



A child's early home environment has long-term effects on development.

A child's early home environment has a profound effect on his well-being. Beginning in infancy, a problematic home environment can disrupt the brain's stress response system, reduce the quality of caregiving a child receives, and interfere with healthy development.¹

Research has linked negative home environments during children's first three years with a host of developmental problems, including

- poorer language development by age three.
- later behavior problems.
- deficits in school readiness.
- aggression, anxiety and depression.
- impaired cognitive development at age three.²⁻⁴

Longer-term effects have also been documented: A child's early home environment and the skills he learns in the first three years have been linked to

- high school graduation.
- teen parenthood.
- adult employment and earnings.^{5,6}

The home environment can even affect a child's brain development.

Brain imaging research suggests that growing up in a disadvantaged environment causes the brain to develop differently.⁷ For example, living in an environment affected by chaos and poverty can lead to changes in the brain's stress system that increase a child's vulnerability to chronic diseases later in life.⁸

Studies of very young children have identified distinctive patterns of brain activity associated with family income and socioeconomic status, especially in brain areas related to social and emotional development, language ability, and learning and memory.⁹⁻¹¹

What is a risk factor ?

A risk factor is a condition that is statistically associated with a given outcome. For example, children who grow up poor are more likely than other children to drop out of high school. Poverty, then, is a risk factor for high school dropout. Not all poor children will drop out of high school, of course. They are said to be at risk because as a group they have a higher incidence of dropout.

Research has identified specific aspects of a child's environment that are associated with later outcomes. Commonly studied risk factors

include poverty/income, maternal depression, and low maternal education. They are strong predictors of later outcomes including academic performance, cognitive development, and social and emotional well-being.¹²⁻¹⁴

Risk factors like these can affect children even in the first years of life. Early risk is associated with later behavioral and academic outcomes. For example, risk exposure during infancy appears to be more detrimental for children's school readiness than later exposure.^{13,14}

The CANDLE Study provides valuable data about our community's children.

The Conditions Affecting Neurocognitive Development and Learning in Early Childhood (CANDLE) is an ongoing study of approximately 1,500 Shelby County women and their young children. Mothers enroll in their 2nd trimester and participate until their children are three years old. The CANDLE study collects information on numerous aspects of development, including health, nutrition, cognition functioning, and psychosocial well-being.

Overall, CANDLE participants are similar to Shelby County mothers as a whole, increasing the likelihood that trends seen among the CANDLE group can be generalized to expectant mothers throughout Shelby County. This chapter uses CANDLE data to examine the presence of three well-known risk factors—low-income, low maternal education, and maternal depression—among our community's young children.¹⁵

Family income and economic well-being are important predictors of children's well-being.

Family income and economic circumstances have a powerful effect on children's development. Like other risk factors, low family income affects children mainly by affecting their home environments and the parenting they receive in ways that hinder optimal development.^{3,16}

Income-related differences in parenting appear early. For instance, lower-income mothers are, on average, less affectionate, less responsive to their infants' distress signals, and more likely to have harsh parenting styles.^{17,18}

In poor and low-income families, the home environment is more likely to be chaotic, and

parents are more likely to be stressed and unresponsive. They show less sensitivity and provide less cognitive stimulation.^{2,13,19} Research shows that lower-income mothers talk less and spend less time in shared activities with their children than do middle-income mothers, and are less engaged when their children talk to them.²⁰

Poor children have fewer stimulating experiences and learning materials than higher-income children.^{14,21} The effects are apparent in the first years and often last into adulthood. Low-income children, even in the first three years of life, are more likely to have lower cognitive scores and increased behavioral problems.¹⁹

55.3 percent of families participating in the CANDLE study have annual incomes below \$25,000. (The Federal Poverty Level for a family of four is \$22,050).²²

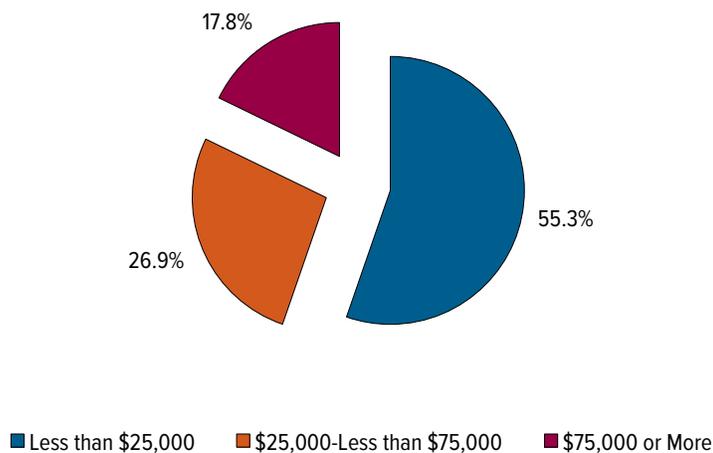


FIGURE 1:
Percent of CANDLE
Families by Annual
Income.

Source: Shih R, Chandra A, Griffin BA, et al. Birth outcomes in the Conditions Affecting Neurocognitive Development and Learning in Early Childhood (CANDLE) Study. 2012. (Pending publication).

Better-educated parents tend provide more positive home environments.

Like family income, parental education is a strong influence on children's home environments. In some research on child outcomes, maternal education is a better predictor than family income.²³

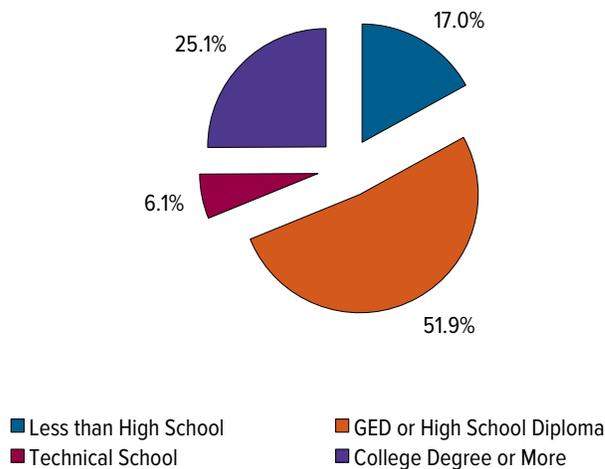
In a brain imaging study of young children, there were measurable effects of maternal education on brain regions involved in attention skills.²³ In another study, parental educational level was related to children's educational and occupational success at age 48.²⁵

Among mothers of infants and toddlers, increases in education have been shown to promote improvements in young children's home environments and language development. Parents' education appears to be especially beneficial for children of poor, young, or single-mothers.^{15,26}

17 percent of CANDLE mothers have less than a high school education. 25 percent have a Bachelor's Degree or higher.²²

FIGURE 2:
Percent of CANDLE Mothers by Educational Attainment.

Source: Shih R, Chandra A, Griffin BA, et al. Birth outcomes in the Conditions Affecting Neurocognitive Development and Learning in Early Childhood (CANDLE) Study. 2012. (Pending publication).



Maternal depression is a grave threat to children’s healthy development.

Maternal postpartum depression is the most common medical complication of childbearing. Although most women experience some brief depression-like symptoms in the first week or two after giving birth, national research shows that 10 to 15 percent of new mothers are afflicted by major depression—often lasting six months or longer.²⁷⁻²⁹

Common symptoms of postnatal depression include sleep disturbances, feelings of guilt, and loss of interest in daily activities. Not surprisingly, then, new mothers who suffer from untreated depression are unlikely to be able to provide the positive experiences their infants need.

On average, depressed mothers spend less time touching and talking to their babies, and their interactions tend to be more negative. Studies

repeatedly show that depression is associated with parenting styles that are either understimulating or overstimulating.^{27,28}

If left untreated, maternal depression in a child’s first years can have negative effects on cognitive development, behavior, and school readiness.³⁰ There appear to be biological effects as well: recent research has discovered distinct patterns of brain activity and stress hormone levels in children of depressed mothers.²⁷

Mothers in the CANDLE study complete a brief assessment to screen for possible depression at 4 weeks after birth and again at 12 months. While not an actual diagnosis, an At Risk score indicates that a mother is likely to be suffering from postpartum depression and that further assessment is recommended.

At 4 weeks, 11.2 percent of all mothers scored At Risk.
At 12 months, 10.7 percent scored At Risk.²²

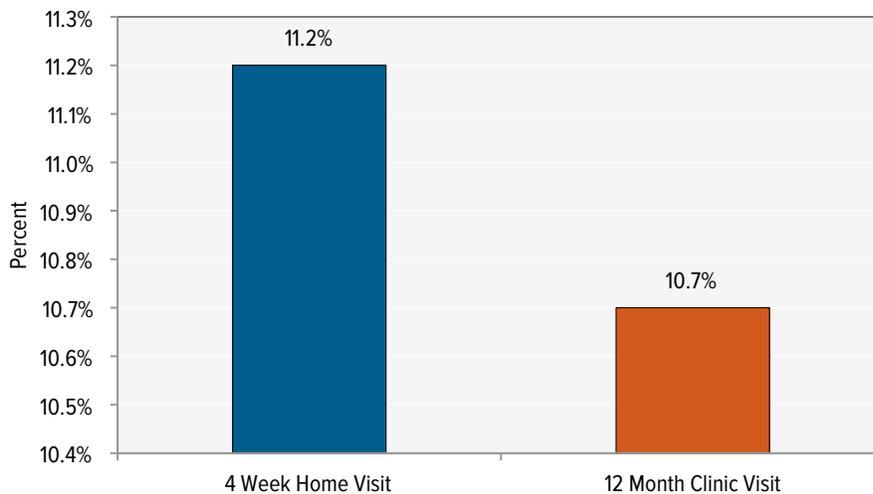


FIGURE 3:
Percent of CANDLE
Mothers at Risk
for Depression,
4 Weeks and 12
Months.

Source: Tylavsky F, Atkins JK, Atkins R, Bush A, et al. Conditions Affecting Neurocognitive Development and Learning in Early Childhood. 2012. Unpublished raw data.

The CANDLE data show that many of our community's families with young children are at risk.

Because CANDLE participants, as a group, are roughly representative of the local population, we can reasonably assume that similar patterns would be found among expectant mothers throughout Memphis and Shelby County.¹⁵

Although these preliminary findings do not allow us to make specific projections or draw hard conclusions, it is clear that economic hardship, low educational attainment, and maternal depression are a widespread threat to our children's healthy development.

The importance of children's early environments means that reducing and eliminating later gaps in achievement must begin early in life. Effective interventions need to start long before children reach kindergarten—the earlier, the better.

Policy efforts to reduce economic hardship, promote education among parents of young children, and improve the identification and treatment of depression among new mothers are promising strategies for improving children's early home environments.

References

1. Blair C, Granger DA, Willoughby M, et al. Salivary cortisol mediates effects of poverty and parenting on executive functions in early childhood. *Child Development*. 2011; 82(6):1970-8.
2. Evans GW, Ricciuti HN, Hope S, et al. Crowding and cognitive development. The mediating role of maternal responsiveness among 36-month-old children. *Environment and Behavior*. 2010; 42(1): 135-148.
3. Trentacosta CJ, Hyde, LW, Shaw DS, et al. The relations among cumulative risk, parenting, and behavior problems during early childhood. *Journal of Child Psychology and Psychiatry*. 2008; 49: 1211-1219.
4. Vernon-Feagans L, Garrett-Peters P, Willoughby M, et al. Chaos, poverty, and parenting: Predictors of early language development. *Early Childhood Research Quarterly*. 2011 (in press).
5. Duncan GJ, Ziol-Guest KM, Kalil A. Early childhood poverty and adult attainment, behavior, and health. *Child Development*. 2010; 81: 306–325.
6. Pungello EP, Kainz K, Burchinal M, et al. Early educational intervention, early cumulative risk, and the early home environment as predictors of young adult outcomes within a high-risk sample. *Child Development*. 2010; 81: 410-426.
7. Gianaros PJ. Socioeconomic health disparities: A health neuroscience and lifecourse perspective. *Psychological Science Agenda*. 2011; 25(1).
8. Miller GE, Chen E, Fok AK, et al. Low early-life social class leaves a biological residue manifested by decreased glucocorticoid and increased proinflammatory signaling. *Proceedings of the National Academy of Sciences USA*. 2009; 106: 14716-14721.
9. Hanson JL, Chandra A, Wolfe BL, et al. Association between income and the hippocampus. *PLoS ONE*. 2011; 6(5): e18712.
10. Noble KG, Houston SM, Kan E, et al. Neural correlates of socioeconomic status in the developing human brain. *Developmental Science*. 2012; in press, 1–12.
11. Raizada RD, Richards TL, Meltzoff A, et al. Socioeconomic status predicts hemispheric specialisation of the left inferior frontal gyrus in young children. *NeuroImage*. 2008; 40(3): 1392–1401.
12. Burchinal M, Roberts JE, Zeisel SA, et al. Social risk and protective child, parenting, and child care factors in early elementary school years. *Parenting: Science and Practice*. 2006; 6(1): 79-113.
13. Mistry RS, et al. Family and social risk, and parental investments during the early childhood years as predictors of low-income children's school readiness outcomes. *Early Childhood Research Quarterly*. 2010; 25: 432–449.
14. Sektan M, McClelland MM, Acock A, et al. Relations between early family risk, children's behavioural regulation, and academic achievement. *Early Child Research Quarterly*. 2010; 25: 464-479.
15. Shih R, Chandra A, Griffin BA, et al. *Birth outcomes in the Conditions Affecting Neurocognitive Development and Learning in Early Childhood (CANDLE) Study*. 2012 (Pending publication).
16. Lanza ST, et al. Modeling multiple risks during infancy to predict quality of the caregiving environment: contributions of a person-centered approach. *Infant Behavior & Development*. 2011; 34: 390-406.

17. Fouts HN, Roopnarine JL, Lamb ME. Social experiences and daily routines of African American infants in different socioeconomic contexts. *Journal of Family Psychology*. 2007; 21: 655-664.
18. Kim HK, Pears KC, Fisher PA, et al. Trajectories of maternal harsh parenting in the first 3 years of life. *Child Abuse & Neglect*. 2010; 34(12): 897-906.
19. Berger LM, Paxson C, Waldfogel J. Income and child development. *Children and Youth Services Review*. 2009; 31: 978-989.
20. Huttenlocher J, Vasilyeva M, Waterfall HR, et al. The varieties of speech to young children. *Developmental Psychology*. 2007; 43(5): 1062-1083.
21. Yeung WJ, Pfeiffer KM. The black-white test score gap and early home environment. *Social Science Research*. 2009; 38: 412-437.
22. Tylavsky F, Atkins JK, Atkins R, Bush A, et al. *Conditions Affecting Neurocognitive Development and Learning in Early Childhood*. 2012. Unpublished raw data.
23. Son S, Morrison F. The nature and impact of changes in home learning environment on development of language and academic skills in preschool children. *Developmental Psychology*. 2010; 46(5):1103-1118.
24. Stevens C, Lauinger B, Neville H. Differences in the neural mechanisms of selective attention in children from different socioeconomic backgrounds: An event-related brain potential study. *Developmental Science*. 2009; 12(4): 634-646.
25. Dubow EF, Boxer P, Huesmann LR. Long-term effects of parents' education on children's educational and occupational success. *Merrill-Palmer Quarterly*. 2009; 55(3): 224-249.
26. Magnuson KA, Sexton HR, Davis-Kean PE, et al. Increases in maternal education and young children's language skills. *Merrill-Palmer Quarterly*. 2009; 55 (3): 319-350.
27. Field, T, Hernandez-Reif M, Diego M. Intrusive and withdrawn depressed mothers and their infants. *Developmental Review*. 2006; 26: 15-30.
28. Parsons CE, Young KS, Murray L, et al. The functional neuroanatomy of the evolving parent-infant relationship. *Progress in Neurobiology*. 2010; 91: 220-241.
29. Sit DK, Wisner KL. The identification of postpartum depression. *Clinical Obstetrics and Gynecology*. 2009; 52(3): 456-468.
30. Logsdon MC, Wisner KL, Pinto-Foltz MD. The impact of postpartum depression on mothering. *Journal of Obstetric Gynecological and Neonatal Nursing*. 2006; 35: 652-658.