

Trajectories of Parenting and Child Negative Emotionality During Infancy and Toddlerhood: A Longitudinal Analysis

Shannon Tierney Lipscomb
Oregon State University-Cascades Campus

Leslie D. Leve
Oregon Social Learning Center

Gordon T. Harold
University of Leicester

Jenae M. Neiderhiser
The Pennsylvania State University

Daniel S. Shaw
University of Pittsburgh

Xiaoja Ge
University of Minnesota

David Reiss
Yale Child Study Center

The current longitudinal study examined trajectories of child negative emotionality, parenting efficacy, and overreactive parenting among 382 adoptive families during infancy and toddlerhood. Data were collected from adoptive parents when the children were 9-, 18-, and 27-month-old. Latent growth curve modeling indicated age-related increases in child negative emotionality and overreactive parenting for adoptive fathers and adoptive mothers (AM), and decreases in parent efficacy among AM. Increases in child negative emotionality were also associated with increases in parent overreactivity and decreases in maternal efficacy. Mothers' and fathers' developmental patterns were linked within but not across parenting domains. Limitations and directions for future research are discussed.

Negative emotionality, defined in early childhood as behaviors such as fussiness, difficulty to soothe, and irritability, has important implications for the social and psychological health and development of children (Rothbart & Bates, 1998; Sanson, Hempill, & Smart, 2004; Vitaro, Brendgen, & Tremblay,

2002). Two key areas of inquiry regarding early negative emotionality are continuity over time (e.g., Rothbart & Bates, 1998) and associations with parenting (Proper & Moore, 2006; Rothbart & Bates, 1998). The current study integrates and extends both areas by examining individual differences in developmental patterns of child negative emotionality across infancy and toddlerhood, while simultaneously investigating longitudinal patterns of parenting efficacy and overreactive (harsh, irritable, angry) parenting in adoptive mothers (AM) and adoptive fathers (AF).

In the first years of life, negative emotionality is considered a core component of temperament (Rothbart & Bates, 1998). Psychologists generally agree that early temperamental styles are expressed through behaviors such as negative emotionality and have a strong genetic basis (Buss & Plomin, 1984; Rothbart & Bates, 1998). Recent approaches to the study of negative emotionality emphasize that

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Correspondence concerning this article should be addressed to Dr. Shannon T. Lipscomb or Leslie D. Leve, Oregon Social Learning Center, 10 Shelton McMurphey Boulevard, Eugene, OR 97401. Electronic mail may be sent to shannon.lipscomb@osucascades.edu or lesliel@osl.org.

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temperamental behaviors are not only biologically based, but they can also develop over time and are likely explained, in part, by the quality of interactions with parents and other proximal caregivers, particularly during early childhood when children spend a larger amount of time interacting with their parents than they do later in life (Bates, Pettit, Dodge, & Ridge, 1998; Rothbart & Bates, 1998). Some division among researchers remains, however, with respect to the degree of continuity present in the development of behaviors such as negative emotionality in early childhood, and the extent to which individual trajectories of children's early emotionality are linked with parents' own development of efficacy and parenting behaviors.

An important distinction in examining the development of negative emotionality over time is disambiguating mean level shifts (change) in emotionality versus examining individual differences in patterns of emotionality expressed over time. Very little work has been done in this latter area, yet it has important implications given the evidence that negative emotionality is relevant to a variety of parent and child outcomes (Rothbart & Bates, 1998; Sanson et al., 2004; Vitaro et al., 2002). One recent study detected a linear increase in parent-rated child negative emotionality from 1 to 2 years of age, coupled with a leveling off or decrease in negative emotionality through age 5 (Partridge & Lerner, 2007). Another study found support for a linear increase from 4 to 12 months of age (Bridgett et al., 2009). Increasing negative emotionality during the first 2 years of life is likely a result of the enhanced mobility and drive for independence that young children experience during the progression from infancy to toddlerhood, coupled with parents' increasing expectations for compliance (see Shaw, Bell, & Gilliom, 2000). The present investigation builds from the two aforementioned studies by examining age-related changes in child negative emotionality from 9 to 27 months of age, and extends previous work by simultaneously examining individual variability in rates of change and associations with changes in parenting by both mothers and fathers during this time period.

Consistent with a process-oriented perspective (e.g., family systems theory: Cox & Paley, 1997, 2003; transactional models; Sameroff & Fiese, 1990), we propose that variation in children's negative emotionality over time may be best understood by simultaneously examining co-occurring variation in proximal family level influences such as parenting (overreactive parenting, parenting efficacy). To provide a contextual perspective on children's develop-

ment, trajectories of negative emotionality were modeled simultaneously with mothers' and fathers' developmental patterns of parenting efficacy and overreactive parenting across a developmental period in which toddlers' increasing mobility and independence present new challenges for both children and parents.

Consideration of Both Parents: Mother's and Father's Parenting

The vast majority of research on parent-child interactions has focused on mothers, and although studies of fathers are becoming more common (Lamb & Tamis-Lamonda, 2004), few have examined mother-child and father-child development simultaneously. Research on fathering typically shows that although there are some specific differences between mother-child and father-child relationships, characteristics of the relationship, such as warmth and overreactivity, are consistent predictors of child development, regardless of parent gender (Lamb & Lewis, 2004; Lamb & Tamis-Lamonda, 2004). Little is known, however, about the similarities and differences of mothers' and fathers' patterns of developing parenting efficacy and behaviors. Prior research shows that, compared to mothers, fathers tend to spend less time with young children, even in dual-earner families (Pleck & Masciadrelli, 2004), and often have different expectations for their roles as parents (Moon & Hoffman, 2008). Consistent with these findings, fathers tend to report lower levels of parent efficacy than mothers (Hudson, Elek, & Fleck, 2001). The current study contributes to this work by examining developmental patterns in both mothers' and fathers' parenting, and similarities and differences in their associations with changes in children's negative emotionality during a period marked by increasing independence for young children and new challenges for parents.

Capturing Change and Continuity in Infancy and Toddlerhood

Although questions related to parents' and children's effects on one another have been an important part of developmental research for many years, recent advances in research design and statistical modeling have made examination of these associations much more feasible (Pettit & Arsiwalla, 2008; Sameroff & MacKenzie, 2003). To date, the majority of this work has been focused on older children and adolescents and is not yet well understood in relation to change and continuity in early negative

emotionality among infants and toddlers. A few recent studies have detected bidirectional associations between parenting and children's disruptive behaviors during preschool and the early school years (e.g., Combs-Ronto, Olson, Lunkenheimer, & Sameroff, 2009; Larsson, Viding, Rijdsdijk, & Plomin, 2007). For example, Combs-Ronto et al. (2009) found evidence for reciprocal associations between negative maternal parenting and child disruptive behaviors during the transition from preschool to elementary school, yet relatively little is known about co-occurring parent-child trajectories during the infant and toddler years, when the foundations of the parent-child relationships are becoming established. Recent work provides some evidence that infants with more negative emotionality may evoke more hostile styles of parenting (e.g., Boivin et al., 2005; Forget-Dubois et al., 2007).

The present study extends this work by examining associations among developmental trajectories of child negative emotionality, overreactive parenting, and parent efficacy during the first 2 years of children's lives. The focus, therefore, is not on disentangling the directions of associations between parents and children; rather, we seek to examine the degree of association in co-occurring *developmental processes* in family and child level variables among mothers, fathers, and children as children progress from infancy into early toddlerhood.

Disentangling Parent Behavior from Parenting Efficacy

The concept of parent efficacy is a derivative of self-efficacy (Bandura, 1977). It includes parental feelings of self-efficacy in relation to specific domains of parenting and general feelings of parenting efficacy (Teti & Gelfand, 1991). Parent efficacy tends to be positively associated with sensitivity of parent-child interaction (Leerkes & Crockenberg, 2002; Teti & Gelfand, 1991) and with parent-child attachment (Spieker & Booth, 1988), and may therefore have important implications for children's development in a variety of areas. Parent efficacy is distinct from parenting behavior, however, because it refers to parents' internal feelings rather than their outward behaviors toward their children. Past research exploring longitudinal associations between parenting efficacy and child negative emotionality is relatively limited. There is some indication that mothers who perceive their toddlers as more difficult also exhibit lower feelings of parenting efficacy than mothers who do not (Gross, Conrad, Fogg, & Wothke, 1994; Leerkes & Crockenberg, 2002; Teti & Gelfand, 1991).

Very few studies have examined continuity and change in parent efficacy during early childhood. There is some indication that parent efficacy may increase during the first few years of children's lives as parents become more familiar with their infants and comfortable in their parental roles (Gross et al., 1994; Weaver, Shaw, Dishion, & Wilson, 2008). On the other hand, given the linkages between parent efficacy and parents' perceptions of children's negative emotionality (Gross et al., 1994; Leerkes & Crockenberg, 2002; Teti & Gelfand, 1991), and growing evidence of increased negative emotionality during the 2nd year of life (Bridgett et al., 2009; Partridge & Lerner, 2007), it is likely that parenting efficacy decreases as children transition into toddlerhood. Prior research also suggests that many parents experience reduced enjoyment in parenting (Fagot & Kavanagh, 1993), increased parenting stress (Chang & Fine, 2007), and more parenting hassles during this period (Crnic & Booth, 1991). By examining parental efficacy and child negative emotionality over time, this study contributes to the understanding of both the developmental course of parent efficacy and its associations with children's trajectories of negative emotionality.

Overreactive (harsh, irritable, angry) parenting has consistently been linked with negative outcomes such as externalizing problems in childhood and adolescence (e.g., Maccoby, 2000; Rothbaum & Weisz, 1994; Shaw, Gilliom, Ingoldsby, & Nagin, 2003). This line of research suggests that when parents fail to control their own emotions during their interactions with their children, such as when they yell, threaten, and use aggression, children experience difficulties with emotion regulation, negative emotionality, and externalizing behaviors (Chang, Schwartz, Dodge, & McBride-Chang, 2003; Eisenberg et al., 1999; Scaramella, Sohr-Preston, Mirabile, Robinson, & Callahan, 2008). Overreactive parenting, however, is also thought to develop in response to increases in children's challenging behaviors (Lengua & Kovacs, 2005; Patterson & Fisher, 2002). Such behaviors include negative emotionality and difficult temperament in early childhood and externalizing behaviors later during childhood and adolescence (see Shaw et al., 2000).

Consequently, overreactive parenting should be expected to increase during the first 2 years of life, in tandem with increases in child negative emotionality. While the aforementioned body of research documents longitudinal associations between increases in overreactive or harsh parenting and development of child negative emotion and externalizing behaviors (e.g., Chang et al., 2003; Shaw

et al., 2000) very little is known about the developmental course of overreactive parenting for either mothers or fathers.

As far as we know, the present study is the first to examine these complementary yet conceptually distinct dimensions of parenting in relation to variation in children's negative emotionality over time, specifically during the period of infancy and early toddlerhood. Moreover, by modeling mothers' and fathers' parenting efficacy and overreactivity simultaneously, the current study examines cross-domain associations between parents in the same family (e.g., mother's efficacy with father's overreactivity), which to our knowledge has not been studied in prior research.

Eliminating Passive Genotype–Environment Correlation

Previous research examining associations between parenting and child behavior, such as negative emotionality, has typically been conducted with biological families (Combs-Ronto et al., 2009; Shaw et al., 2000; Teti & Gelfand, 1991). However, it is difficult to ascertain whether associations between parent behaviors and child outcomes represent environmental effects or shared genetic influences in studies of biologically related family members (Plomin, DeFries, & Loehlin, 1977; Scarr & McCartney, 1983). In biological families, associations between a characteristic of the parent and a characteristic of the child may result from an underlying shared genetic characteristic that simultaneously influences both the trait in the parent and the trait in the child (e.g., passive genotype–environment correlation), even if the parent and child traits have quite different behavioral manifestations (e.g., parental overreactivity and child negative emotionality). Precisely because these shared genes influence the behaviors of both parent and child, and by extension influence the family environment, it is not possible to disentangle whether the association between parent and child characteristics is genetic or environmental in origin when studying biological families.

Thus, designs that permit the separation of passive genotype–environment correlation from environmental main effects may have profound implications for understanding the mechanisms underlying associations between parent and child characteristics. The early childhood period may be a particularly salient developmental period for examining associations in unrelated families, because passive gene–environment effects have been hypothesized to be strongest during infancy and to decline

during later childhood and adolescence (Scarr & McCartney, 1983). Few researchers have quantified the magnitude of passive gene–environment correlation effects, given methodological challenges in doing so. Estimates of cumulative effects of passive gene–environment correlation, taking into account the entire genotype, require adoption designs or their variants (e.g., children of twin designs). The only other existing adoption study that begins during infancy is the Colorado Adoption Project (Plomin & DeFries, 1983), which reports mixed evidence for passive gene–environment correlation during infancy. For example, daily stimulation in the home environment was more strongly associated with infants' task orientation in nonadoptive than in adoptive families ($r_s = .26$ and $.14$, respectively), and was more strongly associated with activity level in nonadoptive than in adoptive families during early childhood ($r_s = .20$ and $.12$, respectively). However, no clear pattern of effects across measures was found (Braungart, 1994). In addition, there is replicated evidence that shared genes continue to be responsible for at least a portion of the association between parent and child characteristics in families with older children and adolescents (Harden et al., 2007; Narusyte et al., 2008; Neiderhiser et al., 2004; Neiderhiser, Reiss, Lichenstein, Spotts, & Ganiban, 2007; O'Connor, Caspi, DeFries, & Plomin, 2000). In the present study, the influence of shared genes on parent and child characteristics is eliminated by studying children adopted at birth. This approach allows for a more precise estimate of environmental influences on the association between parenting behavior, parenting efficacy, and children's negative emotionality across infancy and toddlerhood.

The Present Study

Using data from the Early Growth and Development Study (EGDS; Leve et al., 2007), the current study examines the developmental trajectories of child negative emotionality, parenting efficacy, and overreactive parenting among adoptive families across an 18-month-period using data from assessments collected at child age 9, 18, and 27 months. All three constructs were thus measured across a period of rapid development in which newly mobile infants (9 months old) mature into increasingly independent toddlers (27 months old) and parents are continually challenged to adapt their parenting strategies. It was hypothesized that over time (a) children would exhibit increases in negative emotionality, (b) parents would show increases

in overreactive parenting, (c) parents would exhibit decreases in parent efficacy, (d) increases in child negative emotionality would be associated with increases in overreactive parenting and with decreases in parent efficacy, and (e) mothers' and fathers' levels and rates of change in parent efficacy and overreactive parenting would be associated with one another. We also explored differences in levels and rates of change in parent efficacy and overreactive parenting between mothers and fathers in the same family.

Method

Participants

The sample consisted of 382 adoptive families (Leve, Neiderhiser, Scaramella, & Reiss, 2010). The recruitment of participants occurred between 2003 and 2006, beginning with the recruitment of adoption agencies ($N = 33$ agencies in 10 states located in the Northwest, Mid-Atlantic, and Southwest regions of the United States). The participating agencies reflected the full range of adoption agencies operating in the United States: public, private, religious, secular, those favoring open adoptions, and those favoring closed adoptions. Agency staff identified participants who completed an adoption plan through their agency and met the following eligibility criteria: (a) the adoption placement was domestic, (b) the infant was placed within 3 months postpartum, (c) the infant was placed with a non-relative adoptive family, (d) the parents were able to read or understand English at the eighth-grade level, and (e) the infant had no known major medical conditions such as extreme prematurity or extensive medical surgeries. The participants were representative of the adoptive parent population that completed adoption plans at the participating agencies during the same time period (Leve et al., 2007).

The children were 9 months old at the first assessment (T1; $M = 8.92$, $SD = 1.32$ months), 18 months old at the second assessment (T2; $M = 17.71$, $SD = 1.32$ months), and 27 months old at the third assessment (T3; $M = 27.42$, $SD = 1.94$ months). Forty-three percent of the children were female. The mean child age at the adoption placement was 3 days ($SD = 5$ days). The sample demonstrated significant variability in exposure to prenatal risk conditions that have been shown to increase children's propensity for negative emotionality and related outcomes (Delaney-Black et al., 2004; D'Onofrio et al., 2003; Thapar et al., 2003). For example,

57% of the birth mothers reported using drugs during pregnancy (e.g., nicotine, alcohol, marijuana, cocaine, amphetamines), and 23% reported serious use of at least one drug (e.g., having at least one symptom of dependence). The adoptive families were typically college-educated, middle-class families, and the mean ages of mothers and fathers at T1 were 37 and 38, respectively, and 92% of the fathers and 93% of the mothers were Caucasian. At T1, the adoptive parents had been married an average of 11.8 years ($SD = 5.1$ years).

Adoptive families participated in an in-person assessment at T1, T2, and T3 that ranged in length from 2.5 to 3.5 hr and were compensated for their time. Interviewers completed a minimum of 40 hr of training prior to administering interviews. Portions of each interview were video-recorded and feedback was provided on 15% of the interviews to insure adherence to standardized protocols. Additional details on the study can be found in Leve et al. (2007).

Measures

Parent efficacy. Adoptive parent efficacy was measured at T1, T2, and T3 using the Parenting Efficacy Scale (Teti & Gelfand, 1991). This 10-item scale consists of nine items addressing parental feelings of efficacy in relation to specific domains of parenting, and one item addressing global feelings of parenting efficacy. For the nine domain-specific items, parent responses are on a 4-point scale ranging from 1 = *not good at all* to 4 = *very good*; the global item is rated on a 4-point scale ranging from *I don't understand my child* to *I understand my child all of the time*. The 10 items were summed; for individuals with missing data on one or more items (but not more than 20% missing), the mean of the answered items was interjected to calculate the total score. Individuals with more than 20% of the items missing were coded as missing for the entire scale. Interitem alphas were acceptable (AM α s = .73, .72, .72, respectively; AF α s = .80, .77, .79), with higher scores indicating greater efficacy.

Parent overreactivity. Adoptive parent overreactivity was measured at T1, T2, and T3 using a modified seven-item version of the overreactivity subscale from the Parenting Scale (Arnold, O'Leary, Wolf, & Acker, 1993). The scale was designed to identify parental discipline mistakes that relate theoretically to externalizing problems such as harsh, irritable, and angry parenting behaviors, with higher scores indicating more parental overreactivity. Each identified mistake was paired with its

more effective counterpart to form the anchors for a 7-point scale (e.g., *When my child misbehaves... 1 = I speak to my child calmly, 7 = I raise my voice or yell*). Three items were omitted from the original 10-item scale because they were not considered to be appropriate for parents of infants and toddlers. The seven items were averaged; individuals with more than 20% of the items missing were coded as missing for the entire scale. Interitem alphas were acceptable (AM α s = .71, .74, .71, at each measurement occasion respectively; AF α s = .65, .69, .70).

Child negative emotionality. Child negative emotionality was measured at T1, T2, and T3 using the nine-item Fussy-Difficult-Demanding subscale from the Infant Characteristics Questionnaire (ICQ; Bates, Freeland, & Lounsbury, 1979). This subscale was designed to assess parental perceptions of negative emotionality (e.g., amount of fuss and cry in general, changeable mood, how easily upset, how difficult to soothe). Items were rated on a 7-point, Likert-type scale, with higher scores indicating greater negative emotionality. The seven items were summed; for individuals with missing data on one or more items (but not more than 20% missing), the mean of the answered items was interjected to calculate the total score. Individuals with more than 20% missing were coded as missing for the entire scale. Interitem alphas were acceptable (AM α s = .84, .82, .80 at each measurement occasion respectively; AF α s = .86, .82, .81). Fathers' and mothers' rating were highly correlated with one another (r s = .72, .65, and .57 at T1, T2, and T3, respectively, all p s < .01) and were averaged into one score per occasion.

The Fussy-Difficult-Demanding subscale of the ICQ (Bates et al., 1979) was designed for 13-month-old infants, with slightly different versions of the scale for older and younger children (6–24 months of age). To preserve consistency in measurement and to allow for analysis of change over time using latent growth curve modeling, the present study utilized the same nine-item version of the scale across all three waves. Evidence for measurement invariance (Vandenberg & Lance, 2000) was detected for both configural invariance (same pattern of fixed- and free-factor loadings specified for each wave) and metric invariance (equal factor loadings for like items across each time point; Horn & McArdle, 1992), supporting a consistent construct of "child negative emotionality" over time. Constraining the factor loadings to be equal across time did not significantly worsen the fit of the model to the data, evident by nonsignificant likelihood ratio test statistics (see Singer & Willett, 2003)

for ICQ ratings completed by both mothers, $\chi^2(16) = 20.36$, $p = .20$, and fathers, $\chi^2(16) = 17.24$, $p = .37$.

Data Analytic Plan

Latent variable growth curve modeling was employed to examine mean trajectory shape and variability in trajectory shape for child negative emotionality, parent efficacy, and overreactive parenting as well as the associations among these trajectories. All models were estimated using full-information maximum likelihood (FIML) under the missing-at-random assumption with Mplus Version 4.0 (Muthén & Muthén, 2006), with equal spacing between measurement occasions (T1, T2, and T3 were coded 0, 1, and 2, respectively). FIML provides accurate estimations of models with missing data on the dependent variable, given that the missing-data patterns are not related to the dependent variable (Schafer & Graham, 2002). This assumption was tested and upheld for the present sample, which had no more than 13% missing data for any given variable. Details regarding these analyses are available from the first author.

First, univariate growth models were examined for each of the three constructs: child negative emotionality, overreactive parenting, and parent efficacy. Next, a multivariate growth model was specified to examine associations among family members. The model included one growth curve for each construct (child negative emotionality, mother efficacy, mother overreactivity, father efficacy, and father overreactivity), and estimated associations among the growth factors (levels and slopes). Covariances among the intercepts and slopes for mothers and fathers compensated for the nonindependence between parents (Khoo & Muthén, 2000).

Next, the analyses examined the statistical significance of differences between the levels and slopes of parent efficacy and overreactive parenting between mothers and fathers, as well as the significance of differences between mothers and fathers in the covariances among these parenting constructs' levels and slopes and the level and slope of child negative emotionality. Model constraints were introduced to the multivariate growth model that required specific covariances to be equal, and the likelihood ratio test statistic was used to evaluate whether these constraints led to significant worsening of model fit. The likelihood ratio test statistic, calculated as the difference between the deviance statistics of alternative models, is the preferred

indicator of relative model fit when comparing nested models where the variables are the same but constraints are applied to some parameters. All such analyses compared nested models with exactly the same individuals, such that indices of model fit could be directly compared.

Results

Means, standard deviations, and correlations among variables are presented in Table 1. The correlations indicated stability of individual differences in child negative emotionality across waves. Associations between child negative emotionality and parent efficacy were modest to moderate in size and all significant. Links between overreactive

parenting and child negative emotionality were smaller and not all significant. Parent efficacy and overreactive parenting were negatively and significantly correlated within and across waves for both mothers and fathers. Associations between mothers' and fathers' efficacy, and between mother' and fathers' overreactive parenting were modest to moderate in size and all significant, but correlations between mothers' efficacy and father overreactive parenting, and vice versa, were small.

Child Negative Emotionality

Analyses revealed a significant increase in parent-rated child negative emotionality at a rate of roughly one third of a standard deviation in negative emotionality per 9-month interval (Table 2).

Table 1
Means, Standard Deviations, and Correlations Among Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Min	Max	M	SD
1. Child NE 9 month	1															9.50	47.50	25.87	6.72
2. Child NE 18 month	.69*	1														12.50	47.00	28.13	6.22
3. Child NE 27 month	.54*	.72*	1													14.00	49.50	30.00	6.05
4. Mom PE 9 month	-.40*	-.30*	-.21*	1												27.00	40.00	34.83	2.63
5. Mom PE 18 month	-.28*	-.38*	-.31*	.57*	1											24.00	40.00	34.03	2.67
6. Mom PE 27 month	-.20*	-.35*	-.36*	.46*	.62*	1										23.00	40.00	33.90	2.78
7. Dad PE 9 month	-.31*	-.20*	-.22*	.24*	.13*	.15*	1									21.00	40.00	33.46	3.09
8. Dad PE 18 month	-.21	-.23*	-.23*	.15*	.25*	.17*	.60*	1								23.00	40.00	33.11	2.97
9. Dad PE 27 month	-.25	-.24*	-.37*	.17*	.22*	.24*	.56*	.63*	1							18.00	40.00	33.10	3.07
10. Mom OP 9 month	.16*	.06	.08	-.17*	-.09	-.11	-.30*	-.30*	-.20*	1						1.00	4.57	1.73	0.56
11. Mom OP 18 month	.14*	.12*	.06	-.36*	-.28*	-.20*	-.08	-.10	-.04	.23*	1					1.00	4.90	1.89	0.61
12. Mom OP 27 month	.13*	.12*	.11	-.24*	-.27*	-.24*	-.05	-.05	-.06	.16*	.59*	1				1.00	4.30	2.09	0.59
13. Dad OP 9 month	.15*	.19*	.10	-.03	-.08	-.09	-.24*	-.33*	-.23*	.56*	.18*	.22*	1			1.00	4.43	1.84	0.60
14. Dad OP 18 month	.07	.15*	.23*	-.14*	-.27*	-.38*	-.04	-.11	-.07	.15*	.48*	.63*	.18*	1		1.00	3.91	1.93	0.58
15. Dad OP 27 month	.16*	.13*	.21*	-.07	-.11	-.10	-.30*	-.32*	-.32*	.50*	.20*	.24*	.68*	.21*	1	1.00	4.20	2.08	0.60

Note. NE = negative emotionality; PE = parent efficacy; OP = overreactive parenting.
**p* < .05.

Table 2
Results of the Univariate Growth Curve Models

	Intercept		Slope		Intercept-slope covariance
	Mean level at 9 months	Variance	Change per 9-month interval	Variance	
Child negative emotionality	25.91 (0.35)	37.99 (3.87)	2.10 (0.17)	7.06 (1.29)	-8.63 (1.77)
Mother parent efficacy	34.74 (0.14)	4.62 (0.67)	-0.45 (0.08)	0.85 (0.32)	-0.54 (0.37)
Father parent efficacy	33.37 (0.16)	5.66 (0.85)	-0.15 (0.08)	0.31 (0.40)	-0.16 (0.46)
Mother overreactive parenting	12.06 (0.22)	13.12 (1.88)	1.83 (0.13)	4.12 (0.86)	-2.33 (0.95)
Father overreactive parenting	12.70 (0.22)	12.41 (1.75)	1.28 (0.13)	3.22 (0.82)	-1.39 (0.89)

Note. Values are unstandardized parameter estimates with standard errors in parentheses. Estimates that are significant at the *p* < .05 or *p* < .01 level are denoted in bold font.

Results further documented a negative covariance between the intercept and slope of negative emotionality, indicating that infants who exhibited higher levels of negative emotionality at 9 months of age increased less in negative emotionality over time.

Parent Efficacy

Results from univariate growth curve modeling showed a significant decrease over time in parenting efficacy for mothers but not for fathers (Table 2). Fathers also reported slightly lower initial levels of efficacy than did mothers. Results from a likelihood ratio test show that this difference was statistically significant. Constraining the means of the intercepts and slopes to be equal for mothers and fathers led to a significant worsening of model fit, based on a likelihood ratio test for nested models, $\chi^2(1) = 9.00$, $p < .01$ for intercepts, and $\chi^2(1) = 51.94$, $p < .01$ for slopes. The magnitudes of these differences were approximately one half of a standard deviation.

Overreactive Parenting

Both mothers and fathers reported significant increases in overreactive parenting (Table 2). However, results from the multivariate growth model show that fathers reported slightly higher initial levels of overreactive parenting and smaller increases in overreactivity over time than did mothers. Results from a likelihood ratio test show that these differences were statistically significant. Constraining the means of the intercepts and slopes to be equal for mothers and fathers led to a significant worsening of model fit, $\chi^2(1) = 5.15$, $p = .02$ for intercepts, and $\chi^2(1) = 9.54$, $p < .01$ for slopes. The magnitudes of these differences between mothers and fathers were close to one half of a standard deviation for the intercepts and one third of a standard deviation for the slopes.

Associations Among Trajectories for Children, Mothers, and Fathers

Table 3 presents the covariances among the child and parent growth factors from the multivariate growth model. Results indicate that initial levels of parent efficacy were negatively associated with initial levels of child negative emotionality. The initial level of overreactive parenting was positively associated with initial levels of child negative emotionality. The slope for child negative emotionality was positively associated with the slope for overreactive

Table 3
Results From Multivariate Growth Model: Covariances Among Growth Factors

	1	2	3	4	5	6	7	8	9	10									
	B (SE) β	B (SE) β	B (SE) β	B (SE) β	B (SE) β	B (SE) β	B (SE) β	B (SE) β	B (SE) β	B (SE) β									
Child negative emotionality																			
1. Intercept	1																		
2. Slope	-8.63 (1.78)	-.53	1																
Parent efficacy																			
3. Mother intercept	-7.39 (0.99)	-.55	2.01 (0.47)	.35	1														
4. Mother slope	1.70 (0.52)	.30	-1.51 (0.26)	-.62	-0.59 (0.34)	.30	1												
5. Father intercept	-5.88 (1.10)	-.40	1.24 (0.52)	.20	1.77 (0.42)	.34	-0.33 (0.23)	.15	1										
6. Father slope	0.62 (0.54)	.17	-1.01 (0.27)	-.65	-0.26 (0.21)	.21	0.37 (0.12)	.68	-0.18 (0.42)	-.13	1								
Overreactive parenting																			
7. Mother intercept	4.24 (1.48)	.21	-1.42 (0.72)	-.16	-3.63 (0.59)	-.50	0.73 (0.32)	.24	-0.73 (0.66)	-.09	0.02 (0.33)	.01	1						
8. Mother slope	-1.41 (0.86)	-.13	1.63 (0.43)	.34	1.00 (0.34)	.26	-1.09 (0.19)	-.65	-0.08 (0.38)	-.02	-0.09 (0.20)	.09	-1.28 (0.88)	-.21	1				
9. Father intercept	4.65 (1.50)	.22	-1.64 (0.72)	-.18	-1.75 (0.57)	.23	0.28 (0.32)	.09	-4.38 (0.70)	-.52	0.85 (0.33)	.41	4.31 (0.95)	.37	-0.40 (0.53)	.06	1		
10. Father slope	-0.47 (0.72)	-.04	1.06 (0.40)	.23	0.55 (0.33)	.15	-0.26 (0.18)	-.17	0.32 (0.37)	.08	-0.56 (0.19)	-.55	0.53 (0.53)	.09	0.23 (0.31)	-.20	-1.24 (0.84)	-.20	1

Note. Estimates that are significant at the $p < .05$ or $p < .01$ level are denoted in bold font.

parenting across both father–child dyads and mother–child dyads. Similarly, the slope of child negative emotionality was negatively associated with the slope of parent efficacy for both mothers and fathers. Associations among intercepts and slopes of child negative emotionality and parenting constructs were statistically equivalent for mothers and fathers. Constraining the covariances between growth factors to be equal across parents did not significantly worsen model fit, $\chi^2(4) = 3.56, p = .47$ for parent efficacy, and $\chi^2(4) = 1.98, p = .74$ for overreactive parenting.

Some covariation between mothers' and fathers' efficacy and overreactivity was also detected. The intercept and slope for overreactive parenting were negatively associated with the intercept and slope for parenting efficacy of the same parent. Initial levels of both parenting efficacy and overreactive parenting were significantly associated between parents. The slopes of parenting efficacy for mothers and fathers were also significantly related. The slopes in overreactive parenting for mothers and fathers were not significantly associated with one another. Neither the associations between slopes for mother efficacy and father overreactivity nor the associations between slopes in father efficacy and mother overreactivity were statistically significant.

In sum, mothers and fathers in families where the child had higher initial levels of child negative emotionality reported lower initial levels of efficacy and higher initial levels of overreactive parenting. Moreover, families with greater increases in child negative emotionality over time reported more dramatic decreases in parent efficacy and greater increases in overreactive parenting in both parents. Fathers reported less efficacy, more overreactivity, and smaller rates of change over time than did mothers. However, fathers and mothers exhibited similar degrees of association with their children's levels and changes in negative emotionality. Last, rates of change over time for parents' efficacy and overreactivity were more closely linked to changes in child negative emotionality than they were to changes in the other parents' efficacy or overreactivity.

Discussion

The present study simultaneously examined the developmental trajectories of child negative emotionality, parenting efficacy, and overreactive parenting among adoptive families. Findings suggest that the period in which newly mobile infants (9 months old) mature into increasingly indepen-

dent toddlers (27 months old) is marked by changes for young children and their parents. Results from this study also generally supported the hypotheses regarding linkages among developmental change and continuity within families, as suggested by transactional and family systems' theorists (e.g., Cox & Paley, 1997, 2003; Sameroff & Fiese, 1990).

Consistent with our hypotheses and with past research (Bridgett et al., 2009; Partridge & Lerner, 2007), children showed increases in child negative emotionality from 9 to 27 months of age. Previous research has found that this increase in child negative emotionality levels off during toddlerhood (Partridge & Lerner, 2007). With only three measurement points ending at 27 months of age, the present study was not able to confirm this pattern of findings from prior research; however, this study extends past research by documenting that parents perceive increases in negative emotionality even when they are not genetically related to their child. Significant variation in developmental patterns of negative emotionality were also detected, indicating that infants exhibit varying levels of negative emotionality and varying degrees of increases in negative emotionality as they become mobile and independent toddlers.

Findings revealed four overall patterns related to linkages in families. First and foremost, findings supported the hypotheses regarding linkages among developmental change and continuity in families by documenting both cross-sectional and longitudinal associations among parent efficacy, overreactive parenting, and child negative emotionality. Second, these associations were similar for mother–child and father–child dyads. Third, mothers and fathers exhibited both similarities and a few distinct differences in their developmental trajectories of parent efficacy and overreactive parenting. Fourth, linkages in and across parent–child subsystems appeared to be stronger than those in the mother–father subsystem. The following discussion addresses each of these areas.

Consistent with our expectations, and with parents' daily context of negotiating interactions with toddlers who are experiencing increasing negative emotionality, mothers exhibited decreases in parent efficacy over time. Given prior evidence of increases in parenting efficacy during the preschool years (Gross et al., 1994; Weaver et al., 2008), maternal efficacy may increase after the period included in the current study as a result of mothers' developing confidence in their parenting abilities. Future research that includes repeated assessments of effi-

cacy over a longer period and that examines curvilinear patterns of change is needed to improve our understanding of longitudinal patterns of maternal efficacy.

In contrast to mothers, fathers did not show significant decreases in efficacy during this time period, on average. Considering that fathers often have different expectations for their roles as parents than do mothers (Moon & Hoffman, 2008), it could be that expectations for parenthood play a role in shaping parents' development of efficacy. However, like mothers, a significant degree of variability in the rate of change for fathers was detected. Fathers who had children with greater increases in negative emotionality reported more substantial decreases in efficacy.

Consistent with our hypotheses, findings from this study documented increases in overreactive parenting during the transition from infancy to the toddler period for both mothers and fathers. However, fathers reported slightly higher initial levels of overreactive parenting and smaller increases in overreactivity over time than did mothers. A pattern emerges when considering these findings together with those for parent efficacy discussed earlier: fathers experienced slightly more difficulties (lower efficacy and higher overreactive parenting) when their children were infants than did mothers, but fathers may be less susceptible to the challenges of parenting an increasingly independent toddler than mothers, as evidenced by fewer decreases in parent efficacy and fewer increases in overreactive parenting over time. Moreover, because fathers tend to spend less time with young children than do mothers, even in dual-earner families (Pleck & Masciadrelli, 2004), fathers may have fewer opportunities to build their parenting confidence and skills when their children are infants, resulting in subsequently fewer frustrations with their toddlers that could disrupt their efficacy and fuel increasing overreactive parenting.

Current findings supported our hypothesis that decreases in parenting efficacy and increases in overreactivity would be related to increases in children's negative emotionality. This study did not attempt to determine the directionality of these associations. Rather, we sought to examine the degree of association in *developmental processes* among children and both of their parents across two distinct aspects of parenting. Findings suggest that in both mother-child and father-child dyads increasing child negative emotionality is associated with increasing overreactive parenting. This finding is consistent with the conceptualization of the coer-

cive cycle in which child negative emotionality and harsh parenting practices reinforce one another (e.g., Patterson & Fisher, 2002; Scaramella, Neppl, Ontai, & Conger, 2008).

Although the coercive cycle has been hypothesized to originate in the 2nd year of life during the "terrible twos" (Shaw & Bell, 1993), it has not yet been thoroughly studied during very early childhood, particularly among adoptive families in which associations between parent and child behavior cannot be attributed to shared genes. In biologically related families with older children, within-time correlations between child difficulty (externalizing or conduct problems) and negative parenting tend to be modest to moderate and highly significant (e.g., Scaramella, Neppl, et al., 2008; Williams, Conger, & Blozis, 2007). A relatively new avenue of research in this area explores potential differences in these associations across different phases of development (Pardini, Fite, & Burke, 2008). Findings from this study suggest that even if cross-sectional associations between parenting and child outcomes are small during the infant and toddler years, families with greater increases in child negative emotionality also show greater increases in overreactive parenting over time. Although the current findings are generally consistent with coercion theory (Patterson, 1982), a more robust test that considers the transactional nature of parent-child exchanges is necessary to make stronger conclusions in support of this model; without such data, we cautiously conclude that the development of the two processes appear to be linked during infancy and toddlerhood.

Current findings also shed new light on past research linking parent efficacy with child negative emotionality by documenting associations between *changes* in efficacy and *changes* in child negative emotionality. The transition from infancy through toddlerhood presents challenges for both parents and children and the present findings suggest that when parents perceive their children as becoming more negative over time, they also feel decreasingly efficacious about their parenting. This was true for both mother-child and father-child dyads, even though fathers did not report overall decreases in efficacy during this period.

In sum, by studying developmental trajectories of mothers, fathers, and children simultaneously, the current study revealed an important pattern of findings. Even though compared to mothers, fathers tended to exhibit slightly less efficacy, more overreactive parenting, and fewer changes over time, mothers and fathers in the same family exhib-

ited similar associations with their children's levels and rates of change in negative emotionality. These findings are important in light of research highlighting the differences between mothers' and fathers' level of involvement, roles, and expectations for parenthood (Lamb & Tamis-Lamonda, 2004; Moon & Hoffman, 2008; Pleck & Masciadrelli, 2004).

By documenting associations between mothers' and fathers' rates of change in parent efficacy and overreactive parenting, results from the present study are consistent with both transactional and family systems perspectives that espouse a process-oriented approach to examine the interplay between family and child level variables over time (Cox & Paley, 1997; Sameroff & Fiese, 1990). Present findings contribute to previous work in this area in four primary ways. First, findings indicated that similar to related work documenting linkages between mothers' and fathers' levels of parenting stress (Belsky & Fearon, 2004; Sandler, Miles, Cookston, & Braver, 2008), parents in the same family exhibited associations in parent efficacy. Moreover, current findings documented longitudinal associations between parents' *rates of change* in parent efficacy. For example, when mothers experience decreasing efficacy over time, their spouses are likely to experience declines in efficacy as well, even though fathers, on average, do not exhibit decreases in efficacy during this time period.

Various mechanisms may contribute to associations between mothers' and fathers' parenting efficacy, including similar affects of children on each parent, assortative mating (e.g., Agrawal et al., 2006), quality and satisfaction with the marital relationship (Belsky, 1981; Schofield et al., 2009), social learning of parents from one another (e.g., Bandura, 1977; Belsky, 1981), and coparenting (e.g., Bonds & Gondoli, 2007). In the current study, children's effects on their parents are covaried out. Assortive mating likely contributes more to preexisting similarities between spouses than to associations among changes over time. Thus, the longitudinal associations between mothers and fathers documented in the present study likely stem from a combination of impacts of the marital relationship, social learning, and coparenting.

Second, by modeling mothers' and fathers' efficacy and overreactivity simultaneously, the current study examined whether or not these longitudinal associations between parents were domain-specific or representative of more general linkages between two parents in the same family. Findings supported specific rather than general longitudinal associa-

tions between parents. The only parenting slopes that were significantly associated with one another were mother efficacy with father efficacy. Slopes of mother and father overreactive parenting did not covary significantly, nor did slopes across parenting domains (father efficacy with mother overreactivity and vice versa). This pattern is suggestive of specific effects of parents on one another's development, such as through targeted social learning processes and/or coparenting decisions, compared to more broad sweeping similarities between parents. However, such conclusions are beyond the scope of this article.

Third, the current study builds from previous work on longitudinal associations between mothers' and fathers' parenting behaviors conducted with families of adolescents (Schofield et al., 2009) by detecting similar linkages among families of infants and toddlers. Future research should examine the extent of interparental associations during other developmental periods, such as the preschool period or middle childhood; parents could be particularly susceptible to one another's parenting during transitional periods.

Last, findings from the current study contribute to the growing knowledge of family systems by weighing the relative strength of longitudinal associations within and across family subsystems. Results revealed stronger linkages in parent-child subsystems than in the mother-father subsystem, as well as remarkable similarities in the associations between children and their mothers and the associations between children and their fathers. One possible interpretation of this pattern, detected with a sample of adoptive families, is that toddlers' negative emotionality is an important driving force for dynamics in parent-child subsystems, although the current analyses were not designed to disentangle the direction of effects.

An important methodological strength of the current study is that the adoption design allowed for an examination of longitudinal associations among parenting and child negative emotionality without contamination by the effects of shared genotype (Rutter, Pickles, Murray, & Eaves, 2001). That is, associations between parenting and child negative emotionality over time could not be attributed to shared genetic factors that dually influenced parenting and child negative emotionality. Although a biologically reared comparison group would be needed to estimate the magnitude of effect of shared genotype on associations between parenting and child negative emotionality, this is the first report of which we are aware to examine

longitudinal associations between parenting and infant/toddler negative emotionality in a nonbiological sample. The current findings provide strong support that associations in prior studies are likely not due primarily to the effects of shared genotype.

Some caveats of the study need to be noted. First, as only three time points of measurement were available for the present analyses, latent growth curve modeling was limited to models of linear growth. Second, the adoptive families had limited ethnic and sociodemographic diversity, which affects generalizability of findings. Nonetheless, the demographic characteristics of the sample were similar to those reported in the other large U.S.-based adoption study, the Colorado Adoption Project (Plomin & DeFries, 1983). An additional limitation was the use of parent-report data for all study measures; the analytical technique of averaging mothers' and fathers' reports of child negative emotionality helped to alleviate concerns related to method overlap or reporting bias. In addition, our conceptualization of parenting included internal representations of parent efficacy which are most accurately measured via self-report. Nonetheless, self-reports of overreactive parenting would have ideally been corroborated by direct observations of parent-child interactions that were coded for overreactive parenting.

These limitations notwithstanding, the current investigation underscores the interplay among parents and children during early childhood. Findings documented age-related increases in child negative emotionality and increases in overreactive parenting for both parents, as well as decreases in parent efficacy among mothers. Results also support the conclusion that members in the family unit tend to adapt to this developmental period with some degree of unison. Developmental patterns in mother-child, father-child, and mother-father dyads are linked with one another over time, although associations within parent-child dyads appear to be strongest. Mothers and fathers showed similarities in their relationships to their child's increasing negative emotionality, yet on average, fathers showed slightly less efficacy, more overreactivity, and less change over time than did mothers. In addition, our results documented significant variability from one family to the next in initial levels and rates of changes in all three constructs. Future research on the sources and the consequences of the individual differences that distinguish families from one another will further the understanding of child development.

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