



Published in final edited form as:

J Marriage Fam. 2015 April ; 77(2): 388–406. doi:10.1111/jomf.12163.

Parenting Stress, Parental Reactions, and Externalizing Behavior From Ages 4 to 10

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Abstract

The association between parenting stress and child externalizing behavior, and the mediating role of parenting, has yielded inconsistent findings; however, the literature has typically been cross-sectional and unidirectional. In the current study the authors examined the longitudinal transactions among parenting stress, perceived negative parental reactions, and child externalizing at 4, 5, 7, and 10 years old. Models examining parent effects (parenting stress to child behavior), child effects (externalizing to parental reactions and stress), indirect effects of parental reactions, and the transactional associations among all variables, were compared. The transactional model best fit the data, and longitudinal reciprocal effects emerged between parenting stress and externalizing behavior. The mediating role of parental reactions was not supported; however, indirect effects suggest that parenting stress both is affected by and affects parent and child behavior. The complex associations among parent and child variables indicate the importance of interventions to improve the parent–child relationship and reducing parenting stress.

Keywords

children and child development; parent–child relationships; parenting; stress

Parenting has been described as one of the most rewarding tasks of adulthood. Nevertheless, parenting is also challenging, and some parents feel that the demands of raising their children exceed available resources. The aversive psychological reaction resulting from a mismatch between perceived parenting demands and available parenting resources has been termed *parenting stress* (Deater-Deckard, 1998). Parenting stress has been linked with a number of maladaptive child outcomes, either directly (Crnic, Gaze, & Hoffman, 2005; Crnic & Greenberg, 1990), or indirectly via negative parenting (Abidin, 1986; Deater-Deckard & Scarr, 1996).

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Although much has been learned about parenting stress and child behavior, several key issues are still unresolved. Theories of parenting stress and also key developmental and family theories—including transactional theoretical frameworks (Eyberg, Schuhmann, & Rey, 1998; Sameroff, 1975) and dynamic systems approaches (Granic & Patterson, 2006)—emphasize that parenting stress and child outcomes likely have reciprocal links over time. Yet the most robust evidence on associations between parenting stress and child behavior comes from work predicting child externalizing behavior (Baker et al., 2003; Crnic et al., 2005; Neece, Green, & Baker, 2012); the literature examining the opposite direction of effects from child behavior to parenting stress (e.g., Scarr, 1992) is comparatively small. Furthermore, the role of key potential mediators in associations between parenting stress and child outcomes—most importantly, parenting—are not well understood. Although comprehensive longitudinal models of parental stressors (e.g., parental life events), parenting, and child behavior have recently been conducted (e.g., Yates, Obradovic, & Egeland, 2010), no such transactional examinations have focused on parenting stress specifically. Taken together, although some pieces of parenting stress–child outcomes models are already understood, the complex longitudinal interrelations among these constructs, and the role of parenting in such a model, have not been simultaneously studied to date.

The goal of the current study was to examine a transactional model (Eyberg et al., 1998; Sameroff, 1975) of parenting stress, negative perceptions of parental reactions, and child externalizing behavior across the late preschool years and middle childhood. We begin by reviewing the literature on the direct effects between parenting stress and child externalizing symptoms and then discuss the role of negative parenting reactions to child negative emotions as a possible mediator.

Parenting Stress and Child Externalizing Behaviors: Direct Effects

Studies have shown support for the direct effects model between parenting stress and externalizing behaviors during childhood, suggesting that elevated levels of parenting stress may directly contribute to child behavior problems. For example, data collected from Head Start revealed that high levels of parenting stress were directly related to high, concurrent levels of externalizing behavior problems in 2- to 6-year-olds (Anthony et al., 2005). Similarly, daily parenting hassles during the preschool period predicted both concurrent child behavior problems and behavior problems 2 years later (Crnic et al., 2005; Crnic & Greenberg, 1990). This literature suggests that stress has a direct effect on child outcomes and that greater levels of stress result in greater levels of behavior problems; however, there are limitations to these conclusions. Most notably, an assessment of related but separate constructs (e.g., parenting daily hassles) and of very specific samples (e.g., children participating in Head Start) may not generalize to broader assessments of the association between parenting stress and child outcomes.

Although often not a focus within the parenting stress literature, theoretical frameworks focused on child effects suggest that child characteristics, including behavior problems, also contribute to parental stress (Deater-Deckard, 1998; Mash & Johnston, 1990). For example, when children are aggressive and impulsive, the stressors associated with parenting are

compounded (Crnic & Low, 2002). Thus, a child effects model posits that the child's psychological functioning directly influences parenting stress, as well as parenting behaviors (Deater-Deckard, 1998; Scarr, 1992). In a cross-sectional study of single African American mothers, child behavior problems accounted for a large portion of the variance in concurrent parenting stress and were associated with lower levels of supportive, involved parenting (Jackson, 2000). In our own work, declines in parenting stress from ages 2 to 5 were predicted by the normative decline in externalizing behaviors across these years (Williford, Calkins, & Keane, 2007). In a separate study, which was cross-sectional in nature, we did not find support for the link between difficult behavior and parenting (Calkins, 2002). Although aversive and aggressive child behaviors at age 2 years contributed to greater child-related stress for the parent, these behaviors did not have an effect on either positive or negative parent behaviors (Calkins, 2002). Therefore, it is unclear whether the direct effect of parenting stress on child behavior is affected by parenting behaviors or if these effects only emerge in specific populations.

Taken together, the direct-effects literature suggests that parenting stress is associated with child behavior problems and, in turn, that child externalizing behavior is associated with parenting stress and may have an influence on actual parenting behaviors. Despite some evidence for both directions of effect, there is a paucity of literature that examines the reciprocal effects of parenting stress and child externalizing behavior on one another across childhood. Furthermore, the literature is inconclusive regarding whether the association between parenting stress and child behavior problems is direct or mediated by other factors.

Indirect Effects

Abidin's (1986, 1992) *mediation model* posits that associations between parenting stress and child externalizing behavior may be indirect and that parenting dysfunction is likely a key variable accounting for this association. According to this model, high levels of parenting stress compromise parenting behaviors (Belsky, 1984) and, in turn, such compromised parenting behaviors predict child externalizing behaviors. Empirical research supports the separate paths posited by this model. There is evidence that parenting stress predicts parenting behaviors, including physical punishment, negativity toward the child, and negative parenting attitudes (Deater-Deckard, 1998; Deater-Deckard & Scarr, 1996). In turn, such compromised, negative parenting behavior affects children's functioning, resulting in increased child difficulties, including externalizing behavior problems and adolescent deviance (e.g., Bradley & Corwyn, 2007; Conger, Patterson, & Ge, 1995; Qi & Kaiser, 2003).

To date, relatively few studies have joined these separate literatures and explicitly tested mediational pathways. Only one cross-sectional study to date has found this indirect effect: Authoritarian parenting style mediated the association between parenting stress and high emotionality and poor manageability in 12- to 60-month-olds (Deater-Deckard & Scarr, 1996). A number of cross-sectional and longitudinal studies have failed to identify mediational pathways from parenting stress to child behavior via parenting (Anthony et al., 2005; Crnic et al., 2005; Deater-Deckard, 2005). For example, Anthony and colleagues (2005) identified direct associations between parenting stress and child externalizing

behaviors; however, these associations were not mediated by strict discipline or low nurturance.

Inconsistent findings with regard to the mediating role of parenting behaviors in the parenting stress–child behavior association may be due to several reasons. First, it is possible that parenting stress operates through parental perceptions rather than through actual parenting behavior. In a study that evaluated the association between maternal depression and parenting stress with child externalizing and internalizing problems, the association between maternal factors and child outcomes was moderated by mothers' perceptions of their children (Renk, Roddenberry, Oliveros, & Sieger, 2007). Second, these inconsistent findings may be attributed to the consistent focus on unidirectional effects. Indirect effect models have not evaluated the effect of child behavior on parenting and parenting stress and have studied only child behavior as an outcome of parental influences. Third, it is possible that, at least during some points in development, the effects of parenting stress are indeed not mediated by parenting. Several of the reviewed studies were cross-sectional (e.g., Anthony et al., 2005; Deater-Deckard & Scarr, 1996) and therefore failed to account for changes in the strength and nature of associations between parent and child factors across childhood. It was the aim of this study to examine parenting stress, parental perception of reactions to child negative emotions, and child externalizing behavior in a manner that is sensitive to the dynamic nature of these factors longitudinally.

Transactional Frameworks

A *transactional framework* suggests that dynamic and reciprocal associations occur among parenting stress, parenting behaviors, and child externalizing behaviors across time. Children and their environments continuously interact; thus, associations among parenting stress, parenting behavior, and child externalizing symptoms may best be characterized as transactions over time (Cicchetti & Schneider-Rosen, 1984; Morgan, Robinson, & Aldridge, 2002; Sameroff & MacKenzie, 2003). Only recently have studies begun to examine transactional relations among stress, parenting, and behavior; however, this literature has not examined parenting stress specifically. For example, Yates et al. (2010) used a transactional framework to assess associations among life stress (including stressful life events and social support), parenting behaviors, and child regulation and externalizing behaviors from ages 2 to 6. Although maternal report of life stress predicted dysregulation and externalizing behavior problems during the preschool period, parenting quality was not related to stress or to child outcomes. Furthermore, Zadeh, Jenkins, and Pepler (2010) identified reciprocal associations among negative parenting behaviors and child externalizing from ages 10 to 15. Taken together, although transactional models are beginning to receive support, the transactional associations among parenting stress, parenting behaviors, and child externalizing behaviors across childhood have not been examined.

Examination of transactional models longitudinally may provide additional clarification for the inconsistent findings regarding the role of parenting in the association between parenting stress and child behavior problems. On the basis of Granic and Patterson's (2006) dynamic systems approach toward the development of antisocial behavior, coercive parent–child interactions result in childhood aggression and serve to stabilize and increase child

aggression over time. The longer the parent endures child behavioral difficulties, the less tolerant the parent becomes, resulting in greater coercive interactions. Therefore, it is to be expected that the associations among parenting stress, parent behavior, and child externalizing behaviors would become stronger over time and that the direct effect of child behavior problems on maternal behavior and stress would increase.

Emerging research has found support for the increased effect of child behavior problems on parenting. Research from the National Institute of Child Health and Human Development's Study of Early Child Care and Youth Development found that, although maternal sensitivity is related to child externalizing problems across development, and harshness is associated with child behavior problems throughout middle childhood, externalizing behavior has a continued, strengthened influence on both aspects of maternal behavior from middle childhood onward (Bradley & Corwyn, 2013). Furthermore, a study of the transactional relationship between parental behavior and child disruptive behavior problems found that, around first and second grade, the influence of maternal behavior on child disruptive behavior decreased, but the reverse relationship became stronger: Child disruptive behavior in later childhood resulted in more negative parent behavior (Besnard et al., 2013). The *dynamic systems perspective* emphasizes the importance of examining complex interactive associations rather than linear causality (Granic & Patterson, 2006). Therefore, past examinations of parenting stress that are unidirectional or cross-sectional only describe a brief snapshot of these dynamic associations. From a transactional perspective, early influences are expected to result in compounding difficulties across childhood. Early parenting stress may result in maladaptive child outcomes, but child behavior problems are expected to continually tax mothers over time, resulting in continued parenting stress and compromised parenting.

The Present Study

The aim of the current study was to test whether a transactional model better describes associations among parenting stress, negative parental reactions to child negative emotions, and child externalizing from ages 4 to 10 compared to models that limit their focus to direct parent effects, direct child effects, or indirect effects only. Mothers' perceived reactions to children's negative emotions were an area of focus for the current study. Parents' responses to children's negative emotions are a salient aspect of parenting (Nelson, O'Brien, Blankson, Calkins, & Keane, 2009), given that negative emotions underlie externalizing behavior problems. Mothers' perceived punitive and distress reactions to children's negative emotions in children age 6–8 is associated with increased behavior problems and externalizing emotional reactions age 10–12 (Eisenberg et al., 1999). Reports of how mothers anticipate reacting to children's negative emotions provide information how mothers would respond to the negative displays typically shown by children with behavioral difficulties and offer an important window into maternal responses to challenging parenting situations.

Five specific models we tested included the following (see Figure 1): (a) a stability model that allowed for stability of parenting stress, perceived negative parental reactions to child negative emotions, and child externalizing behavior over time; (b) a parenting stress direct effects model that allowed direct effects from parenting stress to child externalizing

behavior; (c) a child direct effects model that allowed direct effects from child externalizing behaviors to parenting stress as well as on negative parental reactions; (d) an indirect effects model that allowed for indirect effect of negative parental reactions on the relation between parenting stress and child externalizing behaviors; and (e) a transactional model that simultaneously allowed for direct and indirect effects among the study variables after controlling for variable stability. On the basis of the existing literature, we hypothesized that the transactional model will best describe the data. Furthermore, we conducted post hoc analyses on any longitudinal indirect effects observed in the transactional model among parenting stress, negative parental reactions, and child externalizing behaviors. We compared these models to one another to determine which model best describes the association among parenting stress, negative parental reactions, and child behavior problems across childhood.

Method

Recruitment and Attrition

In the current study we used data from three cohorts of children who are part of an ongoing longitudinal study of social and emotional development. The goal for recruitment was to obtain a sample of children who were at risk for developing future externalizing behavior problems and who were representative of the surrounding community in terms of race and socioeconomic status (SES). All cohorts were recruited through child day care centers; the county health department; and the local Women, Infants, and Children program in North Carolina. Potential participants for Cohorts 1 and 2 were recruited at 2 years of age (Cohort 1: 1994–1996 and Cohort 2: 2000–2001) and screened using the Child Behavior Checklist (CBCL 2–3; Achenbach, 1992), completed by the mother, in order to oversample for externalizing behavior problems. Children were identified as being at risk for future externalizing behaviors if they received an externalizing *T*-score of 60 or above. Efforts were made to obtain approximately equal numbers of males and females. This recruitment effort resulted in a total of 307 selected children. Cohort 3 was initially recruited when infants were 6 months of age (in 1998) for their level of frustration, based on laboratory observation and parent report, and were followed through the toddler period (see Calkins, Dedmon, Gill, Lomax, & Johnson, 2002, for more information). Children whose mothers completed the CBCL 2–3 at 2 years of age were included in the current study ($N = 140$). Of the entire sample ($N = 447$), 37% of the children were identified as being at risk for future externalizing problems, and 15% ($N = 447$) were identified as being at risk for future internalizing problems. There were no significant demographic differences between cohorts with regard to gender, $\chi^2(2, N = 447) = 0.63, p = .73$, race, $\chi^2(2, N = 447) = 1.13, p = .57$, or two-year SES, $F(2, 444) = 0.53, p = .59$.

Of the 447 originally selected participants, six were dropped because they did not participate in any 2-year data collection. An additional 12 families participated at recruitment did not participate at 2 years, but did participate at later years. Data collection for all three cohorts occurred during the following years: Cohort 1: 1996–1997, Cohort 2: 2000–2001, Cohort 3: 1999–2001. At 4 years of age, 399 families participated (data collection—Cohort 1: 1998–1999, Cohort 2: 2000–2003, Cohort 3: 2001–2003). Families lost to attrition included those

who could not be located, moved out of the area, declined participation, or did not respond to phone and letter requests to participate. There were no significant differences between families who did and did not participate at age 4 in terms of gender, $\chi^2(1, N = 447) = 3.27, p = .07$; race, $\chi^2(1, N = 447) = 0.65, p = .42$; 2-year SES, $t(432) = 0.92, p = .36$, or 2-year externalizing *T*-score, $t(445) = 0.45, p = .65$. At age 5, 365 families participated, including four that did not participate in the 4-year assessment (Cohort 1: 2000–2001, Cohort 2: 2003–2004, Cohort 3: 2003–2004). Again, there were no significant differences between families who did and did not participate in terms of gender, $\chi^2(1, N = 447) = 0.76, p = .38$; race, $\chi^2(1, N = 447) = 0.14, p = .71$, 2-year SES, $t(432) = 1.93, p = .06$; and 2-year externalizing *T*-score, $t(445) = 1.39, p = .17$. At 7 years of age, 350 families participated, including 19 who did not participate in the 5-year assessment (Cohort 1: 2001–2002, Cohort 2: 2005–2006, Cohort 3: 2005–2006). Again, there were no significant differences between families who did and did not participate in terms of gender, $\chi^2(1, N = 447) = 2.12, p = .15$; race, $\chi^2(3, N = 447) = 0.19, p = .67$; and 2-year externalizing *T*-score, $t(445) = 1.30, p = .19$. Families with lower 2-year SES, $t(432) = 2.61, p < .01$, were less likely to participate in the 7-year assessment. At age 10, 357 families participated, including 31 families who did not participate in the 7-year assessment (Cohort 1: 2005–2006, Cohort 2: 2008–2009, Cohort 3: 2007–2009). No significant differences were noted between families who did and did not participate in the 10-year assessment in terms of child gender, $\chi^2(1, N = 447) = 3.31, p = .07$; race, $\chi^2(3, N = 447) = 3.12, p = .08$; 2-year SES, $t(432) = 0.02, p = .98$; or 2-year externalizing *T*-score, $t(445) = 0.11, p = .91$.

Participants

Based on available data over time, we used data from all three cohorts, and 404 children were used in the current sample (188 male, 216 female). Hence, we collected some data on 404 participants from the original sample of 441 who came in at age 2 over the 4-, 5-, 7-, and 10-year visits. Specifically, at the 4-, 5-, 7-, and 10-year visits we collected data on 383, 356, 342, and 333 participants, respectively. Given that the measures of parental reactions (the Coping with Children's Negative Emotions Scale [CCNES]; Fabes, Eisenberg, & Bernzweig, 1990; Fabes, Poulin, Eisenberg, & Madden-Derdich, 2002) were not administered at the 2-year laboratory visit, data from that time point were not considered for analyses. At the 4-, 5-, 7-, and 10-year laboratory visits children's average ages were as follows: 54 months ($SD = 3.74$ months), 68 months ($SD = 3.25$), 92 months ($SD = 4.31$), and 128 months ($SD = 3.58$), respectively. At the 4-year laboratory visit, 67% were European American, 27% were African American, 4% were biracial, and 2% were Hispanic. At the 4-year visit, families were economically diverse; Hollingshead (1975) SES scores for our sample ranged from 14 to 66 ($M = 42.43, SD = 10.64$), representative of families from each level of social strata. Scores ranging from 40 to 54 are representative of the middle class. Average SES scores for the 5-, 7-, and 10-year visits were as follows: 43.02 ($SD = 10.45$), 44.78 ($SD = 11.77$), and 44.28 ($SD = 12.05$), respectively. Finally, a normative portion of our sample at each assessment was at risk for externalizing behavior problems based on a *T*-score > 60 on the BASC Behavior Assessment System for Children (BASC; Reynolds & Kamphaus, 1992) and the BASC-2 (Reynolds & Kamphaus, 2004). At the 4-year assessment, 14.3% of the sample was at risk, 8.6% was at risk at the 5-year assessment, 6.8% was at risk at the 7-year assessment, and 8.3% was at risk at the 10-year assessment.

As such, the current sample should be considered normative despite oversampling at recruitment.

Procedure

Children and their mothers came to our university-based laboratory in Greensboro, NC, to participate in the study. Consent from mothers and, beginning at age 4, verbal assents from children, were obtained before data collection began. Mothers completed questionnaires in a private setting. Mother–child dyads also participated in a number of tasks, to measure emotional, behavioral, and psychophysiological regulation that are not discussed in the present article. Although laboratory procedures were not identical across time points, analogous age-appropriate tasks for children and their mothers were conducted at each point as a way to maintain measurement equivalence. Mothers received an honorarium of \$50 for every assessment in which they participated across the years of the study; similarly, children received small age-appropriate toys for their participation.

Measures

Parenting stress—Maternal parenting stress was assessed using maternal reports with the Parenting Stress Inventory, Short Form (PSI; Abidin, 1995). The PSI was created for use with parents of children age 1 month to 12 years to assess stress in the parenting system. The PSI Short Form contains 36 items rated on a scale of 1 (*strongly agree*) to 5 (*strongly disagree*) and four subscales representing (a) Parental Distress, (b) Parent–Child Dysfunctional Interaction, (c) Parent Defensive Responding, and (d) Having a Difficult Child. Sample questions consisted of the following: “I find myself giving up more of my life to meet my children’s needs than I ever expected,” “I feel trapped by my responsibilities as a parent,” “My child makes more demands on me than most children.” The overall Parenting Stress Score was calculated by summing all items (possible range: 36–180). This sum score is an indicator of the overall level of parenting stress that an individual is experiencing and, in our sample, demonstrated strong internal reliability (Cronbach’s alphas ranged from .92 to .93 across all assessments).

Perceived negative parental reactions—Mothers’ perceived reactions to hypothetical scenarios in which their children express negative emotions were assessed using a modified version of the CCNES. The CCNES presents the parent with a situation (12 situations total) that typically produces negative affect in children (e.g., “Child becomes angry because s/he is sick or hurt and can’t go to a friend’s birthday party”). Parents then rate, on scale of 1 (*very unlikely*) to 7 (*very likely*), the likelihood of their responding to their child in six specific ways (responding with punishment, distress, minimization, focusing on emotions, expressive encouragement, or problem solving). The CCNES yields six subscales of parent responding, three of which are considered positive/adaptive and three of which are considered negative/maladaptive. Alphas for the subscales ranged from .69 (Punitive Responses) to .85 (Expressive Encouragement). In the current study we adapted the version used to include more anger-related items (Newell, 2001), resulting in a more tailored questionnaire for our sample (changes were made to two questions). We used the summed, mean scores of the three negative subscales (Distress Reactions, Punitive Reactions, and Minimization of Reactions), each of which was created by averaging parents’ responses to

all 12 situations to index parents' perceived negative reactions. For example, *punitive reactions* were characterized by parental ratings of how likely they would tell their child to shape up or punish their child for behavior. *Distressed reactions* were characterized by how likely parents would be angry at their child or tell their child to not embarrass them by crying. *Minimizing reactions* described how likely parents would tell their child that the child is overreacting, or tell their child that he or she is being a baby, or tell their child not to make a big deal out of it. Cronbach's alphas for the perceived negative parental reactions composite ranged from .85 to .88 from ages 4 to 10. We should note that Cohort 3 did not have data on this measure at age 4, because the different cohort protocols were still being merged into one overall study. We opted to use missing-data techniques described below to address this data issue and capitalize on the statistical power available from using all three cohorts in testing our complex model.

Behavior problems—Maternal report on the BASC and BASC–2 (Reynolds & Kamphaus, 1992, 2004) were used to assess children's externalizing behavior when children were 4, 5, 7, and 10 years. The BASC Parent Rating Scale, Preschool version, was administered at ages 4 and 5. The BASC Parent Report, Child version, was administered to participants at age 7, and the BASC–2 Parent Report, Child Version was used at age 10. Mothers were asked to respond with how often certain behaviors occurred with “never,” “sometimes,” “often,” or “almost always.” The T- scores for the Externalizing composite, based on general norms, were used in analyses to ensure appropriate comparison of scores over time. For the preschool version, the overall externalizing composite consists of the Hyperactivity and Aggression subscales. Beginning with the child version, the externalizing composite consists of hyperactivity, aggression, and conduct problems. The BASC and the BASC–2 have moderate to good reliability and validity (Gladman & Lancaster, 2003; Reynolds & Kamphaus, 1992, 2004), and Cronbach's alphas for externalizing behaviors ranged from .78 to .92 across years. No data were collected for Cohort 3 at 4 years. We opted to use missing-data techniques, described below, to address this data issue and capitalize on the statistical power available from using all three cohorts in testing our complex model.

Covariates

Child sex—Child sex was coded as follows: male (1) and female (2). It was initially included in models given that the literature indicates that males typically exhibit higher levels of externalizing problems than females (Deater-Deckard, Dodge, Bates, & Pettit, 1998). No associations were found between child sex and child externalizing behaviors and therefore child sex was removed from the models.

Maternal depression—In our own research, we have found that maternal depressive symptomology has been associated with children's compromised emotion regulation and behavior problems (Blandon, Calkins, Keane, & O'Brien, 2008). Therefore, initial models were conducted controlling for maternal depression for all time points, but the variable of maternal depression was later taken out because of a lack of associations with child externalizing behaviors. We used the Symptom Checklist–90–Revised (Derogatis, 1994) to assess for maternal depression. The questionnaire contains 90 items reflective of commonly

encountered adult psychopathology symptoms, such as “Repeated unpleasant thoughts that won’t leave your mind,” “Crying easily,” or “Worrying too much about things.” Mothers rated each item in terms of how much distress they experienced over the past week, using a scale that ranged from 0 (*not at all*) to 4 (*extremely*). The 90 items were then combined to yield three global indices of psychological distress and nine subscales of specific psychopathology. Here, the subscale for Depression T-scores was used as a measure of maternal depressive symptoms. Scores were converted to T-scores with a mean of 50 and standard deviation of 10, and the non-client norm group was used, and Cronbach’s alphas ranged from .89 to .91.

SES—We used the Hollingshead (1975) Index to assess the SES of the participant families. Given that lower SES has been related to children’s externalizing and aggressive behaviors (Deater-Deckard et al., 1998), the current study controlled for SES at all time points in initial models; however, SES was removed because of a lack of associations with child externalizing behaviors. Hollingshead scores were derived by a weighted average of parental education and employment (Hollingshead, 1975) and can range from 8 to 66. Scores ranging from 40 to 54 represent middle-class professional and technical occupations. The range for the current study was 14 to 66, indicating socioeconomic diversity within the sample.

Results

Analytic Approach

We conducted preliminary analyses to examine descriptive information and correlations for the study variables (see Table 1). To evaluate the relations among child externalizing behaviors, parenting stress, and negative parental reactions, a series of nested path analyses were conducted in Mplus Version 7.0 (Muthén & Muthén, 1998–2013). Specifically, longitudinal associations were assessed by fitting a series of cross-lagged models of increasing complexity to evaluate the transactional relations among the variables. Such models allow for competing theories to be assessed within the same sequence of analyses using model comparison. Furthermore, these models allow for the complexity of developmental patterns to be examined, rather than assuming a uni- or bidirectional association.

As suggested by de Jonge and colleagues (2001), we compared a baseline stability model to increasingly more complex models. This model took into account within-time correlations among child externalizing behavior, negative parental reactions, and parenting stress. It also assessed the stability of these constructs over time. After establishing patterns of continuity among the constructs, subsequent models were conducted to evaluate the direct predictions from parenting stress to child externalizing behavior, the direct predictions from child externalizing behavior to parenting stress and negative parental reactions, the indirect effect of negative parental reactions on child externalizing behavior, and any transactional effects over time among the constructs. A stability model, parenting stress direct effects model, child direct effects model, indirect effects model, and transactional model (see Figure 1) were estimated. Note that the transactional model was not a fully saturated model. Cross-

lagged paths extended only one time point (e.g., from the 4-year assessment to the 5-year assessment, but not from the 4-year assessment to the 7-year assessment).

The models tested were nested; thus, we used a chi-square difference test to select models with the best fit (de Jonge et al., 2001; Kline, 2005), with the exception of the two direct effects models, which were not nested and therefore could not be directly compared. In initial models, child sex, SES, and maternal depression were included as control variables. These variables did not significantly predict externalizing behaviors, and their inclusion also did not change any of the significant paths in the model. Therefore, because of the lack of these associations, and to increase parsimony of the models, these variables were dropped from the models reported here.

Missing Data

Data were missing because of participant attrition as well as the study design. In particular, perceived negative parental reactions and child externalizing behavior were not available for Cohort 3 until the 5-year time point because of study design. Accordingly, model results should be interpreted with caution given that a lack of 4-year information may bias parameter results. We used full-information maximum-likelihood to address any bias produced by the current study's non-ignorable missing data as well as other types of missingness in our data. Data were imputed at the item level and using Mplus. FIML was used at the measure and wave level only. FIML has been shown to produce unbiased parameter estimates and standard errors when data are missing at random, missing completely at random, when data are nonignorable, and when the amount of missingness is large (e.g., > 25%; Collins, Schafer, & Kam, 2001; Graham, 2003; Newsom, 2012). FIML estimates a likelihood function for each individual based on all available variables so that all data are used. Model fit is then derived by summing fit functions from every case, allowing the overall model to use fit information from all cases while also using all available variable information. Moreover, in cases when the data may be nonignorable or the amount of missing data are large, including auxiliary variables in the model that are thought to be associated with the missingness variable will help reduce parameter biases in model fit (Newsom, 2012). The repeated measures design of the current study can be thought of providing auxiliary variables to the model that are significantly related to the missing variables. Note that in addition to using FIML to address missing data, all analyses were rerun using Cohorts 1 and 2 only. Results from these models were highly similar to the results using all three cohorts.

Structural Model Comparisons

Stability model—The baseline model represented a stability model that estimated constancy among negative parental reactions, parenting stress, and child externalizing behaviors over time. Subsequent complex models were then examined and compared to the stability model to determine the best fitting model. In general, stability coefficients were high for the parent report model of children's externalizing behavior, with $\beta = .67, .68, \text{ and } .69$ for 4-year \rightarrow 5-year, 5-year \rightarrow 7-year, and 7-year \rightarrow 10-year stability coefficients, respectively ($p < .001$). Standardized path coefficients for stability in parenting stress across waves were also fairly high ($\beta = .60, .70, \text{ and } .61$ at $p < .001$, respectively). Stability

coefficients for negative parental reactions to child negative emotions were also high but decreased slightly across waves ($\beta = .74, .65, \text{ and } .56$ at $p < .001$, respectively). Despite these relatively high stability coefficients, a moderate amount of variance in parenting stress, negative parental reactions, and child externalizing behaviors remained to be explained. Given the high stabilities, we expected any direct, indirect, and transactional effects observed above and beyond stability effects to be small to modest in magnitude.

Model comparisons—A summary of model fits across the nested models can be viewed in Table 2. We conducted chi-square difference tests to determine which nested model best described the data. Comparative fit index (CFI) fit statistics ranged from .90 to .93, the root-mean-square error of approximation (RMSEAs) ranged from .11 to .12, and standardized root-mean-square residuals (SRMRs) ranged from .06 to .12. Model fits were generally adequate, indicating that our models may be expected to roughly reproduce the data consistently. With regard to cutoffs for fit indices, Hu and Bentler (1999) suggested using a combination of one of the relative fit indexes (e.g., CFI, Tucker–Lewis Index, incremental fit index, or nonnormed fit index where values larger than .90–.95 are considered good-fitting models) and the SRMR (where good models $< .08$) or the RMSEA (where good models $< .06$). Model fits reported here fell within most of these fit statistic ranges, giving the current study a plausible basis to analyze and discuss the significant pathways involving parenting stress, negative parental reactions, and child behavior problems.

Model fit improved as a function of adding more paths, in particular, the addition of cross-lagged paths (see Table 2). Both the parenting stress, $\chi^2(3) = 32, p < .001$, and child direct effects models, $\chi^2(6) = 44, p < .001$, demonstrated significantly better model fit than the stability model. The indirect effects model did not demonstrate improved fit over and above the stability model, $\chi^2(4) = 8, p > .05$. The parent and child direct effects models are not nested, and thus a chi-square difference test could not be conducted. The transactional model was compared to the child direct effects model, $\chi^2(12) = 43, p < .001$, and the parenting stress direct effects model, $\chi^2(15) = 56, p < .001$, and the transactional model had significantly better model fit than either of the other models. Because the transactional model is the best fitting model, we interpret results from only this model (see Figure 2).

Transactional Model

Concurrent associations—Across the 4-, 5-, 7-, and 10-year time points children's externalizing behavior was positively related to parenting stress ($r_s = .45, .34, .22, \text{ and } .30$, respectively), and parenting stress was positively related to negative parental reactions ($r_s = .33, .17, .12, \text{ and } .20$, respectively). Children's externalizing behavior was positively correlated with parental negative reactions for the 4-, 7-, and 10-year time points only ($r_s = .21, .11, \text{ and } .17$, respectively).

Parenting stress direct effects—There was support for the direct effect of parenting stress model on child externalizing behaviors over time. Parenting stress was found to predict, positively and significantly, children's externalizing behavior when children were 5 years ($\beta = .16, p < .001$), 7 years ($\beta = .11, p < .05$) and 10 years ($\beta = .08, p < .10$) old. Follow-up analyses constrained these paths to be equal versus allowing them to vary. The

results indicated that the model with the equality constraint did not fit significantly worse compared to the transactional model depicted in Figure 2, meaning that there was no significant decline in the size of direct effects from parenting stress to child behavior across time, $\chi^2(1) = 2.11, p = .14$.

Child direct effects within the transactional model—We also found support for the child direct effects model in the association between child externalizing and parenting stress. Children's externalizing behaviors at ages 4, 5, and 7 years of age were associated with later parenting stress at child ages of 5, 7, and 10, respectively ($\beta = .13, p < .01$; $\beta = .11, p < .01$; $\beta = .19, p < .001$; see Figure 2). In contrast, there was no support for the association of child externalizing behavior and negative parental reactions.

Given that significant direct effects were found for both parent stress and child externalizing behavior problems, we tested to see whether parenting stress effects were stronger than child externalizing behavior effects or vice versa. We tested a series of models that held the parent and child direct paths equivalent from the 4- to 5-year time point, then from the 5- to 7-year time point, and then from the 7- to 10-year time point. These tests showed that, from ages 4 to 7, parent and child effects were equal in size, but from ages 7 to 10 the predictions from child externalizing behaviors to later parenting stress were stronger compared to the predictions from parenting stress to later externalizing behaviors, Wald $\chi^2(1) = 10.75, p < .001$.

Indirect effects within the transactional model—To test whether the longitudinal indirect effects in the model were significant, we used a bias-corrected bootstrapping procedure (10,000 draws). MacKinnon and colleagues (MacKinnon, Lockwood, & Williams, 2004) showed that this approach generates accurate confidence intervals for indirect effects by reducing Type I error rates and increasing power. Only indirect relations involving parenting stress, negative parental reactions, and child externalizing were probed. Significant indirect effects were observed for 4-year negative parental reactions to 5-year parenting stress to 7-year child externalizing problems 4-year child externalizing to 5-year parenting stress to 7-year negative parental reactions, and 5-year child externalizing to 7-year parent stress to 10-year negative parental reactions (see Table 3 for confidence interval estimates).

Given the lack of indirect effects of negative parental reactions as a theorized mediator of the relation between parenting stress and child externalizing behavior, we conducted post hoc exploratory analyses to determine whether model fit is improved by removing all negative parental reactions cross-lagged paths, resulting in a trimmed transactional model. The fit of the trimmed model (RMSEA = .10, CFI = .92, SRMR = .08) was somewhat comparable to that of the transactional model (RMSEA = .12, CFI = .93, SRMR = .06). The resulting trimmed model was significantly better fitting than the stability model, $\chi^2(6) = 64, p < .001$, and marginally worse, given the slightly poorer CFI and SRMR fit indices, than the transactional model, $\chi^2(12) = 24, p = .02$. Although the difference in model fit was marginal, model comparison suggests that the better fitting model benefits from the inclusion of the negative parental reactions cross-lagged pathways. Therefore, although negative parental reactions do not appear to mediate the relation between parenting stress

and externalizing behaviors, negative parental reactions influence and are influenced by both parenting stress and child externalizing behaviors across childhood, as evidenced by the significant indirect effects in the transactional model.

Robustness check—Because of the study’s oversampling of children with externalizing behaviors at recruitment, and to ensure that this sampling strategy did not bias the results, we re-ran the models without children who were very high on externalizing behaviors. Approximately 10% of children had clinically elevated externalizing scores on the BASC–2 at 4 years, and these children’s data were removed. Overall, results were the same for all main and indirect effects across the full and reduced sample. Differences observed in the reduced-sample transactional model included the disappearance of the marginal association of 7-year parenting stress to 10-year child externalizing behavior and the emergence of a marginal association between 7-year negative parental reactions to 10-year parenting stress. In addition, the marginal concurrent association between 7-year child externalizing behavior and 7-year negative parental reactions was gone for the reduced sample model. Given that the only differences among the two models concerned marginal effects, which indicate tentative trends in the data, these models both show consistent and comparable pattern of effects.

Discussion

There have been numerous examinations of the associations among parenting stress, parent behavior, and child externalizing behavior; however, the literature is inconsistent, and there has been mostly disconfirming evidence for Abidin’s (1986, 1992) mediational model. The current body of literature often examines the direction of effects from parent to child, rather than their bidirectional relationship across development. Therefore, these inconsistent findings may be a function of cross-sectional, unidirectional analyses. Although related research (e.g., Yates et al., 2010) has begun to focus on transactional models of parental stressors, a method that accounts for dynamic associations among variables over time, these analyses have not been conducted with parenting stress specifically. Therefore, the goal of the present study was to use a transactional model to examine associations among parenting stress, perceived negative parental reactions to child negative emotions, and child behavior problems across childhood. A series of increasingly complex nested models was tested, including a final transactional model that allowed for reciprocal associations among all variables across time. In doing so, the dynamic associations among these constructs and clarification of direct and indirect effects could be examined simultaneously after accounting for the stability of parenting stress, child externalizing problems, and parenting reactions over time.

The examination of autoregressive paths revealed that all constructs were quite stable from ages 4 to 10, indicating that high levels of parenting stress, reports of child behavior problems, and negative parental reactions were likely to remain high across childhood. Although evidence did emerge for both parent and child direct effect models, the model that estimated all hypothesized paths simultaneously best described the data, indicating that results were best described transactionally. The results from the transactional model offer support for specific hypotheses from separate bodies of literature (the parent effects, child

effects, and indirect effects literatures); however, the improved fit of the transactional model indicates that these constructs are dynamic and are best interpreted in light of their interactions over time, rather than isolating specific unidirectional associations. From age 4 to 10 there was a transactional association between child externalizing behavior and parenting stress, such that high levels of behavior problems and high levels of parenting stress were associated over time. Recent research examining the transactional nature of parenting stress and child behavior problems has found similar associations across early and middle childhood (Neece et al., 2012). Follow-up analyses revealed that, from ages 7 to 10, the effect of externalizing symptoms on parenting stress also became stronger compared to the opposite effect (i.e., parenting stress to externalizing). This is consistent with emerging research that has found child effects to become stronger than parent effects in middle and late childhood (Besnard et al., 2013; Bradley & Corwyn, 2013).

Indirect effects among the transactional associations emerged during the elementary school years. These effects did not reflect the hypothesized mediation of parenting behavior as measured by mother's reports of their negative responses to child negative emotion. The lack of indirect effects from parenting stress to parenting behavior to child outcomes adds to the growing body of literature that has not found support for Abidin's (1986, 1992) model (Anthony et al., 2005; Crnic et al., 2005; Deater-Deckard, 2005). The only study to date that has found this indirect effect with parenting stress (vs. other indicators of stress) found the mediating effect of parent behavior in very early childhood (12–60 months; Deater-Deckard & Scarr, 1996). It is possible that parenting stress is more likely to be reflected in parent behavior when children are young and patterns of parenting are still forming. Much of the parenting stress literature focuses on the cumulative effect of stress over time and the taxing nature of parenting a child with behavior problems. It seems that parental stress, instead of being expressed through parenting behavior, directly spills over to child behavior, for example, via an emotional atmosphere of irritability and negativity (Crnic et al., 2005). Given the dynamic association between parenting stress and externalizing behavior over time in the current study, and consistent with dynamic systems theory (Granic & Patterson, 2006), there is stronger evidence for examining the effect of continued coercive interactions on increased stress and behavior problems over time rather than determining a specific mechanism.

Exploratory post hoc analyses revealed that, although negative parental reactions did not mediate the relation between parenting stress and child behavior, parenting behaviors do contribute to our understanding of these processes across childhood. This was evident both by the unexpected indirect effects, including negative parental reactions, that emerged, along with the marginally poorer model fit when the negative parental reactions cross-lagged paths were removed from the model. With regard to the indirect effects that emerged, there were significant indirect effects from child externalizing behavior to parenting stress to negative parental reactions. This indicates that child behavior problems consistently tax parents, and this increased parenting stress in turn compromises parenting. There was also a significant indirect effect from 4-year negative parental reactions to 5-year parenting stress to 7-year externalizing behavior. Ang (2007) found a similar effect of parent behavior on parenting stress in a sample of aggressive boys in Singapore. These indirect effects were surprising and shed light on the complexity of child and parenting factors. Moreover, although model

fit was only marginally worsened by excluding cross-lagged negative parental reactions paths, the transactional model revealed that these associations are dynamic and complex and are best described by including parenting in our understanding of these processes. The results suggest that parenting stress forms a bridge between child behavior problems and parenting behaviors and highlight that parenting stress may be an important factor for intervention, in addition to parenting behavior, and warrant continued research.

It is important to note that, surprisingly, a transactional relationship did not emerge between negative parental reactions and child externalizing behavior. One possibility for these nonsignificant effects for negative parental reactions in the transactional model may be our measurement of parenting behavior. The CCNES addresses how parents would react to hypothetical situations in which their child becomes upset, and therefore it is not an observed measure of actual parenting behaviors. Given that in the current study we did not use observation of parenting behavior, future studies should inquire whether these transactional associations hold when using multiple raters or observation of maternal and child behavior. In a similar vein, all key variables in our model were reported by mothers. The strength of associations over time may have been due to shared-rater variance, in particular for mothers who were experiencing stress in the mother–child relationship. It has been suggested that some parents may be poor reporters of children’s behavior problems, particularly when they are experiencing stress, because they may have a lower tolerance for typical child misbehavior (Reid, Kavanagh, & Baldwin, 1987). Hence, as a result of mothers’ stress, their rating of their children’s behavior problems may be a function of their biased perceptions, and stressed mothers may therefore overreport children’s behavior problems (Renk et al., 2007). Nevertheless, the current model still bears meaningful influences among the constructs assessed. There has been an increased focus on mothers’ perceptions of their children as a predictor of child outcomes broadly (Renk, 2011) and with regard to parenting stress and child behavior problems more specifically (e.g., McMahon & Meins, 2012; Renk et al., 2007). We believe that the use of self-report measures is justifiable and necessary to best index self-referential perceptions that speak to personal experiences by mothers related to parenting, stress, and their children’s behavioral adjustment. Furthermore, allowing mothers to rate how they would react to children’s negative emotional displays taps into situations that cannot be generated in a laboratory setting.

Although our results are consistent with a transactional model, the magnitude of the associations among parenting stress, parental negative reactions to child negative emotions, and child externalizing behavior were small. Caution should be taken so that one does not overinterpret relatively small effects. Nevertheless, any significant cross-lagged paths emerged above and beyond the contributions of the high stability of the key variables in our model (Burkholder & Harlow, 2003). This provides compelling evidence that transactional relationships emerged over and above considerable variable stability in our model over time.

An important limitation concerns missing data. Participants from Cohort 3 initially were part of a separate study. As a consequence, at the 4-year time point two of the three assessments were missing. Although FIML was used to handle missing data, only two thirds of the data were able to be used to estimate those constructs at the 4-year assessment (the total percentage of missing data across all assessment points was about 17%). Missing data due to

potentially nonrandom events could bias the results; however, missing data are a common feature in longitudinal, multiwave research studies. The results should be interpreted in light of the missing data because of the study's design.

Although the findings must be considered in light of these limitations, the study serves to clarify the current, conflicting body of literature examining parenting stress. Instead of solely considering a singular model (i.e., direct effects) as explaining the association between parenting stress and child behavior problems, we found that the examination of transactional processes across childhood best explained the nature of these relations. This suggests that multiple family-level factors and also child behaviors may simultaneously need to be targets of intervention. The transactional association between parenting stress and child behavior problems in particular has bearing on clinical practice. When there is a history of negative interactions and cumulative stress, therapeutic interventions, such as Parent–Child Interaction Therapy (Zisser & Eyberg, 2010) and the Positive Parenting Program (Turner & Sanders, 2006), which are aimed at improving parent–child interactions and intervening in coercive patterns, may be necessary. Recent research also suggests that parental perceptions may be a point of intervention; parents who perceive their children negatively alter their parenting practices, which influences child outcomes (Renk, 2011). Therefore, interventions targeting parental perceptions of their children and expectations of how their children behave and react to difficult situations may result in altered parenting practices and more adaptive child outcomes. Moreover, support has been found for adding treatment components that address parenting stress to traditional parent-training interventions for child behavior problems (Kazdin & Whitley, 2003).

The results of this study suggest that the processes of parenting stress, parenting, and child behavior problems influence one another across early and middle childhood. In particular, there was strong evidence for a dynamic association over time between parenting stress and child externalizing behavior. A benefit of transactional models over bidirectional ones is that the latter model addresses static influences, but transactional models also account for reciprocal influences of variables on one another across development (Sameroff, 2009). Therefore, this study contributes to the parenting stress literature by demonstrating that these processes are best examined transactionally. Furthermore, the consistent, reciprocal association between parenting stress and child externalizing points to how early parent–child interactions can exacerbate and persist across development. Given the conflicting support for the indirect effects model in past research, and some of the surprising indirect effects found in the current study, further research that accounts for the transactional nature of child and parent factors through late childhood would further increase our understanding of these dynamic influences on child and parent functioning.

Acknowledgments

This research was supported by a National Institute of Mental Health (NIMH) Behavioral Science Track Award for Rapid Transition (MH 55625); an NIMH FIRST (First Independent Research Support & Transition) Award (MH 55584) to Susan D. Calkins; and an NIMH grant (MH 58144) awarded to Susan D. Calkins, Susan P. Keane, and Marion O'Brien. We thank the families who have repeatedly given their time and effort to participate in this research and are grateful to the entire RIGHT (Research Investigating Growth and Health Trajectories) Track staff.

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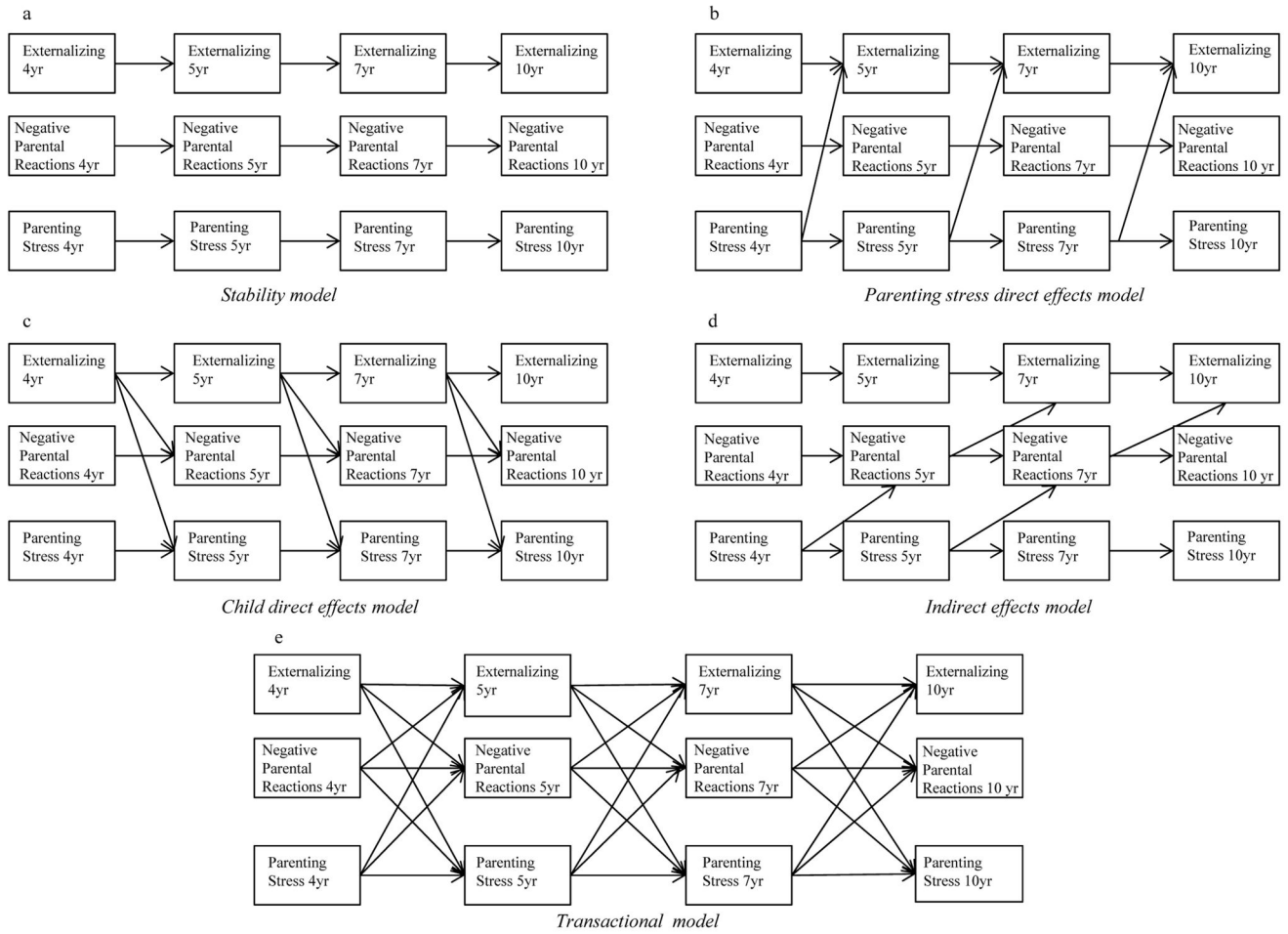


Figure 1. Nested Path Models Assessing Relations Among Child Externalizing Behaviors, Negative Parenting Responding, and Parenting Stress Over Time.
Note. The top left model (a) assesses construct stability over time, the top right model (b) longitudinally tests the direct effect of parenting stress on child externalizing behaviors, the middle left model (c) longitudinally tests the direct effect of child externalizing behavior on both negative parental reactions and parenting stress, the middle right model (d) longitudinally tests the indirect effect of parenting stress on child externalizing behavior through negative parental reactions, and the bottom model (e) tests all pathways among the constructs over time. yr = years.

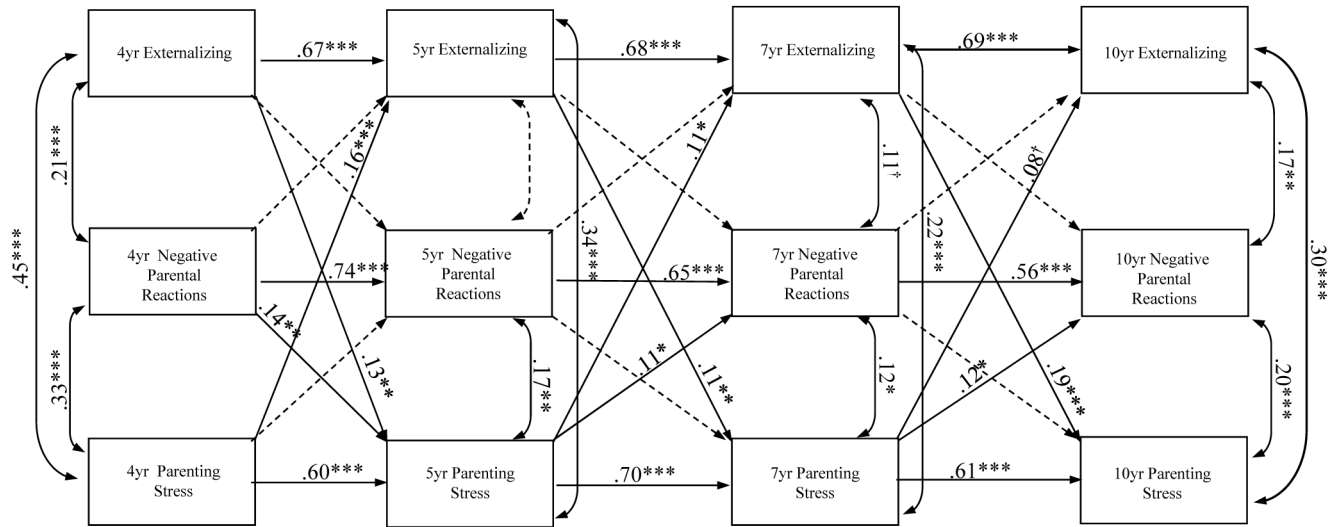


Figure 2. Cross-Lagged Panel Model Among Parent Report of Child Externalizing Behavior, Parenting Stress, and Negative Parental Reactions.

Note. yr = year. † $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 1

Descriptive Information and Correlations for Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Externalizing, 4 years	—											
2. Externalizing, 5 years	.77**	—										
3. Externalizing, 7 years	.68**	.74**	—									
4. Externalizing, 10 years	.69**	.71**	.72**	—								
5. Parenting stress, 4 years	.53**	.49**	.46**	.49**	—							
6. Parenting stress, 5 years	.46**	.57**	.49**	.48**	.70**	—						
7. Parenting stress, 7 years	.43**	.53**	.54**	.43**	.68**	.77**	—					
8. Parenting stress, 10 years	.46**	.53**	.49**	.55**	.63**	.72**	.70**	—				
9. Negative parental reactions, 4 years	.21**	.20**	.20**	.24**	.32**	.33**	.35**	.24**	—			
10. Negative parental reactions, 5 years	.22**	.21**	.22**	.16**	.25**	.34**	.32**	.22**	.73**	—		
11. Negative parental reactions, 7 years	.21**	.15**	.21**	.16**	.25**	.29**	.35**	.27**	.62**	.67**	—	
12. Negative parental reactions, 10 years	.16*	.12*	.16**	.20**	.23**	.29**	.32**	.31**	.54**	.58**	.60**	—
<i>N</i>	258	326	323	315	372	321	327	321	259	344	327	319
<i>M</i>	48.79	46.06	44.30	46.96	70.32	67.28	66.61	65.75	7.42	7.40	7.20	7.56
<i>SD</i>	10.48	10.50	9.11	8.31	17.73	18.41	16.84	18.51	1.82	1.84	1.96	1.86

* $p < .05$.

** $p < .01$.

Table 2

Child Externalizing Parent Report Model: Fit and Model Comparisons

Model	χ^2	df	p	CFI	RMSEA	SRMR
Stability	274	45	.000	.90	.11	.12
Parenting stress direct	242	42	.000	.91	.11	.10
Child direct	230	39	.000	.91	.11	.09
Indirect	266	41	.000	.90	.12	.11
Transactional	186	27	.000	.93	.12	.06
<i>χ^2 difference tests</i>						
Model comparisons	χ^2	df	p			
Stability vs. parenting stress direct	32	3	.000			
Stability vs. child direct	44	6	.000			
Stability vs. indirect	8	4	.092			
Stability vs. transactional	87	18	.000			
Parenting stress direct vs. transactional	56	15	.000			
Child direct vs. transactional	43	12	.000			

Note. Reduced nested models were compared to their parent model. CFI = comparative fit index; RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual.

Table 3

Model Estimates and 95% Bias-Corrected Bootstrap Confidence Intervals

Indirect paths	Estimate	Confidence interval	
4-yr Parental reactions → 5-yr parenting stress → 7-yr child externalizing	.105	[0.046, 0.164]	
4-yr Child externalizing → 5-yr parenting stress → 7-yr parental reactions	.169	[0.103, 0.236]	
5-yr Child externalizing → 7-yr parenting stress → 10-yr parental reactions	.158	[0.075, 0.241]	

Note. yr = year.

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