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# FROM NEURONS TO NEIGHBORHOODS: *The Science of Early Childhood Development – An Introduction*

**O**n October 3, 2000, the National Research Council and Institute of Medicine of the National Academies released *From Neurons to Neighborhoods: The Science of Early Childhood Development*. This report is the product of a two-and-a-half year effort by the Committee on Integrating the Science of Early Childhood Development, a group of 17 individuals with backgrounds in neuroscience, psychology, child development, economics, education, pediatrics, psychiatry, and public policy, and by the project's Study Director and staff. The Committee's charge was to review what is known about the nature of early development and the influence of early experiences on children's health and well-being, to disentangle established knowledge from erroneous popular beliefs or misunderstandings, and to examine the implications of the science base for policy, practice, professional development, and research.

As we began our work, we acknowledged that the science of early childhood development, as it has grown over the past several decades, has been as fragmented as the existing service

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programs and the policies that address the diverse needs of young children and their families. Thus, although there is only one species of humans in this world, researchers have compartmentalized the study of young children through investigations embedded in “poverty” or “disability” or “mental health” or “child care” or “child welfare” as relatively discrete phenomena. Consequently, each of these domains has its own distinctive research constituency and separate advocacy community.

Notwithstanding the fact that some viewed the goal of evaluating and integrating the multidisciplinary science of early childhood development as too ambitious, the task of the Committee was to identify and articulate a single coherent knowledge base. In view of the scope of our mandate, we were particularly pleased that funding for the project came from all of the major scientific, policy, and programmatic agencies in the U.S. Department of Health and Human Services, as well as The Office of Special Education Programs in the U. S. Department of Education, and The Commonwealth Fund, The Ewing Marion Kauffman Foundation, The Heinz Endowments, and The Irving B. Harris Foundation. In order to assure that our final report would be useful to the broadest possible audience, we reached out to the practice and policy communities at the beginning of the process to find out what questions they wanted the scientific community to answer.

Operating under the auspices of the National Research Council and the Institute of Medicine subjected this effort to an extraordinarily high standard of scientific review. Thus, whereas the compelling needs of young children and their families often tempt well-meaning advocates to overstate the science or “oversell” its conclusions, the Committee took very seriously its responsibility to adhere to rigorous scientific principles in order to separate fact from fiction. Over the course of 2½ years, we reviewed hundreds of studies, convened a number of workshops, commissioned several papers, and engaged in extended and spirited debate. The final draft of our report was scrutinized by 11 outside reviewers, each of whom provided detailed comments and suggestions that required an explicit response. Consequently, the final approval of *From Neurons to Neighborhoods* by the nation’s most rigorous and prestigious scientific body allows us to say, with clear authority, “This is the current state of the science of early childhood development.”

Equally important is the need to view this study within the context of two profound changes over the past several decades that have coincided to produce a dramatically altered landscape for early childhood policy, service delivery, and child rearing in the United States. The first is manifested in an explosion of research in the neurobiological, behavioral, and social sciences that has led to major advances in our understanding of the conditions that influence whether children get off to a promising or a worrisome start in life. The second is reflected in a number of dramatic transformations that characterize the social and economic circumstances under which American families are raising young children.

The cultural diversity of the nation’s early childhood population is increasing dramatically. The nature, schedule, and

amount of parental work have changed and continue to evolve at all income levels. High rates of economic hardship persist despite increased maternal education, greater parental work, and a strong economy — and recent evidence suggests that poverty may be particularly damaging during the early childhood period. Indeed, striking developmental disparities associated with economic and social disadvantage are apparent well before kindergarten and predictive of later school performance. And sadly, at a time when scientific advances could be used to strengthen early childhood policies and practices, knowledge is frequently dismissed or ignored, and our children and their parents are paying the price.

### **“Take-home Messages” and Themes of the Report**

While *From Neurons to Neighborhoods* does its best to “embrace the complexity” of the science of early childhood development (see Fenichel, this issue), a number of clear themes, all heavily grounded in and strongly supported by science, emerged from the Committee’s inquiry. These include the following conclusions:

- The traditional “nature versus nurture” debate is simplistic and scientifically obsolete.
- Early experiences clearly influence brain development, but a disproportionate focus on “birth to three” begins too late and ends too soon.
- Early intervention programs can improve the odds for vulnerable young children, but those that work are rarely simple, inexpensive, or easy to implement.
- How young children *feel* is as important as how they *think*, particularly with regard to school readiness.
- Healthy early development depends on nurturing and dependable relationships.
- Culture influences all aspects of early development through child-rearing beliefs and practices.
- There is little scientific evidence that special “stimulation” activities above and beyond normal growth-promoting experiences lead to “advanced” brain development in infancy.
- Substantial scientific evidence indicates that poor nutrition, specific infections, environmental neurotoxins, drug exposures, and chronic stress can harm the developing brain.
- Significant parent mental health problems (particularly maternal depression), substance abuse, and family violence impose heavy developmental burdens on young children.

### **Recommendations for Policy, Practice, Research, and Evaluation**

After examining and integrating the science of early childhood development, the Committee then addressed the implications of that science for policy, practice, professional development, training, and research in a wide range of early childhood domains. Several clusters of recommendations were formulated, as follows:

- **Need for greater attention to social-emotional development and the mental health needs of young children.** Early childhood programs must balance their long-standing focus on cognition and literacy skills with comparable attention to the emotional, regulatory, and social development of all children, including those with special needs. In addition, greater commitments must be made to address significant unmet mental health needs in young children by establishing clear policy and practice linkages among child protective services, welfare reform, mental health agencies, early intervention programs, early care and education, and primary health care. In order to meet these goals, major investments in professional development are essential (see Emde, this issue).
- **Need to recognize the significance of early childhood caregivers and educators.** The early childhood years lay a foundation that influences the effectiveness of all subsequent education efforts. Therefore, public expenditures for early care and education must be invested in high-quality programs that promote sustained relationships between young children and qualified personnel, address the special needs of children with developmental disabilities or chronic health conditions, and guarantee that all settings are safe, stimulating, and compatible with the values and priorities of the families they serve. In order to achieve significant progress in this area, major investments must be made to enhance the skills and compensation of providers of early care and education.
- **Need to enhance supports for working families.** Tax, wage, and income-support policies should be reassessed to assure that no child supported by a working adult lives in poverty. Family and medical leave should be expanded to cover all working parents, and strategies should be explored to provide income replacement. The exemption period should be lengthened before states require parents of infants to work as part of welfare reform.
- **Interactions among knowledge, policy, and practice demand dramatic rethinking.** State and local decision-makers must take bold actions to design and implement coordinated infrastructures to reduce the long-standing fragmentation of policies and programs. Early childhood programs must reconcile their traditional strategies for active parent involvement with the increasing cultural diversity and the economic and social realities of current family life. Most important, there needs to be a change in the politicized context of program evaluation, which results in a high-stakes environment that undermines honest attempts to improve quality.

- **Need to integrate child development research, neuroscience, and molecular genetics.** Research is needed that will advance our understanding of how experience is incorporated into the maturing nervous system and how biological processes interact with environmental influences to affect the development of complex behaviors. We need to define more precisely the concepts of deprivation, sufficiency, and enrichment in the context of development (see Greenough, Gunnar, Emde, Massinga, and Shonkoff, this issue). The dynamics of gene-environment interaction that contribute to differential vulnerability and resilience also require further study, as do the mechanisms that underlie non-optimal birth outcomes and developmental disabilities.
- **Need to integrate the basic science of human development and the applied science of early childhood intervention** (see Guralnick, this issue). In order to translate research into practice, we need improved preventive and ameliorative interventions for children who are exposed to biological or environmental risks, as well as for children with established disabilities. Achieving this goal requires identifying modifiable mechanisms that link poverty to adverse outcomes for individual children and that explain persistent disparities across populations. Similarly, we need to enhance our understanding, detection, and treatment of early precursors of psychopathology. Finally, the growing cultural diversity of the United States requires a refined understanding of how specific interventions can be tailored to the distinctive characteristics of different cultural groups.
- **Need to improve evaluations of early childhood interventions.** Evaluation researchers need to adopt higher standards to assure rigorous and appropriate study designs, and all studies of intervention impacts must pay greater attention to program implementation. Moreover, greater attention should be paid to including outcomes related to early childhood development in studies of broad-based community and economic interventions that are not targeted specifically toward young children.

### at a glance

- *From Neurons to Neighborhoods* represents 2½ years' work by the 17-member multidisciplinary Committee on Integrating the Science of Early Childhood Development, working under the auspices of the National Research Council and the Institute of Medicine.
- Approval of the report by the country's most rigorous scientific body means that its findings should be considered the current state of the science of early childhood development.
- *From Neurons to Neighborhoods* presents both scientific findings and science-based recommendations for policy, practice, professional development, and research.

### Toward a New Public Dialogue and Shared Responsibility for Children

As we neared the completion of *From Neurons to Neighborhoods*, it became increasingly clear to the members of the Committee that the science of early childhood development is typically viewed through highly personalized and sharply politicized lenses. In many respects, this is an area of

study in which personal experience allows everyone to claim some level of expertise.

As a public issue, questions about the care and protection of children confront many of the basic values that have defined the United States from the time of its founding — personal responsibility, individual self-reliance, privacy, and limited government involvement in the lives of its citizens. In a highly pluralistic society that is experiencing dramatic economic and social change, however, the development of all children must be viewed as a matter of intense concern for both their parents and for the nation as a whole. Thus, based on the evidence gleaned from a rich and rapidly growing science base, the Committee felt an urgent need to call for a new national dialogue focused on rethinking the meaning of both individual and shared responsibility for children, as well as underscoring the importance of strategic investment in their future.

The time has come to stop blaming parents, communities, business, and government — and to shape a shared agenda to ensure both a rewarding childhood and a promising future for all children. Central to this agenda is the importance of matching different needs and discrete capabilities. Families, for example, are the best vehicle for providing loving and caring relationships and for creating safe and nurturing environments that promote healthy physical, cognitive, linguistic, social, emotional, and moral development. Communities are ideally situated to provide a wide range of supports for families through informal social networks and formal voluntary organizations. Businesses have the opportunity to support family well-being through creating positive work environments, offering flexible work schedules, and providing important financial benefits, such as family health insurance and child care. Local, state,

and federal governments have substantial opportunities to support child needs through such diverse mechanisms as tax policies (e.g., earned income and child care tax credits) and minimum wage laws that alleviate economic hardship, child care standards that ensure safe and stimulating environments for young children, early intervention services for children with special needs, and paid family leave benefits and child care and education subsidies that give parents a real choice about whether and when to work. No single locus of responsibility can address all the needs of young children and their families. Effective policies clearly require aggregate responsibility.

Finally, the Committee calls for a national commitment to two complementary agendas, each of which addresses a critical question:

- The first poses a question for the future — How can society use knowledge about early childhood development to maximize the nation's human capital and ensure the ongoing vitality of our democratic institutions?
- The second poses a question for the present — How can the nation use knowledge to nurture, protect, and ensure the health and well-being of all young children as an important objective in its own right, regardless of whether measurable returns can be documented in the future?

The charge to the Committee was to blend the knowledge and insights of a broad range of disciplines to generate an integrated science of early childhood development. The charge to society is to blend the skepticism of a scientist, the passion of an advocate, the pragmatism of a policy maker, the creativity of a practitioner, and the devotion of a parent — and to use existing knowledge to ensure both a decent quality of life for all of our children and a promising future for the nation. ¶

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