BRIEF REPORT

A Naturalistic Observation Study of the Links Between Parental Depressive Symptoms and Preschoolers' Behaviors in Everyday Life

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Previous research has shown that parental depressive symptoms are linked to a number of negative child outcomes. However, the associations between parental depressive symptoms and actual child behaviors in everyday life remain largely unknown. The aims of this study were to investigate the links between parental depressive symptoms and everyday child behaviors and emotional language use using a novel observational methodology, and to explore the potential moderating role of parent–child conflict. We tracked the behaviors and language use of 35 preschool-aged children for two 1-day periods separated by one year using a child version of the Electronically Activated Recorder, a digital voice recorder that records ambient sounds while participants go about their daily lives. Parental depressive symptoms were positively associated with multiple problem behaviors among children (i.e., crying, acting mad, watching TV) when measured both concurrently and prospectively, and with negative emotion word use prospectively. Further, the links between parental depressive symptoms and child crying were moderated by parents' perceptions of parent–child conflict. This study offers the first empirical evidence of direct links between parental depressive symptoms and child behaviors in daily life and presents a promising research tool for the study of everyday child behaviors.

Keywords: families, depression, naturalistic behavior, language, parent–child conflict

The robust links between maternal and paternal depressive symptoms and problematic child outcomes indicate that parental depression is a serious public health concern (Goodman, 2007; Kane & Garber, 2004). However, research has not yet examined associations between parents' depressive symptoms and child behaviors in daily life. Instead, investigations frequently rely on questionnaire reports, which are not ideal for disentangling the links between parental depressive symptoms and child behavior from biases and idealized views of children (Youngstrom, Izard, & Ackerman, 1999). And while laboratory measurements provide an important perspective on child behaviors, their ecological validity is limited (Barkley, 1991). Another approach is to assess behaviors as they unfold in daily life with naturalistic observation.

Examining relations between parental depressive symptoms and child behaviors in daily life during the preschool period has many advantages. The emergence of an emotion vocabulary and associated gains in language contribute to preschoolers' use of more sophisticated emotional self-regulation strategies (Cole, Armstrong, & Pemberton, 2010). On the other hand, parents continue to play a central role in emotional, behavioral, and cognitive socialization during the preschool years (Haden, Haine, & Fivush, 1997). In addition, early emerging psychopathology that is linked to problem behaviors and emotion regulation difficulties can be reliably identified for the first time during the preschool period (Wakschlag et al., 2007). Behaviors investigated in the present study included crying, whining, acting mad, TV viewing, and negative emotion word use, because these developmentally salient behaviors can be indicative of internalizing and externalizing problems (Zeman, Shipman, & Suveg, 2002).

Attention has increasingly focused on moderators of associations between parental depressive symptoms and child functioning. For example, maternal depressive symptoms predicted emotional and behavioral problems, but only when the child's mother exhibited low levels of responsiveness or high levels of negative affect (Leckman-Westin, Cohen, & Stueve, 2009). Parent–child conflict is an important construct to examine as a moderator because it plays a central role in youth psychopathology, and it is also asso-

ciated with parental depression (Marmorstein & Iacono, 2004). Furthermore, parent–child conflict is often at its peak during the preschool period, but there is substantial variability in conflict across families prior to school entry (Trentacosta et al., in press). Thus, a secondary aim was to explore whether the links between parent depressive symptoms and child behaviors in daily life would be stronger in families where parents reported more conflict with their children.

Method

A total of 35 two-parent families with 3- to 5-year-old children from Austin, TX were recruited through local daycare centers and postings on craigslist.com.[1] The sample of children included 21 girls (mean age at Time 1 = 4 years 6 months, range = 38 to 68 months) and 14 boys (mean age at Time 1 = 4 years 1 month, range = 39 to 71 months). Annual household income ranged from $30,000 to $500,000, with a median of $85,000. The sample was 73% white, 21% Latino/Hispanic, 4% African American and 2% other.

Families came to the lab on a weekday evening to receive an overview of the study and complete baseline questionnaires. Each parent completed either the Beck Depression Inventory (Beck, Steer, & Garbin, 1988) ($n = 11$; $M = 2.64$, $SD = 1.45$) or a short form of the Center for Epidemiological Studies-Depression scale (CES-D Short Form; Cole, Rabin, Smith, & Kaufman, 2004) ($n = 55$; $M = 8.83$, $SD = 2.73$); the variation in which depression scales were completed by each parent was caused by copyright issues with the BDI, necessitating a switch to the CES-D. The BDI and CES-D have been shown to correlate highly with each other ($r = .74$ in a validation study; Cole et al., 2004). Scores on the depressive symptom measures were Z-scored prior to all analyses and treated as a continuous variable in all statistical analyses. In order to assess parents' perceptions of parent–child conflict, parents were asked, on a 7-point Likert scale (1 = *much less*, 7 = *much more*), "Compared to other people, how much time do you spend arguing and fighting with your child?" ($M = 2.64$, $SD = 1.45$). Each parent also completed the *Internalizing* and *Externalizing* subscales of the Child Behavior Checklist (CBCL 4–18; Achenbach, 1991) at the outset of the study and at the 1-year follow-up. Descriptive statistics for all child variables are displayed in Table 1.

The following weekend, children wore the Electronically Activated Recorder (EAR; Mehl, Pennebaker, Crow, Dabbs, & Price, 2001) for a full day on either Saturday or Sunday. The EAR records ambient sounds while participants go about their daily lives, giving researchers a window into participants' actual behaviors as they naturally unfold. The Child EAR used in this study (Sony model # ICD-P320) is able to record for up to 19 hours in standard play mode. The recorder was worn by the child inside a "special magic shirt" designed for the study that has a pocket with colorful cartoon characters on it, allowing the EAR to be "out of sight, out of mind."

One year later, children wore the EAR for a second time on a Saturday or Sunday. To standardize recording times across children, 150 randomly selected 30-s sound files were transcribed and coded for each child at each time point. EAR transcriptions were submitted to a computerized linguistic analysis program called Linguistic Inquiry and Word Count (LIWC; Pennebaker, Booth, & Francis, 2007), which analyzed negative emotion words (e.g., "mad", "sad", "hate", and "scared"). 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 problem 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 (ICC[2, K] = .92 across behaviors).

Results

As shown in Table 2, fathers' depressive symptoms were positively correlated with children's crying, acting mad, and watching TV at Time 1, and with children's TV watching at Time 2. Mothers' depressive symptoms were positively correlated with children crying at Time 2. Maternal and paternal depressive symptoms were positively correlated with negative emotion word use at Time 2 as well as with increases in negative emotion word use from Time 1 to Time 2.[2] Mothers' depressive symptoms were significantly positively correlated with their children's externalizing symptoms at Time 2. Given that mothers' and fathers' depressive symptoms were both predictive of increases in children's negative emotion word use (specifically anger words) at Time 2, we tested whether maternal and paternal depressive symptoms were additive. We found that mothers' and fathers' depressive symptoms uniquely predicted increases in children's anger word use (with β's of .40 and .42 and p's of .011 and .014, respectively), together accounting for 40% of the variance in changes in children's anger word use from Time 1 to Time 2.

We next tested whether the links between parents' de-

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[1] Previously published findings from this study (Slatcher, Robles, Repetti, & Fellows, 2010) focused on the links between parents' self-reported momentary work worries and salivary cortisol. The findings presented here relating to parents' depressive symptoms and EAR-measured child behaviors and language use have not been published elsewhere.

[2] Secondary analyses examining the LIWC negative emotion word subcategories showed parental depressive symptoms to be strongly associated with increases in child anger words from Time 1 to Time 2 (r's of .49 and .50 for mothers and fathers, respectively, p's < .004), but unrelated to changes in sadness words (r's of .00 and −.09 for mothers and fathers, respectively, p's > .65) or anxiety words (r's of −.02 and .27 for mothers and fathers, respectively, p's > .14).

Table 1

Descriptive Statistics: Children's Problem Behaviors, Word Use, and Parent Reports of Children's Internalizing and Externalizing Symptoms

Child variable	Time 1 Mean (SD)	Time 2 Mean (SD)	Cohen's d	Paired t-test p-values
EAR Behaviors				
Crying	1.75% (2.48)	0.36% (0.63)	.77	<.01
Mad	0.62% (1.00)	0.23% (0.42)	.51	.03
Whining	4.29% (5.38)	1.56% (2.02)	.67	.01
Watching TV	27.65% (15.07)	28.84% (21.50)	.06	.70
EAR Word Use				
Negative emotion words	7.80 (6.92)	12.00 (10.96)	.46	.05
CBCL				
Mother-reported				
Internalizing symptoms	4.03 (3.39)	4.54 (3.16)	.16	.35
Externalizing symptoms	8.49 (5.07)	9.34 (5.85)	.16	.24
Father-reported				
Internalizing symptoms	3.64 (3.37)	5.58 (4.03)	.22	<.01
Externalizing symptoms	8.32 (6.52)	9.54 (5.51)	.20	.18

Note. Time 1 reflects measurement at baseline; Time 2 reflects measurement at 1-year follow up. Mean values for EAR behaviors represent the percentage of 30-second EAR segments where this behavior occurred at least once. Mean for negative emotion words represents the average number of negative emotion words transcribed from each child's EAR recordings. Effect size estimates (Cohen's d) and p-values reflect tests of Time 1–Time 2 differences for each variable.

pressive symptoms and child behaviors and word use were moderated by parent reports of parent–child conflict. We found that mother reports of mother–child conflict moderated the links between their own depressive symptoms at Time 1 and increases in child crying from Time 1 to Time 2 ($p < .002$). Similarly, we found that father reports of father–child conflict moderated the links between their own depressive symptoms at Time 1 and child crying at Time 1 ($p = .04$) and moderated increases in child crying from Time 1 to Time 2 ($p < .002$). As shown in Figure 1, when parents reported low levels of parent–child conflict, the association between their own depressive symptoms and child crying was nonsignificant; however, at high levels of parent–child conflict, there was a strong positive associa-

tion between parents' depressive symptoms and child crying for both mothers and fathers. Notably, the interaction effects of parent-reported depressive symptoms and parent–child conflict were additive for mothers and fathers (β's = .43 and .39 for mothers and fathers, respectively; p's < .01), accounting for 34% of the variance in changes in child crying.

Discussion

This study investigated the links between parents' depressive symptoms and child problem behaviors and negative emotion word use in everyday life as measured by the Child EAR. Two major findings emerged: (1) Parental depressive

Table 2

Correlations Between Parents' Depressive Symptoms, Children's Problem Behaviors, Word Use, and Parent Reports of Children's Internalizing and Externalizing Symptoms

Child variable	Mother depressive symptoms at Time 1	Father depressive symptoms at Time 1
EAR Behaviors		
Crying	.33†/.36* (.24)	.35*/.20 (.03)
Mad	.17/.32† (.30)	.47**/.10 (.01)
Whining	.19/.01 (−.01)	.33†/−.04 (−.06)
Watching TV	.15/.07 (−.03)	.37*/.39* (.24)
EAR Word Use		
Negative Emotion Words	−.07/.42* (.43*)	.14/.36* (.36*)
CBCL		
Internalizing symptoms	.23/.32† (.24)	.20/.04 (−.08)
Externalizing symptoms	.33†/37* (.21)	−.04/−.04 (−.04)

Note. Time 1 (first correlation) reflects measurement at baseline; Time 2 (second correlation) reflects measurement at 1-year follow up, with numbers in parentheses reflecting changes from Time 1 to Time 2 (Time 2 child behavior controlling for Time 1 child behavior). CBCL correlations are based on separate reports from mothers and fathers (e.g., reflecting correlation between mothers' depressive symptoms and mothers' reports of children's internalizing symptoms).
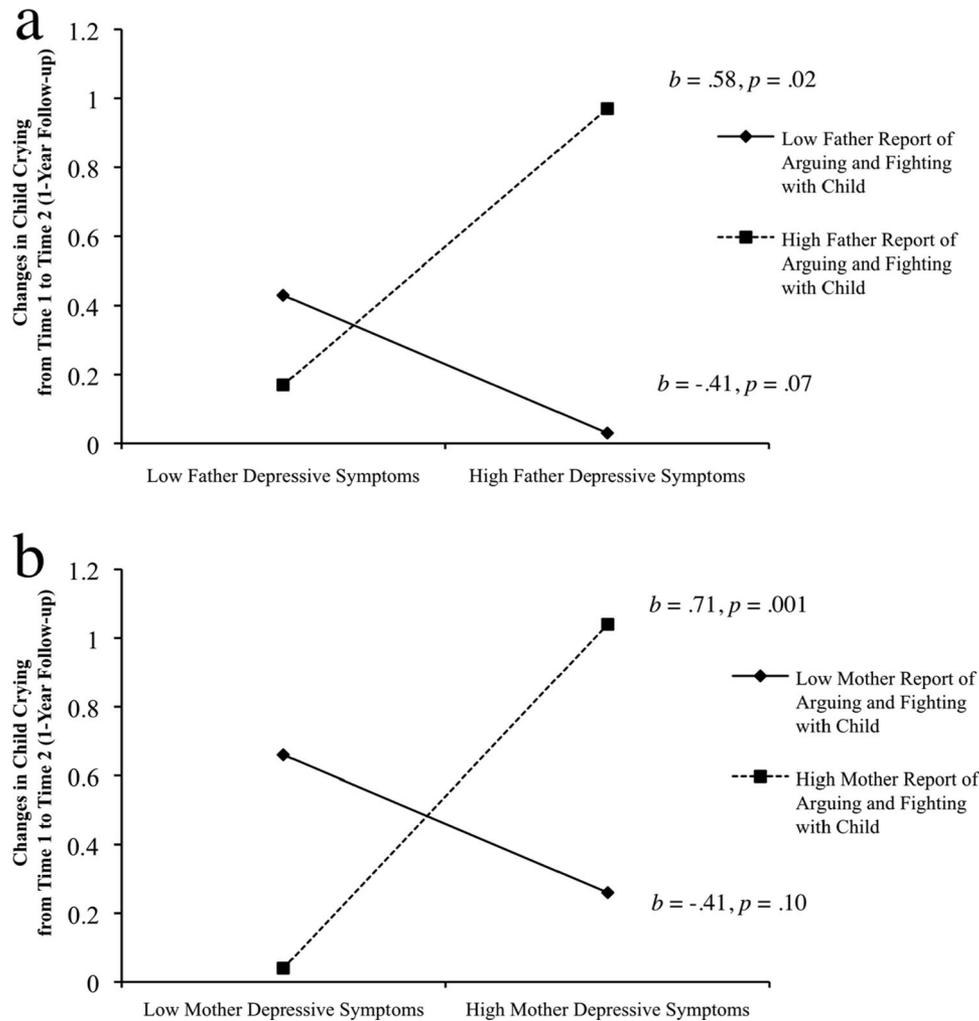† $p < .07$. * $p < .05$. ** $p < .01$, two-tailed.

Figure 1. Moderation of the association between parental depressive symptoms and changes in child crying (Time 2 crying controlling for Time 1 crying) by parental reports of arguing and fighting with the child. High values are plotted at + 1 standard deviation and low values plotted at −1 standard deviation from the mean. Analyses of fathers' and mothers' reports are displayed in panels "a" and "b", respectively.

symptoms were positively associated with children's crying, acting mad, and watching TV. (2) Mothers' and fathers' depressive symptoms at baseline additively predicted increases in children's negative emotion word use one year later.

We found much stronger associations between parents' depressive symptoms and child crying concurrently (for fathers) and with changes in crying from Time 1 to Time 2 (for both mothers and fathers) among families reporting greater parent–child conflict. Thus, for parents who argue and fight more with their children, the links between parental depressive symptoms and child negative emotion behaviors may be especially potent. These findings add to the literature demonstrating the parent–child relationship can modify the impact of parental depressive symptoms on children's functioning (e.g., Leckman-Westin, Cohen, & Stueve, 2009) and point to the parent–child relationship as

a important target for preventive intervention programs that aim to buffer the negative effects of parental depression.

An important limitation of the richness and ecological validity of this type of data is a small sample size with limited statistical power. A second limitation was the use of a single item to assess the level of parent–child conflict. Although the single item measure is limited from a psychometric perspective, the item's focus on arguing and fighting suggests that it has face validity as a measure of parent–child conflict. Another limitation was that, although the majority of children were age four or older, the 3-year-old children in this sample were younger than the normative sample for the version of the CBCL that was used. Finally, future research with the Child EAR should assess parental depressive symptoms over multiple time points.

Despite these limitations, this work reflects an important step in generating an ecologically valid understanding of the

links between parental depressive symptoms and child behaviors and emotion language use in everyday life. Taken together, these findings demonstrate that parental depressive symptoms are concurrently and prospectively associated with how preschool-aged children act in their daily lives. These findings extend previous research demonstrating links between parental depressive symptoms and problematic child behaviors (see Goodman, 2007 for a review). However, this study is the first to our knowledge to go beyond questionnaire and structured observation approaches to show that parents' depressive symptoms are linked to discrete child behaviors in everyday life. This information will help researchers better understand emotional development in children broadly and the links between parents' mood states and children's emotional processes specifically. Furthermore, evaluating at-risk children's emotions and behaviors in their everyday contexts has numerous potential implications for preventive intervention programs that aim to ameliorate the intergenerational transmission of psychopathology.

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