ORIGINAL ARTICLE

Sensitive Fathering Buffers the Effects of Chronic Maternal Depression on Child Psychopathology

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Abstract

Maternal depression across the first years of life carries long-term negative consequences for children's well-being; yet, few studies focused on fathers as potential source of resilience in the context of chronic maternal depression. Utilizing an extreme-case design, a community birth cohort of married/cohabiting mothers (N = 1983) with no comorbid risk was repeatedly tested for maternal depression across the first year and again at 6 years, leading to two matched cohorts; 46 mothers with chronic depression and 103 non-depressed controls. At 6 years, mother and child underwent psychiatric diagnosis and mother–child and father–child interactions observed. Partners of depressed mothers exhibited reduced sensitivity, lower reciprocity, and higher tension during interactions, particularly among children with psychopathology. Maternal depression increased child propensity to display Axis-I disorder upon school-entry by fourfold. Sensitive fathering reduced this risk by half. Findings underscore the father's resilience-promoting role in cases of maternal depression and emphasize the need for father-focused interventions.

Keywords Maternal depression · Fatherhood · Parent–child interaction · Longitudinal studies · Child psychopathology

Introduction

Resilience, defined as positive adaptation despite adversity [1], implies that while exposure to early life stress negatively impacts later development, some children growing amidst adversity display adequate adjustment, suggesting that there are elements in the rearing environment that can shield children in harsh or deprived contexts [2]. Although much research has demonstrated that early life stress exerts long-term negative effects on children's brain maturation [3], socio-emotional growth [4], cognitive and executive functions [5], and propensity for psychopathology [6], less research has focused on factors that can serve as resilience buffers. Since resilience often builds on positive relationships with benevolent adults [7], it is important to examine the effects of such relationships within the child's natural rearing ecology, not only in the context of adoption or

foster-care, as most (77.1%) children exposed to early adversity remain in the care of their parents [8].

The current study utilizes a well-selected birth cohort to test the buffering effects of sensitive fathering on children's mental health in the context of chronic maternal depression experienced across the first 6 years of life. Maternal postpartum depression, a condition affecting approximately 15% of women in industrial societies [9], is a well-known early life stress that has been known to carry long-term negative consequences for children's physical, social, and emotional development [10]. Yet, whereas offspring of depressed mothers show greater susceptibility to psychopathology [11], some children growing up in the context of chronic maternal depression are more resilient. To date, longitudinal studies on sequelae of maternal depression did not focus on resilience and several methodological constrains preclude greater specificity in research on resilience-enhancing factors. First, most studies did not differentiate maternal depression from frequently-occurring comorbid conditions, such as poverty, single parenthood, teenage pregnancy, or premature birth, each of which carries independent effects on children's social-emotional development and on the propensity for psychopathology [12]. Second, fathers have rarely been included in research on maternal depression and father's

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role in promoting resilience has not been tested. Third, very few studies used an observational approach and tested both mother–child and father–child interactions in the context of chronic maternal depression. Thus, the buffering effects of the father on children's adjustment amidst adversity and the relational components that underpin the father's contribution to resilience are mostly unknown.

Maternal depression has been repeatedly associated with disruptions to children's social-emotional growth and with increased susceptibility to both externalizing and internalizing psychopathology [11]. Authors have suggested that the mechanisms of transmission relate, at least partly, to the nature of caregiving provided by depressed mothers [13]. Indeed, during mother–infant relationships, depressed mothers show reduced sensitivity [14], minimal amounts of positive maternal behavior [15], higher intrusiveness [16], and the dyadic atmosphere is characterized by diminished reciprocity and greater tension [17]. Animal models indicate that reduction in maternal behavior ("licking-and-grooming") carries long-term effects on the organization of stress and affiliation networks in the offspring's brain, leading to lifetime difficulties in stress management and social adaptation [18]. However, cross-fostering studies show that when infants receive adequate amounts of maternal behavior not from the biological mother, these negative effects are reversed and the positive caregiving is transmitted to the next generation [19]. Such findings lend support to the hypothesis that sensitive fathering may reverse some of the negative effects of maternal depression on child psychopathology.

Sensitive fathering promotes social-emotional growth and carries unique positive effects on child adaptation [20]. Studies have underscored the contribution of positive father–child relationships to children's social adaptation in the peer group, lower aggression, conflict management, and low psychopathology [21–24]. In mammals, while paternal care is evident in only 3–5% of mammalian species [25], fathers display the entire caregiving repertoire and paternal investment uniquely contributes to offspring survival and thriving [26]. Reduced paternal care leads to increased stress reactivity and anxiety-like behavior [27], suggesting parallel effects of mothering and fathering on the child's propensity to anxiety [18]. In bi-parental species, such as prairie voles or degu, father absence has been linked with reduced maternal presence, less nurturing, and early weaning [28]. Yet, despite the potentially compensatory role of fathers, few studies addressed the effects of sensitive fathering by utilizing direct observations of the father–child relationship.

The current family-level study tested the role of sensitive fathering in the context of chronic maternal depression, a well-defined early life stress condition. A large community cohort of married/cohabitating mothers (N = 1983) with no co-morbid risk was recruited on the second post-birth day. Using an extreme-case design, depression was assessed repeatedly across the first year and again at 6 years, leading to two comparable cohorts at 6 years; 46 families with mothers who were continuously depressed across the child's first 6 years and 103 non-depressed controls families. At 6 years, clinical diagnosis of mother and child was conducted and mother–child and father–child interactions videotaped. We hypothesized that: (a) chronic maternal depression will markedly increase child propensity for psychopathology at 6 years; (b) in the depressed group, the father–child relationship will be less optimal, characterized by lower parental sensitivity and dyadic reciprocity and increased negativity and tension; and (c) sensitive fathering will decrease child propensity for psychopathology in the context of chronic maternal depression.

Method

Participants

The initial cohort included 1983 women who were recruited on the second post-birth day in three maternity wards and completed measures of anxiety and depression. The study included only mothers who were healthy, completed high school, were at least 21 years old, were above poverty line, were married/cohabitating, and who gave birth to healthy, term, singleton infant. Women at second post-birth day with Beck Depression Inventory [29] scores in the highest and lowest quartiles completed measures of anxiety and depression at 6 months (900 approached, 680 responded, 76%) and again at 9 months (350 approached, 254 responded, 73%). Women with high levels of anxiety symptoms (STAI scores > 43) were excluded. Of responding mothers at 9 months, 192 (76%) were clinically diagnosed and observed. Of these, 156 (81%) including mothers, fathers, and children were visited when the child were 6 years (M = 6.33, SD = 1.25). Mothers' mean age was 38.66 years (SD = 4.40), and fathers' mean age was 41.04 years (SD = 4.74). Eighty percent of parents had college degrees, 91% were married, and 89% of mothers and 98.5% of fathers were employed. Among children, 51% were boys and 36% were the firstborn. None of the fathers in the sample received a clinical diagnosis and BDI scores of fathers did not exceed the clinical cutoff (M = 3.37, SD = 3.27). The study was approved by the Institutional Review Board and all parents signed an inform consent.

Procedure and Measures

At 6 years, families were visited at home in the afternoon-evening hours to enable father participation. Each visit lasted approximately 4 h and included psychiatric diagnosis for

mother and child, DNA collection, parent–child interactions, and social-emotional paradigms.

Maternal Psychiatric Diagnosis—was conducted using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) [30]. Forty-six mothers were defined as chronically depressed. These mothers showed high depressive symptoms across the first year (BDI > 11 at birth, 6 month, and 9 months), diagnosed with MDD at both 9 months and 6 years, and reported being depressed throughout the child's first 6 years. The control group included 103 mothers who showed no elevated symptoms at any time-point and did not receive other Axis-I diagnosis. Seven mothers were excluded, due to anxiety (n = 3) or sub-clinical depression (n = 4).

Child Psychiatric Diagnosis

The Development and Well-Being Assessment-DAWBA is a structured interview and questionnaire to generate ICD-10/DSM-IV diagnoses in children 4–16 years old [31].

Parent–Child Interactions

Ten minutes of father–child interactions were videotaped (counterbalanced) using preselected toys shown to elicit symbolic play in preschool children [32]. The Coding Interactive Behavior (CIB) was used, a well-validated system for analyzing videotaped interactions with good psychometric properties that has been extensively researched in multiple samples, including fathers and children at this age [33]. Coders were blind to any information, and reliability, tested over 20% of interactions, exceeded 85% on all codes (*kappa* = .86, range = .81–.93). The *Parent Sensitivity* construct was used to index father's relational behavior and included the following (averaged) codes; acknowledging, elaboration, social gaze, vocalization, positive affect, range of affect, supportive presence, resourcefulness, child-lead of interaction, affectionate touch, and praising (alpha = .93). Two dyadic constructs addressed the dyadic atmosphere; *Dyadic Reciprocity*; reciprocity, adaptation-regulation, and fluency (alpha = .97), and *Dyadic Tension* included negativity-anxiety, hyper-vigilance, and constriction of play (alpha = .89).

Results

Maternal Depression and Child Psychopathology

To test our first hypothesis, Chi square for independence of measures was computed to test the prevalence of psychiatric disorders in children of depressed mothers compared to controls. Chronic maternal depression increased the prevalence of child psychopathology by fourfold, $x^2 = 32.85$,

df = 1, p < .001. Among children of depressed mothers, 61% received Axis-I diagnoses, whereas among children of controls, only 15% received a clinical diagnosis. In testing specific psychopathologies, we found that prevalence of anxiety disorders ($x^2 = 14.51$, df = 1, p < .001), oppositional defiant disorder ($x^2 = 7.97$, df = 1, p = .006), and attention deficit hyperactivity disorder ($x^2 = 5.69$, df = 1, p = .02) increased in children of depressed mothers.
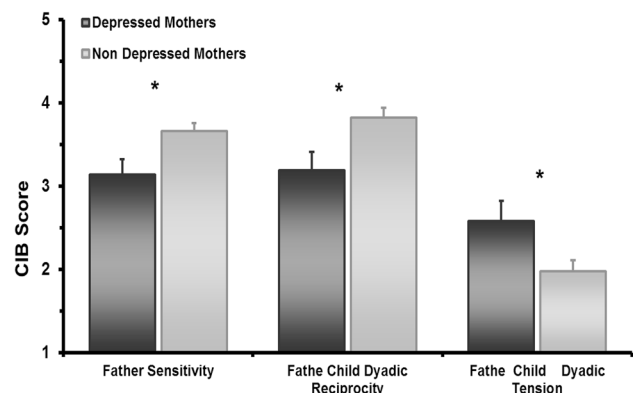
Maternal Depression and Father–Child Interaction

To test our second hypothesis, a series of independent samples t-tests with Bonferroni adjustment were computed. Results indicate that partners of depressed mothers exhibited lower sensitivity, $t_{(116)} = 2.62$, $p = .01$, and the dyadic atmosphere was characterized by lower father–child reciprocity, $t_{(116)} = 2.61$, $p = .01$, and increased tension, $t_{(116)} = -2.36$, $p = .02$, as compared with partners of controls (Fig. 1; Table 1).

Child Psychopathology; Effects of Maternal Depression and Father Sensitivity

To examine our third hypothesis—that father sensitivity buffers the effects of maternal depression on child psychopathology, we conducted logistic regression with child Axis-I disorder as a binary outcome. We included maternal depression, father sensitivity (centered) and maternal depression × father sensitivity interaction. Interaction was probed using Dawson's method [34] (Table 2).

Results showed a significant effect for maternal depression; children were more likely to receive a clinical diagnosis if their mother was depressed. In addition, we found an interaction effect of maternal depression and father sensitivity. As plotted in Fig. 2, the prevalence of child psychopathology was low among children of controls regardless of whether father sensitivity was high or low. On the other hand, among children

Fig. 1 Father–child interaction in families or depressed and non-depressed mothers. *p < .05

Table 1 Means, standard deviations, test statistics, and effect sizes for the effects of maternal depression on the father–child relationship

	Depression (N = 104)		No depression (N = 43)		t	d
	M	SD	M	SD		
Paternal sensitivity	3.15	1.04	3.66	.92	2.62**	.49
Dyadic reciprocity	3.19	1.27	3.82	1.12	2.61**	.48
Dyadic tension	2.58	1.35	1.99	1.18	− 2.36*	.44

*p < .05; **p < .01

Table 2 Logistic regression predicting child psychopathology from maternal depression and father sensitivity

	b	SE	exp(B)	95% CI for exp(B)	
				LL	UL
Maternal depression	.71˜	.24	2.03	1.27	3.23
Paternal sensitivity	− .39	.25	.68	.41	1.11
Maternal depression × paternal sensitivity	− .54*	.25	.58	.36	.95
			Cox and Snell's R² = 16%**		

exb(B) odd ratios, *LL* lower limit of confidence interval, *UL* upper limit of confidence interval

˜p < .07; *p < .05, **p < .01
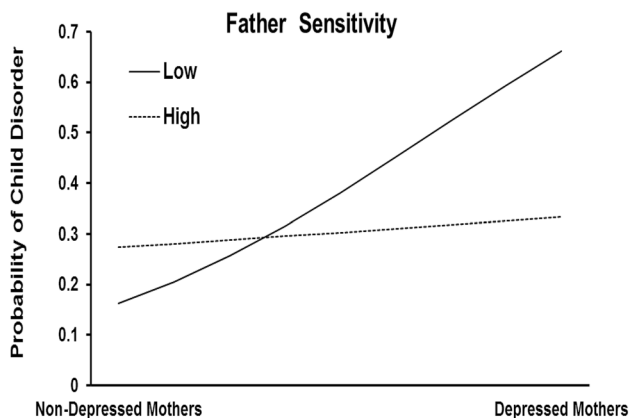
Fig. 2 Interaction effect of father sensitivity and maternal depression in predicting child psychopathology at 6 years

of depressed mothers, children experiencing sensitive fathering were significantly less likely to receive a clinical diagnosis upon school entry as compared to children of depressed mothers whose fathers were less sensitive. Adding gender as a predictor did not change the pattern of results.

Discussion

Results of the current study underscore the role of the father as a resilience buffer in the context of chronic maternal depression. We found that while children of depressed mothers were four times more likely have a psychiatric disorder by the time they enter school, sensitive fathering reduced this risk by half and the protective effect of the father was specific to the depressed group, not to controls. Such family level findings, specific to maternal depression, paternal behavior, and child psychiatric condition, highlight the importance of assessing father's role in the context of early adversity and emphasize the need to disseminate the well-researched construct of "early life stress" into specific conditions that are characterized by unique disruptions to child adaptation as well as by specific opportunities for resilience.

Our study is unique in several aspects and the findings may have important implications for theory and practice. First, unlike most research on maternal depression, we recruited a low-risk community cohort, excluded frequently-occurring comorbidities, and followed families across the first 6 years of life; thus, our results reflects the effects of maternal depression per se, independent of other contextual risks. Second, this is the first longitudinal study to examine fathering in the context of maternal depression by using direct observations, not self-reports. Finally, we employed a longitudinal design that assessed maternal depression repeatedly across the first year of life and again at 6 years to address the chronicity of maternal depression across early childhood.

Very few studies focused on fathers in the context of chronic maternal depression and no study to our knowledge examined father's behavior as a potential source of resilience in longitudinal research in relation to children's psychiatric disorders. In a study assessing infants whose mothers reported elevated depressive symptoms compared to controls, father–infant interaction was more optimal as compared to the mother–infant relationship in the depressed group at 3–6 months [35]. Similarly, positive self-reported father–adolescent relationship was found to buffer the effects of maternal mood on adolescents' internalizing and externalizing problems [36]. In contrast, studies have also shown that partners of depressed mothers provide less sensitive parenting than partners of controls [11, 37] and thus, children of

depressed mothers are often reared in environments marked by a double risk. Our findings similarly show that partners of depressed mothers were less sensitive and the dyadic atmosphere between father and child was less reciprocal and more negative. Several mechanisms can lead to these results, including "assortative mating", which suggests that women with psychopathology tend to select less adaptive spouses [38] and family-level approaches, which contend that fathers learn sensitive parenting from mothers, not vice versa, and when maternal care is deficient sensitive fathering is harder to acquire [39]. It is also possible that parenting alongside a depressed mother is very difficult and depletes the father's emotional resources so that fathers become less sensitive at 6 years of age. Because we did not observe father–child interactions in the first post-partum period, it is not possible to assess this hypothesis and this is a study limitation. Nonetheless, our findings show that when fathers are able to develop sensitive parenting, such sensitivity is critical for their children's well-being and can markedly reduce the child's propensity for psychopathology when mothers are depressed.

Overall, our results suggest that while chronic exposure to maternal depression bears long-term negative effects on children's well-being, regardless of other contextual risks that were controlled in this study, continuous exposure to paternal sensitivity carries positive effects. We have previously shown that father sensitivity is an individually-stable trait from infancy to adolescence [21], and it is thus likely that children receiving sensitive fathering at 6 years were exposed to such patterns of sensitive paternal care since infancy. Sensitive fathering develops on the basis of functionality of the father's oxytocin system [40] and intactness of empathy-related neural networks ion the paternal brain [41] in the first months of life and these neurobiological affiliation systems carry long-term benefits for children, including reduced aggression, better social relationships in the peer group, and more intimate relationships with a best friend [22, 23]. Our findings, therefore, highlight the importance of implementing father-focused interventions in cases of maternal depression already in infancy to enable children who are exposed to deficient maternal care to benefit from more invested and sensitive fathering.

From a conceptual perspective, our findings emphasize the need to focus much more effort on disseminating the construct of "resilience". Moreover, our data suggest that resilience implies specificity and research on resilience should differentiate one adverse condition from another, define child factors that open some children to certain influences and not others, and test specific effects of different benevolent relationships amidst adversity, including fathers, grandparents, siblings, or non-kin caregivers and how their contributions differ from one another. From a clinical perspective, our findings highlight the necessity to involve fathers in intervention efforts in cases of maternal depression. While greater father involvement is beneficial to any infant, our findings demonstrate in the context of maternal depression fathering is critical. Interventions for fathers in cases of postpartum depression should start early and begin by teaching fathers how to provide sensitive caregiving when they are not able to learn it from mothers as well as empower fathers by emphasizing their important, potentially compensatory role for infant well-being.

Several study limitations should be remembered in the interpretation of the findings. First, because we wanted to test the effects of maternal depression per se on child development, we included mothers without contextual risk or comorbid anxiety disorders. Our findings can therefore provide a first step and further research is needed to address the effect of father sensitivity in the context of maternal depression in higher risk cases. Next, fathering was only assessed when children were 6 years old and no causal effects can be inferred. However, growing body of results shows that father behaviour tends to be stable across children's development from infancy to adolescence [21, 22, 42], and thus, assessing fathers at the preschool stage can provide an index to the atmosphere in which children are reared. We measured parental sensitivity only through observation and not via self-reports, and it is possible that the cognitive-representational aspect of sensitive parenting was not fully tested.

Much further research is required to tease apart long-term risk and resilience factors in children growing up in the context of maternal depression and understand how each factor plays a unique role at different developmental nodes. There is a need to address genetic, neuroendocrine, and brain systems that may be negatively impacted by maternal depression and assess whether and how functioning of these systems can be ameliorated by sensitive paternal care, to what extent, and for which children. Finally, due to the large and growing prevalence of postpartum depression in the population, it is critical to follow children exposed to early maternal depression across childhood and adolescence and describe how such children meet the next transitions in their life, including the pubertal transition, leaving home, building long-term intimate relationships, and eventually nurturing their own children.

Summary

We tested the father's role as resilience buffer in the context of early and chronic maternal depression. Utilizing a community cohort followed from birth to 6 years and repeatedly assessed for maternal depression we formed two cohorts; families where mothers were chronically depressed and nondepressed controls. During father–child interactions, partners of depressed mothers were less sensitive and reciprocal

and the dyadic atmosphere was tense. Maternal depression increased child propensity to display Axis-I disorder at 6 years by four fold. However, when fathers showed high sensitivity, child psychopathology was markedly reduced. Findings highlight the importance of developing father-focused interventions.

Compliance with Ethical Standards

Conflict of interest Drs. Vakrat, Apter-Levy, and Feldman have no conflict of interest to disclose.

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