



NATIONAL SCIENTIFIC COUNCIL ON THE DEVELOPING CHILD

**CHILDREN'S EMOTIONAL DEVELOPMENT IS BUILT INTO
THE ARCHITECTURE OF THEIR BRAINS**

WINTER 2004

WORKING PAPER #2

COUNCIL MEMBERS

Jack P. Shonkoff, M.D. (Chair)

Samuel F. and Rose B. Gingold Professor of
Human Development and Social Policy
The Heller School for Social Policy
and Management
Brandeis University

Judy Cameron, Ph.D.

Professor of Psychiatry
University of Pittsburgh
Senior Scientist
Oregon National Primate Research Center

Greg Duncan, Ph.D.

Edwina S. Tarry Professor of Education
and Social Policy
Northwestern University
Director
Joint Center for Poverty Research
Northwestern University and
University of Chicago

Nathan Fox, Ph.D.

Professor of Human Development
University of Maryland, College Park

William Greenough, Ph.D.

Swanlund Professor of Psychology
Psychiatry and Cell and Structural Biology
Director
Center for Advanced Study
University of Illinois, Urbana-Champaign

Megan Gunnar, Ph.D.

Distinguished McKnight University Professor
Institute of Child Development
University of Minnesota

Eric Knudsen, Ph.D.

Edward C. and Amy H. Sewall Professor of Neurobiology
Stanford University School of Medicine

Pat Levitt, Ph.D.

Professor of Pharmacology
Director
Kennedy Center for Human Development
Vanderbilt University

Betsy Lozoff, M.D.

Professor of Pediatrics
University of Michigan Medical School
Research Professor
Center for Human Growth and Development
University of Michigan

Charles A. Nelson, Ph.D.

Richard David Scott Professor of Pediatrics
Harvard University Medical School
Director of Research
Developmental Medicine Center, Boston Children's Hospital

Deborah Phillips, Ph.D.

Professor of Psychology
Co-Director
Center for Research on Children
Georgetown University

Ross Thompson, Ph.D.

Professor of Psychology
University of California, Davis

SECOND PRINTING - APRIL 2006



NATIONAL SCIENTIFIC COUNCIL ON THE DEVELOPING CHILD

is a multidisciplinary collaboration of leading scientists in early childhood and early brain development. Its mission is to bring sound and accurate science to bear on public decision-making affecting the lives of young children.

For more information on the Council and the science of early childhood, please see www.developingchild.net.

THE ISSUE

A growing body of scientific evidence tells us that emotional development begins early in life, that it is a critical aspect of the development of overall brain architecture and that it has enormous consequences over the course of a lifetime. These findings have far-reaching implications for policy makers and parents, and therefore demand our attention.

From birth, children rapidly develop their abilities to experience and express different emotions, as well as their capacity to cope with and manage a variety of feelings.^{1,2,3} The development of these capabilities occurs at the same time as a wide range of highly visible skills in mobility (motor control), thinking (cognition) and communication (language).⁴ Yet, emotional development often receives relatively less recognition as a core emerging capacity in the early childhood years.

The foundations of social competence that are developed in the first five years are linked to emotional well-being and affect a child's later ability to functionally adapt in school and to form successful relationships throughout life.^{5,6,7,8} As a person develops into adulthood, these same social skills are essential for the formation of lasting friendships and intimate relationships, effective parenting, the ability to hold a job and work well with others, and for becoming a contributing member of a community.^{9,10}

Disregarding this critical aspect of the developing child can lead parents and policy makers to underestimate its importance and to ignore the foundation that emotions establish for later growth and development. Thus, it is essential that young children's feelings get the same level of attention as their thinking. In fact, learning to manage emotions is more difficult for some children than learning to count or read and may, in some cases, be an early warning sign of future psychological problems. The failure to address difficulties in this equally important domain can result in missed opportunities for interventions. Had they been initiated early, these interventions could have yielded tremendous benefits for large numbers of children and for society.

WHAT SCIENCE TELLS US

The core features of emotional development include the ability to identify and understand one's own feelings, to accurately read and comprehend emotional states in others, to manage strong emotions and their expression in a constructive manner, to regulate one's own behavior, to develop empathy for others and to establish and sustain relationships.^{2,11,12}

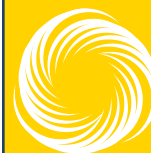
Emotional development is actually built into the architecture of young children's brains in response to their individual personal experiences and the influences of the environments in which they live. In fact, emotion is a biologically based aspect of human functioning that is “wired” into multiple regions of the central nervous system that have a long history in the evolution of our species.^{13,14,15,16,17} These growing interconnections among brain circuits support the emergence of increasingly mature emotional behavior, particularly in the preschool years. Stated simply, as young children develop, their early emotional experiences literally become embedded in the architecture of their brains. Here is what we know:

- The emotional experiences of newborns and young infants occur most commonly during periods of interaction with a caregiver (such as feeding, comforting and holding).^{8,11,18,19} Infants display distress and cry when they are hungry, cold, wet or in other ways uncomfortable, and they experience positive emotions when they are fed, soothed and held. During this early period, children are incapable of modulating the expression of overwhelming feelings, and they have limited ability to control their emotions in the service of focusing or sustaining attention.¹³ Associations between positive emotions and the availability of sensitive and responsive caregiving are strengthened during infancy in both behavior and brain architecture.²⁰
- The emotional states of toddlers and preschoolers are much more complex.²¹ They depend on their emerging capacities to interpret their own personal experiences and understand what others are doing and thinking, as well as to interpret the nuances of how others respond to them.^{2,11, 22,23} As they (and their brains) build on foundations that are established earlier, they mature and acquire a better understanding of a range of emotions. They also become more capable of managing their feelings, which is one of the most challenging tasks of early childhood.^{3,24,25,26,27}
- By the end of the preschool years, children who have acquired a strong emotional foundation have the capacity to anticipate, talk about and use their awareness of their own and others' feelings to better manage everyday social interactions.^{2,11} Their emotional repertoires have expanded dramatically and now include such feelings as pride, shame, guilt, and embarrassment — all of which influence how individuals function as contributing members of a society.^{21,28} Throughout the early childhood years, children develop increasing capacities to use language to communicate how they feel and to gain help without “melting down,” as well as to inhibit the expression of emotions that are inappropriate for a particular setting.^{3,29}



- When feelings are not well managed, thinking can be impaired. Recent scientific advances have shown how the interrelated development of emotion and cognition relies on the emergence, maturation and interconnection of complex neural circuits in multiple areas of the brain, including the prefrontal cortex, limbic cortex, basal forebrain, amygdala, hypothalamus and brainstem.³⁰ The circuits that are involved in the regulation of emotion are highly interactive with those that are associated with “executive functions” (such as planning, judgment and decision making), which are intimately involved in the development of problem-solving skills during the preschool years.³¹ In terms of basic brain functioning, emotions support executive functions when they are well regulated but interfere with attention and decision making when they are poorly controlled.^{19,32,33,34,35}
- We now know that differences in early childhood temperament — ranging from being extremely outgoing and adventurous to being painfully shy and easily upset by anything new or unusual — are grounded in one's biological makeup.^{36,37} These variations lead to alternative behavioral pathways for young children as they develop individual strategies to control their emotions during the preschool years and beyond. They also present diverse challenges for parents and other adults who must respond differently to different kinds of children.³⁸ When it comes to finding the “best” approach for raising young children, scientists tell us that one size does not fit all.³⁹
- Young children are capable of surprisingly deep and intense feelings of sadness (including depression), grief, anxiety and anger (which can result in unmanageable aggression), in addition to the heights of joy and happiness for which they are better known.^{40,41,42,43} For some children, the preschool years mark the beginning of enduring emotional difficulties and mental-health problems that may become more severe than earlier generations of parents and clinicians ever suspected.
- The emotional health of young children — or the absence of it — is closely tied to the social and emotional characteristics of the environments in which they live, which include not only their parents but also the broader context of their families and communities.^{44,45,46,47,48} Young children who grow up in homes that are troubled by parental mental-health problems, substance abuse or family violence face significant threats to their own emotional development. In fact, the experience of chronic, extreme and/or uncontrollable maltreatment has been documented as producing measurable changes in the immature brain.^{49,50}

Children's early abilities to deal with their emotions are important not only for the foundation these capacities provide for the future, but also for the children's current social functioning with their parents, teachers and peers. In fact, differences in how young children understand and regulate their own emotions are closely associated with peer and teacher perceptions of their social competence, as well as with how well-liked they are in a child-care setting or preschool classroom.^{51,52,53}



UNFOUNDED ASSERTIONS IN THE NAME OF SCIENCE

As the public's appetite for scientific information about the development of young children is whetted by exciting new findings, the risk of exaggerated or misleading messages grows. Within this context, it is essential that scientific fact be differentiated from popularly accepted fiction.

- There is no credible scientific evidence that young children who have been exposed to violence will invariably grow up to be violent adults themselves. Although these children clearly are at greater risk for adverse impacts on brain development and later problems with aggression, they are not doomed to poor outcomes, and they can be helped substantially if provided with early and appropriate treatment, combined with reliable and nurturing relationships with supportive caregivers.⁵⁴
- Science does not support the claim that infants and toddlers are too young to have serious mental-health problems. In fact, young children who have experienced significant maltreatment exhibit an early childhood equivalent of post-traumatic stress disorder, which presents a predictable array of clinical symptoms that are amenable to successful therapeutic intervention.⁵⁵

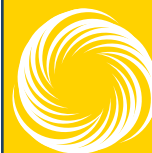


THE SCIENCE-POLICY GAP

The fact that young children have feelings is old news. The extent to which infants can experience deep emotional pain as a result of early traumas and losses is less understood. The realization that young children can have serious mental-health problems, including anxiety disorders and signs of depression accompanied by the same kind of brain changes seen on electroencephalograms in clinically depressed adults, is startling news to most people.^{40,44,56,57} The fact that significant and prolonged emotional distress can affect the emerging architecture of a young child's brain should be a sobering wake-up call for society as a whole.

Despite the availability of rich and extensive knowledge on the emotional and social development of young children, including its underlying neurobiology, current early-childhood policies focus largely on cognition, language, and early literacy. Policies addressing children's emotional and behavioral needs have been the exception, not the rule. This gap between what we “know” about healthy emotional development and the management of behavioral difficulties, and what we “do” through public policies and programs, is illustrated by the following examples:

- Uneven availability of support for parents and providers of early care and education to deal with common, age-appropriate behavioral challenges, such as discipline and limit setting.⁵⁸
- Limited caregiver and teacher training to evaluate and deal with children who present significant emotional and/or behavioral problems in early care and education programs. This is particularly alarming in the face of recent evidence of dramatic increases in prescriptions for behavior-modifying medications to treat preschoolers.^{59,60}
- Minimal expertise in early childhood development or “infant mental health” within child-welfare agencies that assess and treat children who have been the victims of serious maltreatment, despite extensive evidence that very young children can experience debilitating anxiety and trauma from parental abuse or neglect or from witnessing violence in their family or neighborhood, as well as data illustrating that early interventions can moderate the effects of these traumas.⁶¹



IMPLICATIONS FOR POLICY AND PROGRAMS

The science of early childhood development is sufficiently mature at the present time to support a number of well-documented, evidence-based implications for those who develop and implement policies that affect the health and well-being of young children. Five compelling messages are particularly worthy of thoughtful consideration:

- All early childhood programs, including Head Start, must balance their focus on cognition and literacy skills with significant attention to emotional and social development. Children clearly need the social and emotional capabilities that enable them to sit still in a classroom, pay attention, and get along with their classmates just as much as they need the cognitive skills required to master the reading and math concepts taught in kindergarten.⁶²
- The rich and growing science of early emotional and social development must be incorporated into services to support parents who are struggling to manage routine behavioral difficulties in their young children, as well as those who are trying to figure out whether, when and how to deal with more serious social or emotional problems.⁶³
- Providers of early care and education must have sufficient knowledge and skills to help children who present common behavior problems early on, particularly those who exhibit significant aggression or difficulties with attention and "hyperactivity." The achievement of this goal requires a two-pronged approach. First, greater attention must be focused on the social and emotional development of children in both pre-professional training programs and continuing professional education. Second, all early childhood programs must have access to specialized mental-health services that have professionals available to meet the needs of young children whose problems cannot be addressed adequately by front-line staff.¹⁹
- Expertise in early identification, assessment and clinical treatment must be incorporated into existing intervention programs to address the complex and currently unmet needs of young children with serious mental-health problems such as depression, anxiety and significant antisocial behaviors. Central to this challenge is the need to accurately differentiate transient emotional difficulties that reflect a "phase" that the child will out-grow from diagnosable disorders that require clinical treatment.¹⁹
- All child-welfare agencies that have responsibility for investigating suspected abuse or neglect must include a sophisticated assessment of the child's developmental status, including cognitive, linguistic, emotional and social competence. This could be accomplished through closer collaboration between child-protective services and early intervention programs for children with developmental delays or disabilities, as mandated by the recently enacted Keeping Children and Families Safe Act of 2003 (Public Law 108-36).⁶⁴



These implications for policy and practice are striking in their simplicity, the extent to which they reflect common sense and their solid grounding in the science of early childhood and brain development. Closing the science-policy gap as it affects the future of our children, and therefore our society, should be an important priority for all who are engaged in public life.

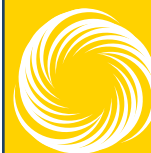


NOTES



REFERENCES

- 1 Saarni, C., Mumme, D.L., & Campos, J.J. (1998). Emotional development: Action, communication, and understanding. In W. Damon (Ed.), & N. Eisenberg, *Handbook of Child Psychology, Vol. 3, (5th Ed.)*, Social, emotional and personality development (pp. 237-309). New York: Wiley.
- 2 Thompson, R.A., & Lagatutta, K. (in press). Feeling and understanding: Early emotional development. In K. McCartney & D. Phillips (Eds.), *The Blackwell Handbook of Early Childhood Development*. Oxford, UK: Blackwell.
- 3 Thompson, R.A. (1994). Emotion regulation: A theme in search of definition. In N.A. Fox (Ed.), *The development of emotion regulation and dysregulation: Biological and behavioral aspects. Monographs of the Society for Research in Child Development, 59(2-3)*, 25-52 (Serial no. 240).
- 4 Thompson, R.A. (2001). Development in the first years of life. *The Future of Children, 11(1)*, 20-33.
- 5 Collins, W.A., & Laursen, B. (1999). Relationships as developmental contexts. *The Minnesota Symposia on Child Psychology, Vol. 30*. Mahwah, NJ: Erlbaum.
- 6 Dunn, J. (1993). *Young Children's Close Relationships: Beyond attachment*. Newbury Park, CA: Sage.
- 7 Cassidy, J. & P.R. Shaver (Eds.) (1999). *Handbook of Attachment: Theory, research, and clinical applications* (pp. 89-111). New York: Guilford.
- 8 Thompson, R.A. (1998). Early sociopersonality development. In W. Damon (Ed.), & N. Eisenberg (Vol. Ed.), *Handbook of Child Psychology, Vol. 3, (5th Ed.)*, Social, emotional, and personality development (pp. 25-104). New York: Wiley.
- 9 Berscheid, E., & Reis, H.T. (1998). Attraction and close relationships. In D.T. Gilbert, S.T. Fiske, & G. Lindzey (Eds.), *Handbook of Social Psychology, Vol. 1, (2nd Ed.)*. New York: McGraw-Hill.
- 10 Reis, H.T., Collins, W.A., & Berscheid, E. (2000). Relationships in human behavior and development. *Psychological Bulletin, 126*, 844-872.
- 11 Denham, S. (1998). *Emotional Development in Young Children*. New York: Guilford.
- 12 Harris, P.L. (1989). *Children and Emotion: The development of psychological understanding*. Oxford, UK: Blackwell.
- 13 LeDoux, J. (2000). Emotion circuits in the brain. *Annual Review of Neuroscience, 23*, 155-184.
- 14 Panksepp, J. (1998). *Affective Neuroscience*. London: Oxford University Press.
- 15 Panksepp, J. (2000). Developing mechanisms of self-regulation. *Development and Psychopathology, 12(3)*, 427-442.
- 16 Dawson, G., & Fischer, K.W. (Eds.) (1994). *Human Behavior and the Developing Brain*. New York: Guilford.
- 17 Gunnar, M.R., & Davis, E.P. (2003). Stress and emotion in early childhood. In R.M. Lerner & M.A. Easterbrooks (Eds.), *Handbook of Psychology, Vol. 6. Developmental Psychology* (pp. 113-134). New York: Wiley.
- 18 Fogel, A. (1993). *Developing Through Relationships: Origins of communication, self, and culture*. Chicago: University of Chicago Press.
- 19 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*. Washington, DC: National Academy Press.
- 20 Cassidy, J. (1994). Emotion regulation: Influences of attachment relationships. In N.A. Fox (Ed.), *The development of emotion regulation and dysregulation: Biological and behavioral aspects. Monographs of the Society for Research in Child Development, 59(2-3)*, 228-249 (Serial no. 240).



- 21 Lewis, M. (2000). Self-conscious emotions: Embarrassment, pride, shame, and guilt. In M. Lewis & J.M. Haviland-Jones (Eds.), *Handbook of Emotions* (pp. 563-573). New York: Guilford.
- 22 Banerjee, M. (1997). Peeling the onion: A multilayered view of children's emotional development. In S. Hala (Ed.), *The Development of Social Cognition* (pp. 241-272). Hove, UK: Psychology Press.
- 23 Wellman, H.M., Harris, P.L., Banerjee, M., & Sinclair, A. (1995). *Early understanding of emotion: Evidence from natural language. Cognition and Emotion, 9*, 117-149.
- 24 Eisenberg, N. & Morris, A.S. (2002). Children's emotion-related regulation. In R. Kail (Ed.), *Advances in Child Development and Behavior, Vol. 30* (pp. 190-229). San Diego: Academic.
- 25 Buss, K.A., & Goldsmith, H.H. (1998). Fear and anger regulation in infancy: Effects on the temporal dynamics of affective expression. *Child Development, 69*, 359-374.
- 26 Eisenberg, N., Fabes, R., Guthrie, I., & Reiser, M. (2000). Dispositional emotionality and regulation: Their role in predicting quality of social functioning. *Journal of Personality and Social Psychology, 78*, 136-157.
- 27 Kopp, C.B. (1989). Regulation of distress and negative emotions: A developmental view. *Developmental Psychology, 25*(3), 343-355.
- 28 Barrett, K. (1998). The origins of guilt in early childhood. In J. Bybee (Ed.), *Guilt and Children* (pp. 75-90). San Diego: Academic.
- 29 Lagattuta, K.H., & Wellman, H.M. (2002). Differences in early parent-child conversations about negative versus positive emotions: Implications for the development of emotion understanding. *Developmental Psychology, 38*, 564-580.
- 30 Davidson, R.J., Lewis, M., Alloy, L.B., Amaral, D.G., Bush, G., Cohen, J., et al. (2002). Neural and behavioral substrates of mood and mood regulation. *Biological Psychiatry, 52*(6), 478-502.
- 31 Posner, M., & Rothbart, M. (2000). Developing mechanisms of self-regulation. *Development and Psychopathology, 12*(3), 427-442.
- 32 Damasio A.R. (1999). *The Feeling of What Happened*. New York: Harcourt Brace.
- 33 Davis, M. (1992). The role of the amygdala in fear and anxiety. *Annual Review of Neuroscience, 15*, 353-375.
- 34 LeDoux, J.E. (1996). *The Emotional Brain*. New York: Simon & Schuster.
- 35 Bush, G., Luu, P., & Posner, M.I. (2000). Cognitive and emotional influences in anterior cingulate cortex. *Trends in Cognitive Sciences, 4*(6), 215-222.
- 36 Rothbart, M.K., & Bates, J.E. (1998). Temperament. In W. Damon (Ed.), & N. Eisenberg (Vol. Ed.), *Handbook of Child Psychology Vol. 3, (5th Ed.)*, Social, emotional and personality development (pp. 105-176). New York: Wiley.
- 37 Rothbart, M.K., Derryberry, D., & Posner, M.I. (1994). A psychobiological approach to the development of temperament. In J.E. Bates & T.D. Wachs (Eds.), *Temperament: Individual differences at the interface of biology and behavior* (pp. 83-116). Washington, DC: American Psychological Association.
- 38 Kochanska, G. (1997). Multiple pathways to conscience for children with different temperaments: From toddlerhood to age 5. *Developmental Psychopathology, 33*, 228-240.
- 39 Teti, D.M., & Candelaria, M.A. (2002). Parenting competence. In M.H. Bornstein (Ed.), *Handbook of Parenting, Vol. 4. Social conditions and applied parenting (2nd Ed.)* (pp. 149-180). Mahwah, NJ: Erlbaum.
- 40 Shaw, D.S., Owens, E.B., Giovannelli, J., & Winslow, E.B. (2001). Infant and toddler pathways leading to early externalizing disorders. *Journal of the American Academy of Child & Adolescent Psychiatry, 40*, 36-43.
- 41 Ashman, S.B., & Dawson, G. (2002). Maternal depression, infant psychobiological development, and risk for



depression. In S.H. Goodman & I.H. Gotlib (Eds.), *Children of Depressed Parents* (pp. 37-58). Washington, DC: American Psychological Association.

42 Rubin, K.H., Burgess, K.B., Dwyer, K.M., & Hastings, P.D. (2003). Predicting preschoolers' externalizing behaviors from toddler temperament, conflict, and maternal negativity. *Developmental Psychology, 39*, 164-176.

43 Vasey, M.W., & Dadds, M.R. (2001). *The Developmental Psychopathology of Anxiety*. London: Oxford University Press.

44 Dawson, G., & Ashman, D.B. (2000). On the origins of a vulnerability to depression: The influence of the early social environment on the development of psychobiological systems related to risk of affective disorder. In C.A. Nelson (Ed.), *The effects of early adversity on neurobehavioral development*. Minnesota Symposia on Child Psychology, Vol. 31 (pp. 245-279). Mahwah, NJ: Erlbaum.

45 Cummings, E.M., & Davies, P. (1994). *Children and Marital Conflict*. New York: Guilford.

46 Reid, J.B., Patterson, G.R., & Snyder, J. (2002). *Antisocial Behavior in Children and Adolescents: A developmental analysis and model for intervention*. Washington, DC: American Psychological Association.

47 Thompson, R.A., & Calkins, S. (1996). The double-edged sword: Emotional regulation for children at risk. *Development and Psychopathology, 8*(1), 163-182.

48 Davies, P.T., & Forman, E.M. (2002). Children's patterns of preserving emotional security in the interparental subsystem. *Child Development, 73*, 1880-1903.

49 Glaser, D. (2000). Child abuse and neglect and the brain - A review. *Journal of Child Psychology and Psychiatry, 41*, 97-118.

50 De Bellis, M.D., Keshavan, M.S., Clark, D.B., Casey, B.J., Giedd, J.B., Boring, A.M., et al. (1999). Developmental traumatology, Part 2: Brain development. *Biological Psychiatry, 45*, 1271-1284.

51 Denham, S.A., Blair, K.A., DeMulder, E., Levitas, J., Sawyer, K., Auerbach-Major, S., & Queenan, P. (2003). Preschool emotional competence: Pathway to social competence. *Child Development, 74*, 238-256.

52 Halberstadt, A.G., Denham, S.A., & Dunsmore, J.C. (2001). Affective social competence. *Social Development, 10*, 79-119.

53 Rubin, K.H., Coplan, R.J., Nelson, L.J., Cheah, C.S.L., & Lagace-Seguin, D.G. (1999). Peer relationships in childhood. In M.H. Bornstein & M.E. Lamb (Eds.), *Developmental Psychology: An advanced textbook* (4th Ed.) (pp. 451-501). Mahwah, NJ: Erlbaum.

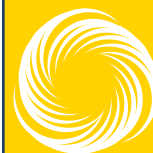
54 Graham-Berman, S.A., & Hughes, H.M. (2003). Intervention for children exposed to interparental violence (IPV): Assessments of needs and research priorities. *Clinical Child & Family Psychology Review, 6*, 189-204.

55 Scheeringa, M.S., & Zeanah, C.H. (1995). Symptom expression and trauma variables in children under 48 months of age. *Infant Mental Health Journal, 16*(4), 259-270.

56 Dawson, G., Frey, K., Panagiotides, H., Yamada, E., Hessel, D., & Osterling, J. (1999). Infants of depressed mothers exhibit atypical frontal electrical brain activity during interactions with mother and with a familiar, nondepressed adult. *Child Development, 70*, 1058-1066.

57 Shaw, D.S., Gilliom, M., Ingoldsby, E.M., & Nagin, D.S. (2003). Trajectories leading to school-age conduct problems. *Developmental Psychology, 39*, 189-200.

58 Knitzer, J. (2001). *Building Services and Systems to Support the Healthy Emotional Development of Young Children: An action guide for policymakers*. New York: National Center for Children in Poverty, Columbia University Mailman School of Public Health.



- 59 Knitzer, J. (2000). Early childhood mental health services: A policy and systems development perspective. In J.P. Shonkoff & S.J. Meisels (Eds.), *Handbook of Early Childhood Intervention* (2nd Ed.) (pp. 416-438). New York: Cambridge University Press.
- 60 Zito, J., Safer, D., dosReis, S., Gardner, J., Boles, M., & Lynch, F. (2000). Trends in the prescribing of psychotropic medications to preschoolers. *Journal of the American Medical Association*, *283*, 1025-1030.
- 61 Melton, G.B., & Thompson, R.A. (2002). The conceptual foundation: Why child protection should be neighborhood-based and child-centered. In G.B. Melton, R.A. Thompson, & M.A. Small (Eds.), *Toward a Child-centered, Neighborhood-based Child Protection System: A report of the Consortium on Children, Families, and the Law* (pp. 3-27). Westport, CT: Praeger.
- 62 Thompson, R.A., & Raikes, H.A. (in preparation). Early socioemotional development and the roots of school readiness. In J. Knitzer, R. Kaufmann, & D. Perry (Eds.), *Early Childhood Mental Health*. Baltimore, MD: Paul H. Brookes Publishing Co.
- 63 Brooks-Gunn, J., Berlin, L.J., & Fuligni, A.S. (2000). Early childhood intervention programs: What about the family? In J.P. Shonkoff & S.J. Meisels (Eds.), *Handbook of Early Childhood Intervention* (2nd Ed.) (pp. 549-577). New York: Cambridge University Press.
- 64 Thompson, R.A. & Flood, M.F. (2002). Toward a child-oriented child protection system. In G. B. Melton, R.A. Thompson, & M.A. Small (Eds.), *Toward a Child-centered, Neighborhood-based Child Protection System: A report of the Consortium on Children, Families, and the Law* (pp. 155-194). Westport, CT: Praeger.

Suggested Citation: National Scientific Council on the Developing Child, *Children's emotional development is built into the architecture of their brains*. (2004), Working Paper No. 2.



CONTRIBUTING MEMBERS

Susan Nall Bales

President
The FrameWorks Institute

W. Thomas Boyce, M.D.

Professor of Epidemiology and Child Development
Division of Health and Medical Sciences
University of California, Berkeley

James Heckman, Ph.D.

Henry Schultz Distinguished Service Professor of Economics
Director
Economics Research Center, Department of Economics
University of Chicago

Arthur J. Rolnick, Ph.D.

Senior Vice President and Director of Research
Federal Reserve Bank of Minneapolis

COUNCIL PARTNERS

The FrameWorks Institute

The Johnson & Johnson Pediatric Institute

The National Conference of State Legislatures

COUNCIL SPONSORS

The John D. and Catherine T. MacArthur Foundation

The Buffett Early Childhood Fund

The Susan A. Buffett Foundation

COUNCIL WORKING PAPER SERIES

WORKING PAPER #1 – Young Children Develop In An Environment Of Relationships

WORKING PAPER #3 – Excessive Stress Disrupts the Architecture of the Developing Brain

WORKING PAPER #4 – Early Exposure To Toxic Substances Damages Brain Architecture

NATIONAL SCIENTIFIC COUNCIL ON THE DEVELOPING CHILD

THE HELLER SCHOOL, BRANDEIS UNIVERSITY
MS 077 · Waltham, MA 02454-9110 · 781-736-3822 · fax 781-736-3773 · www.developingchild.net



NATIONAL SCIENTIFIC COUNCIL ON THE DEVELOPING CHILD
www.developingchild.net

