

# Influences of Parent and Child Negative Emotionality on Young Children's Everyday Behaviors

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Negative emotionality is linked to unfavorable life outcomes, but studies have yet to examine negative emotionality of parents and children as predictors of children's problem behaviors and negative emotion word use in everyday life. This study used a novel naturalistic recording device called the Electronically Activated Recorder to investigate the separate and interactive influences of parent and child negative emotionality on daily child behaviors in a sample of 35 preschool-aged children over two time points separated by 1 year. Fathers' negative emotionality predicted children's whining at Time 1; mothers' negative emotionality predicted children's negative emotion word use at Time 1 and increases in children's arguing/fighting from Time 1 to Time 2. Parents' ratings of child negative emotionality also were associated with increases in children's arguing/fighting from Time 1 to Time 2, and child negative emotionality moderated the association between mothers' negative emotionality and children's arguing/fighting. Further, children with mothers high in negative emotionality displayed higher levels of problem behaviors when their mothers self-reported low levels of positive emotional expressiveness and/or high levels of negative emotional expressiveness. These findings offer preliminary evidence linking parent and child negative emotionality to everyday child behaviors and suggest that emotional expressiveness may play a key role in moderating the links between maternal negative emotionality and child behavioral problems.

*Keywords:* negative emotionality, naturalistic behavior, language, neuroticism, Electronically Activated Recorder

Negative emotionality is a robust predictor of numerous problematic life outcomes, including poorer physical and mental health, lower quality of life, less satisfaction in romantic relationships, and reduced longevity (Diener, Oishi, & Lucas, 2003; Eisenberg et al., 2009; Lahey, 2009; Slatcher & Vazire, 2009). In addition to its role as a predictor of individuals' problematic outcomes, negative emotionality may also be a precursor to problems across generations. Because children's problem behaviors early in life are linked to negative outcomes such as psychiatric diagnoses in adulthood (Caspi, Moffitt, Newman, & Silva, 1996), there has been increasing interest in identifying cross-generational predictors of young children's functioning (e.g., Schofield et al., 2011). In this article, we present findings from a study designed to investigate negative emotionality-problem behavior links using a cutting-edge naturalistic observation sampling methodology called

the Electronically Activated Recorder (EAR; Mehl, Pennebaker, Crow, Dabbs, & Price, 2001). We used the EAR to assess the concurrent and prospective associations among parents' negative emotionality, parent reports of children's negative emotionality, and children's problem behaviors and negative emotion words as they occur during daily interactions in the home. Further, we investigated whether the relationships between parental negative emotionality and child behavior were moderated by parents' self-reported positive and negative emotional expressiveness in the family context.

## Parent Negative Emotionality and Child Problem Behaviors

With regard to links with child problem behaviors, parents' neuroticism has been the most extensively studied parental personality trait. Neuroticism—comprised of traits such as distress, anxiety, tension, and low levels of emotional stability—is very highly correlated with the temperament factor called negative emotionality or negative affectivity (Evans & Rothbart, 2007). For consistency, the term “negative emotionality” will be used throughout this article when referring to the broad temperament/personality dimension of neuroticism or negative affectivity. Parents high in negative emotionality report higher levels of externalizing behaviors in their toddlers (van Aken, Junger, Verhoeven, van Aken, & Deković, 2006), preschool-aged children (Kochanska, Clark, & Goldman, 1997) and school-age children (Cumberland-Li, Eisenberg, Champion, Gershoff, & Fabes, 2003; Ellenbogen & Hodgins, 2004; Prinzie et al., 2004). But research on

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parents' negative emotionality and children's problem behavior has tended to favor parent reports of child behavior, which are often colored by biases and idealized views of children (Youngstrom, Izard, & Ackerman, 1999). Only a small handful of parental personality studies have incorporated observational measures of child behavior, showing mothers' negative emotionality to be associated with toddlers' angry affect in structured child-rearing interactions and deviance in a "don't touch" situation (Kochanska et al., 1997) and with cheating in school-aged girls (Cumberland-Li et al., 2003).

Although structured observational paradigms (e.g., play and cleanup tasks) provide a more objective method of assessing child behavior than parent reports alone, they do not provide a complete picture of how children behave across the variety of situations that they encounter in their everyday lives. Alternatively, capturing children's problem behaviors in daily life may uncover unique associations between parent negative emotionality and problematic behaviors that are not as easily assessed with informant reports or in structured settings. For example, children of easily distressed and tense parents may be more likely to whine and cry when their needs are not met, but a structured laboratory context may not adequately tax the parent-child dyad to uncover these links.

The use of naturalistic observation in quantitative research has become more common in recent years as technological advancements have made ecological momentary assessments (EMA) of behaviors and emotions less expensive and more practical. Among other advantages, EMA approaches help researchers to avoid the risks of errors in autobiographical memory and recall that accompany the use of traditional self-report methodology (Shiffman, Stone, & Hufford, 2008). Unfortunately, young children do not typically provide reliable self-reports, making traditional EMA methods for tracking child behavior and emotions impractical. Furthermore, established approaches for the naturalistic assessment of young children and their families, such as the Home Observation for the Measurement of the Environment (HOME; Caldwell & Bradley, 2003), do not provide a quantitative assessment of specific child behaviors in everyday life. Moreover, the HOME and other observational approaches for assessing young children's behavior and the family context typically require the presence of a research assistant and/or obtrusive video equipment.

A promising new methodology for unobtrusively tracking everyday child behaviors is the Electronically Activated Recorder (EAR; Mehl et al., 2001). The EAR is a digital audio recorder that periodically samples brief snippets of ambient sounds from participants' momentary environments. Participants wear the EAR while going about their lives, providing an "acoustic log" of their days as they naturally unfold. To date, more than 20 EAR articles have been published with adult samples (for a review, see Mehl, Robbins, & Deters, in press), investigating depression-behavior links (Mehl, 2006), manifestations of personality in daily behaviors (Mehl, Gosling, & Pennebaker, 2006), and associations between daily behaviors and happiness (Mehl, Vazire, Holleran, & Clark, 2010). Our work has shown that the EAR can be used to unobtrusively observe everyday problem behaviors in young children (e.g., fighting, crying, whining) as families go about their lives (Slatcher & Robles, in press; Slatcher & Trentacosta, 2011). No studies that we are aware of have investigated the links between personality and temperament traits and discrete child behaviors in everyday life. The primary aim of the current study was

to investigate the use of the EAR as a novel technology for testing these links in preschool-aged children.

In addition to problem behaviors that are coded from EAR recordings, children's negative emotion words provide important insights into psychological functioning in daily life. Previous studies of personality and word use have found consistent links between adult negative emotionality and negative emotion word use (Hirsh & Peterson, 2009; Li & Chignell, 2010; Pennebaker & King, 1999; Yarkoni, 2010). However, no studies that we are aware of have examined the links between parent negative emotionality and children's negative emotion word use. We expected that parents reporting higher levels of negative emotionality are more likely to have young children who use high levels of negative emotion words in daily life.

### The Role of Child Negative Emotionality

Not surprisingly, children's temperament traits, including their negative emotionality, also play a key role in the development of behavior problems. Child negative emotionality is a central component of theoretical models of the development of internalizing and externalizing problem behaviors (Lahey & Waldman, 2003; Nigg, 2006), and empirical findings support links between children's negative emotionality and both dimensions of problem behavior (e.g., Eisenberg et al., 2005). However, parent and/or teacher reports are typically used to index child problem behaviors in these studies. When assessing child behavior with the EAR, we expect associations to emerge between parent reports of children's negative emotionality and problem behaviors that are similar to those uncovered in studies using teacher or parent assessment of child problem behaviors.

In addition to examining direct associations between parent negative emotionality, parent-reported child negative emotionality and children's problem behaviors and negative emotion words in daily life, we also examined child negative emotionality as a moderator of the association between parents' negative emotionality and children's daily life behaviors. Negative emotionality in children is not only a risk factor for problematic behavior, but a growing body of research suggests that negative emotionality is a phenotype that makes children more susceptible to rearing influence (Belsky & Pluess, 2009). Children who have a tendency to become frustrated, sad, and fearful may be especially likely to show problem behaviors in everyday life such as arguing and fighting when their parents are also prone to experiencing negative emotions. On the other hand, children who are low in negative emotionality may not be at-risk for problem behaviors in the home even if their parents are themselves relatively high in negative emotionality.

### The Role of Parents' Emotional Expressiveness

Interestingly, although several studies have shown maternal negative emotionality to be linked to externalizing behavior in children, others have found little or no association between parental negative emotionality and child behavior (Oliver, Guerin, & Coffman, 2009; van Aken, et al., 2006)—suggesting that parental negative emotionality may predict child problem behaviors in some families but not in others. On the one hand, negative emotionality is reliably linked to difficulties in close relationships

(Karney & Bradbury, 1997; Prinzie, Stams, Deković, Reijntjes, & Belsky, 2009; Slatcher & Vazire, 2009), but on the other hand, negative emotionality is considered to be mostly an “internal” trait that often is invisible to others (Borkenau & Liebler, 1993; Gosling, Ko, Mannarelli, & Morris, 2002; Kenny, Horner, Kashy, & Chu, 1992; Vazire, 2010). Thus, it is likely that the damaging effects of negative emotionality are moderated to a certain extent by how much parents *express* their negative emotions within the family context (rather than simply feel negative emotions, characteristic of negative emotionality).

Although negative emotionality captures the tendency to experience strong, intense and easily evoked negative emotions, negative emotional expressiveness signals the overt *expression* (through words, facial expressions and gestures) of negative emotion. Therefore, although many individuals who are high in negative emotionality may frequently display negative emotions around family members, others may not. Indeed, previous research indicates that negative emotionality and negative emotional expressiveness are related but distinct constructs, correlating about  $r = .50$  (Halberstadt, Cassidy, Stifter, Parke, & Fox, 1995). Parents high in both negative emotionality and negative emotional expressiveness in the family context (who both feel and express negative emotions) would be expected to have children who display more pronounced problem behaviors in daily life than children of parents high in negative emotionality but low in negative emotional expressiveness (who tend not to express their negative emotions in the family context). In contrast with the potential role of negative emotional expressiveness, parents’ positive emotional expressiveness may *attenuate* the association between parents’ negative emotionality and children’s problem behaviors. Put another way, children of parents who experience high levels of emotional distress and tension may have fewer problem behaviors when their parents are able to put aside their worries and anxieties to engage in warm and supportive interactions with their children. Thus, another aim of this study was to investigate the interactive effects of parents’ negative emotionality and their self-reported emotional expressiveness in the family context (both positive and negative expressiveness) in influencing children’s problem behaviors and negative emotion word use in everyday life.

### The Current Study

In the present study, we examined the concurrent and prospective associations between parent and child negative emotionality, parents’ self-reported emotional expressiveness and preschoolers’ everyday life behaviors in a two-wave study. We used the EAR to assess children’s discrete problem behaviors and negative emotion word use on two weekend days separated by 1 year. Children’s daily life behaviors were negative emotion words and problem behaviors that are often included in assessments of children’s emotion dysregulation and internalizing and externalizing problems (i.e., crying, whining, arguing/fighting; Spinrad & Stifter, 2006; Zeman, Shipman, & Suveg, 2002). On the basis of previous research, we hypothesized that (a) higher levels of parental negative emotionality would be linked to more frequent child problem behaviors in daily life, including arguing/fighting with others, crying, whining, and negative emotion word use; (b) higher levels of child negative emotionality would also be linked to more frequent child problem behaviors and use of negative emotion

words in daily life; (c) child negative emotionality would moderate the association between parents’ negative emotionality and child behavior in daily life, such that parents’ negative emotionality would be positively associated with children’s problem behaviors among children high in negative emotionality; and (d) parents’ self-reported emotional expressiveness would also moderate the association between parental negative emotionality and child behaviors in daily life.

## Methods

### Participants

A total of 35 married two-parent families with 3- to 5-year-old children from Austin, Texas, took part in the study as part of a larger study of everyday family life (Slatcher & Robles, in press; Slatcher, Robles, Repetti, & Fellows, 2010; Slatcher & Trentacosta, 2011). The sample of children included 21 girls (mean age at Time 1 = 54 months,  $SD = 9$  months, range = 38 to 68 months) and 14 boys (mean age at Time 1 = 49 months,  $SD = 11$  months, range = 39 to 71 months). Age of mothers ranged from 22 to 51 years with an average of 34.7 years ( $SD = 5.5$ ). Fathers’ ages ranged from 24 to 53 years with an average of 34.9 years ( $SD = 5.7$ ). Annual household income ranged from \$30,000 to \$500,000, with a median of \$85,000; annual income was unrelated to any of the outcome variables in this study. Of the mothers, 25 identified themselves as White, nine as Hispanic, and one as African American. Of the fathers, 26 identified themselves as White, six as Hispanic, two as African American, and one as multiracial. The average marriage duration for couples was 7 years 9 months ( $SD = 3$  years 6 months).

### Procedure

Families initially came to the lab on a weekday evening to receive an overview of the study and to complete baseline questionnaires assessing demographic information, parents’ self-reports of negative emotionality and emotional expressiveness, and parent reports of children’s negative emotionality. During the following weekend, children wore the Child EAR for a full day on either Saturday or Sunday (described below). One year later, children wore the EAR for a second time on a Saturday or Sunday. The average amount of time between the Time 1 and Time 2 waves of data collection was 11.97 months ( $SD = 1.07$  months). Research assistants then transcribed and coded the EAR recordings. Finally, transcriptions of children’s utterances captured by the EAR were submitted to a computerized linguistic analysis program (Linguistic Inquiry and Word Count; Pennebaker, Booth, & Francis, 2007). The process of EAR coding and linguistic analysis is described in detail below.

### Questionnaire Measures

**Parent negative emotionality.** At the outset of the study, each parent completed the 8-item neuroticism subscale of the 44-item Big Five Inventory (BFI; John & Srivastava, 1999), a scale with high convergent validity with other measures of trait negative emotionality. Parents were asked to indicate the degree to which each item was descriptive of them on a 5-point scale ranging

from *disagree strongly* to *strongly agree*. Examples of items on the BFI neuroticism subscale include “Can be tense,” “Worries a lot,” and “Is emotionally stable, not easily upset” (reverse-scored). The mean parent negative emotionality score in this sample was 2.64 ( $SD = 0.75$ ; range = 1.50–4.88;  $\alpha = .82$ ).

**Child negative emotionality.** Each parent completed the 94-item short form of the Children’s Behavior Questionnaire (CBQ; Putnam & Rothbart, 2006), a measure of temperament designed to assess children aged 3 to 8. With the CBQ, parents are asked to rate their child’s temperament traits on a 7-point Likert scale ranging from 1 (*extremely untrue of your child*) to 7 (*extremely true of your child*). We focused on the 31-item Negative Affectivity scale, which measures negative emotions such as anger and sadness and has been shown to correlate strongly ( $r = .65$ ) with other child measures of negative emotionality (Grist & McCord, 2010). Mothers’ and fathers’ ratings of children’s negative emotionality were significantly correlated ( $r = .42$ ,  $p = .01$ ). Ratings of children’s negative emotionality were not correlated with fathers’ negative emotionality ( $r = -.05$ , *ns*) but were moderately correlated with mothers’ negative emotionality ( $r = .43$ ,  $p = .01$ ). Mean paternal-rated child negative emotionality was 3.62 ( $SD = 0.64$ ; range = 2.50 – 4.94;  $\alpha = .82$ ) and mean maternal-rated child negative emotionality was 3.61 ( $SD = 0.57$ ; range = 2.50 – 4.58;  $\alpha = .90$ ).

**Parent emotional expressiveness in the family.** The Self-Expressiveness in the Family Questionnaire (SEFQ; Halberstadt et al., 1995) was used to measure how emotionally expressive each parent considered themselves to be in the family context. This self-report scale includes 23 items measuring positive expression and 17 items measuring negative expression that are rated for frequency on a 9-point Likert scale (1 = *not at all frequently*, 9 = *very frequently*), with higher scores indicating greater emotional expressiveness. Examples of positive emotional expressiveness items include “Spontaneously hugging a family member,” and “Telling family members how happy you are.” Examples of negative emotional expressiveness items include “Expressing momentary anger over a trivial irritation,” and “Showing how upset you are after a bad day.” Positive and negative emotional expressiveness were uncorrelated ( $r$ s of  $-.10$  and  $.06$  for mothers and fathers, respectively;  $p$ s  $> .50$ ). Correlations between negative emotional expressiveness and negative emotionality were  $.53$  for mothers and  $.56$  for fathers ( $p$ s  $< .001$ ); positive emotional expressiveness and negative emotionality were uncorrelated ( $r$ s of  $-.10$  and  $.12$  for mothers and fathers, respectively;  $p$ s  $> .45$ ). Mean positive emotional expressiveness was 6.82 ( $SD = 1.06$ ; range = 3.67–8.92;  $\alpha = .80$ ) and mean negative emotional expressiveness was 3.80 ( $SD = 1.06$ ; range = 1.92–6.92;  $\alpha = .90$ ).

### Naturalistic Assessment of Behaviors and Emotion Words: The Child EAR

In order to assess problem behaviors and emotion language use in everyday life, each child wore a modified version of the EAR (Mehl et al., 2001). The Child EAR used in this study (Sony model # ICD-P320) is 1-inch wide and 4-inches long, weighs 3.2 ounces, and is able to record for up to 19 hr in standard play mode (which limited EAR data collection to 1 day per child for each data collection wave). The recorder was worn by the child inside a “special magic shirt” that was designed specifically for the study.

Each shirt had an internal pocket built into the front that was covered by a piece of cloth with colorful cartoon characters on it. This allowed the recorder to be “out of sight, out of mind” for the child and for the recorder to be in a stable, safe place regardless of what activity the child might engage in.

The recorder was worn for 1 day, on either a Saturday or Sunday, and recorded continuously from the time the child woke up (and the parent activated the recorder) until bedtime or as long as the parent was able to keep the shirt on the child; parents were called the evening before to remind them to turn on the EAR the following morning. Recordings ranged in length from 2 hours 19 minutes to 15 hours 22 minutes, with an average of 10 hours 1 minute ( $SD = 3$  hours 32 minutes); variations in recording times appeared to be random and did not vary as a function of any of the variables measured in this study. To standardize recording times across children and to capture a representative sample of each child’s daily life, 150 randomly selected 30-s sound files were transcribed and coded for each child. Randomization procedures were the same across all children, irrespective of recording length. An important advantage of randomly sampling EAR files from each child—and, indeed a key advantage of all research employing any sort of sampling, be it event sampling or person sampling (Lohr, 2010)—is that it reflects each child’s day without having to examine the entirety that child’s day. In this case, one is making inferences about a child’s daily behavior from a randomly selected sample of moments from a child’s day. As a naturalistic observation method, the EAR can capture large amounts of vivid information about a person’s ecological behavior and interactions over the course of a day. In sampling only a fraction of the time instead of recording continuously, the amount of recorded material is kept manageable, making comparatively large-scale naturalistic observation studies possible (Mehl et al., 2001; Mehl et al., *in press*).

Each child wore the EAR again for 1 continuous day 1 year later at Time 2 (either on a Saturday or Sunday). The recordings ranged in length from 1 hour 17 minutes to 13 hours 25 minutes, with an average of 8 hours 59 minutes ( $SD = 3$  hours 55 minutes). Recording length was unrelated to any of the variables of interest in this study. Again, 150 randomly selected 30-s sound files were coded for each child.

**Measurement of negative emotion word use.** All EAR recordings were transcribed and saved as files to be analyzed using a computerized text analysis program called Linguistic Inquiry and Word Count (LIWC; Pennebaker et al., 2007) and coded by research assistants. The LIWC program creates an output that reflects the overall percentage of the total words spoken that fall into each preset category. The category of interest for this study was negative emotion words (e.g., “mad,” “sad,” “hate,” and “scared”). In a construct validation study (Kahn, Tobin, Massey, & Anderson, 2007), the results from three experiments showed LIWC-measured emotion word use to be highly positively correlated with both self-reported and behavioral measures of emotion. Mean percentage of total words that were negative emotion words was 0.54 at Time 1 ( $SD = .43$ ; range = 0.00–1.76) and 0.77 at Time 1 ( $SD = .56$ ; range = 0.00–2.37).

**Measurement of problem behaviors.** Previous EAR data has been coded with the Social Environment Coding of Sound Inventory (SECSI; Mehl & Pennebaker, 2003), a coding system that details the person’s current location (e.g., in apartment, outdoors, in transit), activity (e.g., watching TV, eating), and various

behaviors (e.g., socializing, laughing, crying). We adapted this coding scheme for children, focusing on problematic child behaviors (e.g., “whining” was added). Intercoder reliabilities were determined from a set of training recordings (235 30-s sound files) independently coded by the 20 research assistants who transcribed and coded these data. Intraclass correlations (ICCs) based on a two-way random effects model were computed for each coded behavior. Scores for each EAR behavior reflect the percentage of total recordings in which that behavior was observed. The mean for child arguing/fighting with others was 0.74 at Time 1 ( $SD = 1.50$ ; range = 0.00–6.67) and 1.00 at Time 2 ( $SD = 1.60$ ; range = 0.00–6.00); mean for child crying was 1.75 at Time 1 ( $SD = 2.48$ ; range = 0.00–11.30) and 0.36 at Time 2 ( $SD = 0.63$ ; range = 0.00–3.61); and mean for child whining was 4.29 at Time 1 ( $SD = 5.38$ ; range = 0.00–22.00) and 1.56 at Time 2 ( $SD = 2.02$ ; range = 0.00–9.00). Interrater reliabilities (based on ICCs) were .92, .94, and .93 for child arguing/fighting with others, crying, and whining, respectively. Because child EAR behaviors and negative emotion word use were positively skewed, we log-transformed all values prior to conducting statistical analyses. Intercorrelations among child EAR behaviors are presented in Table 1. In this table, Time 1 intercorrelations appear below the diagonal; Time 2 intercorrelations appear above the diagonal. Time 1–Time 2 stability correlations for each variable appear on the diagonal. Neither child age at baseline nor gender was significantly correlated with any of the child EAR behaviors.

## Results

### Parent Negative Emotionality, Parent-Reported Child Negative Emotionality, and Child Behaviors

We first examined associations between mothers’ negative emotionality and child behaviors. As shown in Table 2, mother’s negative emotionality was positively correlated with children’s negative emotion word use at Time 1 and with increases in children arguing/fighting with others from Time 1 to Time 2 (partial correlation of Time 2 behavior controlling for Time 1 behavior). To illustrate, children of mothers high in negative emotionality ( $> +1 SD$ ) used more than three times as many negative emotion words as children of mothers low in negative emotionality ( $< -1 SD$ ) at Time 1 (an average of 14.16 vs. 4.60 negative emotion words, respectively). Similarly, compared to

children of mothers low in negative emotionality ( $< -1 SD$ ), children of mothers high in negative emotionality ( $> +1 SD$ ) argued/fought with others almost four times as much at Time 2 (in 3.0% vs. 0.8% of their EAR sound files). Among fathers, negative emotionality was positively correlated with children’s whining and marginally correlated with children’s crying at Time 1. To illustrate, compared to children of fathers low in negative emotionality ( $< -1 SD$ ), children of the fathers high in negative emotionality ( $> +1 SD$ ) whined more than three times as often (5.9% vs. 1.7%) and cried more than twice as often (2.0% vs. 0.8%) at Time 1.<sup>1</sup>

In addition to parents’ negative emotionality being associated with everyday problem behaviors, we found evidence that parents’ reports of children’s temperament was associated with their own everyday behavior: as shown in Table 2, children higher in negative emotionality (as rated by both mothers and fathers) had greater increases from Time 1 to Time 2 in arguing and fighting with others in daily life (partial correlation with Time 2 arguing/fighting, controlling for Time 1 arguing/fighting). When entering both mothers’ negative emotionality and parent ratings of child negative emotionality as predictors of children arguing and fighting on the EAR in a multiple regression, mothers’ negative emotionality remained a significant predictor, whereas parent-rated child negative emotionality was reduced to marginal significance ( $\beta = .47, p = .004$  for mothers’ negative emotionality vs.  $\beta = .28, p = .069$  for children’s negative emotionality); note that in this analysis and the subsequent moderation analysis focusing on maternal negative emotionality, we used father’s ratings of child negative emotionality from the CBQ, which are free of maternal negative rating bias (i.e., mothers high in negative emotionality are more likely to also rate their children negatively), as our measure of parent-rated child negative emotionality.

### Child Negative Emotionality as a Moderator

We next explored paternal-reported child negative emotionality as a moderator of the association between parents’ negative emotionality and children’s behaviors in everyday life. We found no evidence of child negative emotionality as a moderator of the association between fathers’ negative emotionality and children’s negative everyday behaviors. However, we did find evidence for paternal-reported child negative emotionality as a moderator of the association between mothers’ negative emotionality and increases in child arguing/fighting with others from Time 1 to Time 2 (residualized Time 2 arguing/fighting, controlling for Time 1 arguing/fighting). When entered together in a regression, paternal-reported child negative emotionality, mothers’ negative emotionality, and their interaction term all significantly predicted residualized Time 2 arguing/fighting with others ( $\beta$ s of .33, .49, and .29, respectively; all  $ps < .05$ ). As shown in Figure 1, for children high in negative emotionality, there was a strong positive

Table 1  
Intercorrelations Among Child EAR Behaviors

Variable	1	2	3	4
1. Arguing/fighting with others (EAR)	.16	.04	.64**	.17
2. Crying (EAR)	.47**	.51**	.19	.42**
3. Whining (EAR)	.38*	.84**	.10	.02
4. Negative emotion words (EAR)	.11	.02	-.10	.04

Note. Time 1 correlations appear below the diagonal; Time 2 correlations appear above the diagonal. Time 1–Time 2 stability correlations for each variable appear on the diagonal and are italicized. Child EAR behaviors and negative emotion words were log-transformed prior to analyses. EAR, Electronically Activated Recorder.

\*  $p < .05$ . \*\*  $p < .01$ .

<sup>1</sup> Previously published findings from this study include a report of the links between parental depression and child EAR behaviors (Slatcher & Trentacosta, 2011). Conceptually related, parental depression and negative emotionality were uncorrelated for mothers in this sample ( $r = .19, p = .28$ ) and significantly correlated for fathers ( $r = .46, p = .01$ ). The findings reported in this article do not change when including parental depressive symptoms as a covariate, providing evidence for depression and negative emotionality as distinct constructs.

Table 2  
Correlations Between Parent Negative Emotionality, Child Negative Emotionality, and Child Behaviors

Child behaviors	Mother negative emotionality (BFI neuroticism)		Father negative emotionality (BFI neuroticism)		Child negative emotionality (CBQ: maternal-rated)		Child negative emotionality (CBQ: paternal-rated)	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
Child EAR behaviors								
Arguing/fighting with others	.20	.52**	.07	-.09	.29	.42*	-.09	.37*
Crying	-.04	-.07	.32†	-.26	.12	-.01	-.02	-.15
Whining	-.06	.17	.41*	.01	.00	.32†	-.16	.29
Child Word use								
Negative emotion words	.39*	.14	-.11	.08	.22	-.03	-.13	-.01

Note. Time 1 reflects measurement of child behavior at baseline; Time 2 reflects changes in child behavior from Time 1 to Time 2 (residualized Time 2 child behavior at 1-year follow-up controlling for Time 1 child behavior). Child EAR behaviors and negative emotion words were log-transformed prior to analyses. EAR = Electronically Activated Recorder; BFI = Big Five Inventory; CBQ = Children’s Behavior Questionnaire.

†  $p < .07$ , two-tailed. \*  $p < .05$ . \*\*  $p < .01$ .

association between mothers’ negative emotionality and increases in residualized Time 2 children arguing/fighting; among children low in negative emotionality, mothers’ negative emotionality was not significantly related to children’s arguing/fighting. Together, maternal negative emotionality, paternal-rated child negative emotionality and their interaction accounted for 44% of the variance in Time 1 to Time 2 changes in children’s arguing/fighting in daily life.

**Parental Self-Reported Emotional Expressiveness as a Moderator**

We next tested whether the links between parents’ negative emotionality and child behaviors and word use were also moderated by parents’ self-reported emotional expressiveness in the family context. Emotional expressiveness did not moderate the

links between parents’ negative emotionality and crying, whining, or emotion words. However, maternal self-reported negative emotional expressiveness did moderate the links between mothers’ own negative emotionality and residualized changes in child arguing/fighting with others from Time 1 to Time 2 (maternal negative emotionality main effect  $\beta = .36, p = .01$ ; negative emotional expressiveness main effect  $\beta = .05, p = .72$ ; Negative Emotionality  $\times$  Negative Emotional Expressiveness interaction  $\beta = .39, p < .003$ ). A separate regression showed that maternal self-reported positive emotional expressiveness also moderated the links between mothers’ own negative emotionality and changes in child arguing/fighting with others (negative emotionality main effect  $\beta = .45, p < .001$ ; positive emotional expressiveness main effect  $\beta = -.09, p = .41$ ; Negative Emotionality  $\times$  Positive Emotional Expressiveness interaction  $\beta = -.39, p < .001$ ). To examine whether mothers’ self-reported negative and positive

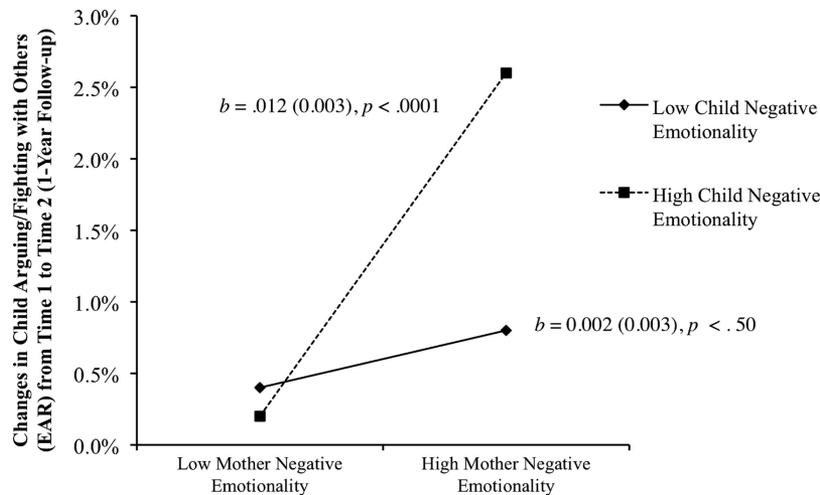


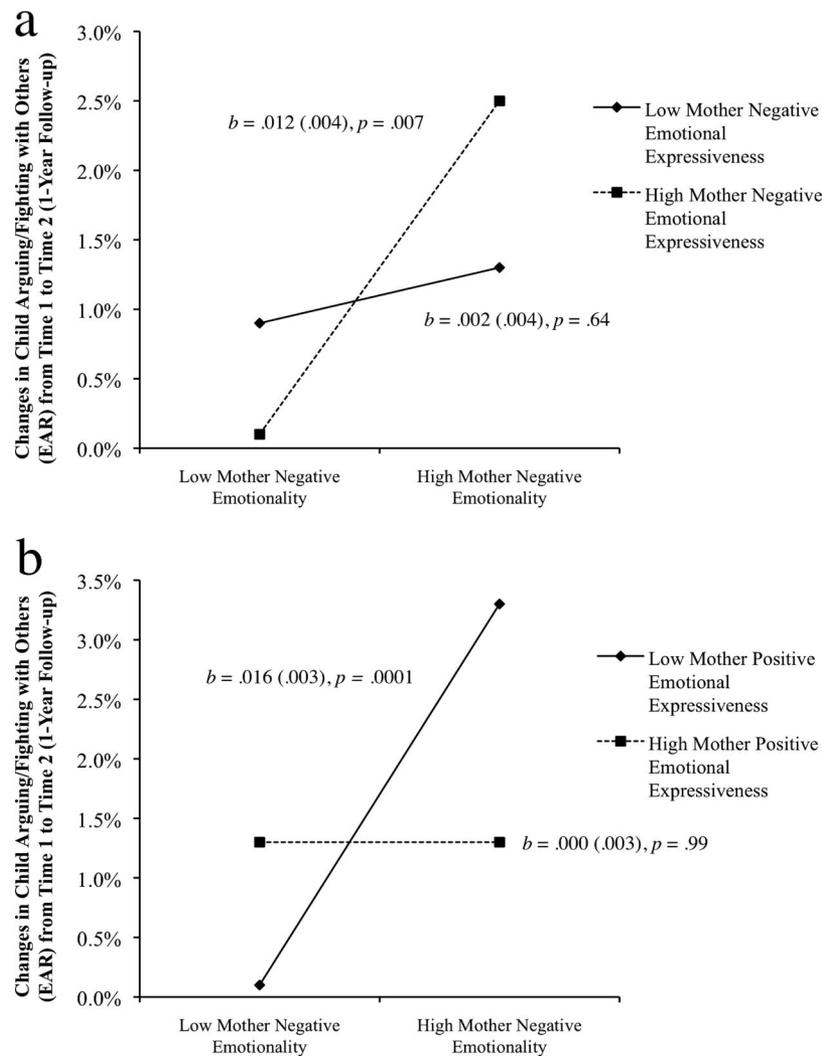
Figure 1. Moderation of the effects of mothers’ self-reported negative emotionality on residualized changes in child arguing/fighting with others from Time 1 (baseline) to Time 2 (1-year follow-up) by child negative emotionality. Child negative emotionality scores based on paternal-rated Child CBQ Negative Affectivity. High values are plotted at +1 standard deviation and low values plotted at -1 standard deviation from the mean (Aiken & West, 1991).

emotional expressiveness both uniquely moderated the associations between maternal negative emotionality and increases in children arguing/fighting, we entered both indicators of emotional expressiveness along with mothers' negative emotionality and their interaction terms into a regression. Maternal self-reported negative and positive emotional expressiveness each independently moderated the associations between mothers' negative emotionality and changes in children arguing/fighting, along with a significant main effect of mother's negative emotionality (Mothers' Negative Emotional Expressiveness  $\times$  Mother Negative Emotionality  $\beta = .38$ ; Mothers' Positive Emotional Expressiveness  $\times$  Mother Negative Emotionality  $\beta = -.41$ ; main effect of mothers' negative emotionality  $\beta = .43$ ; all  $ps < .005$ ). Together with maternal negative emotionality, mothers' negative and positive emotional expressiveness accounted for 57% of the variance in

children's residualized Time 2 arguing/fighting with others. As displayed in Figure 2, mother's negative emotionality was strongly associated with residualized increases in children arguing/fighting in their EAR recordings from Time 1 to Time 2 only when mothers were low in positive emotional expressiveness and/or high in negative emotional expressiveness.

## Discussion

This study investigated the links between parent and child negative emotionality, parents' self-reported emotional expressiveness and child everyday life behaviors. In support of our first hypothesis, parents' negative emotionality was a relatively robust predictor of child problem behaviors and negative emotion word use in everyday life, as measured by the EAR. Mothers reporting



*Figure 2.* Moderation of the effects of mothers' self-reported negative emotionality on residualized changes in child arguing/fighting with others from Time 1 (baseline) to Time 2 (1-year follow-up) by mothers' self-reported emotional expressiveness in the family. High values are plotted at +1 standard deviation and low values plotted at -1 standard deviation from the mean (Aiken & West, 1991). Moderating effects of mothers' self-reported negative emotional expressiveness and positive emotional expressiveness are shown in a and b, respectively.

higher levels of negative emotionality had children who argued and fought more with others and used more negative emotion words; fathers with higher levels of negative emotionality had children who whined more and who were marginally more likely to cry. We found limited support for our second hypothesis concerning associations between parent-reported child negative emotionality and everyday life behaviors. Specifically, when paternal reports of child negative emotionality were entered together with maternal negative emotionality, only maternal negative emotionality significantly predicted children's arguing and fighting with others in daily life.

In support of our third hypothesis, paternal-reported child negative emotionality moderated the association between maternal negative emotionality and child arguing and fighting in daily life. Furthermore, the pattern of moderation provided limited support for the differential susceptibility model outlined by Belsky and Pluess (2009). Specifically, at low levels of child negative emotionality, maternal negative emotionality was not associated with children's arguing and fighting, but at high levels of child negative emotionality, maternal negative emotionality had a significant positive association with arguing and fighting. Supportive of the differential susceptibility model, there was a cross-over interaction, meaning that the *lowest* levels of arguing and fighting were observed when *higher* child negative emotionality was paired with lower levels of maternal negative emotionality. However, our findings may be more supportive of a dual risk model (Sameroff, 1983) because levels of arguing and fighting were especially elevated when high levels of maternal negative emotionality was paired with higher levels of child negative emotionality.

We also found that the association between mothers' negative emotionality and children's problem behaviors was moderated by mothers' self-reported positive and negative expressiveness in the family context. Specifically, mothers' negative emotionality was strongly associated with children arguing/fighting in their EAR recordings only when mothers reported lower levels of positive emotional expressiveness and/or higher levels of negative emotional expressiveness. Thus, although negative expressiveness amplified the links between negative emotionality and child problem behaviors, positive expressiveness dampened those links.

Taken together, these findings demonstrate that maternal negative emotionality is associated with how preschool-aged children objectively act and talk in their daily lives. These findings extend previous questionnaire and structured observational studies showing links between maternal negative emotionality and young children's problem behaviors (Cumberland-Li et al., 2003; Kochanska et al., 1997; e.g., Oliver et al., 2009), and this is the first study to our knowledge to show that parents' negative emotionality is linked to discrete child behaviors in everyday life. The moderation findings indicate that the association between mothers' negative emotionality and their children's problem behaviors may vary as function of children's temperament traits and how emotionally expressive (of both positive and negative emotions) mothers report themselves to be around their children. These findings also suggest that addressing parents' emotion behaviors in the family context may be a potential target for preventive intervention programs aiming to ameliorate problematic outcomes associated with negative emotionality (Ellenbogen, Ostiguy, & Hodgins, 2010; Izard et al., 2008; Lahey, 2009).

The combination of direct associations between negative emotionality and child behavior and the moderation findings may have important implications for future research on cross-generational links between parents' personality traits and their children's behavior. For example, genetic factors may underlie associations between parental negative emotionality, child negative emotionality, and children's behaviors in everyday life. However, social learning may also play an important role whereby children model their mothers' negative traits but only if these traits are expressed within the family environment. Future research that uses the current naturalistic assessment approach within a genetically informed research framework such as a prospective adoption design (see Leve et al., 2007) could help to disentangle the role of underlying genetic factors and social learning in the intergenerational transmission of problematic personality traits and behaviors.

There are multiple limitations and strengths of this research. Studying child behavior as it unfolds in everyday life is, of course, time and labor intensive. Along with the richness and ecological validity of this type of data comes a notable trade-off of having a relatively small sample size with fairly limited statistical power. In particular, the small sample size limited our ability to explore three-way interactions of parental negative emotionality, parental expressiveness, and child negative emotionality when predicting children's behavior in everyday life. Nevertheless, these types of studies are vital for validating previous research findings with an assessment technique that is both independent of questionnaire reports of child behavior and that has generalizability beyond behaviors observed in structured settings.

A second limitation is that children wore the EAR for only 1 day at a time. This limitation was due to the relatively short battery life of the first-generation Child EAR (an issue now resolved with the newer generation of the Child EAR) and due to the inconvenience to families of asking their young child to wear the EAR for an extended period of time; it is possible that children may have more difficulty wearing the EAR for multiple days compared to adults in previous EAR studies. However, having child participants wear the EAR for a second time 1 year later helped ensure that the behaviors observed were not simply due to atypical or unusual family circumstances of a particular weekend. Further, the very high reliability between raters suggests that problem behaviors in everyday life can be identified and coded. Still, future research is needed to assess whether the pattern of findings reported here would also emerge on weekdays, when additional outside stressors including parents' work stress, child care, and other factors relevant to weekdays arise. Also, our decision to conduct the observations naturalistically in everyday life is not without disadvantages relative to other observational approaches. For example, use of structured observation in specific contexts (e.g., clean-up tasks; Scaramella, Sohr-Preston, Mirabile, Robison, & Callahan, 2008) may have allowed us to draw firmer conclusions regarding how parents' and children's negative emotionality impacts specific child behaviors within a discrete context.

Because the base rates of daily conflict reported in previous adult EAR studies have been very low (e.g., Holtzman, Vazire, & Mehl, 2010) and because there were generally very few conflicts within the families in this sample (with fewer than one conflict per day in most families), we made the decision at the outset of the coding process to create a single code for arguing/fighting that taps into conflict between the target child and any family member

(parents or siblings). Unpacking the nuances of the effects of daily parent-child conflict and conflict with siblings on child adjustment is a critically important question for future EAR research that should be able to be addressed using larger samples and more days of EAR sampling.

There were other sampling limitations as well. First, the relatively wide age range of children was less than ideal, given that there is considerable emotional and cognitive growth between these ages. Second, we did not ask parents about the presence of siblings of children in the study, nor did we assess whether all of the parents in the study were biologically related to their children. Larger samples with greater diversity in cultural background, socioeconomic status, and more precise assessments of family composition are essential to determine the generalizability of these findings.

In spite of these limitations, this study has several notable strengths. Perhaps most obvious is the EAR methodology itself, which provides a direct route to the interior workings of everyday family life and their relations to parent and child negative emotionality. In most studies of young children, researchers have had to rely on parent or teacher reports of child behavior or structured behavioral observation in relatively artificial contexts. With the EAR, researchers can circumvent this stubborn methodological issue. EAR data, although fairly time-consuming to code (but not necessarily much more so than structured observation) is relatively easy and inexpensive to collect. As such, it is method within reach of most investigators interested in studying how children behave in everyday settings. What makes this tool especially promising for this type of research is the nonoverlap of methods between parent reports and child behaviors, ensuring that links found between parental and child negative emotionality and young children's daily life behaviors are not simply methodological artifacts.

The other key strength is the theoretical contribution of this work. This research represents a significant advance in our understanding of the extent to which parents' negative emotionality—when considered within the context of child temperament and family emotional expressiveness—may influence young children's problem behaviors. It is our hope that these findings will prompt more research on the links between emotions and children's real-world behaviors. Although momentary and daily diary assessment is now a mainstay in studies of adults and adolescents (Conner, Tennen, Fleeson, & Barrett, 2009; Tennen, Affleck, & Armeli, 2005), its use in studies of young children is comparatively much lower, undoubtedly in part because of young children's inability to complete self-report questionnaires. With rapidly advancing technology, new methodological approaches such as the EAR may bring the number of studies of children's everyday lives more in line with that of adults, complementing other approaches to child research. Our findings demonstrate that young children's everyday behaviors are both measurable and vary as a function of both parents' and children's negative emotionality.

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