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Interaction of Temperamental Resistance to Control and Restrictive Parenting in the Development of Externalizing Behavior

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Abstract

Child temperament and parental control were studied as interacting predictors of behavior outcomes in 2 longitudinal samples. In Sample 1, data were ratings of resistant temperament and observed restrictive control in infancy–toddlerhood and ratings of externalizing behavior at ages 7 to 10 years; in Sample 2, data were retrospective ratings of temperament in infancy–toddlerhood, observed restrictive control at age 5 years, and ratings of externalizing behavior as ages 7 to 11 years. Resistance more strongly related to externalizing in low-restriction groups than in high-restriction groups. This was true in both samples and for both teacher- and mother-rated outcomes. Several Temperament × Environment interaction effects have been reported previously, but this is one of very few replicated effects.

Most theoretical explanations of the development of behavior problems include child temperament factors and their interactions with qualities of the socializing environment. Thomas and Chess (1977) summarized these interactive processes in terms of goodness of fit between a child's temperament and the expectations and resources of the child's home and schools. In theory, temperament does not lead to behavior problems by itself; it does so only in conjunction with particular environments. Beyond this seminal idea, there has been little progress in detailing models of developmental interplay between temperament and environment, despite large numbers of studies on temperament. Additional descriptions of such effects are needed. The present article reports an empirical demonstration of one particular temperament–environment interaction. The article focuses on children's temperamental unmanageability, parents' restrictive control efforts, and children's externalizing behavior problem outcomes.

Temperament as a general construct refers to a broad array of behavior traits considered to be biologically rooted and, to one degree or another, early appearing. Temperament traits can be characterized as various forms of reactivity and self-regulation (Rothbart & Bates, 1998). Specific temperament dimensions are associated with distinct combinations of

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psychobiological substrates. Research has found several temperament traits to have direct, main-effects-type relations with behavior problems in a nonperfect but replicated pattern of partially differential linkage: Temperamental predictors of behavior problems include (a) irritability–difficultness, preceding both internalizing (e.g., anxious) and externalizing (e.g., aggressive) kinds of behavior problems; (b) behavioral inhibition–fearfulness, typically preceding internalizing more so than externalizing problems (but not always); and (c) impulsivity–unmanageability, typically preceding externalizing problems more than internalizing problems (Bates, 1989; Guerin, Gottfried, & Thomas, 1997; Rothbart & Bates, 1998; Sanson, Smart, Prior, & Oberklaid, 1993; Slotboom, Elphick, van Riessen, van Mill, & Kohnstamm, 1996). Details of the process by which temperament predicts later behavior problems are not known, but the evidence so far provides modest support for models of direct (e.g., continuity of personality traits) and indirect (e.g., through child's impact on parents) linear effects (Rothbart & Bates, 1998).

The temperament construct we chose to focus on was impulsivity–unmanageability. This choice was based on our major interest in aggression and externalizing problems. The chosen temperament construct is the one with the most differentiated relevance to externalizing behavior (Bates, 1989; Caspi, Moffitt, Newman, & Silva, 1996; Rothbart & Bates, 1998). The impulsivity–unmanageability trait was operationalized in the present study as parental reports on a scale of resistance to control.[1] The resistance to control construct emerged empirically in previous research on the kinds of infant behaviors parents might find difficult (see Bates & Bayles, 1984). The core behaviors in this trait are the child's failure to comply with parental attempts to stop or to redirect the child's action—for example, ignoring a parent's directive not to touch a breakable object. As with any operational measure of temperament, our parent report measure of resistance to control reflects more than the purely biological definition of temperament. Such an index contains components of psychometric error (some parts of which may be ultimately explained by currently unmeasured factors), perceptual biases in the person providing the ratings, as well as environmentally conditioned experience in the child. Those factors are not so large, however, that they eclipse the components of both stable and developmentally unfolding, biologically rooted temperament. A chain of evidence and theory supports, with caution, the use of the construct in general (Rothbart & Bates, 1998) and this index in particular (Bates & Bayles, 1984).

Theoretically, the concept of resistance to control can be seen as a temperament construct that reflects several more basic temperament dimensions and associated differences in fundamental neural systems. In terms of reactivity, the key elements of resistance to control may be two: First, there may be a relatively strong attraction to rewarding stimuli, accompanied by excitement (controlled by the coordinated actions of the behavioral activation system, involving especially the caudate motor system, the accumbens motor system, the septohippocampal system, and the prefrontal cortex; Gray, 1991; see also Rothbart & Bates, 1998). Second, there may be a relatively weak level of basic social agreeableness (Lanthier & Bates, 1995) or warm, trusting, helpful responses to people (controlled by ventromedial hypothalamic structures receiving opiate projections from higher limbic regions; see Rothbart & Bates, 1998, for a brief review). It is also theoretically possible that resistance to control could partly depend on a weak fear–inhibition response to threats of punishment (controlled by loci in the septohippocampal system (Gray, 1991), with lateral asymmetry patterns of the anterior portions of the brain playing a role in the dynamic balance of emotions associated with inhibition and approach; Calkins & Fox, 1994). However, although we think inhibition differences may moderate resistant tendencies, we think they are less likely to be central to resistance because we have noted that a conceptually relevant dimension of distress in the

[1]We are grateful to G. A. Kohnstamm for suggesting this term and its conceptual roots.

context of novelty tends to vary independently of both resistance to control (Bates & Bayles, 1984) and externalizing behavior problems (Bates, Bayles, Bennett, Ridge, & Brown, 1991). In terms of self-regulation, resistance to control may further reflect difficulties in the effortful control of attention (related to the functioning of the frontal lobe's anterior cingulate gyrus) as well as vigilance (related to the activity of the locus coeruleus inhibiting the cingulate; Rothbart & Bates, 1998). Theoretically related to the effortful control construct is Newman's construct of response modulation (e.g., C. M. Patterson & Newman, 1993). According to Newman, differences in impulsivity are due not only to differences in affective responses to reward and the threat of punishment or nonreward but also to differences in the processing of peripheral cues that provide information about the consequences of responses. This produces differences in the ability to inhibit actions. We would argue that very young children's differences in response to caregivers' attempts to regulate their actions represent one substrate of the kinds of self-regulatory abilities that are seen as important in the adaptations of older children and adolescents. Current theory on self-regulation strongly emphasizes temperamental concepts (Barkley, 1996; Eisenberg et al., 1997; Kochanska, Murray, & Coy, 1997; Kopp, 1982; Olson, 1996). Children with higher levels of resistance to control may tend to have strong attraction to rewards, weak inhibitory competencies, and weak connections to the feelings of others. These traits would make it difficult to learn rules for conduct and would raise the risk for behavior disorders.

However, even though there are conceptual and empirical links between temperamental resistance to control and behavioral adaptations, in theory, temperament must operate through transactions with the socializing environment. Parenting characteristics have been the most frequently considered environmental antecedents of child behavior problems. Like temperament variables, parenting variables have been found to show direct, main-effects links with child adjustment (Hetherington & Martin, 1986; G. R. Patterson, Reid, & Dishion, 1992; Rothbaum & Weisz, 1994), And also like temperament, the links are of a typically modest-to-moderate order, with correlations in the range of .2 to .4 (e.g., see Rothbaum & Weisz, 1994). Not only current systems theories but also empirical findings of limited main-effects relations call for the study of Temperament × Environment interactions.[2] What characteristics of the environment, then, would be most likely to interact with child temperamental resistance to control? The parenting construct most conceptually relevant as a possible moderator of temperamental resistance to control would be parental restrictive control, involving behaviors intended to stop or to punish the child, such as giving negative commands, removing objects from the child, scolding, and spanking.[3] The extent to which a parent uses such behaviors has been found to be correlated with externalizing behavior problems (Coie & Dodge, 1998). It must be noted that restrictive control, especially as seen through an observer from outside the family, does not necessarily involve elements of harsh discipline, such as spanking and other efforts to inflict physical or emotional discomfort. At a conceptual level, restrictive control could moderate the effects of child temperamental resistance to control in at least two ways: High-level control could either create opportunities for exacerbation of parent–child conflict, leading to pathological development, or actually modulate the effect of temperament. We are aware of no theory that would allow a choice between these alternatives.

If the linkage of temperament and later adjustment is, in fact, moderated by parenting characteristics, empirical discovery of such an interaction effect would advance description

[2]There is the possibility, as suggested by G. R. Patterson et al. (1992), that the links between parenting and child outcomes could also be enhanced by the use of analyses that statistically control for error of measurement, but results of such analyses still leave room for possible temperament–environment interaction effects.

[3]Positive behaviors, including affectionate and educative parenting, are also related to child externalizing problems (e.g., Pettit & Bates, 1989; Pettit, Bates, & Dodge, 1997). We chose restrictive control for our focus in this set of analyses because of its more obvious conceptual relevance to temperamental resistance to control as well as because of results of previous analyses in one of the data sets, as is described later.

and ultimately, perhaps, understanding of the process of development. By *discovery*, we mean finding a replicated pattern. By *interaction effect*, we mean a nonlinear effect rather than simply the summed effects of two or more main effects (Baron & Kenny, 1986; Rutter, 1983). Interaction implies that relations between two variables are affected by the level of a third variable.

Reports of relevant interaction effects are relatively infrequent (Bates, 1989; Rothbart & Bates, 1998; Rutter, 1983); however, they have been emerging. In one recent example, Hagekull and Bohlin (1995) found that preschool-age children with higher levels of temperamental manageability were less aggressive when they had high-quality day care than when they had low-quality care. Less manageable preschoolers aggressiveness was not associated with quality of day care. Other intriguing examples have been reported by Brody, Stoneman, and Gauger (1996); Henry, Caspi, Moffitt, and Silva (1996); Lerner and Lerner (1994); and Shaw, Owens, Vondra, Keenan, and Winslow (1996). What is particularly crucial at this point in research on Temperament × Environment interactions is the replication of effects. Replications of relevant interaction effects are very rare, but there are a few.

One replicated Temperament × Environment interaction effect in the literature is the finding that the cognitive development of highly active children is less adversely affected by living in an understimulating environment than that of inactive children (Wachs, 1992). There have also been replicated findings in which difficult children's cognitive development is more adversely affected by noisy environments than that of easy children (Wachs, 1992). More directly in the area of child psychopathology, Kochanska (1995) found an interaction between preschoolers' temperamental fearfulness and the nature of their relations with their mothers in predicting signs of conscience. Highly fearful children's signs of conscience (i.e., internalized self-control) were predicted by mothers' use of gentle rather than harsh, power-oriented forms of discipline. Gentle discipline theoretically promotes the development of internalized control in fearful children by keeping their anxiety levels low. In contrast, nonfearful children's internalized self-control behaviors were predicted by security of the mother–child attachment, as indexed by mother report on a Q sort, and not by gentle discipline. Kochanska interpreted this as being due to the fearless child's having developed a positive partnership with the mother and thereby acquiring internal controls. Kochanska (1991) had previously shown, in a sample of 8- to 10-year-olds, that fearful children tended to show more signs of conscience when their mothers used gentle control than when they used power assertion; in contrast, for the relatively fearless children, gentle control did not make a difference. In addition, the full interaction effect (Kochanska, 1995) was replicated in the main study's sample at a later age (Kochanska, 1997). A converging finding comes from a recent cross-sectional study of a small group of fourth- and fifth-grade boys by Colder, Lochman, and Wells (1997). These researchers found that temperamentally fearful children with parents who used harsh discipline were higher on teacher-rated aggression than both low-fear children with harsh parents and high-fear children with gentle parents.

Arcus and Gardner (1993) and Park, Belsky, Putnam, and Crnic (1997) provided an additional Temperament × Environment effect. Both studies found that early child negative reactivity interacted with parenting in forecasting later child (fearful) inhibition. Arcus and Gardner (1993) found that extremely reactive infants were less likely lo develop into inhibited toddlers if their mothers were high in limit setting (similar to this article's core construct of restrictive control) than if their mothers were low in limit setting; however, extremely nonreactive infants were later low on inhibition, no matter the nature of maternal control. Park et al. (1997) found that infants who were high in temperamental negativity at about 1 year of age were rated as less behaviorally inhibited in a laboratory task at 3 years of age to the extent that their mothers and fathers were rated as affectively negative during home observations in Years 2 and 3. However, the inhibitedness of low-negativity infants was essentially un-correlated with

parental negativity. The two studies differ on ages of assessments and measures, but nevertheless, they can be interpreted as demonstrating a replicated interaction effect.

The shortage of replicated Temperament × Environment interaction effects may be partly a general problem of insufficient interest in replication in social development research and partly a function of the fact that there are so many possible effects that could be examined. However, the difficulty may also involve statistical power and the effects of outliers in the relatively small samples that are characteristic of longitudinal studies. After a sample has been subdivided on some characteristic, as in the typical interaction analysis, the groups may be too small for detecting the ordinary effect of modest–moderate size. Alternatively, in such limited samples, a few outliers may produce statistically significant interaction effects that are not more generally evident in the sample, or they may preclude detecting an interaction effect that is in fact more generally present. Even if one could assume adequate scaling and measurement, in nonexperimental studies, the typical properties of the joint distributions of a predictor and a moderator variable cause exponential drop-offs in the efficiency with which studies will detect interaction effects (McClelland & Judd, 1993). Such considerations have led some statistical experts to recommend increased efforts to analyze data visually (M. Stoolmiller, personal communication, Oregon Social Learning Center statistics seminar, fall 1995; Cleveland, 1993). It may also be useful to use structural equation modeling methods in addition to the more conventional multiple regression statistics. Whatever the analytic approach, however, replication would seem to be particularly important for interaction effects—if an effect replicates, complex concerns about joint distributions are mitigated, and there is more hope that theoretical interpretation of that effect might eventually be fruitful. As Rutter (1983) said, statistical procedures can help avoid spurious conclusions, but “replication provides the most important test” (p. 315).

In searching for Temperament × Environment interactions, the present study used data from two separate longitudinal data sets, the Bloomington Longitudinal Study (BLS; e.g., Bates et al., 1991) and the Child Development Project (CDP; e.g., Bates et al., 1994; Dodge, Bates, & Pettit, 1990; Pettit et al., 1997). In both studies, we measured the child’s early temperament in the earliest years through similar mother-report items, but the measures were prospective from infancy in the case of the BLS and retrospective from age 5 in the case of the CDP, The retrospective questionnaire used in the CDP was validated prospectively in the BLS. We assessed parent–child interaction through observations at age 1 to 2 years in the BLS and at age 5 years in the CDP. We measured externalizing outcomes through teacher and parent reports on Achenbach questionnaires (Achenbach, 1991a, 1991b; Achenbach & Edelbrock, 1983, 1986) in middle childhood in both samples. The outcome measure represented an average of scores across the largest number of middle-childhood years available (ages 7. 8, and 10 years for the BLS and 7–11 years for the CDP). The decision to average was based first on the moderately large cross-age correlations of externalizing (e.g., Olweus, 1979) and the fact that analyses of individual years’ outcomes produced very similar results—despite the fact that individual growth curves also showed considerable shifting from year to year. The decision to average was based second on the tendency of a shifting array of participants in any given year and on our desire to maximize sample sizes. The analytic approach was to first create groups on the moderator variable by median split and then to examine correlations and scatter plots. This was followed by structural model fitting. Our primary interest was in the predictiveness of temperament, moderated by parenting, rather than in the predictiveness of parenting as moderated by the temperament of the child. However, we also summarize findings on the latter question because we recognize that this has been the most frequent perspective in the relevant prior research.

The present study builds on foundation of preliminary analyses in one of the two samples: the BLS. Previous BLS searches for interaction patterns revealed some patterns that were

reasonably well replicated across the preschool years (Bates & Marvinney, 1993) but not in middle childhood. These searches emphasized a three-way interaction between temperament and two observed parenting dimensions: restrictive control and positive involvement. Further preliminary analyses (Bates, 1994a) suggested that the most consistent parenting moderator of the temperament–behavior problem link was restrictive control rather than positive involvement, with higher levels of linkage found in children with low-controlling mothers than in children with highly controlling mothers. Although this pattern was not directly suggested by any major theory, its presence in successive years of development recommended further study.

Method

Samples

Bloomington Longitudinal Study—At inception, the BLS sample consisted of families of 6-month-old infants, recruited without any commitment to longitudinal participation. Just before their infants were 6 months old, parents of most babies born in the Bloomington, Indiana, area were sent a brief temperament questionnaire (Bates et al., 1979). From the 68% who returned the questionnaire, we invited 247 to participate in a more detailed study representing balances on child sex, first- versus later-born status, and difficultness of temperament; 168 agreed. The distribution on a temperamental difficultness scale completed several weeks after the screening questionnaire, during the detailed assessment, approximated normal At the first follow-up at age 13 months, 142 participated: at the second, age 24 months, 121 participated. Subsequent follow-ups included a core of approximately 90 participants, with a rotating group of 1 to 30 additional, varying according to the procedure and year (for method details on the 6- to 24-month phase, see Bates, Olson, Pettit, & Bayles, 1982; Pettit & Bates, 1984; Olson, Bates, & Bayles, 1982, 1984; for details on the 3- to 10-year phase, see Bates, Maslin, & Frankel, 1985; Bates & Bayles, 1984, 1988; Bates et al., 1991; Ridge, 1992). Analyses comparing participating versus nonparticipating families have revealed no systematic biases on sex of child, temperament, socioeconomic status (SES), and early childhood adjustment (Bates & Bayles, 1988). In the core sample most relevant to the present analyses, parental occupations were largely middle class (64% of families), which included skilled trades, white collar, and student, but there were also working-class families (22%) and upper-middle-class families (15%). The children in this core were 56% boys and 44% girls.

Child Development Project—The CDP sample consisted of families with 5-year-old children in three cities (small: Bloomington, Indiana; medium: Knoxville, Tennessee: large: Nashville, Tennessee), recruited during spring enrollment for kindergarten, except for the 15%, who were late enrollees, purposely recruited in late summer or early fail. Families were approached at random, and about 70% of those approached agreed to participate. Schools were selected to achieve a fuller representation of lower SES families than typical in volunteer community samples. From a larger sample of 585, a subsample of 156 participated in a further assessment procedure of home observation (9 others were observed but, for various technical and other reasons, did not have the relevant measure). The families were selected for balanced numbers of low, average, and moderately to highly aggressive children, as described by their mothers—and, where possible, fathers—on the Aggression scale of the Achenbach Child Behavior Checklist (CBCL; Achenbach & Edelbrock, 1983). The observation subsample represented both a wide range of SES (*M* Hollingshead Four-factor index of SES = 40.85, *SD* = 15.28, range = 8–66) and the ethnic makeup of the study sites (84% European American, 15% African American, and 1% other). It was also balanced on sex of child (49% boys, 51% girls). These figures are comparable to those for the sample as a whole. (See Pettit, Bates, and Dodge, 1993, for method details regarding the observation subsample.)

Procedure

Bloomington Longitudinal Study—At 6, 13, and 24 months, the relevant measures in the BLS were collected through maternal-report questionnaires and home observations performed by trained observers. There were two 3-hr visits at both 6 and 24 months and one 3-hr visit at 13 months. Observations were recorded in the form of molecular event codes and a variety of ratings. During middle childhood, at ages 7, 8, and 10 months (±approximately 6 months), the relevant measures were collected through maternal and teacher questionnaires sent in the mail.

Child Development Project—At age 5 years, the relevant measures were collected through maternal questionnaires and two 2-hr observations around the family dinner time. Both procedures occurred in the summer preceding kindergarten or early in autumn. The observations were recorded in narrative form, segmented into events, and then coded. During middle childhood, at ages 7, 8, 9, 10, and 11 years, the relevant measures were from maternal and teacher questionnaires.

Measures

Resistance to control—This construct, resistance to control, refers to very early unmanageability. Toddlers scoring high on it may be socially unresponsive, dominating, or impulsive in their explorations. In moderate amounts and for shorter periods of time, such traits are developmentally normal; however, higher and more continuous levels may mark a risk for externalizing problems. In the BLS, resistance to control was assessed through the 13- and 24-month versions of the Infant Characteristics Questionnaire (ICQ: Bates, Freeland, & Lounsbury, 1979: Bates & Bayles, 1984). Resistance to control items are listed in Table 1. In the CDP, resistance to control was assessed through the retrospective ICQ (RICQ), in which the mother was asked when her child was age 5 years to rate the child's traits as an infant. Items are listed in Table 1. Partial validation of the RICQ in the BLS sample provides support for the use of this method. Maternal retrospective reports completed when the child was age 10 on the RICQ scales were related to ICQ scales completed at 6 to 24 months (n = 79–94), depending on the variable. RICQ resistance to control was correlated with its prospective counterpart to a significant degree, but its discriminant validity was less impressive than that for the other two scales. The correlations follow: Infancy difficultness (6–24 months) significantly predicted retrospective difficultness (r = .58) and resistance (.44) but not unadaptability (.08); infancy unadaptability (6–24 months) significantly predicted retrospective unadaptability (.34) but not difficultness (.06) or resistance (.14); infancy resistance to control (13–24 months) significantly predicted retrospective resistance (.34) and, to a trend degree, difficultness (.20, p = .053) but not unadaptability (−.02). On the basis of the psychometric shortcomings of very brief scales and the long time interval, we primarily interpreted the findings as showing a degree of accuracy in mothers' retrospective reports. A plausible secondary interpretation is that the mother is describing continuity in child personality. The interpretation that the correlations are due to consistent, global bias in maternal perception does not seem as likely, on the basis of arguments detailed in Bates (1994b) and Rothbart and Bates (1998). Even if it is not accepted that the RICQ provides information about the child's earliest characteristics, the temperament measures were antecedent to the externalizing outcome measures by 2 to 6 years. Descriptive statistics for the resistance variables are listed in Table 2. Coefficient alpha internal consistencies were adequate— .76 for the BLS index and .83 for the CDP one.

Maternal restrictive control—Maternal restrictive control emerged from within and across-time multivariate analyses of home observation data in she BLS. This construct refers to reactive efforts, such as prohibitions, warnings, and scoldings, to manage inconvenient or potentially harmful child actions. Although this measure involves restriction, it does not strongly index harsh punishment, because observers seldom saw even threats of physical

punishment, much less strongly angry scolding or actual spanking. In the BLS, the measure was based on the average of factors within molecular event codes at ages 6.13, and 24 months plus more subjective observer ratings on the Post-Observation Questionnaire (Olson et al., 1982). Interobserver reliability was adequate: Observer reliability correlations on total scores of individual codes in the molecular measures averaged .73, and observers agreed on a minimum of two thirds of the subjective rating items. Internal consistencies of composites were .7 or higher. Constituents of the composite are listed in Table 1. In the CDP, the measure was a single, complex variable from the age 5 home observations, involving a count of events in which the child engaged in some misbehavior and the mother responded wish a restrictive effort to control die child's behavior. We have in the past described it as coercive control (McFadyen-Ketchum, Bates, Dodge, & Pettit, 1996; Pettit et al., 1993); however, it is not necessarily coercive in the sense of involving highly aversive behaviors. Interobserver reliability was adequate whether computed at the level of the content of narrative events (at a . 75 average level of concordance), at the level of the general class of event (control, teaching, social contact, or reflective listening, at a κ average = .64), and or at the level of event descriptors (e.g., whether the event was initiated by the parent, whether it was cued by child misbehavior, and the nature of the control, κ average = .64). Descriptive statistics are in Table 2.

Externalizing behavior problems—Externalizing was measured through the parallel teacher and mother forms of the Achenbach (Achenbach, 1991a, 1991b; Achenbach & Edelbrock, 1983, 1986) questionnaires: the Teacher Rating Form and the CBCL. The BLS used the 1983 or 1986 algorithms for designating the individual first-order scales, and the CDP used the 1991 algorithms. The different scoring procedures result in nonidentical but highly correlated scores (Achenbach, 1991a, 1991b). The scores from the 3 (BLS) or 5 (CDP) middle-childhood ages were averaged together within source. Children with no score during the follow-through period were excluded. In the BLS, 2 or all 3 years of outcome data were present for 73% of the sample for teacher outcome data and 78% of the sample for mother outcome data. Reflecting the often-reported, moderate-to-high year-to-year stability for externalizing behavior, the alpha internal consistencies were .60 for the teacher score and .91 for the mother score. In the CDP, the majority of years' data were present for 94% of the sample for teacher scores and 93% for mother scores. Alphas were .85 and .92 for the teacher and mother scores, respectively. Thus, the summary externalizing indexes were quite reliable. Teacher and mother scores were treated separately rather than being combined into a composite or latent indicator because they are only modestly to moderately correlated (as is detailed later), and they describe distinctly different settings for child adjustment.

Results

Direct Effects

Temperament—As shown in Table 3, the direct main effects of temperamental resistance to control confirmed previous results: Maternal perceptions of early resistance to control were, to a modest degree, correlated with middle-childhood externalizing problems, whether perceived by the teacher or the mother and whether in the BLS or the CDP data set.

Maternal behavior—Table 3 also shows correlations between observed restrictive control variables and later externalizing problems. For the BLS, the correlations were essentially zero, whereas for the CDP, the correlations were significant and of modest magnitude. The difference between BLS and CDP results here may reflect the different meanings of similar maternal behaviors with children of different ages. The BLS measure was taken during the 2nd year of life, and the variables in this composite have never had consistent main-effects-type relations with child behavior problems in this study (Bates & Bayles, 1988;Bates et al., 1985,1991). The CDP measure was taken at age 5 years, so it is possible that the mother behavior here was more

in response to child deviance rather than to develop-mentally normative and transitory misbehaviors.

Moderated Correlations

Analytic approach—The Study's central questions were whether and how maternal restrictive control actions moderate the link between temperamental resistance to control and later externalizing behavior. We began our main analyses, then, with visual inspection of the scatter plots and correlations of externalizing outcomes predicted by temperamental resistance to control, viewed in groups defined by low versus high levels of observed maternal control. This was followed by multiple-groups, structural equation modeling as a test of the robustness of the apparent interaction effect. In secondary analyses, correlations between maternal control and externalizing outcomes were examined in groups defined by low versus high levels of temperamental resistance to control. Other secondary analyses considered possible confounds of the focal moderator effect, including child sex and family SES. The latter analyses were not followed by structural equation modeling.

Temperament predicting behavior, moderated by parenting—Participants were divided at the median of observed maternal restrictive control into two groups in each sample. We first examined scatter plots and associated correlations. These are shown in Figures 1 (BLS data) and 2 (CDP data). Despite methodological differences between the studies, the pattern of results was the same in each sample: When mothers were relatively low in restrictive control, there was a stronger relation between early temperament and later externalizing problems than when mothers were relatively high in control. This was true for both teacher- and mother-reported outcomes and in both the BLS and the CDP samples. It can also be noted in passing that the moderator effects were not attributable to any correlation between temperamental resistance and maternal restrictive control: The correlations between these two variables were . 07 (p = .429) and .02 (p = .825) in the BLS and CDP, respectively.

Examination of the plots suggested further description of the lower degree of relation in the high-control subgroups: The effect is a small one, involving probably only small numbers of cases, and it appears to operate at both ends of the temperament continuum. For each graph, one may take the regression line of the low-restriction group as the reference line for comparing individuals in the high-restriction group with those in the low-restriction group. This shows, in the bottom panel of the figure, that there were a few highly resistant children in the high-restrictiveness groups whose externalizing outcomes were lower than might have been predicted by the low maternal control groups' regression lines. However, by looking at the top panel of the figure, with the same reference line, it also may be seen that there were, typically, a few low-resistant children in the high-control groups whose externalizing outcomes were higher than would have been predicted by the low group's regression line. This pattern suggests some interesting interpretations that are discussed later. For the moment, it is worth emphasizing that the main pattern is remarkably consistent: When the control of the mothers was observed to be relatively low, the resistant temperament of the child was more strongly predictive of levels of externalizing in middle childhood.

Parenting predicting behavior, moderated by temperament—We also considered the same interaction from the alternate perspective. We divided the samples at the median of child temperamental resistance to control and examined correlations between earlier maternal control and later child externalizing behavior. The resulting pattern of correlations was not quite as clear as the pattern obtained from the first perspective. It was symmetrical in the same way, but the correlations themselves were not as strong. The comparative patterns resembled the interaction as seen from the first perspective, but further research will need to confirm the apparent pattern, in which there were slightly stronger effects of restrictive parenting in the

low-resistant children than in the high-resistant children. In the BLS, the correlations between maternal restrictive control and the externalizing outcomes in middle childhood in the low-resistant group were .17 and .12 (both *ns*) for teacher and mother outcomes, respectively, whereas in the high-resistant group, the corresponding correlations were .07 and −.11 (both *ns*). In the CDP, the corresponding two pairs of correlations were .39 ($p = .001$) and .18 ($p = .15$) in the low-resistant group and .19 ($p = .09$) and .10 (*ns*) in the high-resistant group. Statistics (*r* to *Z*) comparing the high- versus low-resistant groups' correlations did not reach significance, but three of four could be considered as approaching borderline significance: For the BLS comparisons, the *p*s were .12 and .13 for teacher and mother, respectively; for the CDP, they were .10 and .31 for teacher and mother, respectively. Further analyses on moderating effects of temperament on the maternal control-to-child externalizing link were not performed.

Structural Modeling

We chose to further evaluate the moderation of the temperament–behavior link by parenting in structural equation modeling using the EQS program (Bentler, 1995). The visual analysis did not provide a statistical test of the pattern's robustness. After deciding to do the structural equation modeling, and before actually doing it, however, we also performed a set of four conventional multiple regression tests, in which the product of the (centered) temperament and parenting variables was entered following the main effects. The results were inconclusive: For the respective studies and the teacher- and mother-report outcomes, betas (exact *ps*) were as follows: BLS: teacher outcome. −.17 (.085), mother outcome, −.15 (.122):CDP: teacher. −.11 (.182), mother, −.03 (.671).

To test in a more elegant way the hypothesis that the apparent differences between the low- versus high-restrictive control groups were due to chance, we compared the results of two structural models with contrasting assumptions about the groups' differences (Byrne, 1994; Hoyle, 1995, among others, provide a basic description of such models). The first model asks how well the data fit a simple path diagram in which the path coefficients between resistance and externalizing are expected to be nonzero but free to vary in any way with respect to one another. The second model asks how well the data fit the notion that the basic pattern of the data is one of equal paths in both the low- and the high-restrictive control groups. In other words, the second model assumes that maternal control does not moderate the relations of temperament and externalizing behavior. The comparison of the two models indicates the tenability of the interpretation that there is an interaction effect.

First, then, we tested a four-group model without constraints on the paths (i.e., allowing the relations between early resistance to control and the teacher and mother ratings of externalizing behavior to vary according to group). We did, however, include constraints on the error terms associated with the outcome variables. The error constraints amounted to assuming that controlling for their separate paths from child temperament, the mother and teacher ratings of externalizing behavior were correlated the same across high- and low-control groups. This was done to see whether the model could be simplified by the addition of constraints and to see if we needed to worry about possible complications in the interpretation of an interaction effect (e.g., possible nonequivalence of measurement of externalizing in the high- vs. low-maternal restriction groups). The relations between error terms were not assumed to be equal across samples, given that the teacher–mother Pearson correlation in the BLS was .20 ($p = .019$) and that in the CDP, it was .41 ($p < .001$; observation subsample only). Although we had used similar constructs, there were some measurement and scaling differences between samples. The basic model, illustrated in Figure 3, was repeated for all four groups (i.e., BLS and CDP, low and high control). Then, this four-group design was repeated in a model that constrained

the temperament–externalizing behavior paths to be equivalent in the low- and high-control groups within each sample.

The first model, constraining only the residual correlations of the two dependent measures, provided an excellent fit to the data, χ^2 (2, N = 239) = 0.705, p = .703 (Bentler–Bonett normed fit index = .990; comparative fit index = 1.000). In addition, the Lagrange multiplier test showed that removing the requirement that the mother and teacher ratings' correlations be equivalent across groups did not improve the fit. Thus, the model can be simpler, and it does not require us to evaluate nonequivalence across groups in the measurement of externalizing. The path coefficients are shown in Table 4.

The second model we tested, in addition to constraining the teacher–mother outcome correlations, also constrained the temperament–externalizing paths to be equal across groups within samples. This is, in essence, the no-interaction effect or null model. This model provided a worse fit to the data than the first, less constrained model, χ^2 (6, N = 239) = 10.122. p = .120. The probability of a fit this much worse (χ^2 difference = 9.317) occurring by chance is slightly greater than .05. Each of the four path constraints contributed to the multivariate Lagrange multiplier test (cumulative χ^2= 9.347, p = .053), indicating that the constraints of equal paths, within samples, worsened the model's fit. The probability estimate does not include information about the directional comparisons of coefficients so is analogous to a conservative two-tailed test. Because of our prediction of a particular direction of differences between the paths across the two levels of restrictive control, we estimated the probability of the effect's being spurious as something less than the nondirectional chi-square value. The statistical findings suggested that the orderly pattern observed in the correlations of the separate groups was relatively unlikely to be due to chance.

Additional Control Analyses

In addition to considering whether the effect was likely due to any relation between maternal control and the cross-situational meaning of the measure of externalizing, we also considered several other possible confounds. First, we asked whether there were artifactual distribution variations in temperament or behavior problems. Although the distributions were not perfectly equivalent across groups, they were rather similar. This can be seen impressionistically in the scatter plots (Figures 1 and 2). Within each source (mother or teacher) and study (BLS or CDP), the variances of externalizing scores in the low-restriction and high-restriction groups were quite similar, ranging from 8% difference at the most to less than 1% difference. None of the differences approached significance. Distributional properties probably do not account for the interaction effect. Second, we considered a possible confound with sex of child. The interaction did not depend on gender differences m the regressions as related to the maternal restrictive control group, as we saw by visually comparing the scatter plots for boys with the corresponding ones for girls. The pattern was one of similarity, with no consistent differences emerging in these comparisons. Third, we did the same kind of comparison for lower versus middle versus upper SES. No consistent pattern emerged, suggesting that the effect was not associated with SES.[4] Finally, using the same graphical analysis approach, we considered the possible further moderating role of observed maternal warmth. No evident pattern of moderation was found.

[4]These findings do not, of course, preclude direct main-effects-type relations between sex of child or SES and externalizing. Such effects are often found and were not relevant to the present study. The present findings also do not preclude the presence of direct main-effects-type correlations between SES and maternal restrictiveness, which have also been found frequently in past research, in which lower SES mothers are more restrictive. This is true in the present study, too, in both samples, with modest degrees of relations. Nevertheless, there are many lower SES mothers low in restrictive control and many higher SES mothers high in restrictive control, and visual comparisons do not suggest that the moderator effect of restrictive control is confounded with SES. In principle, these comparisons could be statistically tested through *r*-to-Z tests, structural modeling, or other techniques. However, we chose not to test them because the *N*s would have been too small for adequate power.

Discussion

Children's early resistance to control predicted later externalizing behavior more accurately when the mother had been observed to be relatively low in control actions than when she had been high in control actions. This pattern was evident whether the child outcome was measured at home or at school in two separate longitudinal research projects and through both graphical and statistical analyses. This pattern does not seem to be attributable to chance, distributional confounds, gender, or SES. Efforts to explain the effect are justified by the present findings alone. However, in addition, the pattern resembles, in broad form, the effect found by Arcus and Gardner (1993) and Park et al. (1997) in which stern parenting reduced the likelihood of early child fearfulness being associated with later over-inhibition.

How Does the Mother–Child Interaction Affect the Linkage of Temperament and Externalizing Behavior?

The scatter plots show cases in which highly resistant children in the high-restriction group turned out better behaved than their counterparts in the low-restriction group, as well as cases of nonresistant children in the high-restriction group who turned out worse behaved than their less highly restricted counterparts. How might this pattern have occurred? First, considering the resistant child, if the parent's high level of control is consistent, over time it may reduce the impact of the child's early unmanageability, shaping higher levels of responsiveness to social limits. This assumes some degree of effectiveness in the parent's control. However, because the moderator effect was shown clearly in only handfuls of cases, some controlling parents may not have effectively altered the developmental process that links unmanageability and externalizing behavior. One can consider the hypothetical process from another angle, as in the case of a child high on resistance but observed lo receive relatively little control: Perhaps the mother wished to avoid, at least during the observer's visit, the kind of conflict her temperament perceptions would have forecasted. Frequent occasions like this, especially if accompanied by episodically high irritability, such as in cases in which the mother is depressed or highly stressed (Campbell, Pierce, Moore, Marakovitz, & Newby, 1996), would facilitate the occurrence of coercive family process. Patterson et al. (1992) have demonstrated coercive process to be associated with the development of externalizing behavior problems. Speculatively, then, in at least some cases, highly controlling mothers prevent highly resistant children's temperamental resistance from leading to coercion training by bringing the child under control. Less controlling mothers, in contrast, perhaps because they feel more distress from the perceived uncontrollability of the child and tend to participate in coercive process, more often see their resistant children become behaviorally disruptive.

Second, considering the low-resistant cases, low parental control may be an optimal environment for the development of internalized self-control. When mothers were relatively light in their control of nonresistant children, the children typically showed few problem behaviors. Relatively low levels of control would provide ample opportunities for developing autonomous functioning (Kochanska, 1995) and thus would help the child to internalize social limits. Low-resistant children experiencing high control, however, may have fewer experiences of autonomy and thus less practice in cognitively and emotionally internalizing social limits. This might facilitate development of coercive, disruptive behavior patterns, especially when children are outside their highly controlling parents' reach. In addition, because they lack a high level of resistance to control, they suffer many interruptions without many "successes," which might lead to some level of frustration-based anger. Some child–mother dyads may even begin a coercive process—the training of increasing levels of defiance or other deviant behavior as an adaptive means of sometimes obtaining autonomy. Assuming that all children have some degree of autonomy-striving (White, 1959), even if they are highly responsive to external

controls, a relatively nonresistant child could conceivably learn irritable, coercive responses in response to an interrupting environment.

We are partly modeling our interpretations on the elegant work of Kochanska (1995, 1997), who has found evidence that in developing signs of conscience, temperamentally fearless children respond to different aspects of mother–child interactions than do fearful children. Our temperament and outcome variables differ from Kochanska's, and we preferred to consider the interaction from the temperament–adjustment linkage perspective than from the parenting–adjustment linkage perspective. Nevertheless, our results do complement Kochanska's. We are, like Kochanska, suggesting that differences in maternal control interact with child temperamental differences in producing adjustment outcomes and that at its root, the interaction effect may involve the extent to which the child develops internalized self-control.[5]

As a supplement to the reported analyses, we also considered whether the effects of the interaction of resistant temperament and restrictive control would also extend to internalizing behavior problems. The pattern of higher correlations between resistant temperament and externalizing scores in the low-restriction dyads versus the high-restriction dyads was partially repeated with the internalizing outcome. However, this was applied more clearly in the BLS than the CDP data, and when the effects of externalizing behavior were partialed out (because of the overlap between internalizing and externalizing scores), the pattern was further attenuated. Therefore, we conclude that the moderating effects of maternal, control on the relation between early unmanageability and later adjustment are fairly specific to externalizing outcomes.

How Does Child Temperament Moderate Linkage Between Parenting and Child Behavior?

How child temperament moderates the effects of parenting on externalizing adjustment was not our central focus. However, findings from this perspective were consistent in pattern with our interpretations of the parenting-moderating-temperament effect. We tentatively interpreted the predictiveness of parenting measures as being slightly greater when the children were low in perceived resistance to control than when they were perceived to be high in resistance. With nonresistant children, high restriction forecasted more behavior problems, and low restriction forecasted fewer. However, among resistant children, two processes might cancel out part of the relation between parenting and behavior problems: Some resistant children's mothers arc controlling, thereby reducing their chances of externalizing problems; some of their mothers are low in controlling, increasing their chances of behavior problems. This converges in form with the Hagekull and Bohlin (1995) finding that aggressiveness of temperamentally hard-to-manage children was less affected by day-care quality than that of manageable children.

Limitations

Although we consider the moderator effect robust and meaningful, we also remain aware of limitations. First, although the addition of an interaction term adds to the precision of the explanation, it adds only a small amount. We have tentatively ruled out several artifactual and substantive explanations of the effect. However, it remains possible that multivariate measurement models for the constructs of the study, more explicitly controlling for measurement error, would have allowed us to account for additional variance. Any measure of temperament, parenting, or adjustment has weaknesses, but sometimes combinations of measures from alternate perspectives can allow closer estimates of the theoretical construct.

[5]Preliminary analyses with temperamental unadaptability—partially akin to concepts of behavioral inhibition or fearfulness—as the moderator of the parental control variable in predicting externalizing did not provide a direct replication of the Kochanska effect. This could be due to many factors, especially because of differences in measurement and design.

There are also possibilities of additional interacting factors. Some likely candidates are mentioned later. In addition, although the findings do conceptually converge with emerging theoretical–empirical models, they were not hypothesized on the basis of a clear a priori theory. The findings suggest that our observational measures of restrictive control reflect not only harsh, punitive parenting but also appropriate parenting, in some contexts. Before seeing these results, it would have been possible, especially for one who did not know the preliminary BLS findings, to predict that temperament's most adverse effects would be in the presence of restrictive parenting and conversely that the most adverse effects of restrictive parenting would be in the context of a resistant temperament, exactly opposite to the replicated pattern of findings. It would also have been possible, especially for one who knew the preliminary BLS findings, to predict what was, in fact, found. Further replications and extensions will be important.

Future Research

Assuming future replications of the effect, further specification of the developmental processes we have outlined should be sought. We will be particularly interested in how additional temperament elements may improve the model. Some interesting Temperament × Temperament interaction effects have been emerging (e.g., Eisenberg et al., 1996; Rothbart & Bates, 1998; Tremblay, 1992). One key question would be, What are the particular core temperament dimensions involved in the perceived resistance to control of a given child? One child may be high in resistance to control because of a very strong response to the potential rewards in stimuli, whereas another child is resistant because of low levels of executive control of attention and deficient verbal control of action. This distinction could change the socialization impact of both temperamental resistance and maternal restrictive control. Other theoretically independent temperament variables could also moderate effects of resistant temperament. For example, a resistant but fearful child's responses to parental or teacher control could produce developmentally different outcomes compared with the responses of a resistant, nonfearful child (Bates, Pettit, & Dodge, 1995). A second kind of additional moderator could be family structure or socializing efforts by other family members and friends. Another might be child physical attractiveness or intellectual development. A further moderator might be distinctions in the particular kinds of externalizing behavior problems. For example, perhaps resistant children in restrictive families show more covert symptoms, like stealing, and in nonrestrictive families, they might show more overt symptoms, like fighting. Ultimately, it will be useful to search for higher order interaction effects (i.e., controlling for levels of more than one moderator variable). However, as may be well illustrated in the present study, it is difficult to detect modest-sized but statistically robust effects, even with only one moderator variable in medium-sized longitudinal samples. Higher order tests will require larger samples either in single studies or pooled across studies.

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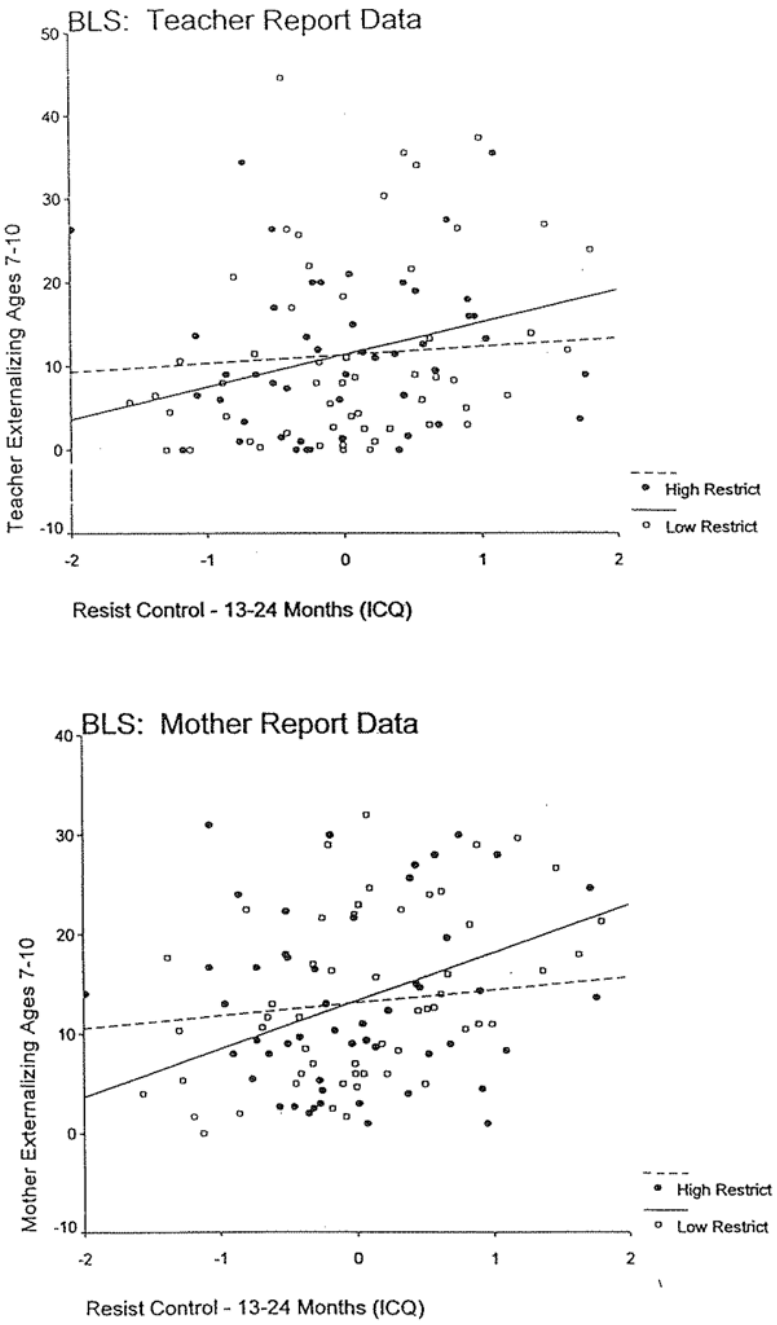

Figure 1.

Scatter plots for the Bloomington Longitudinal Study (BLS) sample of temperamental resistance to control predicting externalizing outcomes as reported by teachers (top panel) and mothers (bottom panel). High Restrict = high restrictive control (for teachers, $r = .09$, *ns;* for mothers, $r = .11$. *ns*); Low Restrict = low restrictive control (for teachers, r = .27, $p = .05$; for mothers, $r = .44$, $p = .001$); Resist Control = child resistance to control; ICQ = Infant Characteristics Questionnaire.

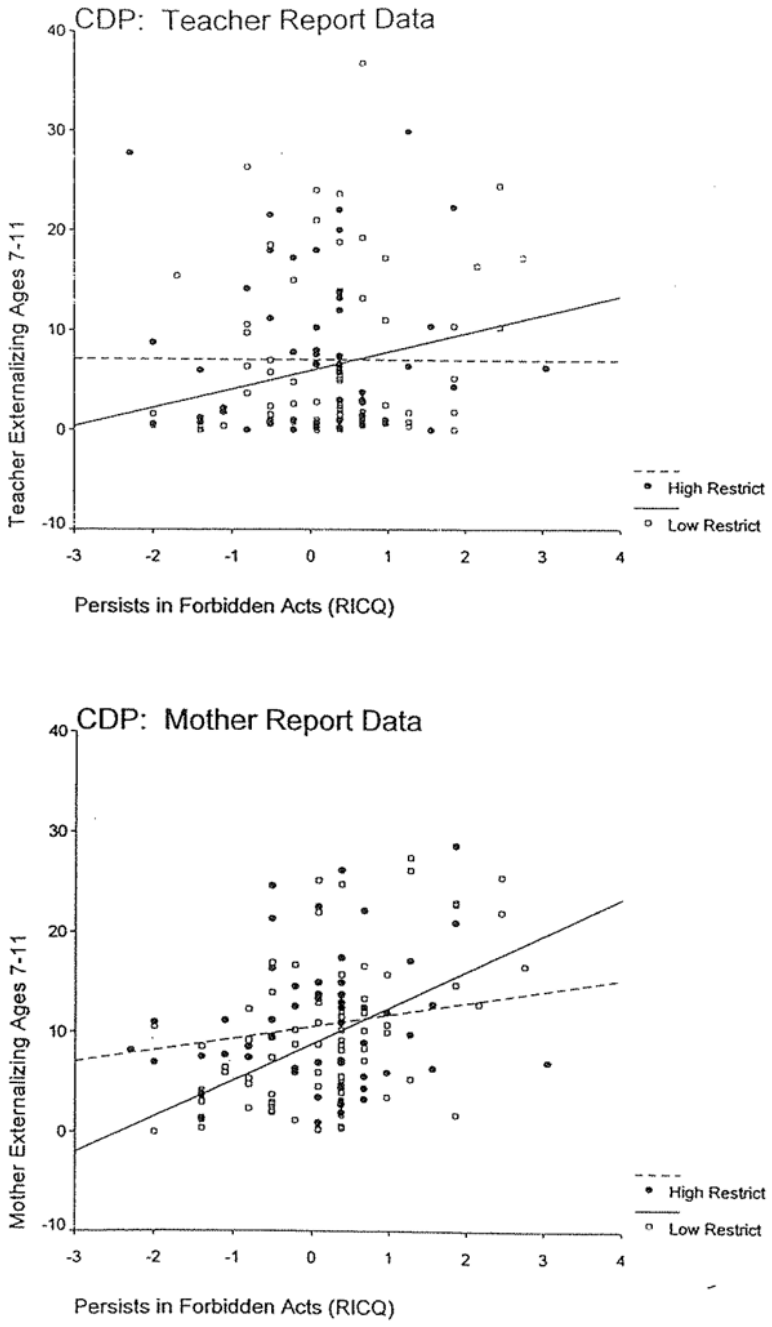

Figure 2.

Scatter plots for the Child Development Project (CDP) sample of temperamental resistance to control predicting externalizing outcomes as reported by teachers (top panel) and mothers (bottom panel). High Restrict = high restrictive control (for teachers, $r = .01$, *ns;* for mothers, $r = .21$, $p = .13$); Low Restrict = low restrictive control (for teachers, $r = .22$, $p = .04$; for mothers, $r = .53$, $p = .000$); RICQ = Retrospective Infant Characteristics Questionnaire.

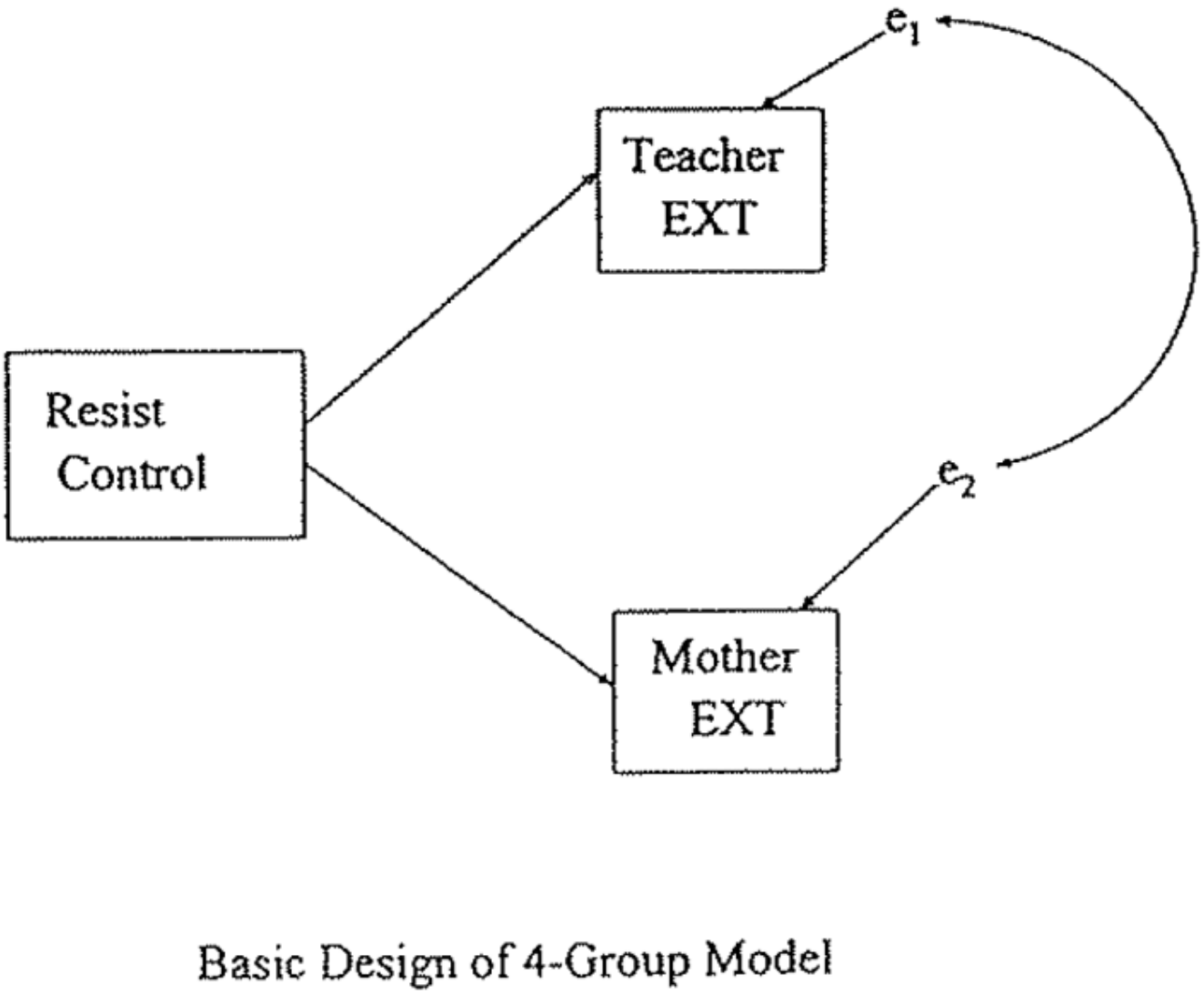

Figure 3.
Basic design of multiple-group, structural model (repeated four times, for teacher- and mother-report outcomes and for Bloomington Longitudinal Study and Child Development Project data sets). EXT = eternalizing behavior score.

Table 1

Overview of Predictor Measures

Construct	Data set and items
Temperamental resistance to control	
	BLS and CDP
	Persist in playing with objects when told to leave them alone;
	Continue to go someplace even when told “stop,” “come here,” “no-no”;
	Upset when removed from something she or he is interested in but should not be getting into;
	How much cuddle and snuggle when held (scaled from *a lot* to *very little, seldom snuggles*).
Observed maternal restrictive control	
	BLS
	Molecular code factor composites
	Management (13 months; prohibit/scold/warn, take away object, restrain baby);
	Negative Control (24 months; prohibit, scold, repeat prohibition, physical punishment, remove or restrain child, remove object).
	Observer ratings composites
	HOME Avoidance of Restriction and Punishment (13 months; lack of hostility. punishment, physical restraint directed toward child by mother);
	Post-Observation Questionnaire Mother Non-Punitive (24 months; infrequent scold or punish, mild punishment).
	CDP
	Restrictive control events (5 years; child acts immaturely or irresponsibly, which is followed by mother negative control (e.g., prohibit, demand, yell, warn, criticize/scold/shame).

Note. BLS = Bloomington Longitudinal Study; CDP = Child Development Project; HOME = Home Observation for Measurement of the Environment.

Table 2

Descriptive Statistics

Data set and variable	*M*	*SD*
Bloomington Longitudinal Study		
Maternal restrictive control (*n* = 121)	0.00	0.73
Resistance to control (*n* = 129)	0.01	0.79
Teacher-rated externalizing (*n* = 136)	11.42	11.35
Mother-rated externalizing (*n* = 139)	13.21	8.46
Child Development Project		
Mother restrictive control (*n* = 156)	3.41	4.53
Resistance to control (*n* = 153)	3.73	1.12
Teacher externalizing (*n* = 146)	6.51	7.77
Mother externalizing (*n* = 144)	9.82	6.84

Note. Variables 1 and 2 of the Bloomington Longitudinal Study (BLS) are sums of *Z* scores from ages 13 and 24 months, whereas the corresponding scores of the Child Development Project (CDP) are raw scores from age 5. To facilitate comparison with the BLS, CDP temperament scores are expressed in Figure 2 as standard scores. Externalizing scores in the BLS were computed with the Achenbach and Edelbrock (1983,1986) algorithms, whereas in the CDP, they were computed with the Achenbach (1991a. 1991b) algorithms.

Table 3

Direct Predictions of Middle-Childhood Externalizing Problems

Mode of prediction and data set	Teacher EXT	Mother EXT
Temperamental resistance		
Bloomington Longitudinal Study	.22**	.30***
Child Development Project	.14***	.32***
Mother control		
Bloomington Longitudinal Study	.04 (*ns*)	−.01 (*ns*)
Child Development Project	.28***	.14*

Note. For the Bloomington Longitudinal Study, *ns* = 104–116; for the Child Development Project temperament prediction, *ns* = 509–525; for the home observation prediction by mother control, *ns* = 144–146, EXT = externalizing.

* $p < .092$.

** $p < .021$.

*** $p < .001$.

Table 4

Structural Modeling Results

Group	Path coefficient		e_T	e_M	$r_{eT–eM}$
	Resist → T Ext	Resist → M Ext			
BLS low control	.27	.45	.96	.89	.05
BLS high control	.05	.10	.99	.99	.05
CDP low control	.32	.53	.95	.85	.40
CDP high control	−.03	.22	1.00	.98	.36

Note. Resist = temperamental resistance to control; T Ext = teacher-reported externalizing; M Ext = mother-reported externalizing; e_T= error associated with T Ext; e_M = error associated with M Ext; $r_{eT–eM}$ = correlation between teacher and mother reports; BLS = Bloomington Longitudinal Study; CDP = Child Development Project. $\chi^2(2, N = 239) = 0.705$. $p = .703$; Bentler–Bonett normed fit index = .990; comparative fit index = 1.000.