ENCYCLOPEDIA
on Early Childhood
Development



# Perinatal Depression and Children: A Developmental Perspective

**Sherryl H. Goodman, PhD**

Emory University, USA

January 2024, Éd. rév.

## Introduction

Perinatal depression in mothers, defined as depression occurring during pregnancy or postpartum among individuals who identify as women, is of concern for all who are involved with such families. These concerns derive from common understandings of the essential role both a healthy pregnancy and mothers' warm responsive care play in fetal and infant development and how depression might interfere. A growing body of research reveals the associations between perinatal depression and the psychological development of infants and young children of depressed mothers.  The research has focused on outcomes that are concerning themselves and also vulnerabilities to the later development of psychopathology as well as likely mechanisms in the intergenerational transmission of depression. Although many questions remain, some conclusions can be drawn about the effects of perinatal depression on child development and the implications for parents, service providers and policy makers.

## Subject

©2024-2026 ABILIO | MATERNAL DEPRESSION

Depression is common, especially in women. During pregnancy, rates of major depressive episodes, as defined by the *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (DSM-5), or of clinically significant levels of depressive symptoms based on scores from psychometrically sound rating scales range from 10-25%[1] with higher estimates in studies of women in low- and middle-income countries. Rates are even higher, i.e., 77%, among women who had at least one episode of major depression prior to their first pregnancy.[2] Antenatal depression occurs in similar rates as in the postpartum period. Finally, given that antenatal depression is one of the strongest predictors of postnatal depression, i.e., that perinatal depression often begins in pregnancy or preconception,[3,4] many children are exposed both during fetal and infant development.

**Problems**

From a developmental perspective, timing of exposure to maternal depression is an important consideration, especially in terms of specific risks to development, resiliencies that older children would be able to bring to bear, and the mechanisms by which those risks are likely to be transmitted. Of particular concern is that early on, children of depressed mothers may develop vulnerabilities to later depression or other problems. Antenatal depression may not only alter development of stress-related biological systems in the fetus, but may also increase risk of obstetrical complications.[5] Postnatal depression may also be an early life stressor given known associations with mothers' lower levels of sensitive, responsive care needed for infants' development of health attachment relationships, emotional regulation skills, interpersonal skills and stress response mechanisms.[6,7] Early life stressors, such as those that might be associated with maternal depression, can influence brain development, which continues at a rapid pace at least for several years after birth.[8,9] Problems in any of these aspects of development may disrupt the earliest stages of socio-emotional and cognitive development, predisposing to the later development of depression or other disorders.

**Research Context**

Research on the development of children exposed to perinatal depression emerges and benefits from the body of work which considers the broader context within which perinatal depression is embedded, including comorbidities (e.g., anxiety and/or substance use), correlates (e.g., marital distress), and the broader environment (e.g., economic stressors).[10,11]

## Key Research Questions

Researchers have focused their questions on the effects of antenatal or postnatal depression on infant and later development, with a few examining the combined effect of both. Essential questions that have been addressed include: (a) effects of antenatal, postnatal, or dual exposures on infant and later development (b) primary mechanisms or mediators that help explain those effects (c) moderators of those associations such that some children are at greater risk than others, especially considering qualities of the parents, the children and the environment. Goodman and Gotlib's integrative model has served as an organizing framework for much of this work.[12,13]

## Recent Research Results

Consistent with theorized mechanisms, antenatal depression has been found to be associated with preterm birth, newborns' neurobehavioural regulation, including their ability to attend to visual and auditory stimuli and overall alertness, as measured by the Neonatal Behavioral Assessment Scale.[14-17] Beyond the newborn period, other adverse outcomes noted for offspring are higher levels of fussing/crying and more sleep problems (with sleep problems persisting through 18 and 30 months of age[18]), greater frontal electroencephalogram (EEG) asymmetry,[19,20] higher cortisol,[21] lower fetal heart rate variability and lower infant self-regulation at three months,[22] and various aspects of infant brain development.[23-26] Finally, antenatal depression is associated with elevations in emotional and behavioural problems  at 8 to 9 years of age.[27]

Postpartum depression has been associated with a range of problems in infants' and young children's development.[28] Associated outcomes include negative infant temperament, especially negative affectivity,[29] insecure attachment,[30] cognitive and language development difficulties,[31] lower self-esteem and other cognitive vulnerabilities to depression in five year olds,[32] and poorer peer relations in early childhood.[33]

Despite much theorizing and support from the animal literature for a role of cortisol as a mediator of the associations between antenatal depression and infant and child outcomes, support has been inconsistent and primarily indirect. First, tests of associations between depression and cortisol in pregnancy have yielded mixed or no support,[34] although a recent study of a birth cohort revealed strong associations between hair cortisol levels at delivery and consistently elevated prenatal depression, suggesting an important role of cumulative or

trajectory indices of antenatal depression.[35] Second, studies that tested either direct associations between antenatal maternal cortisol levels on infant or child outcomes or the mediational role of antenatal cortisol in associations between antenatal depression and outcomes yield mixed findings, although with some recent support.[36,37] In contrast, evidence is increasingly revealing characteristics of the offspring functioning as mediators in the intergenerational transmission of risk from depression in mothers, including prenatal depression. For example, elevated depression symptoms in pregnant women were associated with less neural maturation in the parietal region of 4-month-old infant (regions that support sociocognitive functions), which subsequently were associated with greater infant negative affectivity temperament.[38]

The primary mechanisms implicated in associations between postnatal depression and young children's development have been problems in parenting and high stress levels, both of which have strong associations with depression in women. Support has been accumulating for parenting and stress/adversity as mediators of associations between postnatal depression and problems in child development.[7,39,40] Depression interferes with the qualities of parenting known to be associated with infants' and young children's healthy development, as it is associated with parenting likely experienced as stressful by children (e.g., unresponsive/disengaged, hostile/critical or unpredictable).[41] Other mechanisms that have yielded empirical support are couples conflict.[6] Increasingly, tests of mechanisms in the intergenerational transmission of depression reveal complexities of predictive models. As one example, Sellers et al.[42] found empirical support for mothers' hostility and warmth as mediators of association between their severity of depression and offsprings' risk for psychopathology, which was attenuated by mothers' co-occurring antisocial behaviour symptoms.

Given that antenatal depression for many women is followed by postnatal depression, many children are dually exposed; that repeated exposure across pregnancy and the postpartum is associated with worse outcomes than either exposure alone.[43] More broadly, chronicity is associated with worse outcomes.[43,44]

**Research Gaps**

Although perinatal depression in relation to children is increasingly understood, many unanswered questions remain. Longitudinal studies are needed to test the specific mechanisms that may explain these associations, and the pathways by which depression, beginning in pregnancy, comes to be associated with adverse outcomes among the children. Increasingly

sophisticated study designs and approaches to analyses enable tests of how mechanisms might work together, and in different ways at different points in development.

Similarly, more studies are needed to reveal which children of perinatally depressed parents are more or less likely to develop problems, whether explained by parent characteristics, such as the severity of depression or comorbid conditions, child characteristics such as gender, or contextual factors such as poverty. Also important to study as potential moderators are genetic polymorphisms implicated in depression. The propensity score matching approach holds promise for revealing the differences between mothers with and without depression that matter for children.[45] Essentially, we need to give greater consideration to variability, beginning with characterizing our samples of depressed mothers in terms of comorbidities, correlates, and course. Overall, more studies are needed from a developmental perspective that include multiple time points of measures of perinatal depression, and that test transactional processes such as how child factors can contribute to the development and maintenance of depression in mothers.[46] Further, it is essential to recognize and include in our studies trans and gender expansive pregnant and postpartum people.

**Conclusions**

Perinatal depression is associated with infants' and young children's problems in multiple aspects of functioning, increasing their vulnerability for the later development of depression and other disorders. Problems range from affective and interpersonal functioning to EEG frontal asymmetry and neuroendocrine abnormalities. Although most of the perinatal literature has focused on postnatal depression, studies that also measured antenatal depression suggest that antenatal depression may at least partially explain some effects previously attributed to postnatal depression. Both parenting qualities and stressful environments are at least partial mechanisms in pathways from postnatal depression to young children's problems in development. Support is emerging for additional mechanisms to explain associations between antenatal depression and young children's problems. Transactional processes help to explain negative cascades such as an antenatally depressed mother who gives birth to a fussy baby, who then challenges an already vulnerable mother, who then might be more likely to experience a postnatal depression. Although not reviewed here, depression, including perinatal depression, is often preventable and treatable.

**Implications for Parents, Services and Policy**

The findings have implications for parents in helping them to understand that perinatal depression must be taken seriously, assessed and treated. Women with histories of depression might benefit from preventive interventions when they become or consider becoming pregnant, to prevent the likelihood of a perinatal depression. Family members can be helpful in identifying early signs of perinatal depression, providing support and helping minimize barriers to care, including practical and belief-related barriers. Service providers who work with pregnant and postpartum women play key roles in being able to not only identify perinatal depression, but, equally importantly, to facilitate prompt and effective treatment and monitor the development of the infants. A range of treatment options are available. A report issued from the National Research Council and Institute of Medicine of the National Academies has multiple recommendations for policy makers.[47]

**References**


1. Roddy Mitchell A, Gordon H, Lindquist A, et al. Prevalence of perinatal depression in low- and middle-income countries: a systematic review and meta-analysis. *JAMA Psychiatry* 2023;80(5):425-431.
2. Kiewa J, Meltzer-Brody S, Milgrom J, et al. Lifetime prevalence and correlates of perinatal depression in a case-cohort study of depression. *BMJ Open* 2022;12(8):e059300.
3. Johansen SL, Stenhaug BA, Robakis TK, Williams KE, Cullen MR. Past psychiatric conditions as risk factors for postpartum depression: a nationwide cohort study. *Journal of Clinical Psychiatry* 2020;81(1):19m12929.
4. Wilcox M, McGee BA, Ionescu DF, et al. Perinatal depressive symptoms often start in the prenatal rather than postpartum period: results from a longitudinal study. *Archives of Women's Mental Health* 2020;24(1):119-131.
5. Dadi AF, Miller ER, Bisetegn TA, Mwanri L. Global burden of antenatal depression and its association with adverse birth outcomes: an umbrella review. *BMC Public Health* 2020;20(1):173.
6. Stein A, Pearson RM, Goodman SH, et al. Effects of perinatal mental disorders on the fetus and child. *The Lancet* 2014;384(9956):1800-1819.
7. Goodman SH, Simon HFM, Shamblaw AL, Kim CY. Parenting as a mediator of associations between depression in mothers and children’s functioning: a systematic review and meta-analysis. *Clinical Child and Family Psychology Review* 2020;23(4):427-460.

8. Wu Y, Espinosa KM, Barnett SD, et al. Association of elevated maternal psychological distress, altered fetal brain, and offspring cognitive and social-emotional outcomes at 18 months. *JAMA Network Open* 2022;5(4):e229244-e229244.
9. Sethna V, Siew J, Gudbrandsen M, et al. Maternal depression during pregnancy alters infant subcortical and midbrain volumes. *Journal of Affective Disorders* 2021;291:163-170.
10. Pelham WE, West SG, Lemery-Chalfant K, et al. Depression in mothers and the externalizing and internalizing behavior of children: An attempt to go beyond association. *Journal of Abnormal Psychology* 2021;130(1):60-77.
11. Goodman SH, Tully EC. Recurrence of depression during pregnancy: Psychosocial and personal functioning correlates. *Depression and Anxiety* 2009;26(6):557-567.
12. Goodman SH, Gotlib IH. Risk for psychopathology in the children of depressed mothers: A developmental model for understanding mechanisms of transmission. *Psychological Review* 1999;106(3):458-490.
13. Goodman SH. Intergenerational transmission of depression. *Annual Review of Clinical Psychology* 2020;16:213-238.
14. Brazelton TB. *Neonatal Behavioral Assessment Scale*. Philadelphia, PA: Lippincott; 1984.
15. Diego MA, Field T, Hernandez-Reif M. Prepartum, postpartum and chronic depression effects on neonatal behavior. *Infant Behavior and Development* 2005;28(2):155-164.
16. Goodman SH, Rouse MH, Long Q, Ji S, Brand SR. Deconstructing antenatal depression: What is it that matters for neonatal behavioral functioning? *Infant Mental Health Journal* 2011;32(3):339-361.
17. Smith A, Twynstra J, Seabrook JA. Antenatal depression and offspring health outcomes. *Obstetric Medicine* 2020;13(2):55-61.
18. O'Connor TG, Caprariello P, Blackmore ER, et al. Prenatal mood disturbance predicts sleep problems in infancy and toddlerhood. *Early Human Development* 2007;83(7):451-458.
19. Field T, Diego M, Hernandez-Reif M. Prenatal predictors of maternal and newborn EEG. *Infant Behavior and Development* 2004;27(4):533-536.
20. Goodman SH, Liu R, Lusby CM, et al. Consistency of EEG asymmetry patterns in infants of depressed mothers. *Developmental Psychobiology* 2021;63(4):768-781.

21. Peterson GF, Espel EV, Davis EP, Sandman CA, Glynn LM. Characterizing prenatal maternal distress with unique prenatal cortisol trajectories. *Health Psychology* 2020;39(11):1013-1019.

22. Pinto TM, Nogueira-Silva C, Figueiredo B. Fetal heart rate variability and infant self-regulation: The impact of mother's prenatal depressive symptoms. *Journal of Reproductive and Infant Psychology* 2023. doi:10.1080/02646838.2023.2257730

23. Hashempour N, Tuulari JJ, Merisaari H, et al. Prenatal maternal depressive symptoms are associated with neonatal left amygdala microstructure in a sex-dependent way. *European Journal of Neuroscience* 2023;57(10):1671-1688.

24. Rotem-Kohavi N, Virji-Babul N, Oberlander TF. Prenatal exposure to maternal depression is related to the functional connectivity organization underlying emotion perception in 8-10-month-old infants—Preliminary findings. *Infant Behavior & Development* 2021;63:101545.

25. Acosta H, Tuulari Jj, Scheinin Nm, et al. Prenatal maternal depressive symptoms are associated with smaller amygdalar volumes of four-year-old children. *Psychiatry Research: Neuroimaging* 2020;304:111153.

26. Lee A, Poh JS, Wen DJ, et al. Long-term influences of prenatal maternal depressive symptoms on the amygdala-prefrontal circuitry of the offspring from birth to childhood. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging* 2019;4(11):940-947.

27. Luoma I, Tamminen T, Kaukonen P, et al. Longitudinal study of maternal depressive symptoms and child well-being. *Journal of the American Academy of Child & Adolescent Psychiatry* 2001;40(12):1367-1374.

28. Murray L, Halligan S, Cooper P. Postnatal depression and young children's development. In: Zeanah C, ed. *Handbook of Infant Mental Health*. Guilford Publications; 2018:172-186.

29. Spry EA, Aarsman SR, Youssef GJ, et al. Maternal and paternal depression and anxiety and offspring infant negative affectivity: A systematic review and meta-analysis. *Developmental Review* 2020;58:100934.

30. Śliwerski A, Kossakowska K, Jarecka K, Świtalska J, Bielawska-Batorowicz E. The effect of maternal depression on infant attachment: a systematic review. *International Journal of Environmental Research* and Public Health 2020;17(8):2675.

31. Sohr-Preston SL, Scaramella LV. Implications of timing of maternal depressive symptoms for early cognitive and language development. *Clinical Child & Family Psychology Review*

2006;9(1):65-83.

32. Murray L, Woolgar M, Cooper P, Hipwell A. Cognitive vulnerability to depression in 5-year-old children of depressed mothers. *Journal of Child Psychology and Psychiatry* 2001;42(7):891-899.

33. Murray L, Sinclair D, Cooper P, Ducournau P, Turner P, Stein A. The socioemotional development of 5-year-old children of postnatally depressed mothers. *Journal of Child Psychology and Psychiatry* 1999;40(8):1259-1271.

34. Orta OR, Gelaye B, Bain PA, Williams MA. The association between maternal cortisol and depression during pregnancy, a systematic review. *Archives of Women's Mental Health* 2018;21(1):43-53.

35. Mustonen P, Karlsson L, Kataja EL, et al. Maternal prenatal hair cortisol is associated with prenatal depressive symptom trajectories. *Psychoneuroendocrinology* 2019;109:104383.

36. Osborne S, Biaggi A, Chua TE, et al. Antenatal depression programs cortisol stress reactivity in offspring through increased maternal inflammation and cortisol in pregnancy: The Psychiatry Research and Motherhood–Depression (PRAM-D) Study. *Psychoneuroendocrinology* 2018;98:211-221.

37. Graham AM, Rasmussen JM, Entringer S, et al. Maternal cortisol concentrations during pregnancy and sex-specific associations with neonatal amygdala connectivity and emerging internalizing behaviors. *Biological Psychiatry* 2019;85(2):172-181.

38. Kling JL, Mistry-Patel S, Peoples SG, Caldera DR, Brooker RJ. Prenatal maternal depression predicts neural maturation and negative emotion in infants. *Infant Behavior and Development* 2023;70:101802.

39. Cummings EM, Cheung RYM, and Davies PT. Prospective relations between parental depression, negative expressiveness, emotional insecurity, and children’s internalizing symptoms. *Child Psychiatry* and Human Development 2013;44(6):698-708.

40. Sullivan ADW, Forehand R, Vreeland A, Compas BE. Does parenting explain the link between cumulative ses risk and child problems in the context of parental depression? *Child Psychiatry & Human Development* 2022;53(2):330-341.

41. Hazell Raine K, Nath S, Howard LM, et al. Associations between prenatal maternal mental health indices and mother–infant relationship quality 6 to 18 months’ postpartum: A systematic review. *Infant Mental Health Journal* 2020;41(1):24-39.

42. Sellers R, Harold GT, Elam K, et al. Maternal depression and co-occurring antisocial behaviour: testing maternal hostility and warmth as mediators of risk for offspring psychopathology. *Journal of Child Psychology and Psychiatry* 2014;55(2):112-120.

43. Morgan JE, Channon S, Penny H, Waters CS. Longitudinal studies examining the impact of prenatal and subsequent episodes of maternal depression on offspring antisocial behaviour. *European Child & Adolescent Psychiatry* 2021;30(1):5-40.

44. Morales MF, Girard LC, Raouna A, MacBeth A. The association of different presentations of maternal depression with children's socio-emotional development: A systematic review. *PLOS Global Public Health* 2023;3(2):e0001649.

45. Joyner B, Beaver KM. Maternal depression and child and adolescent problem behaviors: a propensity score matching approach. *Psychiatric Quarterly* 2021;92(2):655-674.

46. Goodman SH. Depression in family relationships. In: Overall NC, Simpson JA, Lavner JA, eds. *Research handbook on couple and family relationships*. Camberley Surrey, UK: Edward Elgar Publishing Limited; 2024.

47. National Research Council (US) and Institute of Medicine (US) Committee on Depression, Parenting Practices, and the Healthy Development of Children, England MJ, Sim LJ, eds. *Depression in Parents, Parenting, and Children: Opportunities to Improve Identification, Treatment, and Prevention*. Washington (DC): National Academies Press (US); 2009.