

Hormonal sensitivity of preterm versus full-term infants to the effects of maternal depression

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Abstract

Comparisons were made of differences in the hormonal sensitivity of preterm versus full-term infants to maternal depression, as reflected in children's cortisol levels. In Study 1 ($N=25$), a comparison was made between preterm versus healthy full-term children. In Study 2 ($N=80$), a comparison was made between preterm infants and full-term infants with mild or moderate medical problems. Preterm infants were found to be highly reactive to maternal depression (as measured by the Beck Depression Inventory). That is, they demonstrated higher cortisol levels when paired with depressed mothers and lower cortisol levels when paired with non-depressed mothers. No equivalent effects were found for children who were full-term, even when they had experienced other medical problems at birth. It was concluded that premature infants are exceptionally sensitive to the "emotional climate" in their home environment. As a result, they may manifest very different hormonal outcomes—with implications for their later development. © 2007 Elsevier Inc. All rights reserved.

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1. Introduction

Considerable attention has been given historically to the fact that high levels of stress early in life predict later problems. More recently, such effects have been interpreted in terms of biological changes as mediators of this process. Researchers concerned with developmental psychopathology have given increasing attention to the neurohormonal responses of very young children to early trauma or stress (e.g., Bremner & Narayan, 1998; Gunnar, 2000; Nelson, 2000). However, interests have expanded beyond concern with trauma to a broader consideration of early experiences that predict children's later outcomes. It has also extended to consider possible variations in child vulnerability. Repetti, Taylor, and Seeman (2002), in a review of literature concerning the biological outcomes of children in "risky" families (e.g., those characterized by aggression/conflict or coldness/neglect), concluded that child vulnerability and family risk combine to predict dysregulation of the child's stress response system—a consequence that ultimately has negative implications for their later health and well-being. In this study, we focused attention on maternal depression as a potential source of early stress for infants. Our specific concern here was on the differential vulnerability of preterm versus full-term infants to maternal depression—in terms of their stress-relevant hormonal responses.

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1.1. Maternal depression

Maternal depression has repeatedly been found to have negative implications for maternal responsiveness and sensitivity to infants—which in turn has implications for infant development. For example, Zlochower and Cohn (1996) demonstrated that depressed mothers were less responsive to their infants—leading to a reduction in synchrony of the interaction within the dyad. Donovan, Leavitt, and Walsh (1998) observed that depressed mothers manifested deficits in their ability to detect differences in infant cries—communication patterns that have significance for accurate signal detection within the relationship. Supporting this finding, Broth, Goodman, Hall, and Raynor (2004) found that depressed mothers were less accurate than non-depressed mothers in interpreting infant emotions, as reflected in their facial expressions.

The response patterns typically shown by depressed mothers, in turn, predict more negative outcomes for their children. Field and her colleagues have conducted extensive research concerned with interaction between depressed mothers and their children. In reviewing the literature, Field (1994) concluded that disruptions are shown at many levels among infants of depressed mothers. When mothers are relatively emotionally and socially unavailable, their infants are more likely to show negative affect and disrupted emotional regulation abilities, as well as dysregulated neurobehavioral development at later ages (Ashman, Dawson, Panagiotides, & Wilkinson, 2002; Dawson & Ashman, 2000; Field, 1994). Laboratory research has also demonstrated that disruptions can be experimentally produced in the affective responses of infants if they are exposed to a “still face” that simulates the behavior of depressed mothers (Gianino & Tronick, 1988). Extensive work making use of this paradigm has demonstrated that children manifest short-term responses to the still-face stimulus that are equivalent to those shown by the children of depressed mothers (as described by Field, 1994). For example, they show greater negative affect, increased heart rate and vagal tone (Moore & Calkins, 2004). In addition, infancy has been identified as a period in which maternal depression has the greatest effect on later development during early childhood (Sohr-Preston & Scaramella, 2006). However, less is known about the differential sensitivity of infants to maternal depression.

1.2. Variations in children’s sensitivity to context: potential moderators of responses shown to maternal depression

Whereas children are believed to be generally sensitive to their early environment, children may also vary in their level of sensitivity. For example, Belsky and his colleagues (Belsky, 2005; Belsky, Hsieh, & Crnic, 1998) have proposed that children differ in their degree of reactivity or responsiveness to parents’ childrearing practices. Specifically, infants who show high negative emotionality are more (negatively) reactive to parenting practices than are those who show low negative emotionality; ultimately such children show a greater frequency of externalizing problems. Such children may be thought of as exceptionally vulnerable to the effects of harmful environments. Boyce and Ellis (2005) proposed that some children may be highly reactive to *all* aspects of their parenting history—with resultant implications for their later outcomes. In similar fashion, De Bellis (2004) proposed that some children have predispositions that lead them to show increased sensitivity to social cues in general.

Past research has focused on differences in children’s temperament as a source of differential sensitivity to their social environment. However, there are suggestive indications that preterm infants may also provide an instance of children who are exceptionally vulnerable to their early social-emotional environment. In some ways, they show heightened reactivity to their environment, for example, they show greater eye opening in response to infant-directed speech, and greater manifestations of distress when tactile stimulation (to the arms) is used in combination with infant-directed speech (Eckerman, Oehler, Medvin, & Hannan, 1994). However, they have more difficulty in sustaining attention to stimuli (Ruff, 1986). The attentional reactivity of preterm infants appears to pose a cost to their physiological stability (Lester, Boukydis, & LaGasse, 1996). In general, preterm infants show disorganization of their self-regulation ability, as well as attention and state disorganization (Als, Duffy, & McAnulty, 1988). They also show deficits in their processing of social stimuli. For example, preterm infants show auditory-visual deficits in their ability to detect face-voice synchrony in social stimuli (Pickens, Field, Nawrocki, & Martinez, 1994). Possibly in the service of self-regulation, preterm infants are also more likely to withdraw from social stimuli (Field, 1994). At the most general level, preterm infants have been found to show poorly developed social, communication, and joint attention initiation abilities (De Groote, Roeyers, & Warreyn, 2006). On a long-term basis, children born prematurely are less socially competent at later ages than are full-term children (Tessler, Nadeau, Boivin, & Tremblay, 1997).

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