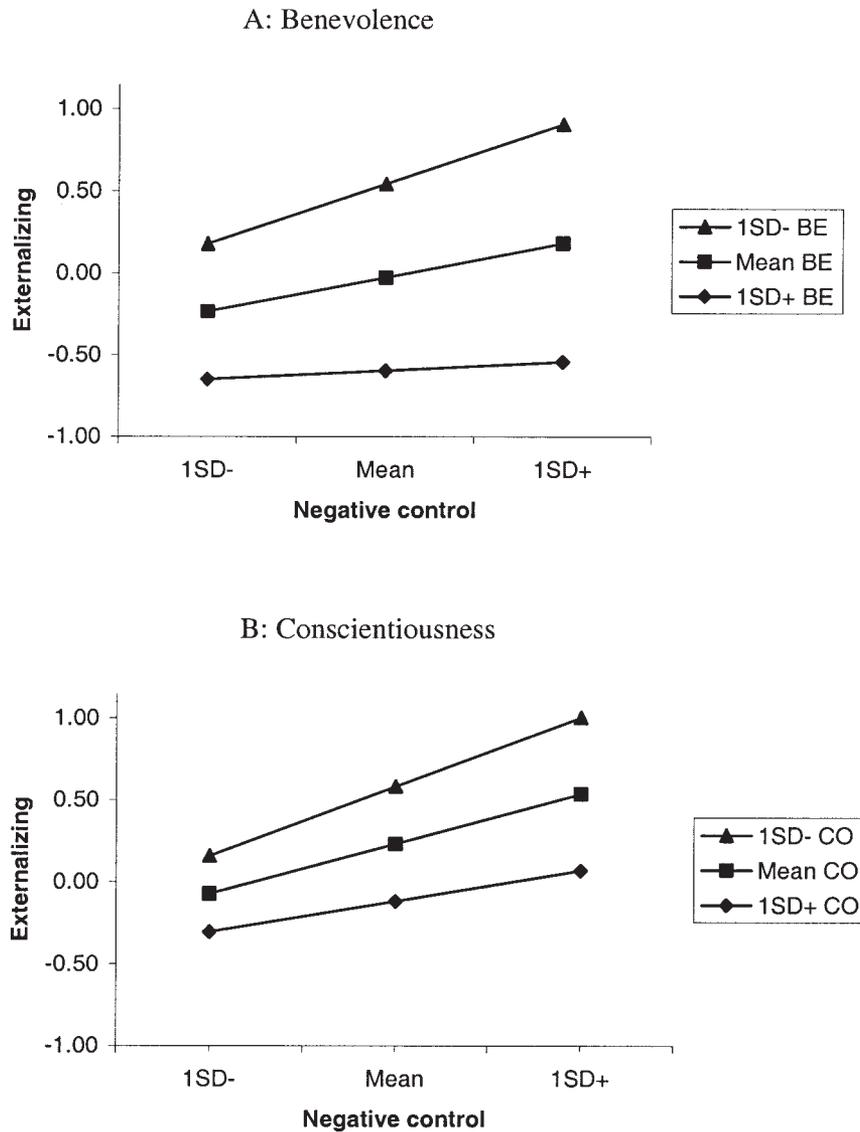
A: Benevolence

B: Conscientiousness

Figure 1. Interaction between personality and negative control predicting externalizing behavior at Time 1.
BE = benevolence; CO = conscientiousness.

(e.g., O'Connor & Dvorak, 2001; Prinzie et al., 2003). However, integrating all Big Five personality domains in this study (i.e., Agreeableness, Conscientiousness, Emotional Stability, Extraversion, and Imagination) enabled us to test for interactions between parenting and each of the five broad child personality domains as predictors of both externalizing and internalizing behavior.

HMR analyses showed prominent interactions between negative parental control and the personality domains of benevolence and conscientiousness, predicting externalizing behavior, and hence corroborating the findings of previous studies. These interactions were found for parental self-ratings of parenting behavior and were partly replicable across raters and a 3-year interval. Moreover, the Time 1 interactions predicted Time 2 externalizing behavior. The results indicate that negative control is a risk factor for externalizing behavior, in particular for children rated low or around the mean on benevolence and conscientiousness. On the other hand,

children rated high on these personality domains are not likely to develop externalizing behavior even when exposed to restrictive parental control. Significant interactions were also found between positive parenting and benevolence.

From these results it can be concluded that children rated low on benevolence are likely to show externalizing behavior in particular when parents are not supportive. When children show high levels of benevolence they are not affected by low levels of positive parenting. However, this Positive Parenting × Benevolence interaction is not stable across judges and across time.

With internalizing behavior as the outcome variable, there were no significant interactions. Our findings suggest mainly independent or additive contributions of parenting and child characteristics to internalizing behavior. The significant main effects suggest that, in particular, child personality is an important independent predictor of internalizing behavior.
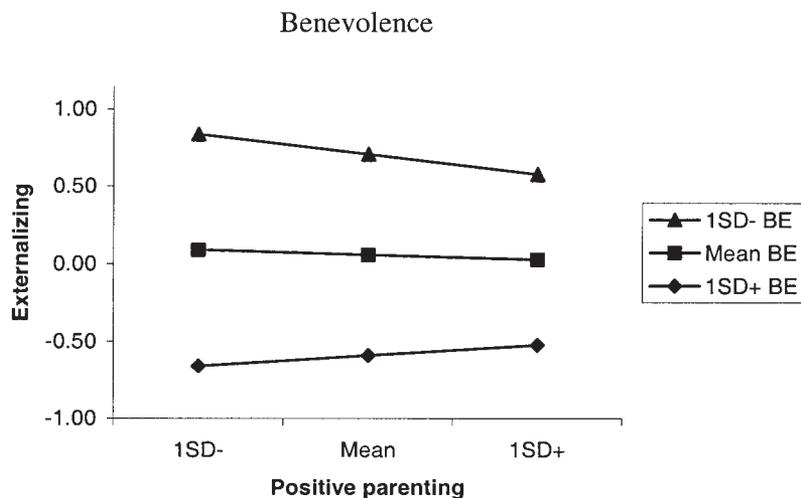
Benevolence

Figure 2. Interaction between personality and positive parenting predicting externalizing behavior at Time 1. BE = benevolence.

In Study 1, we adopted a variable-centered approach to child personality, considering the effects of single Big Five domains and parenting variables as well as the effects of personality–parenting interactions. The variable-centered approach identifies the important personality and parenting dimensions, but it does not allow us to target particular groups of children at risk. Moreover, it does not take into account the prevalence and relevance of particular combinations of risk factors, such as a low score on both benevolence and conscientiousness, and therefore it is not clear to what extent such configurations constitute an additional risk factor for developing externalizing or internalizing problem behavior. In Study 2, we adopted a person-centered approach, grouping children into types based on their personality profiles. We assigned the same sample of children to three replicable personality types: resilient, overcontrolled, and undercontrolled. Hence the next study focused on the interactions between these personality types and the parenting dimensions.

Study 2

Method

Participants

The sample in Study 2 is part of the Time 1 sample of the longitudinal data set described in Study 1 and consisted of 539 families with 251 boys and 288 girls. Participants with missing variables were dropped, which accounts for the reduced sample size in comparison with the Time 1 sample of Study 1.

Measures and Procedure

The results of this study are based on the same questionnaires administered in Study 1: the GPBS (Van Leeuwen & Vermulst, in press), the HiPIC (Mervielde & De Fruyt, 1999), and the Dutch version of the CBCL (Verhulst et al., 1996). The data collection procedure was the same as that described in Study 1.

Assessment of Personality Types[2]

In order to derive the overcontrolled, undercontrolled, and resilient personality types, we followed the method described by Asendorpf et al.

(2001). In a first step, we conducted hierarchical cluster analyses with Ward's method, using raw HiPIC domain scores. The resulting three-cluster solutions of these analyses were then used as initial cluster centers in a nonhierarchical K-means clustering procedure.

Delineation of Parenting Categories

The continuous variables positive parenting and negative control, rated by the parents, were recoded into three categories: scores of 1 $SD \le$ the mean, scores around the mean, and scores of 1 $SD \ge$ the mean. In the analyses, only participants scoring low or high on parenting variables were included. The number of children exposed to high positive parenting was 105, whereas the number exposed to low positive parenting was 100. The category of high negative control included 97 participants, and the category of low negative control grouped 91 participants.

Results

Personality Types

The final three-cluster solution obtained after applying the two-step procedure (Ward's method and K-means clustering) clearly resembled the resilient, undercontrolled, and overcontrolled prototypes. The first cluster grouped 185 children with above-average cluster centers for the personality domains benevolence, extraversion, conscientiousness, emotional stability and imagination. This group was identified as the resilient type. The second cluster included 162 children scoring low on emotional stability and extraversion and resembled the overcontrolled type. The third cluster, with 192 children characterized by low scores on conscientiousness and benevolence and scores around the mean for emotional stability, extraversion and imagination, was designated as the undercontrolled type.

Parenting × Personality Type Interactions

General linear model (GLM) univariate analyses of variance were conducted to detect significant Parenting × Personality Type

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[2] A full description of the derivation of the three types for this sample is given in De Fruyt et al. (2002).

Table 5
Time 1 Variables Predicting Time 2 Problem Behavior

| | Externalizing Time 2 | | | | Internalizing Time 2 | | | |
| | Parental ratings of parenting | | Child ratings of parenting | | Parental ratings of parenting | | Child ratings of parenting | |
Time 1 variables	ΔF	B	ΔF	B	ΔF	B	ΔF	B
				Negative Control				
Sex, Age	5.76**	−.05, .03	5.78**	−.10, .03	0.80	.13, .03	0.80	.09, .03
BE, CON	115.47***	−.45***, .17***	101.69***	−.51***, .03	15.84***	−.17***, .11*	12.74***	−.21***, −.02
BE × CON	17.84***	−.15***	2.53	−.05	1.23	−.05	0.07	−.01
Sex, Age	5.76**	−.11, .01	5.78**	−.13, .01	0.80	.10, .02	0.80	.08, .02
CO, CON	63.36***	−.31***, .23***	46.24***	−.35***, .10**	13.65***	−.15***, .13**	9.12***	−.18***, .00
CO × CON	13.95***	−.14***	8.18**	−.11**	1.72	.05	0.00	−.00
Sex, Age	5.76**	−.20*, .03	5.78**	−.24**, .04	0.80	.01, .04	0.80	−.02, .04
ES, CON	32.64***	−.11**, .31***	10.18***	−.14***, .15***	71.61***	−.42***, .15***	62.30***	−.43***, .04
ES × CON	0.86	.04	1.88	−.06	0.17	.02	0.96	−.04
Sex, Age	5.76**	−.19*, .03	5.78**	−.23**, .04	0.80	.09, .01	0.80	.07, .02
EX, CON	28.56***	.04, .31***	5.74**	.05, .14**	25.48***	−.24***, .17***	16.49***	−.24***, .05
EX × CON	0.05	−.01	0.27	−.02	1.83	−.05	0.43	−.03
Sex, Age	5.76**	−.21*, .02	5.78**	−.25**, .02	0.80	.04, .01	0.80	.01, .01
IM, CON	30.29***	−.09*, .30***	9.19***	−.14**, .14***	13.31***	−.15***, .14***	7.67***	−.18***, .02
IM × CON	0.36	−.03	6.11*	−.10*	0.12	−.02	4.70*	−.09*
				Positive Parenting				
Sex, Age	5.76**	−.11, .03	5.91**	−.12, .03	0.80	.09, .02	0.80	.10, .03
BE, POS	101.12***	−.51***, −.01	102.33***	−.52***, .00	15.62***	−.19***, −.10*	14.08***	−.21***, −.06
BE × POS	0.79	.03	0.00	.00	0.16	.02	0.04	.01
Sex, Age	5.76**	−.17*, .01	5.91**	−.18*, .01	0.80	.08, .02	0.80	.08, .02
CO, POS	42.60***	−.36***, .04	41.95***	−.36***, .00	12.21***	−.16***, −.11*	10.13***	−.17***, −.06
CO × POS	2.59	.06	0.98	.04	1.32	−.05	0.50	.03
Sex, Age	5.76**	−.28***, .03	5.91**	−.28***, .04	0.80	−.03, .04	0.80	−.02, .04
ES, POS	7.80***	−.12**, −.11	4.61**	−.12**, −.03	67.48***	−.42***, −.11**	63.59***	−.42***, −.06
ES × POS	2.50	−.07	0.37	−.03	3.28	.07	1.30	.04
Sex, Age	5.76**	−.27**, .03	5.91**	−.27**, .04	0.80	.06, .01	0.80	.06, .02
EX, POS	5.95**	.09, −.14**	1.33	.07, −.02	18.66***	−.21***, −.09*	17.20***	−.23***, −.06
EX × POS	0.21	−.02	6.24*	.11*	0.02	.01	0.31	.02
Sex, Age	5.76**	−.28***, .02	5.91**	−.28***, .02	0.80	.00, .01	0.80	.01, .01
IM, POS	7.06***	−.11*, −.10*	4.41*	−.13**, −.02	11.43***	−.15***, −.11*	8.70***	−.16***, −.06
IM × POS	0.02	.01	0.16	.02	1.68	−.06	0.05	.01

Note. BE = Benevolence; CO = Conscientiousness; ES = Emotional Stability, EX = Extraversion; IM = Imagination; POS = Positive Parenting; CON = Negative Control.
* $p < .05$. ** $p < .01$. *** $p < .001$.

interactions. In the analyses with externalizing behavior as the dependent variable, the undercontrollers versus resilients dichotomy was entered as one of the independent variables, whereas in the analyses with internalizing behavior as the dependent variable, the overcontrollers versus resilients dichotomy was entered as one of the independent variables. This choice was based on previous research that showed a meaningful relationship between the undercontrolled personality type and externalizing behavior and a relationship between the overcontrolled personality type and internalizing behavior (Asendorpf et al., 2001; De Fruyt et al., 2002; Van Leeuwen et al., 2004).

Table 6 shows the category means and the results of the analyses of variance. Significant Parenting × Personality Type interactions were found only when negative control was included as the parenting variable, for both externalizing and internalizing behavior. The results indicate that undercontrolled children were rated significantly higher on externalizing behavior than were resilient children, with the greatest difference occurring for children exposed to high levels of parental negative control. This suggests that undercontrolled children subjected to negative parental control are especially at risk for externalizing behavior. The difference in problem behavior

Table 6
Category Means and Results of General Linear Model Analysis With Parenting Categories and Personality Types

Dependent variable	Resilients Low[a]	Resilients High[a]	Overcontrollers Low	Overcontrollers High	Undercontrollers Low	Undercontrollers High	Parenting F	η²	Power	Personality type F	η²	Power	Parenting × Personality Type F	η²	Power
				Negative Control											
Externalizing T1	−0.66 (38)	0.05 (16)			−0.25 (28)	1.32 (39)	38.38***	.247	1.00	20.97***	.152	0.99	5.53*	.045	0.65
Externalizing T2	−0.56 (35)	−0.31 (11)			−0.30 (23)	1.07 (33)	17.84***	.154	.987	18.27***	.157	.988	8.49**	.080	.823
Internalizing T1	−0.45 (38)	−0.49 (16)	0.18 (20)	0.99 (36)			4.23*	.038	0.53	30.85***	.225	1.00	4.92*	.044	0.59
Internalizing T2	−0.54 (35)	−0.39 (11)	−0.02 (18)	0.77 (25)			4.96*	.055	.594	17.84***	.173	.987	2.16	.025	.306
				Positive Parenting											
Externalizing T1	−0.01 (19)	−0.55 (44)			0.71 (42)	0.02 (22)	10.67***	.080	0.90	11.61***	.086	0.92	0.15	.001	0.07
Externalizing T2	−0.22 (15)	−0.54 (32)			−0.41 (37)	0.16 (17)	6.87**	.066	.738	9.08**	.086	.847	0.57	.006	.117
Internalizing T1	−0.25 (19)	−0.51 (44)	0.74 (28)	0.28 (22)			4.26*	.038	0.53	25.99***	.193	0.99	0.33	.003	0.09
Internalizing T2	−0.08 (15)	−0.50 (32)	0.30 (23)	0.24 (18)			1.63	.019	.243	9.19**	.099	.850	0.94	.011	.160

Note. *N*s appear in parentheses below the means. T1 = Time 1; T2 = Time 2. For Negative Control, *df*s for *F*s are (3, 117), (3, 101), (3, 109), and (3, 88) for Externalizing T1, Internalizing T1, and Internalizing T2, respectively. The corresponding *df*s for Positive Parenting are (3, 126), (3, 100), (3, 112), and (3, 87).
[a] Low and high refer to categories of parenting.
* *p* < .05. ** *p* < .01. *** *p* < .001.

between undercontrollers and resilients faded when the level of received negative control was low.

The overcontrolled children were rated significantly higher on internalizing behavior than were the resilient children, with the overcontrolled children in negative control families showing the highest levels of internalizing problem behavior. The results also indicate that high or low negative parental control did not make a difference for the resilient children: The mean scores on internalizing behavior were almost equal.[3]

The value of eta-squared (η^2; see Table 6), which is the regression coefficient (R^2) for a nonlinear regression curve, can be used as an estimate of effect size. For the interaction effects in this study, we found values of .04, which resemble the effect sizes of the interaction effects in Study 1 (see Table 4). Values of the observed statistical power of the interaction effects were .59 and .65 for internalizing and externalizing, respectively, and are also comparable to the power estimations of Study 1.

No significant interactions were found between the personality types and positive parenting. However, there were significant main effects for both positive parenting and personality type. Undercontrollers were rated significantly higher on externalizing behavior than were resilients, and overcontrollers were rated significantly higher on internalizing behavior than were resilients. Children who were supported by their parents showed significantly lower levels of problem behavior in comparison with children who received low levels of positive parental behavior.

Time 1 Categorization Predicts Time 2 Problem Behavior

Table 6 shows how Time 1 categorization predicts Time 2 problem behavior. The Time 1 Negative Control $\times$ Undercontrollers/Resilients interaction predicted Time 2 externalizing behavior. The results further illustrate that the Time 1 personality types significantly predict Time 2 externalizing and internalizing behavior. The Negative Control categories also predicted Time 2 externalizing and, to a lesser extent, internalizing behavior, whereas the Positive Parenting categories mainly predicted externalizing behavior.

Discussion

In Study 2, we adopted a person-centered approach and examined the interactive effects of parenting and the resilient, undercontrolled, and overcontrolled personality types. The types were assigned according to the standard procedure outlined by Asendorpf et al. (2001). Children were assigned to groups experiencing differences in parenting on the basis of their scores on the parenting variables: children experiencing below- or above-average positive parenting and children exposed to below- or above-average negative control.

GLM analyses showed two significant interaction effects. Undercontrolled children (characterized by below-average levels on both conscientiousness and benevolence) showed significantly more externalizing behavior than resilient children, especially when exposed to highly negative parental control. Overcontrolled children (scoring low on emotional stability and extraversion) exhibited higher levels of internalizing behavior than resilient children, with the highest levels of internalizing behavior shown by children experiencing high negative parental control. Resilient children were not affected by negative control and showed no

problem behavior at all. In addition, the results showed that the strongest Time 1 interaction effect still predicted Time 2 externalizing behavior. The Time 1 main effects of personality types and parenting categories largely held up over time.

The results of Study 2 are partially in line with the results of Study 1. Children scoring below the mean on the benevolence and conscientiousness dimensions in Study 1 correspond to the undercontrolled children in Study 2. These children are at risk for externalizing behavior when exposed to high levels of negative parental control. Children with above-average scores on benevolence and conscientiousness in Study 1 resemble the resilient children in Study 2. These children are not affected by restrictive control. However, in contrast to the results of Study 1, positive parenting, benevolence, and conscientiousness were not identified as moderators in the prediction of externalizing behavior, because there was no significant interaction between positive parenting and the undercontrolled/resilient dichotomy.

This study demonstrates the utility of personality types as moderators of the relationship between environmental variables such as parenting and problem behavior. Groups of children with similar configurations of personality characteristics were a priori identified. Note that to group children using a variable-centered approach, researchers or clinicians have to define arbitrary ad hoc cut-off scores on the dimensions or divide the children into groups on the basis of a median split. The present study illustrates that a priori defined types have predictive validity in explaining maladaptive child behavior and that they should therefore be considered as a viable alternative to the variable-centered approach in developmental and clinical research. However, it has to be recognized that identifying the relevant personality dimensions (adopting the variable-centered approach) remains important because the scores on the dimensions are indispensable for grouping children into the types and for describing the typical personality profiles of the resilient, undercontrolled, and overcontrolled children. The knowledge that undercontrolled children are at risk for developing externalizing behavior, in particular when they have experienced a highly negative parental style, may have practical utility when one has to decide whether they are at risk. However, in order to explain why they are at risk, it may be useful to refer to the dimensions defining the particular personality profile of each personality type. Therefore, types and dimensions should be considered as useful classes of information generated by two complementary research

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[3] Parenting $\times$ Personality Type interactions were also examined with HMR analysis, with personality types as dummy-coded variables (resilients vs. undercontrollers and resilients vs. overcontrollers) and parenting dimensions as continuous variables. This revealed one significant interaction effect, Undercontrolled/Resilient Types $\times$ Negative Control, in predicting child externalizing behavior, $\Delta R^2 = .027$; $F_{\text{change}}(1, 369) = 15.77$, $p < .001$. This interaction was of the synergistic or enhancing type (Cohen et al., 2003, p. 285), with both predictors affecting externalizing behavior in the same direction and their combination producing an additional effect. The effect size of this interaction was .04, which equals the effect size of the GLM interaction effect (see Table 6), although the number of included participants was larger in the HMR analysis ($N = 374$) than in the GLM analyses ($N = 121$). The Overcontrolled/Resilient Types $\times$ Negative Control interaction effect on internalizing behavior, which was significant in the GLM analysis ($N = 110$), showed a statistical trend ($p = .085$) in the HMR analysis ($N = 345$).

strategies, that is, the variable- and the person-centered approaches.

General Discussion

A Comprehensive Test of Personality as a Moderator

The present research extends in several ways previous empirical studies that documented the role of personality–environment interactions in the development of child problem behavior. First, other studies that linked parenting and child characteristics assessed only the child's temperament or various specific personality characteristics. Our first study included a broadband measure of child personality based on the five factor model, which can be regarded as a robust reference model (De Raad & Perugini, 2002) applicable to both children and adolescents (Shiner, 1998). In our second study, we considered child personality from a person-centered approach, studying the role of personality *types* in interaction with parenting. Second, a review of the literature indicates that most studies that have investigated Parenting × Temperament or Personality interactions were limited to negative child parenting practices such as coerciveness or restrictive control. The present research included both a positive and a negative dimension of parenting behavior. Finally, both internalizing and externalizing behavior were studied as outcome variables, whereas past research has focused mostly on externalizing behavior.

Reliable Moderator Effects

Past moderator research has been hampered by various methodological and statistical shortcomings. To reduce these problems, we used (a) a nonrestricted large population sample, (b) reliable measures, (c) more than one informant, and (d) a follow-up measurement within a 3-year interval. The HMR analyses provided evidence for several significant Parenting × Child Personality interactions. Six major conclusions can be drawn: (a) Several significant Parenting × Personality interactions were identified, but they were more prominent for externalizing than for internalizing behavior; (b) two types of interactions were identified, buffering interactions and interference interactions; (c) the interactions were largely replicable across informants (i.e., parents and children) and across a 3-year interval (i.e., for children and adolescents); (d) the most prominent personality domains that figured in the interactions were benevolence and conscientiousness; (e) the person-centered study also showed meaningful Personality × Parenting interactions; and (f) interactions measured at Time 1 predicted problem behavior across a 3-year interval.

Differences in the Prediction of Externalizing and Internalizing Behavior

The present research identified moderating effects predominantly for externalizing behavior, whereas for internalizing behavior, parenting and child personality turned out to be primarily additive effects. Strong negative first-order effects of extraversion and emotional stability on internalizing behavior were clearly present: Children scoring low on these adaptive traits were more prone to internalizing behavior. Independent effects of extraversion and emotional stability on externalizing behavior were much smaller. This result corroborates previous research findings by

Finch and Graziano (2001) which showed that the benevolence, extraversion, and neuroticism personality dimensions are strongly related to depression.

The weaker associations between the parenting variables and internalizing behavior, in comparison with externalizing behavior, can be explained by the theoretical and empirical underpinnings of the parenting questionnaire, that is, the heavy emphasis in social learning theory on antisocial behavior and parenting. For example, the majority of the behavior control items in the GPBS predominantly describe how a parent reacts when a child misbehaves, and hence there is a limited emphasis on parental behavior that may reduce internalizing behavior. A study by Barber (1996) showed that behavioral control, referring to attempts to control or manage children's behavior, was uniquely associated with externalizing, and not with internalizing, adolescent problem behavior. However, there was no evidence for a particular association between internalizing behavior and psychological control aimed at the psychological and emotional development of the child.

Types of Interaction

A buffering interaction pattern was identified for the Negative Control × Personality interactions. Negative parental control tended to be a risk factor for externalizing behavior, especially for children rated low or around the mean on benevolence and conscientiousness. Hence, these personality domains function as protective factors: Children rated high on these domains do not show problem behavior at all, even in the presence of parental restrictive control. Interference, or antagonistic, interactions were present for positive parenting and benevolence. Again, the results show that children rated high on benevolence do not show problem behavior at all, even when they are deprived of positive parenting. The combination of above-mean-level positive parenting and below-mean-level benevolence diminishes externalizing behavior.

The Replicability of the Interactions

Some of the findings in this study were replicable across judges and across a 3-year interval. Our study included two measurement occasions: the first when most of the participants were school-age children, the second when 88% of the sample were adolescents. The Benevolence × Negative Control and the Conscientiousness × Negative Control interactions predicting externalizing problem behavior for the school-age children remained 3 years later. These interactions measured at Time 1 were also predictive of Time 2 externalizing behavior. The first-order effects of personality showed great stability over time, whereas the effects of parenting behavior, especially on internalizing behavior, diminished slightly over time.

The Role of Benevolence and Conscientiousness

The most prominent interactions included the benevolence and conscientiousness personality domains. This finding is consistent with the results of a study by Prinzie et al. (2003) and is related to the results of studies that have investigated Parenting × Temperament interactions. The interactions of parenting with benevolence and conscientiousness may reflect "evocative person–environment transactions" (Caspi, 1998, p. 357): On the basis of their unique personality characteristics, individuals act, and the environment

reacts, resulting in mutually interlocking evocative transactions. Patterson (1982) also described this process as part of the coercive family process. The present analyses showed no significant interactions for imagination, extraversion, and emotional stability, and hence the present results are consistent with the findings of Prinzie et al. (2003).

The Importance of Interaction Effects

The emphasis in the present study on the importance of Parenting × Child Personality interaction effects is not meant to minimize or to cloud the main effects of the child's personality or the effects of parenting. The importance of the main effects is clearly documented in Tables 2, 3, 5, and 6 and has also been recognized and stressed in several studies referred to in the introduction. Although it is evident that main effects explain a greater proportion of the variance in externalizing and internalizing behavior, documenting reliable interaction effects essentially qualifies the main effects.

The study of interaction effects is important from both theoretical and practical perspectives. Reliable interaction effects qualify theories that are based on straightforward and unqualified effects of parenting and child personality. Moreover, because most theories are tested by adopting a variable-centered approach, the implications at the individual or person level are usually underestimated. The practical implications at the individual level can be judged more appropriately by adopting a person-centered approach because it specifies the type of participants for whom the general rule does or does not apply (e.g., Negative Control has detrimental effects on Time 1 internalizing; see Table 6). For instance, high versus low negative parental control did make a difference for the degree of internalizing shown by the 162 overcontrollers, but the same differences in parenting did not affect the internalizing scores of the 185 resilient children. Hence, although this interaction effect explains only 4% of the variance, it nevertheless shows that parenting was an additional risk factor for less than half of the sample. Moreover, in this case, the main effect of parenting explains less of the internalizing variance than does the interaction effect.

A similar procedure can be applied to the data reported in the variable-centered study. Although this procedure requires setting arbitrary ad hoc cut-off points to calculate the number of participants to whom the general rule does or does not apply, the logic is essentially the same. In Table 4 we report the interaction between personality and parenting on externalizing as well as the simple slopes for the relationship between parenting and externalizing for three (ad hoc) groups: those scoring high, moderate, and low on benevolence. Figure 1A shows that the parenting–externalizing relationship was significant for the group scoring below and around the mean but not for the group scoring above the mean. Moreover, calculation of the R^2s for each of these groups shows that the effect of parenting explains 11% of the variance of externalizing for the low-benevolence group and 10% of the variance for the medium-benevolence group, whereas it explains only 5% for the high-benevolence group. This comparison illustrates that the overall main effect of parenting underestimates the importance of parenting for children scoring low or around the mean on benevolence but overestimates it for the other ad hoc personality group. Finally, this sort of data not only has theoretical significance but is also important for clinical researchers, who

want to screen children, and for parents, who will benefit from treatment such as enrollment in a parenting training program.

Variable- Versus Person-Centered Approaches

Including personality types in interactions with parenting, instead of personality variables, enriched the findings of the first study. Neither the number of significant effects nor the effect sizes of Study 2 are remarkable in comparison with the findings of Study 1. After all, it was not our goal to enhance the likelihood of finding interaction effects by using categorical variables, a strategy that McClelland and Judd (1993) have tried to dissuade researchers from using. The main advantage of the personality type approach is that, instead of considering only one variable at a time, it combines children with a given profile of scores on multiple personality variables into one category. From Study 1 we concluded that children rated low on conscientiousness *or* low on benevolence were at risk for externalizing behavior when exposed to parental negative control. Including personality types in the interactions led to the conclusion that children rated below the mean on both conscientiousness *and* benevolence, that is, the undercontrolled children, are at risk for externalizing behavior when exposed to parental negative control, in comparison with resilient children. This study further showed that children scoring low on emotional stability and low on extraversion, that is, the overcontrolled children, are at risk for internalizing behavior when exposed to parental negative control. Resilient children are protected against possible negative effects of parental negative control. With the variable-centered approach in Study 1, we found evidence only for main effects of personality and parenting in the prediction of internalizing behavior. However, studying overcontrolled children with a profile indicating low scores on the two relevant dimensions (emotional stability and extraversion) provides extra information on moderators of internalizing behavior.

These results emphasize the relevance of using personality types in developmental research and clinical practice. Types clearly have predictive validity in the study of maladaptive child behavior and should be further integrated in research about personality–environment interactions. Types also have practical value because they combine information on several personality domains in a single case. This facilitates, for example, the diagnostic process as well as clinical decision making.

To our knowledge, there is only one other study that has investigated interactions between parenting and personality types in predicting problem behavior. Dubas, Gerris, Janssens, and Vermulst (2002) found that undercontrolled adolescents exposed to high levels of restrictive control scored higher on internalizing behavior than did resilients and overcontrollers in less restrictive families. This finding is in contrast to findings of previous studies that evaluated the external validity of the types. Dubas et al. attributed this to the co-morbidity of externalizing and internalizing problems.[4] Our study corroborates the externalizing tendencies for undercontrollers and the internalizing tendencies for overcontrollers.

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[4] In an additional GLM analysis of variance, we checked whether this interaction could also be found in our data, but this was not the case.

Limitations of This Study and Future Research

A study with biologically related parents and children does not rule out that associations between parental behavior and child measures are due to common factors instead of environmental influences. Environmental influences, such as parenting, partly reflect genetic influences, that is, genotype–environment covariance (Lahey, Waldman, & McBurnett, 1999). An example of such a passive type of genotype–environment interaction is a child diagnosed as having a conduct disorder who was reared by parents showing aggressive behavior. In such a case, parental and child behavior are correlated (Rowe, 2003).

The present study found evidence for a moderator effects model that explains child outcomes by the simple interaction of constitutional vulnerability (child personality) and environmental factors (parenting). However, such a model does not imply that conclusions can be drawn about reciprocal and recurrent interactions over time between the organism and the environment, as postulated by the transactional effects model (Lytton, 1990).

The reliance in the present study on a questionnaire measure to assess parenting is a potential limitation. Studies investigating effects of parenting on social development that are based on direct behavioral observations usually show larger effect sizes than do studies centered on parental reports (Collins et al., 2000). However, the need for a large sample in order to maximize statistical power forced us to use self-rating questionnaires. The GPBS was developed with great care and has good psychometric properties. Besides, the questionnaire was administered to two informants, parents and children. The combination of child ratings of parenting with parental ratings of personality and problem behavior reduces shared method variance and allows replication of the results found for parental ratings. We acknowledge that the use of aggregated scores for parental behavior might mask differential effects of maternal and paternal parental behavior, in particular for positive parenting because the correlation between ratings supplied by mothers and fathers was below .3. We also recognize the possibility that parental disagreement about child rearing also might predict problem behavior.

Although we used measures at two assessment times in order to replicate the basic findings, these follow-up measures are not independent, and hence replication in independent samples is warranted. Nevertheless, the five broadband measures of personality and the two parenting dimensions used in this study can be considered as useful measures for detecting Personality × Parenting interactions.

Main effects of parental behavior on the problem behavior of the child often conceal interactions with the personality of the child. This often leads to the erroneous conclusion that some parenting practices (e.g., restrictive parenting) are detrimental or bad and should be avoided at all costs. The present study documents that the effects of parenting behavior should be qualified and hence that it may be premature to blame all parents adopting a common parenting style for the problem behavior of children without taking into account the moderating effects of the child's personality.

Although in our analyses we consistently controlled for effects of child sex and age, we did not look for differential effects of age and sex. Further research could examine whether Parenting × Personality interactions are different for girls and boys or depend on age groups, for example, school-age children versus adolescents. The importance of this differentiation can be illustrated by

research on externalizing behavior that showed evidence for a developmental typology of delinquency, that is, that the childhood-onset and the adolescent-onset categories are characterized by different etiologies (Moffitt, Caspi, Harrington, & Milne, 2002). Three-way interactions in HRM analyses could verify whether Parenting × Personality interactions differ for boys and girls and according to age.

The finding that stable personality characteristics play a major role in child problem behavior should not be equated with the pessimistic or deterministic view that changing problematic behavior is impossible; rather, it should be taken as evidence for a more realistic perspective (Lytton, 1990). Parents can have an impact on their children's behavior, but they will not be able to change major personality traits, such as extraversion and neuroticism (Rowe, 1990). The present studies support the view that parents may receive too much blame for the behavioral difficulties of their children because the moderating role of the child's personality is often ignored. On the other hand, environmental factors combined with certain personality types may increase the likelihood of the development of problem behavior.

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