

# The Neurodevelopmental Impact of Stress, Adversity, and Trauma: *Implications for Social Work* (part 2)

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## FEATURE

In this section, we consider two at-risk groups of parents and children: children whose primary caregiver is depressed, as in the case of maternal depression, and the impact of parental substance use on the developing child. Considered at risk for many social, psychological, physical, and developmental reasons, these groups can each be examined in terms of a variety of risk factors that can affect the parent-child relationship in ways that impair the quality of attachment and important developmental outcomes. Familiar from a psychosocial perspective, we seek to apply the research reviewed earlier in this text that discusses the connections between caregiver-child interaction patterns, the quality of attachment that emerges, and the related neurobiological development of children in early life.

## MATERNAL DEPRESSION

As reported by the National Scientific Council on the Developing Child (2009) at Harvard University, an estimated 10–20% of mothers will experience depression during the first year of their child's life, and the incidence rate is higher for women experiencing a range of other psychosocial stressors. Thus, assessment and intervention with mothers experiencing depression either prenatally or postpartum are important areas of practice, in particular for psychosocially vulnerable families. A developmentally informed approach to the impact of maternal depression requires an understanding of the factors that can lead to experiences of depression among mothers and the ways in which the consequences of maternal depression can disrupt the formation of stable attachment bonds and related indexes

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of developmental well-being in infancy and early childhood. Relational disruption and loss, both related to experiences of maternal depression, can constitute experiences of deprivation in infants and young children (Shapiro, 2015).

Affective disturbances, such as maternal depression, have been shown to increase vulnerability in the developing child (Tronick & Reck, 2009). Sustained periods of maternal depression, particularly during infancy and early childhood, create a context of developmental risk (Dawson, Hessler, & Frey, 1994). Children of depressed mothers have higher rates of developmental vulnerability as indexed by impairment in the regulation of behavior and attention, increased rates of childhood depression, and higher rates of other externalizing and internalizing disorders (National Scientific Council on the Developing Child, 2009). Longitudinal studies have also shown that children of depressed mothers have lower rates of secure attachment, less well-developed social skills, and more difficulties with school readiness and peer relationships (Ashman, Dawson, & Panatogiotides, 2008).

Researchers have documented the developmental risks to the child associated with maternal depression at various developmental phases. Prenatally, infants of depressed mothers are exposed to a higher level of stress chemicals, and alterations in the infants' immunological systems and prenatal growth patterns have been observed.

During infancy, infants of depressed mothers have been described as being more difficult to soothe, showing greater levels of

distress, and having deficits in their ability to sustain gaze and interaction (Shapiro, 2015). During toddlerhood, research has shown that children of depressed mothers display more behavioral problems, less capacity for emotional regulation, and delays in language development. During childhood and adolescence, children of depressed mothers show greater difficulty with peer relationships, learning readiness, and both internalizing and externalizing disorders.

Maternal depression can create an environment in which the infant does not experience a sense of being psychologically held. Winnicott (1965) introduced the concept of the holding environment to describe the context of care that surrounds the developing child. A good-enough holding environment is characterized not by a perfect level of sensitivity and attunement, but by caregiving that is overall consistent and infused with an understanding of the infant's emotional life, needs, and development. When the attachment relationship develops in a good-enough holding environment, the caregiver is able to successfully support the infant's ability to modulate states of psychophysiological arousal and ultimately support the developing child's capacity for self-soothing. When such a supportive environment does not exist, or is only partially available, the developing child may not feel psychologically held and may develop a range of responses for coping with states of psychophysiological arousal that result from being either understimulated (e.g., neglect), overstimulated by intrusive care, or disorganized because of a chaotic care environment (Fonagy & Target, 1998).

Primary developmental goals of infancy and early childhood involve learning, in the context of important attachment relationships, (1) how to identify one's own feelings, (2) how to identify the feelings of others, (3) how to acquire the capacity to regulate affect sufficiently to maintain homeostasis, and (4) how to invest in the object world of people and exploration. Children of depressed mothers are less likely to receive the empathically attuned and contingently responsive care that would contribute to their ability to understand cause-and-effect relationships, most saliently, the relationship between their own internal states and the development of language to describe affective experience. Research has shown that children of depressed mothers, particularly those whose mothers were depressed during the child's infancy and early childhood, are more likely to vigilantly observe their mothers' mood states and to be highly sensitive to relatively small changes in those states (National Scientific Council on the Developing Child, 2009). Even though maternal mood may be responsive to the advent of treatment, the child's early learning environment regarding the nature and regulation of affect may have resulted in styles of interaction, or attachment, and affect regulation that persist beyond the initial alleviation of the parental depression. Certainly, research on brain development in early life has highlighted the finding that the affectively charged relational environment of infancy is closely tied to those aspects of brain development that are primarily responsible for the experience and regulation of affect (Schore & Schore, 2010).

Infants and young children are uniquely

dependent on primary caregivers for a relational environment that augments positive feelings of warmth, security, and joy, and mediates against prolonged states of negative affective arousal (e.g., sadness, anxiety). Children of depressed mothers may come to be at risk, in part, because the depressed caregiver may show either a flatness of affect or a disproportionate amount of negative affect. In either case, the caregiver may be emotionally unavailable and unable to respond contingently to the infant's cues. Moreover, a depressed caregiver is less likely to engage in shared states of positive affect, thereby providing less opportunity for the infant's brain to be engaged in a manner that supports the development of positively charged or positively wired connections. This theory relates to the use-dependency or experientially dependent concept of early brain development in which those synapses that fire more often become more firmly wired into the neural architecture of the child's brain.

Below are two short vignettes showing ways in which maternal depression may pose risks to the caregiving environment that, in turn, can compromise the developmental well-being of the child. A more detailed discussion of maternal depression and its impact on child development follows, with discussion of the vignettes.

Maya is a 5-month-old infant, born full term into an economically struggling family. Maya's mother and father recently immigrated to the United States and are struggling to resettle in their new

country. Maya's mother works two jobs and often leaves Maya in the care of family members or, when necessary, neighbors. A community-based pediatrician referred Maya for a social services assessment because, though full term, she is small for her age and seems not to seek out interaction. The pediatrician was unable to coax her into a social smile or sustained eye contact and she noticed that Maya's mother didn't seem to expect any social recognition from Maya. A medical workup found no physical cause for Maya's withdrawal or lack of interest in people. The social worker noticed that Maya's mother also seemed exhausted and made very few efforts to communicate with either Maya or the worker. The worker did have at least one conversation with Maya's mother about how hard the transition to the United States had been, and how much she missed her home country. Maya's mother did comment that she was "glad" that Maya didn't really "need to play" and that "she seemed fine all on her own." Most worrisome to the pediatrician, Maya's growth was starting to fall below expectations, and Maya's mother reported that she was "the only baby she'd seen who didn't really like to eat." When the worker asked to hold Maya, Maya's mother agreed, but then said, "See . . . she'll settle right down with you. What difference does it make if I'm here too?" She further added, "This is like when I try to feed her. . . She just goes to sleep so . . . if she's not hungry, I'm not going to push it."

This vignette describes a pattern of possible maternal depression in which the mother, although trying to care for her infant, has little energy for interaction. From a brain development perspective, this is a concern because research describes the importance of affectively attuned, positively charged verbal interactions that help the developing child to augment positive experience and cope with negative states of affective arousal (Jones Harden et al., 2016). In addition, this research highlights the ways in which such patterns of interaction are key to the development of those systems involved in the regulation of affect and attention, and in the development of language that, over time, can be used by the child to represent and mediate internal states of mind and experiences (Siegel, 2012). In Maya's case, her mother is almost grateful for her lethargy because it matches mom's available energy. One hypothesis for exploration would be whether Maya had come to find interactions with her mother lacking sensitivity and mirroring, and perhaps even anxiety producing, leading to her withdrawal. Maya's mother seemed particularly sensitive to Maya's interest in the social worker. She interpreted this as proof that her own presence was not necessary, potentially a reflection of a low sense of agency that may also be associated with depression. Overall, Maya's case shows how cycles of misread and misunderstood interactions between infant and caregiver can be related to patterns of depressive symptoms and pose risks to the development of secure attachment and to those aspects of early social-emotional development related to early interactive experience. Moreover, Maya could be at

risk for nonorganic failure to thrive. Her lack of enjoyment in the feeding process (as evidenced by her falling asleep during feedings) could be a signal of poorly attuned interactions that Maya responds to by turning away, shutting down, and even falling asleep.

Claire is a healthy 11-month-old infant of a depressed mother. Born physically and neurologically intact, Claire moved through the first half of her first year of life with no apparent delays or complications. During the last several months, however, Claire's parents have been entrenched in marital conflict over the presence of Claire's father's daughter from a previous marriage. Claire's mother's affect and mood have steadily deteriorated, as has the consistency with which she empathically responds to Claire's bids for attention and interaction. Claire's mother shows intermittent and highly negative facial expressions that, seen from Claire's perspective, must seem to come over her mother. Steadily, Claire has begun to focus less of her attention on exploring her toys and enjoying positively charged interactions. Instead, she vigilantly attends to her mother's facial expressions, searching for a clue about her mother's affective state. Rather than the social referencing we would expect to see in an infant at this age, wherein the infant looks back to the mother in an effort to share excitement or for guidance as to whether a particular action (e.g., going up the stairs) is safe or not, Claire seems to have gotten increasingly still,

and she focuses primarily on searching her mother's face. When Claire observes her mother's facial expression becoming more negative, Claire begins to show signs of anxiety (e.g., drooling, anticipatory crying, unable to sustain focus on play) and, if not quickly soothed, her distress escalates to a dysregulated state of crying. Claire is relatively unable to self-soothe or to easily receive soothing from others.

This vignette shows a different pattern of maternal depressive symptomatology and how it may manifest in the mother-child interaction by impacting the developing infant's capacity for affect regulation. Claire, at 11 months, already shows a pattern descriptive of children whose caregivers have affective disorders. Claire's vigilance in monitoring her mother's mood states, including her search for facial clues to any changes, can be seen as an early coping strategy on Claire's part, an effort to create predictability where much lability exists. It is likely that no one else in Claire's immediate environment is as sensitive to these microaffective changes as is Claire. To Claire, changes in her mother's facial expression have come to represent loss of the emotionally available caregiving figure. In addition, changes in her mother's mood state also signal anxiety to Claire because they serve as a prelude, or forecast, of what may be coming. Because Claire is only 11 months old, her repertoire of self-soothing behaviors in the face of this potential loss and anxiety is limited. What an observer is likely to see is an infant who may turn away from her natural state of exploration and

connection, becoming more dysregulated, as evidenced by body discomfort, an increase in drooling, a lack of muscle tone, or efforts at self-soothing, such as nonnutritive sucking, twirling of hair, stillness, or lack of interest in play.

The case of Claire is highly relevant to the discussion of the applied value of research on brain development in early life. In Claire's case, we can see that her mother's depressive stance creates challenges for her, not only in the regulation of her own affective states but in the ways in which her need to self-soothe and cope with anxiety may hinder her opportunities for learning in other ways, such as the exploration of the object world through play and spontaneous social interaction. To the extent that Claire has become preoccupied with monitoring her mother's affective state, she is spending less of her energy on coming to understand her own internal experience and likely does not have access to a caregiving figure that is reflecting back to her important data about her own experience. Thus, Claire's relational environment does not provide her with a mirror, through either maternal facial expression or language, of her own internal world. As Claire has become more attuned to changes in her mother's expression of affect, she has also become more anxious about the meaning of these changes, because they have come to be associated with loss of maternal availability. Each of these elements is, in turn, related to important indexes of those aspects of early brain development related to affective and cognitive functioning.

## **DRUG USAGE AND PARENTING**

Research on the impact of maternal substance use can have direct and indirect impacts on the developing child (Ross, Graham, Money, & Stanwood, 2014). Even though not all prenatal exposure to substances results in children being born addicted, many deleterious effects are associated with prenatal exposure to drugs such as alcohol, tobacco, cannabinoids, and opiates. Complications may include preterm birth, obstetric complications, respiratory vulnerabilities, reduced growth, cognitive delays, reduced volume in brain regions, and abnormalities in key aspects of brain development associated with emotional, social, and cognitive impairments (Ross et al., 2014). Importantly, while researchers acknowledge the neurological impact of prenatal drug exposure, they also emphasize the importance of the quality of the caregiving environment and access to social resources as important mediators of the long-term impact of prenatal drug exposure.

From the perspective of how drug usage impacts the caregiving environment, two interrelated issues emerge that could create a double jeopardy for children of substance-abusing parents. First, children born addicted to illicit substances face a range of physical and developmental challenges in recovery and present complex caregiving demands for primary caregivers. Children born addicted may have highly reactive nervous systems, become easily dysregulated, and may have difficulty attaining homeostasis. At the same time, if children are being cared for by parents actively involved in addiction or substance abuse, the caregiving environment is likely to be less than optimal, characterized

by inadequate caregiving ranging from neglect to abuse. As well, the caregiving environment may continue to be shaped by those conditions that precipitated parental drug use, including parental depression, chronic stress, difficulties with the regulation of affect, limited problem-solving ability, and deficits in executive functioning, all factors also associated with parenting competency.

A summary prepared by the National Clearinghouse on Child Abuse and Neglect (1993) highlights the ways in which parental substance use can affect parenting behavior and, in turn, a range of child development outcomes, including the following:

1. *Parental access to sufficient income to provide for the child's basic needs and stability, including access to shelter, nutrition, medical care, child care, and education.* For parents with an active addiction, it is likely that the financial resources of the family will be strained by the cost of the addiction itself, or that the addiction will interfere with the stability of other important resources such as housing and nutrition.
2. *The importance of parental capacity for nurturance, sensitivity, and empathic relatedness.* In the parent-child relationship, the responsibility for nurturance, sensitivity, and empathic responsivity lies with adult caregiving figures. If a parent is involved in illicit drug usage, his or her ability to correctly perceive and respond to the needs of the infant may be limited. This limitation is particularly problematic

if the infant was born, secondary to prenatal drug exposure, with unusual or challenging caregiving needs.

Below is a brief vignette that exemplifies some of the ways that parental addiction may pose risks to the caregiving environment via its impact on parenting behavior and ultimately, on child well-being.

#### *Case Example:*

##### *A Mother in Recovery from Addiction*

Melanie is a 25-year-old mother of three who is in recovery from her addictions to opioids that she first took when recovering from an injury. At a certain point in her addiction, Melanie was unable to provide consistent care for her children, and they were placed in foster care at ages 2, 3, and 7. Prior to the children's placement in foster care, they experienced considerable instability in their mother's care. Melanie would often leave the three children alone as she went out in search of drugs, leaving her eldest child in charge. When the children were left alone, they had little ability to care for themselves; on one occasion, they were found foraging for food in a neighbor's trash can. The children show very little emotion and evidence almost no expectation that adults will be responsive to them or sources of comfort or shared positive affect. The youngest child, aged 2, wanders off without looking back, showing no expectation that an adult or caregiver will keep track of her. Closely attached to each other, the children evidence signs of panic and anxiety if efforts are made to

separate them, even briefly.

Melanie is in an active phase of recovery and is working hard to reconnect with her children. That said, she expresses frustration that the “children don’t seem to trust” her and “prefer each other” to her. She is particularly concerned about the attachment of the younger two children to her oldest daughter, who is now almost 9 years of age. While continuing to make efforts at recovery, Melanie often talks about feeling that her children should “appreciate” more of what she is trying to do and how much she has “given up” for them. As she says, “I can’t even reach out to my friends. . . . I just need to be here.” On more than one occasion she has referred to her children as “spoiled,” especially the youngest child, who seeks out close connection to her older sister. Melanie grew up in a family with an alcoholic father and has many times stated that her childhood was “good enough” for her and that even though she “never got any attention,” she “turned out fine.” From this perspective, Melanie often wonders, “If it was good enough for me, why isn’t it good enough for them, too?”

The above vignette highlights some important problems in working with children of drug-addicted parents. Melanie’s drug addiction, while certainly multiply determined, may have begun as an effort to self-soothe and protect against affects that were too overwhelming or painful. Although an outside observer of Melanie’s childhood would recognize that Melanie experienced

substantial neglect and sometimes abuse, she herself only describes “being alone.” On a conscious, or verbal, level Melanie does not express a belief that she was neglected. In addition, although she is able to describe memories of being left alone, without access to adult support, she does not seem to experience affect associated with these memories. Clinical research has shown that for a parent to empathize with children’s emotional pain, the parent must be able to empathize with his or her own childhood experiences. Melanie may be unable to identify or empathize with her children’s emotions because she herself may have been too overwhelmed as a child, too far into survival mode, to let herself feel the affect associated with her own experiences. An infant mental health approach would focus on encouraging Melanie’s ability to understand her children’s feelings via building a relationship with Melanie that also focuses on offering empathy to Melanie. She may also need assistance in recognizing that what she perceives as rejection by her children may be related to their fears of loss in relationship to their mother. Rather than seeing her children’s behavior as a disinterest in her, she may be helped to see it as uncertainty as to her emotional availability to them.

## CONCLUSION

The primary goal of this chapter was to describe the vulnerability of those parent-child dyads whose relational stability is threatened by developmental, social, environmental, or psychological factors. Research in the cognitive neurosciences

certainly highlights the importance of early care experiences to brain development in early life. This research is an important complement to our psychosocial understanding of early attachment and its effects on developmental well-being. From a social work perspective, research on the neurobiological effects of early relational care is critical to our ability to delineate the processes by which developmental risk is accrued by children in at-risk care environments. In addition, we have learned that during the first years of life, neurobiological patterns are formed that, although plastic to some degree, are also significantly enduring—which may explain why at-risk children tend to retain an internal fragility and vulnerability even when the external, situational context has been altered and improved.

## REFERENCES

- Ashman, S., Dawson, G. & Panagiotides, H. (2008). Trajectories of maternal depression over 7 years: Relations with child psychophysiology and behavior and role of contextual risks. *Development and Psychopathology*, 20(1), pp. 55-77.
- Brown, M., Thacker, L., & Cohen, S. (2014). Association between adverse childhood experiences and diagnosis of cancer. *PLOS ONE*, 9(1). <https://doi.org/10.1371/annotation/bd99c401-8d86-465a-a930-bd84bb662657>
- Bruce, J., Fisher, P. A., Pears, K. C., & Levine, S. (2009). Morning cortisol levels in preschool-aged foster children: Differential effects of maltreatment type. *Developmental Psychobiology*, 51(1), 14-23.
- Cohn, J., & Tronick, J. (1989). Specificity of infant's responsiveness to mother's affective behavior. *Journal of the American Academy of Child Psychiatry*, 28, 242-248.
- Davies, D. (2010). *Child development: A practitioner's guide* (3rd ed.). New York: Guilford.
- Dawson, S., Hessler, D., & Frey, K. (1994). Social influences on early developing biological and behavioral systems related to risk for affective disorder. *Development and Psychopathology*, 6, 759-779
- Dozier, M., & Fisher, P. (2014). Neuroscience enhanced childhood maltreatment interventions to improve outcomes. *Social Policy Report*, 28(1), 22-24.
- Dube, S., Felitti, V., Dong, M., Giles, W., & Anda, R. (2003). The impact of adverse childhood experiences on health problems: Evidence from four birth cohorts dating back to 1900. *Preventive Medicine*, 37(3), 268-277.
- Felitti, V. (2009). Adverse childhood experiences and adult health. *Academic Pediatrics*, 9, 131-132.
- Felitti, V., Anda, R., Nordenberg, D., Williamson, D., Spitz, A., Edwards, V., Koss, M., & Marks, J. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The adverse childhood experiences (ACE) study. *American Journal of Preventive Medicine*, 14, 245-258.
- Fonagy, P., & Allison, E. (2012). What is mentalization? The concept and its foundations in developmental research. In N. Midgley & I. Vrouva (Eds.), *Minding the child: Mentalization-based interventions with children, young people and their families* (pp. 11-34). Hove, UK: Routledge.
- Fonagy, P., & Higgitt, A. (2004). Early mental health intervention and prevention: The implications for government and the wider community. In B. Sklarew, S. Twemlow, & S. M. Wilkinson (Eds.), *Analysts in the trenches: Streets, schools, war zones* (pp. 257-309). Hillsdale, NJ: Analytic Press.
- Fonagy, P., & Target, J. (1998). Mentalization and the changing aims of child psychoanalysis. *Psychoanalytic Dialogues*, 8, 87-114.
- Garland, E. L., & Howard, M. O. (2009). Neuroplasticity, psychosocial genomics,

- and the biopsychosocial paradigm in the 21st century. *Health and Social Work*, 34(3), 191-199.
- Green, T. L., & Darity, W. A. (2010). Under the skin: Using theories from biology and the social sciences to explore the mechanisms behind the black-white health gap. *American Journal of Public Health*, 100(S1, no. 81), S36-S40.
- Gunnar, M. (1998). Quality of care and the buffering of stress physiology: Its potential role in protecting the developing human brain. *Newsletter of the Infant Mental Health Promotion Project*, 21, 4-7.
- Gunnar, M. (2000). Early adversity and the development of stress reactivity and regulation. In C. Nelson (Ed.), *The effects of adversity on neuro-behavioral development: Minnesota symposium on child psychology* (Vol. 31, pp. 163-200). Mahwah, NJ: Erlbaum.
- Gunnar, M., Bruce, J., & Grotevant, H. (2000). International adoption of institutionally reared children: Research and policy. *Development and Psychopathology*, 12(4), 677-693.
- Gunnar, M. R., Morison, S. J., Chisholm, K., & Schuder, M. (2001b). Salivary cortisol levels in children adopted from Romanian orphanages. *Development and Psychopathology*, 13(3), 611-628.
- Gunnar, M. R., & Quevedo, K. (2007). The neurobiology of stress and development. *Annual Review of Psychology*, 58, 145-173.
- Gunnar, M. R., & Vazquez, D. (2006). Stress neurobiology and developmental psychopathology. In D. Cicchetti & D. Cohen (Eds.), *Developmental psychopathology: Vol. 2. Developmental neuroscience* (2nd ed.). New York: Wiley.
- Hostinar, C. E., Stellern, S. A., Schaefer, C., Carlson, S. M., & Gunnar, M. R. (2012). Associations between early life adversity and executive function in children adopted internationally from orphanages. *Proceedings of the National Academy of Sciences*, 109(Suppl. 2): 17208-17212.
- Jensen, F., & Nutt, A. E. (2015). *The teenage brain*. New York: Harper Collins.
- Johnson, A. F., Bruce, J., Tarullo, A. R., & Gunnar, M. R. (2011). Growth delay as an index of allostatic load in young children: Predictions to disinhibited social approach and diurnal cortisol activity. *Development and Psychopathology*, 23, 859-871.
- Jones Harden B., Buhler, A., & Jiminez Parra, L. (2016). Maltreatment in infancy: A developmental perspective on prevention and intervention. *Trauma, Violence & Abuse*, 17(4), pp. 366-386.
- Kaufman, J., & Charney, D. (2001). Effects of early stress on brain structure and function: Implications for understanding the relationship between child maltreatment and development. *Developmental Psychopathology*, 13, 451-471.
- Loman, M., & Gunnar, M. R. (2010). Early experience and the development of stress reactivity and regulation in children. *Neuroscience and Biobehavioral Reviews*, 34(6), 867-876.
- Lupien, S., King, S., Meaney, M. J., & McEwen, B. S. (2001). Can poverty get under your skin? Basal cortisol levels and cognitive function in children from low and high socioeconomic status. *Development and Psychopathology*, 13(3), 653-676.
- Lupien, S. J., McEwen, B. S., Gunnar, M. R., & Heim, C. (2009). Effects of stress throughout the lifespan on the brain, behaviour and cognition. *Nature Reviews Neuroscience*, 10, 434-445.
- Luscher, C., & Malenka, R. (2011). Drug evoked synaptic plasticity in addiction from molecular hole to circuitry remodeling. *Nature*, 69(4), 650-664.
- McEwen, B. S. (2008). Central effects of stress hormones in health and disease: Understanding the protective and damaging effects of stress and stress mediators. *European Journal of Pharmacology*, 583(2-3), 174-185.
- National Clearinghouse on Child Abuse and Neglect. (1993). *Child abuse: Intervention and treatment issues*. Washington, DC: Department of Health and Human Services.
- National Scientific Council on the Developing Child. (2007). *The timing and quality*

- of early experiences combine to shape brain architecture. Working Paper No. 5. Retrieved from <https://www.developingchild.harvard.edu/resources/the-timing-and-quality-of-early-experiences-combine-to-shape-brain-architecture/>
- National Scientific Council on the Developing Child. (2009). Maternal depression can undermine the development of young children. Working Paper No. 8. Retrieved from <https://www.developingchild.harvard.edu/resources/maternal-depression-can-undermine-the-development-of-young-children/>
- National Scientific Council on the Developing Child. (2011). Building the brain's "air traffic control" system: How early experiences shape the development of executive function. Working Paper No. 11. Retrieved from <https://www.developingchild.harvard.edu/resources/building-the-brains-air-traffic-control-system-how-early-experiences-shape-the-development-of-executive-function/>
- National Scientific Council on the Developing Child. (2014). Excessive stress disrupts the architecture of the developing brain. Working Paper No. 3 (updated ed.). Retrieved from <http://www.developingchild.harvard.edu/resources/wp3/>
- Perry, D. F., Ettinger, A. K., Mendelson, T., & Le, H. N. (2010). Pre-natal depression predicts postpartum maternal attachment in low-income Latina mothers with infants. *Infant Behavior and Development*, 34(2), 339-350.
- Ross, E., Graham, D., Money, K. & Standwood, G. (2015). Developmental consequences of fetal exposure to drugs: What we know and what we still must learn. *Neuropsychopharmacology*, 40(1), pp. 61-87.
- Schore, A. N., & Schore, J. R. (2010). Clinical social work and regulation theory: Implications of neurobiological models of attachment. In S. Bennett & J. K. Nelson (Eds.), *Adult attachment within clinical social work practice* (pp. 57-75). New York: Springer.
- Shonkoff, J. (2007). Closing the gap between what we know and what we do. Presentation at Early Childhood Partners Meeting, Washington, DC, January 18. Retrieved from [http://www.nccp.org/projects/files/event\\_download\\_10.pdf](http://www.nccp.org/projects/files/event_download_10.pdf)
- Shonkoff, J. P., Boyce, W. T., & McEwen, B. S. (2009). Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for health promotion and disease prevention. *Journal of the American Medical Association*, 301(21), 2252-2259.
- Shonkoff, J. P., & Phillips, D. (Eds.). (2000). *From neurons to neighborhoods: The science of early childhood development*. Committee on Integrating the Science of Early Childhood Development, National Research Council and Institute of Medicine. Washington, DC: National Academy Press.
- Siegel, D. J. (2012b). *Pocket guide to interpersonal neurobiology: An integrative handbook of the mind*. New York: Norton.
- Slade, A. (2002). Keeping the baby in mind: A critical factor in perinatal mental health. *Zero to Three*, June/July, 521-529.
- Tronick, E., & Reck, C. (2009). Infants of depressed mothers. *Harvard Review of Psychiatry*, 17 (2). Turecki, G., Ota, V. K., Belangero, S. I., Jackowski, A., & Kaufman, J. (2014). Early life adversity, genomic plasticity and psychopathology. *Lancet Psychiatry*, 1(6), 461-466.
- Ulrich-Lai, Y., & Herman, J. (2009). Neural regulation of endocrine and autonomic stress responses. *Nature Reviews: Neuroscience*, 10(6), 397-409.
- Weder, N., & Kaufman, J. (2011). Critical periods revisited: Implications for intervention with traumatized children. *Journal of the American Academy of Child and Adolescent Psychiatry*, 50(11), 1087-1089. doi:10.1016/j.jaac.2011.07.021
- Winnicott, D. W. (1965a). The capacity to be alone. In *The maturational processes and the facilitating environment* (pp. 29-36). Madison, CT: International Universities Press. (Original work published 1958)