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NEUROSCIENCE AND THE CHILD WELFARE SYSTEM

*Clare Huntington**

Increasingly, scholars and policymakers are calling for programs that take a preventive approach to child abuse and neglect, rather than our current tendency to respond only after a crisis.¹ There are significant social and economic arguments supporting this shift. The Nurse-Family Partnership, developed by David Olds and discussed in this symposium, illustrates how specific investments in family functioning can lower rates of child abuse and neglect, leading to a host of positive outcomes for children and society, from greater educational attainment to less involvement in the criminal justice system.² Thinking about child well-being more broadly, the Nobel laureate James Heckman has demonstrated the relative value of preventive programs, establishing that targeted interventions that enrich a very young child's environment are more cost effective than investing in schools and far more cost effective than investing in remedial programs for older adolescents and young adults.³

* Associate Professor, Fordham Law School. I thank Marsha Garrison and Cynthia Godsoe for organizing a highly engaging and productive conference, Nestor Davidson and Deborah Denno for insightful feedback on an earlier draft, and Lauren Michaeli for her able research assistance.

¹ See CLARE HUNTINGTON, *FLOURISHING FAMILIES: HARNESSING LAW TO FOSTER STRONG, STABLE, POSITIVE RELATIONSHIPS* (forthcoming) (exploring this development).

² See *What We Do*, NURSE-FAMILY P'SHIP, <http://www.nursefamilypartnership.org/About/What-we-do> (last visited Sept. 24, 2012) (describing the program, which involves a nurse visiting with a woman beginning in pregnancy and continuing for the first two years of the baby's life to work on issues of prenatal health, parenting, educational and career goals for the parents, and the planning of future births).

³ James J. Heckman, *Skill Formation and the Economics of Investing in*

To the extent a preventive approach relies on governmental programs for low-income families, however, there is considerable resistance from those who believe such support encourages unhealthy dependency on the state. For example, in the most recent iteration of a sustained critique of governmental aid for low-income individuals, Charles Murray argues that socioeconomic inequality among whites in the United States—particularly between the top twenty percent and the bottom thirty percent—can be attributed to a difference in values.⁴ To Murray, the top quintile live their lives according to what he describes as the four “founding virtues” of America—marriage, industriousness, honesty, and religiosity.⁵ The bottom thirty percent, by contrast, do not live according to these values, which has led to a loss of social capital for this group and a concomitant loss of the life satisfaction that comes from not living in civic, engaged communities.⁶ Murray contends that the lower life satisfaction stems from the bottom thirty percent abdicating responsibility for their lives. As he says, “[k]nowing that we have responsibility for the consequences of our actions is a major part of what makes life worth living.”⁷

The solution to this psychological dependency, according to Murray, is libertarianism. When the government tries to help the bottom thirty percent, it only robs them of responsibility for their lives.⁸ He cites raising children as an example: “if you’re a low-income parent who finds it easier to let the apparatus of an advanced welfare state take over,” this diminishes “the deep

Disadvantaged Children, 312 SCIENCE 1900, 1901 (2006).

⁴ See CHARLES A. MURRAY, *COMING APART: THE STATE OF WHITE AMERICA, 1960–2010*, at 226–31, 253–68 (2012).

⁵ See *id.* at 130–40, 154–208.

⁶ See *id.* at 154–208.

⁷ *Id.* at 281. Murray does not uncritically laud the top twenty percent. Instead, he contends that there is a hollowness to this group. See *id.* at 294 (“Personally and as families, its members are successful. But they have abdicated their responsibility to set and promulgate standards. The most powerful and successful members of their class increasingly trade on the perks of their privileged positions without regard to the seemliness of that behavior.”); see also *id.* at 285–95.

⁸ See *id.* at 282.

satisfactions that go with raising children.”⁹ In a related argument, he notes that families and communities are strong only because they know that it is up to them to “get things done,” but that when government takes over for these institutions, both families and communities disintegrate.¹⁰ For this reason, Murray argues that the welfare state can be justified only to prevent starvation or death from exposure.¹¹

This antipathy for state support of families has fairly broad political appeal. Indeed, many of the leading Republican candidates for the 2012 presidential nomination cast the solution to struggling families in personal, rather than structural terms.¹² And the bootstrap solution to poverty is an overly familiar, if also effective, trope.

There are numerous grounds for critiquing Murray. Perhaps the most obvious is the argument that the government provides substantial support to the top twenty percent, from Medicaid and Social Security to public education and the home mortgage interest deduction. Political scientist Suzanne Mettler has shown that these kinds of programs are generally not perceived as governmental support, however, because the recipients do not have to interact intensively or frequently with government officials to receive the benefits.¹³ Instead, these programs are

⁹ *Id.* at 281.

¹⁰ *See id.* at 282 (“When the government says it will take some of the trouble out of doing the things that families and communities evolved to do, it inevitably takes some of the action away from families and communities. The web frays, and eventually disintegrates.”).

¹¹ *See id.* at 279–81.

¹² *See, e.g., Rick Santorum in Fox News Debate on MLK Day in Myrtle Beach*, ONTHEISSUES.ORG, (Jan. 16, 2012), http://www.issues2000.org/Archive/2012_GOP_SC_MLK_Rick_Santorum.htm (“Q[uestion]: Given the crisis situation among a group of historically disadvantaged Americans, do you feel the time has come to take special steps to deal with poverty afflicting one race? [Answer from Senator] Santorum: A study done in 2009 determined that if Americans do three things, they can avoid poverty. Three things: work, graduate from high school, and get married before you have children. Those three things result in only 2% of people ending up in poverty.”).

¹³ *See* SUZANNE METTLER, *THE SUBMERGED STATE* 5–6 (2011).

part of what Mettler calls the “submerged state.”¹⁴ Murray’s theory, at heart, has no answer to why government largesse for the top twenty percent does not undermine their personal responsibility as well.

But this ground is fairly well trod, and Murray is hardly alone in his distrust of support for low-income families. There is a deeper, and less recognized, reason to question this kind of minimalism. Focusing on the real stakes in the debate over how to strengthen families, a growing body of research by neuroscientists demonstrates that a child’s early life experiences and environment literally shape the child’s brain architecture, with lifelong consequences that are very difficult to reverse. Children’s relationships with their primary caregivers, most importantly, are at the core of brain development, but when this relationship is severely deficient—from extreme poverty, child abuse or neglect, or maternal clinical depression—the developing child’s brain is deeply affected.

One reason why this research has not gained greater recognition in the debate about early childhood support is that much of the work is complex and hard to decipher with nuance by nonneuroscientists. To try to bridge this divide, a group of neuroscientists and other scholars created the National Scientific Council on the Developing Child in 2003, with the goal of translating scientific research on the neuroscience of early childhood into accessible terms. The National Scientific Council recognized the need to develop persuasive arguments, directed at legislatures and other policymakers, about the importance of investing in families.¹⁵ A central challenge was overcoming the

¹⁴ See *id.* at 4.

¹⁵ See *About the Council*, HARVARD UNIV. CTR. ON THE DEVELOPING CHILD, http://developingchild.harvard.edu/activities/council/about_the_council/ (last visited Sept. 22, 2012) (“The National Scientific Council on the Developing Child is a multi-disciplinary, multi-university collaboration designed to bring the science of early childhood and early brain development to bear on public decision-making. Established in 2003, the Council is committed to an evidence-based approach to building broad-based public will that transcends political partisanship and recognizes the complementary responsibilities of family, community, workplace, and government to promote the well-being of all young children.”); see also Jack P. Shonkoff & Susan Nall Bales, *Science Does Not Speak for Itself: Translating Child Development*

perception that child development is a private matter, with little impact on those outside the family.¹⁶ The heart of this translation effort was the creation of a core story—using persuasive frames and simplifying metaphors—that communicates the key elements of brain development in terms that nonscientists can understand.¹⁷ This effort helps policymakers and the public understand the causal connection between early childhood experiences and environment and later outcomes.

This Essay takes up the challenge posed by the Council and brings a family law scholar's perspective to understanding the possibilities and limitations of drawing on this still-emerging science in the development of child welfare policy.¹⁸ No amount

Research for the Public and Its Policymakers, 82 CHILD DEV. 17, 17–19 (2011).

¹⁶ See Shonkoff & Bales, *supra* note 15, at 23–24.

¹⁷ See *id.* at 20–22 (explaining the challenges inherent in communicating child development research and theorizing ways to better communicate scientific concepts to laypersons).

¹⁸ This Essay uses the terminology that neuroscientists have developed to convey complex scientific processes to laypeople. See *id.* at 17 (arguing for the development of a “core story of [brain] development, using simplifying models (*i.e.*, metaphors) such as ‘brain architecture,’ ‘toxic stress,’ and ‘serve and return’”). This Essay relies primarily on secondary materials that digest and summarize scientific papers for the general public. As someone untrained in neuroscience, I did not feel competent to evaluate the papers myself. This gap, however, is one of the challenges in interdisciplinary work. See *infra* Part II for further discussion of this and other challenges.

The intersection of neuroscience and the law often focuses on criminal justice. For example, the John D. and Catherine T. MacArthur Foundation has funded the Research Network on Law and Neuroscience, which addresses a range of issues in criminal law, including the mental states of defendants, a defendant's ability to regulate her behavior, and the admission of neuroscientific evidence in particular cases. See MACARTHUR FOUND. RESEARCH NETWORK ON LAW & NEUROSCIENCE, <http://www.lawneuro.org/> (last visited Sept. 22, 2012). This focus is also true of much of the scholarly literature. See, *e.g.*, Nita A. Farahany, *Incriminating Thoughts*, 64 STAN. L. REV. 351, 366–96 (2012) (drawing on neuroscientific evidence to undermine the dichotomy in self-incrimination doctrine between testimonial and physical evidence); Joshua Greene & Jonathan Cohen, *For the Law, Neuroscience Changes Nothing and Everything*, 359 PHIL. TRANSACTIONS ROYAL SOC'Y LONDON B 1775, 1783–84 (2004) (arguing that cognitive neuroscience undermines the notion of free will, which lies at the heart of a retributivist

of science about childhood development will necessarily persuade the Charles Murrays of the world to invest in early childhood programs and family functioning more generally, but the critical task of linking that research to the law and policy of the child welfare system can hopefully offer a productive counterweight in public discourse nonetheless.¹⁹

I. WHAT WE (THINK WE) KNOW

In a nutshell, the core story used by the Council is that during the prenatal period and the first few years of life, children develop a brain architecture that is the foundation for all future learning. The interaction between caregivers and

notion of criminal law; instead, behavior is far more determined than is commonly thought, supporting a consequentialist theory of criminal law). When scholars do examine neuroscience and children, it is typically in the context of the juvenile justice system, as with the work of Elizabeth Scott and Laurence Steinberg. See ELIZABETH S. SCOTT & LAURENCE STEINBERG, *RETHINKING JUVENILE JUSTICE* 35–60 (2008) (describing the science of adolescent brain development and the relevance of this research to decision making and conduct); Terry A. Maroney, *Adolescent Brain Science After Graham v. Florida*, 86 NOTRE DAME L. REV. 765, 779–81 (2011) (arguing that the Supreme Court was properly cautious in relying upon neuroscientific evidence of differences between adolescent and adult brains with respect to decision making). For one notable exception, see Allan Schore & Jennifer McIntosh, *Family Law and the Neuroscience of Attachment Part I*, 49 FAM. CT. REV. 501, 501–02, 511–12 (2011) (explaining how neuroscience demonstrates the scientific validity of attachment theory and that the child-caregiver relationship established in the prenatal period and continuing through the third year forms the basis for all future attachment relationships, and further arguing that family law should account for a very young child's need for a predictable, consistent, and emotionally available caregiver); Daniel Siegel & Jennifer McIntosh, *Family Law and the Neuroscience of Attachment Part II*, 49 FAM. CT. REV. 513, 514–17 (2011) (explaining the science of attachment and particularly the effect on children of high-conflict relationships between parents).

¹⁹ This Essay works from the assumption that libertarians such as Murray care deeply about child well-being but believe in a different prescription than prevention-oriented advocates such as David Olds. According to Murray, if the government ceases its support, communities and families will pick up the slack because they will have to. See MURRAY, *supra* note 4, at 282. This, in turn, will benefit children.

children is essential to building this architecture, but when this relationship is deeply compromised because of child abuse or neglect, extreme poverty, or maternal clinical depression, children's brains are affected in ways that last a lifetime. This Section spells out the details of this core story.

A. Brain Architecture

During the prenatal period and early childhood, the brain lays down neural pathways that become the foundation for future brain development, with brain cells—neurons—forming circuits. The neural circuits that are used repeatedly grow stronger, but those that are not used regularly die off through a process called pruning. Neural circuits become the basis for the development of language, emotions, logic, memory, motor skills, and behavioral control.²⁰ With repeated use, the circuits become more efficient, connecting different areas of the brain more rapidly and thus affecting a person's ability to think effectively and regulate emotions.²¹ If the foundation is strong, it is easier to build upon in later years, but if the foundation is weak, it is much harder for the brain to develop the higher-level skills that rely on efficient connections between different areas of the brain.²²

Genetics provide a blueprint for brain development, but it is a child's environment and experiences that determine the strength of the brain's architecture.²³ Beginning with

²⁰ *In Brief: The Science of Early Childhood Development*, HARVARD UNIV. CTR. ON THE DEVELOPING CHILD, http://developingchild.harvard.edu/resources/briefs/inbrief_series/inbrief_the_science_of_ecd/ (last visited Sept. 22, 2012).

²¹ *Id.*

²² *Id.*; Nat'l Scientific Council on the Developing Child, *The Timing and Quality of Early Experiences Combine to Shape Brain Architecture* 1–4 (Harvard Univ. Ctr. on the Developing Child, Working Paper No. 5, 2007) [hereinafter NSCDC Working Paper No. 5], available at http://developingchild.harvard.edu/download_file/-/view/74/.

²³ The mechanism through which experiences affect the expression of genes is the epigenome. In a useful analogy, neuroscientists liken genes to the hardware of a computer, setting the limits of what the body can do, but useless without an operating system. The epigenome is that operating system, determining which functions the hardware will perform. Experiences and

environment, the prenatal and postnatal context for development can affect the expression of the genetic plan. For example, if a fetus is exposed to certain toxins, such as alcohol, during pregnancy (and especially during certain periods of the pregnancy), this harms the development of neural circuits. Similarly, after birth, the availability of nutrients and the absence of toxins also affect the construction of the neural circuitry. As described in greater detail below, a child's experiences also play a central role in shaping the development of neural circuits.²⁴

Much of the critical development period occurs before a child enters formal schooling at age five, although some processes continue into adulthood.²⁵ Different capacities develop during so-called "sensitive periods," with the basic neural circuitry for vision and hearing developing shortly before and soon after birth, and the circuits used for language and speech production peaking before age one.²⁶ The higher level circuits used for cognitive functions develop throughout the first several years of life.²⁷ For example, the so-called executive functions—the brain's ability to hold information in the short term, ignore distractions, and switch gears between contexts and priorities (or, to use slightly more formal terminology, "working

environment shape the epigenome, leaving "signatures" on the epigenome, which, in turn, affect which genes will be turned on and off. The example of identical twins helps explain this process. Although identical twins have the same genetic make-up, their different experiences in life will lead to different epigenomes, meaning that some genes will be expressed differently. Thus, although identical twins may be very similar in many aspects of their lives, their health, behavior, and skills can differ because of the different expressions of their genes. See Nat'l Scientific Council on the Developing Child, *Early Experiences Can Alter Gene Expression and Affect Long-Term Development* 1 (Harvard Univ. Ctr. on the Developing Child, Working Paper No. 10, 2010) [hereinafter NSCDC Working Paper No. 10], available at http://developingchild.harvard.edu/download_file/-/view/666/.

²⁴ See NSCDC Working Paper No. 5, *supra* note 22, at 1–2.

²⁵ See *id.* at 1–5 (explaining that although "the foundations of brain architecture are established early in life," neural circuits continue to adapt through adulthood).

²⁶ See *id.* at 2–3.

²⁷ See *id.* at 3–4.

memory,” “inhibitory control,” and “cognitive flexibility”)—are developed from birth through late adolescence, but with a particularly important period occurring from ages three to five.²⁸

These sensitive periods are a time of particular vulnerability for neural circuits. Significantly adverse environments and experiences during the sensitive periods can have lasting impacts on the circuitry as the circuits develop in response to the adverse conditions. Compromised circuits are harder, although not impossible, to repair later in life.²⁹

A critical mechanism for making and strengthening neural connections is what the National Scientific Council calls “serve-and-return” interaction between an attentive, responsive caregiver and a child. The child initiates interaction through babbling, movements, and facial expressions, and the adult responds with sounds and gestures. Through this serve-and-return, neural connections between different areas of the brain are established and reinforced. As the neuroscientist Daniel Siegel explains, “where you are focusing attention stimulates the firing of certain neurons. And when neurons fire, they increase their synaptic connectivity to one another.”³⁰ In other words, “relational experience drives neural firing, and neural firing drives neural wiring.”³¹ The neural connections forged through interactions with a caregiver become the basis for future communication and social skills.³²

²⁸ See Nat’l Scientific Council on the Developing Child, *Building the Brain’s “Air Traffic Control” System: How Early Experiences Shape the Development of Executive Function* 1–8 (Harvard Univ. Ctr. on the Developing Child, Working Paper No. 11, 2011), available at http://developingchild.harvard.edu/download_file/-/view/836/.

²⁹ See NSCDC Working Paper No. 5, *supra* note 22, at 4.

³⁰ Siegel & McIntosh, *supra* note 18, at 513.

³¹ *Id.*

³² See Nat’l Scientific Council on the Developing Child, *Children’s Emotional Development Is Built into the Architecture of Their Brains* 1 (Harvard Univ. Ctr. on the Developing Child, Working Paper No. 2, 2004), available at http://developingchild.harvard.edu/download_file/-/view/70/; NSCDC Working Paper No. 5, *supra* note 22, at 5; Nat’l Scientific Council on the Developing Child, *Young Children Develop in an Environment of Relationships* 1–3 (Harvard Univ. Ctr. on the Developing Child, Working Paper No. 1, 2004), available at <http://developingchild.harvard.edu/>

B. Toxic Stress

A relationship with an attentive, responsive adult may be the key to building strong brain architecture, but the absence of such a relationship can be devastating. This can be demonstrated through the concept of toxic stress. Learning how to cope with stress is an important part of child development. For example, the temporary disappearance of a caregiver or a minor injury may trigger a child's stress response system, with an increased heart rate and increased levels of stress hormones.³³ When a caregiver promptly comforts the child, the response system is quickly deactivated and the child develops a sense of mastery over stressful events.³⁴ Neuroscientists refer to this as positive stress.³⁵

By contrast, prolonged, severe, or frequent stress stemming from abuse, neglect, extreme poverty, and maternal clinical depression can create "toxic stress,"³⁶ which has a serious adverse impact on brain development. When there is no caring adult able to relieve this stress, or when the caregiver is the source of the stress, as in the case of abuse and neglect, the child's stress response remains activated. This constant activation overloads the developing brain and impedes the construction of neural pathways. In extreme cases, toxic stress can lead to the development of a smaller brain. In cases of moderate toxic stress, the brain can change such that it develops

download_file/-/view/587/; *In Brief: The Science of Early Childhood Development*, *supra* note 20.

³³ See NAT'L SCIENTIFIC COUNCIL ON THE DEVELOPING CHILD, THE SCIENCE OF EARLY CHILDHOOD DEVELOPMENT: CLOSING THE GAP BETWEEN WHAT WE KNOW AND WHAT WE DO 9-10 (2007); *see also* Nat'l Scientific Council on the Developing Child, *Excessive Stress Disrupts the Architecture of the Developing Brain* 1 (Harvard Univ. Ctr. on the Developing Child, Working Paper No. 3, 2005) [hereinafter NSCDC Working Paper No. 3], available at http://developingchild.harvard.edu/download_file/-/view/469/.

³⁴ See NSCDC Working Paper No. 3, *supra* note 33, at 1.

³⁵ *See id.*

³⁶ *See id.* (defining toxic stress). See *supra* note 18, describing the conscious effort by a group of neuroscientists to use metaphors and terms, including "toxic stress," to convey complex scientific methods to nonscientists.

a hair trigger for stress, activating the stress response system in response to events that others might not perceive as stressful.³⁷

This lasting effect occurs because the neural circuits involved in the transmission of stress signals are particularly flexible during early childhood. Toxic stress leaves a lasting impression on the creation of these circuits, affecting how easily the stress response is turned on and off.³⁸ This, in turn, creates a greater vulnerability to physical and mental illnesses, such as diabetes, strokes, cardiovascular disease, and depression and anxiety disorders.³⁹

Further, the heightened level of cortisol, the hormone triggered by stress, has consequences for the development of the areas of the brain dedicated to memory and learning, weakening the neural connections to these parts of the brain.⁴⁰ Responsive caregivers help to prevent the production of cortisol, even in a child temperamentally predisposed to be anxious. By contrast, when a caregiver is depressed or abusive or neglectful, a child's cortisol levels increase, both during stress and even after the stressful period ends.⁴¹

³⁷ NSCDC Working Paper No. 3, *supra* note 33, at 1. "Tolerable stress" falls between positive stress and toxic stress. Tolerable stress has the potential to affect brain architecture but is mitigated by both its brevity and also the presence of responsive caregivers who are able to help children learn to cope with the stressful event. Examples include the loss of a loved one or an alarming accident. *Id.* For further discussion of the effect of toxic stress on brain development, see Nat'l Scientific Council on the Developing Child, *Persistent Fear and Anxiety Can Affect Young Children's Learning and Development* 5-6 (Harvard Univ. Ctr. on the Developing Child, Working Paper No. 9, 2010), available at http://developingchild.harvard.edu/download_file/-/view/622/.

³⁸ NSCDC Working Paper No. 3, *supra* note 33, at 2.

³⁹ *See id.*

⁴⁰ *See id.* at 2-3.

⁴¹ *See id.* at 4. Although adverse experiences such as abuse and neglect put children at risk for poor outcomes, some children are genetically predisposed to be particularly affected by adverse experiences. For these children, toxic stress is correlated with later physical and mental health illnesses, such as clinical depression. *See* Nat'l Scientific Council on the Developing Child, *Mental Health Problems in Early Childhood Can Impair Learning and Behavior for Life* 1 (Harvard Univ. Ctr. on the Developing Child, Working Paper No. 6, 2008) [hereinafter NSCDC Working Paper No.

The effect of toxic stress is particularly strong during sensitive periods when neural circuits are forming and maturing.⁴² During these periods, the genetic plan and brain architecture can be significantly modified. By contrast, once a circuit has matured, environment and experiences affect the genetic plan and architecture to a much lesser degree.⁴³ For example, the loss of an important caregiver during the period of critical growth—say at age nine months—can change the child’s brain development in a way that affects the child’s ability to regulate her emotional state in the future.⁴⁴ For a nine-year-old child, this loss may result in temporary disorganization and regression, but for the infant, the loss may have a lasting effect on brain functioning.⁴⁵

To appreciate the effect of toxic stress on serve-and-return interactions, consider maternal depression. In this context, maternal depression refers to clinical depression, not the “baby blues” that many women experience after giving birth. Instead of engaging in serve-and-return interactions, a clinically depressed mother typically is either hostile and aggressive to her children or withdrawn and disengaged.⁴⁶ Both parenting styles negatively affect the serve-and-return interaction that is crucial for brain development, either because the mother’s serve is unappealing to the child or because the mother does not return a serve from the child.⁴⁷ When this pattern continues for a prolonged period, the child’s brain architecture can be affected.⁴⁸ Indeed, brain scans conducted through an electroencephalogram, or EEG, reveal that children with depressed mothers show brain

6], *available at* http://developingchild.harvard.edu/download_file/-/view/72/.

⁴² See NSCDC Working Paper No. 5, *supra* note 22, at 2.

⁴³ See *id.*

⁴⁴ See Schore & McIntosh, *supra* note 18, at 506–07.

⁴⁵ See *id.*

⁴⁶ See Nat’l Scientific Council on the Developing Child, *Maternal Depression Can Undermine the Development of Young Children 3* (Harvard Univ. Ctr. on the Developing Child, Working Paper No. 8, 2009) [hereinafter NSCDC Working Paper No. 8], *available at* http://developingchild.harvard.edu/download_file/-/view/582/.

⁴⁷ See *id.*

⁴⁸ See *id.*

activity similar to depressed adults. This result was found both with infants and toddlers (children in their second and third years).⁴⁹

Maternal depression is particularly worrisome because it is widespread and highly correlated with poverty. For example, one study of mothers with nine-month-old infants found that ten percent of the women with income levels over 200 percent of the poverty level were severely depressed, but twenty-five percent of the women living below the poverty level were severely depressed.⁵⁰ Further, maternal depression often occurs alongside other adverse conditions—depressed mothers are more likely to be young, have had stressful childhoods, and be socially isolated.⁵¹ They are also more likely to be victims of domestic violence, have poor health, and struggle with substance abuse.⁵² This raises complex questions about the cause and effect of maternal depression, but the correlation—and impact on neural development—is clear.

C. The Effectiveness of Intervention

Even when a child has been exposed to toxic stress during a sensitive period, and even if the child has a genetic predisposition to be harmed by that stress, early interventions can still be effective. Take, for example, mental illness in children. Widely under-recognized and under-diagnosed, mental illnesses in young children often stem from a combination of a genetic predisposition and adverse environment and experiences.⁵³ A child with an anxiety disorder, for example, may have inherited a gene that is associated with adult anxiety. If the child grows up in a stressful environment, the child is particularly at risk for developing an anxiety disorder. But this child also is a candidate for effective intervention, especially if

⁴⁹ *See id.* at 3–4.

⁵⁰ *See id.* at 1–2 (citing calculations using the Early Childhood Longitudinal Study, Birth Cohort 9-month restricted use data).

⁵¹ *See id.* at 4.

⁵² *See id.*

⁵³ *See* NSCDC Working Paper No. 6, *supra* note 41, at 1–9.

undertaken at a young age.⁵⁴ If the child is provided with experiences in an environment rich with appropriate emotional supports, stable relationships with nurturing and skilled caregivers, and preventive mental health services, she may well overcome the anxiety disorder, or at least develop far better coping mechanisms.⁵⁵ Similarly, studies on severe maternal depression have found that intensive interventions focusing on the mother-child interactions have positive outcomes for both parent and child.⁵⁶

The Nurse-Family Partnership is an excellent example of a program that helps foster child brain development. The program arranges for a public health nurse to visit a low-income, first-time parent during pregnancy and for the first two years of a child's life. The nurse works closely with the mother to improve prenatal health; help the new parents provide more competent care to the child; and address the family's economic stability by helping the parents develop and accomplish goals relating to staying in school and finding work, as well as helping the parents plan subsequent pregnancies.⁵⁷ The results of the program are striking. Families receiving this kind of support have a seventy-nine percent lower incidence rate of child abuse and neglect than similarly situated families,⁵⁸ as well as numerous other benefits.⁵⁹

⁵⁴ *See id.*

⁵⁵ *See id.* at 6.

⁵⁶ *See* NSCDC Working Paper No. 8, *supra* note 46, at 5–6.

⁵⁷ *What We Do*, NURSE-FAMILY P'SHIP, <http://www.nursefamilypartnership.org/About/What-we-do> (last visited Sept. 24, 2012).

⁵⁸ *See* David L. Olds, *Prenatal and Infancy Home Visiting by Nurses: From Randomized Trials to Community Replication*, 3 PREVENTION SCI. 153, 161–63 (2002); *Nurse-Family Partnership*, OJJDP MODEL PROGRAM GUIDE, [http://www.ojjdp.gov/mpg/Nurse%E2%80%93Family%20Partnership%20\(NFP\)-MPGProgramDetail-368.aspx](http://www.ojjdp.gov/mpg/Nurse%E2%80%93Family%20Partnership%20(NFP)-MPGProgramDetail-368.aspx) (last visited Sept. 22, 2012).

⁵⁹ *See, e.g.*, David Olds et al., *Long-term Effects of Nurse Home Visitation on Children's Criminal and Antisocial Behavior: 15-Year Follow-up of a Randomized Controlled Trial*, 280 J. AM. MED. ASS'N 1238, 1241 (1998) (documenting lower rates of involvement in the criminal justice system). The program also appears to be cost-effective. *See also* JUDITH GLAZNER ET AL., FINAL REPORT TO THE ADMINISTRATION FOR CHILDREN AND FAMILIES: EFFECT OF THE NURSE FAMILY PARTNERSHIP ON

Although not designed as a program to test neuroscientific insights into brain development, the Nurse-Family Partnership embodies all the elements of the core story. It focuses its efforts on the sensitive periods of brain development—the prenatal period and the first few years of life. It fosters strong serve-and-return interactions between parents and children by helping parents learn to be responsive and attentive to their children. And it helps identify early warning signs of maternal depression and works to get parents treatment.⁶⁰

If Charles Murray had his way, however, the government would not fund programs like the Nurse-Family Partnership. Instead, Murray likely would argue that programs like this only encourage unhealthy dependency and relieve individuals and communities of the responsibility of caring for their own. This is unrealistic. A clinically depressed mother with a history of domestic violence and substance abuse is not simply going to wake up one morning and decide that because a visiting nurse is not coming, she will shake off her depression and interact meaningfully with her child that day. In light of the extraordinary challenges facing families at risk of involvement in the child welfare system, Murray's approach seems wishful thinking at best and dangerously naïve at worst.

II. WHY WE SHOULD BE CAUTIOUS

This growing body of research is clearly relevant to the child welfare system. In a system ostensibly designed to protect the well-being of children, it is important to understand the basic

GOVERNMENT EXPENDITURES FOR VULNERABLE FIRST-TIME MOTHERS AND THEIR CHILDREN IN ELMIRA, NEW YORK, MEMPHIS, TENNESSEE, AND DENVER, COLORADO 11 (2004), *available at* http://www.acf.hhs.gov/sites/default/files/opre/effect_nursefam.pdf (documenting that during the fifteen-year period following intervention, the average visited family used, in 2001 dollars, \$56,600 less in government services and paid \$8,300 more in taxes than a control group, resulting in a 393% recovery over the fifteen year period on the amount invested).

⁶⁰ See, e.g., *Client Story – Amanda*, NURSE-FAMILY P'SHIP, <http://www.nursefamilypartnership.org/first-time-moms/stories-from-moms/amanda-s-story> (last visited Sept. 22, 2012).

building blocks of child development. From the perspective of a scholar focused on discerning the applicability of this research to the contemporary discourse on the state's role in preventive child welfare, the research also raises significant concerns and questions. This Essay focuses on three of these concerns—reliability, relevance, and malleability.⁶¹

A. Reliability

The most fundamental question—indeed, the first question for any research—is whether it is reliable. To discuss reliability, however, immediately begs the question of whether a lay reader is competent to determine reliability. A lay reader can look for obvious flaws in the studies, such as a small sample size or implausible claims about cause and effect, but it is far more challenging to evaluate claims about synaptic connectivity without a considerable grasp of the underlying science. The

⁶¹ For further discussion of the perils of tying law to developmental theories about children, see Emily Buss, *What the Law Should (and Should Not) Learn from Child Development Research*, 38 HOFSTRA L. REV. 13, 13–14 (2009) (identifying four central concerns with the law determining children's capacities based on scientific research into child development: (1) the law cannot accurately account for the complexity of capacity nor the relative immaturity of the scientific research, (2) a more nuanced understanding of children's development tends to caricature adult capacity, (3) the insistence on developing one account of children's capacity that applies in different legal contexts distracts from the need for coherence in other areas of children's law, (4) focusing on current capacity does not reflect society's hopes for children's development and suggests that the law does not affect that development); Terry A. Maroney, *The False Promise of Adolescent Brain Science in Juvenile Justice*, 85 NOTRE DAME L. REV. 89, 145–60 (2009) (describing the limitations of using neuroscience in the context of juvenile justice, noting in particular the inability of neuroscience to offer individualized assessments of defendants; the incomplete understanding of the relationship between an immature brain and immature behavior; the difficulty in determining how much an immature brain should excuse behavior, if at all; the inability of neuroscience to determine a hard line for adult responsibility; and the equality and autonomy implications, including the possible conclusion that girls, who develop more quickly, should be held responsible for their behavior earlier than boys, and concerns about limiting adolescents' autonomy based on determinations of brain maturity).

concern is that lay readers will adopt study findings uncritically and base important policy decisions on an ill-understood area of science.⁶²

The challenge, however, is not necessarily more pointed in this context than in many other interdisciplinary undertakings. The average lay reader may believe she is competent to assess an economics study or a historical account, but perhaps this sense of competence is illusory. The reader may assume that she is capable because the terminology is more familiar, but she likely is not scrutinizing the economists' assumptions and models, nor is she returning to the historian's original sources. Arguably, there is little meaningful difference between relying on a neuroscientist's characterization of a body of research and a historian's characterization of primary sources; we simply believe we can judge the latter more readily and so are less skeptical of such claims. In an interdisciplinary world where reliance on the work of other experts is common practice, we may simply have to settle for safeguards such as peer review and study replication that are intended to ensure that findings are supported and therefore reliable.

Another threshold question is whether the field is sufficiently mature to form the basis for policy decisions. As neuroscientists are quick to acknowledge,⁶³ the field is young and much remains unknown. Thus, there is a real danger in basing decisions on a body of scientific research that is still emerging and evolving. The safest route is to rely only on the findings that are well established by multiple sources and studies, such as the role of serve-and-return interactions in developing neural circuitry.

Finally, consumers of translation efforts, like the laudable work of the National Scientific Council, should be particularly alert. The simplifying metaphors are helpful in explaining

⁶² One model that addresses this potential concern is for scholars from different disciplines to work closely together in determining the relevance of neuroscientific research for the law. An excellent example of the benefits of this kind of careful and close collaboration is the work of legal scholar Elizabeth Scott and psychologist Laurence Steinberg. *See* SCOTT & STEINBERG, *supra* note 18, at 32–60.

⁶³ *See, e.g.*, STEVEN ROSE, *THE FUTURE OF THE BRAIN: THE PROMISE AND PERILS OF TOMORROW'S NEUROSCIENCE* 187–220 (2005).

concepts, but it is difficult to assess what is lost in translation. There are inevitable nuances and qualifications to the findings that are not included in the summaries, and readers should understand that they likely are ill-equipped to identify these elisions.

All these concerns suggest caution in relying too much on this growing body of research. Nonscientists should not conclude that the inability to assess the research independently is a reason for rejecting the research wholesale, but there is good reason to proceed cautiously and with an appreciation both for what is unknown and for what is ill-understood by lay readers.

B. Relevance

The second question concerns *how* the research should be used. It would be misguided to apply general findings about child brain development in individual cases. Take, for example, a clinically depressed mother. Even if they had the resources to do so, participants in the child welfare system should not scan the brain of a mother and a child and then base a removal decision on the extent to which the child's brain activity mimics that of the mother. The studies to date only tell us that there are reasons to be concerned about clinical depression and child development, but not that any given child should be removed from the care of a depressed mother. We simply do not know enough about how a particular child might fare in the care of a particular mother, what other protective factors might be in place, or what hardships the child might face in a different placement.

The growing body of neuroscientific research is most relevant to larger policy questions, and we can look at the data in the aggregate and draw at least tentative conclusions. For example, the research strongly supports the notion that caregiver-child relationships are essential to child well-being. It is also clear that there are particularly important periods for brain development and that the early years are critical to a child's future capacity for learning, social skills, and self-regulation. These findings confirm the importance of the animating purpose of the child welfare system—ensuring the well-being of children. Whether the child welfare system

actually does so is a hotly contested issue,⁶⁴ but this body of research reinforces the notion that parent-child relationships are essential to healthy child development and that adverse early experiences can be highly detrimental. As the next section demonstrates, however, determining the precise policies that should flow from these findings is a fraught endeavor.

C. Malleability

A final, important concern is that the research is highly susceptible to being deployed in support of different, and perhaps competing, policies. Some may look at the research and argue that the child welfare system should do more to remove very young children from questionable caregiving situations. Especially in a time of budget cuts and political inability to incur short-term costs for long-term gains, policymakers and legislatures could argue that this research demonstrates that there is no time to lose. They might use the research to buttress schemes like the Adoption and Safe Families Act, which emphasizes removal and termination, with short time limits for parents to address the issues underlying the abuse or neglect.⁶⁵ The argument would be that there is a basic mismatch between the time line of child brain development, with the need for attentive care during the all-important sensitive periods,⁶⁶ and the time line of a troubled parent who may need prolonged treatment for substance abuse and may well experience relapses that are often part of recovery.⁶⁷

Charles Murray might use the research to support his contention that families should care for themselves. He would

⁶⁴ See Clare Huntington, *Rights Myopia in Child Welfare*, 53 UCLA L. REV. 637, 651–72 (2006) (describing the multiple failings of the child welfare system, both as conceived and as implemented).

⁶⁵ See *id.* at 649, 660 (discussing ASFA).

⁶⁶ See NSCDC Working Paper No. 5, *supra* note 22, at 6.

⁶⁷ See A. Thomas McLellan et al., *Drug Dependence, a Chronic Medical Illness*, 284 J. AM. MED. ASS'N 1689, 1689 (2000) (noting that active substance use relapse occurs in forty to sixty percent of patients, and such common relapses should not be viewed as evidence of treatment failure due to the chronic illness-like nature of substance abuse).

contend that this is just further evidence that childhood instability causes terrible damage, which makes it all the more urgent that families get their act together by ending welfare dependency.⁶⁸

I, however, look at this research and think: “prevention is essential.” If early adverse experiences and environments can deeply affect a child’s neural development, with lifelong consequences, then surely the child welfare system—and the state more generally—should try its hardest to improve the conditions in which children live. Programs like the Nurse-Family Partnership seem particularly well suited to improving both the prenatal and postnatal environment and a child’s early experiences with a caregiver.

I also believe the research cautions against the removal of young children in all but the most serious circumstances. The loss of the primary attachment figure for a very young child can be devastating. Instead, the child welfare system should seek to treat the whole family. Children’s well-being is so tied to the well-being of their parents and caregivers that it is not possible to isolate one from the other.

In short, there are numerous ways to promote a strong bond between children and primary caregivers, and this goal might be achieved through more than one set of policy tools.⁶⁹ Even though science may not provide a clear answer on difficult policy choices—and often it will not—it can still inform the debate. It is the task of scholars and advocates to evaluate and reform the child welfare system in the face of emerging research, a task this symposium has begun.

⁶⁸ One answer is that many families in the child welfare system are not able to respond to the need for a stable environment without external support. If a clinically depressed mother is a primary caregiver, no amount of libertarian autonomy is going to make a difference. So, in some cases, this evidence does point in the favor of some policies over others even if there are disagreements within the realm of support versus intervention.

⁶⁹ Consider an example outside the context of the child welfare system. Although the United States is hardly a leader in paid parental leave, it is not hard to imagine an advocate using this research to argue in favor of far greater leave allowances, and particularly paid leave, for new parents.

CONCLUSION

Based on a growing body of research by neuroscientists, there should be little disagreement about the value of attentive, responsive caregivers to the healthy development of children. In light of the neuroplasticity of children's brains and the importance of sensitive periods for brain development, early childhood is a critical period for child development. Brain architecture is deeply affected by both environment and experiences, and once neural circuits have formed, it is much harder to repair them later in time. As the National Scientific Council puts it, "[t]he brain adapts to the experiences it has."⁷⁰

The disagreement stems from *how* to strengthen families. This research does not resolve the debate over prevention through government programs versus a hands-off approach of letting families figure it out for themselves. Thus, the research likely will not persuade Charles Murray and others that the government should invest in prevention programs like the Nurse-Family Partnership. But at least we know what is at stake.

⁷⁰ NSCDC Working Paper No. 10, *supra* note 23, at 2.