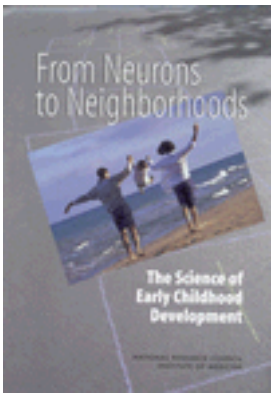
Free Executive Summary



From Neurons to Neighborhoods: The Science of Early Childhood Development

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How we raise young children is one of today's most highly personalized and sharply politicized issues, in part because each of us can claim some level of "expertise." The debate has intensified as discoveries about our development-in the womb and in the first months and years-have reached the popular media. How can we use our burgeoning knowledge to assure the well-being of all young children, for their own sake as well as for the sake of our nation? Drawing from new findings, this book presents important conclusions about nature-versus-nurture, the impact of being born into a working family, the effect of politics on programs for children, the costs and benefits of intervention, and other issues.The committee issues a series of challenges to decision makers regarding the quality of child care, issues of racial and ethnic diversity, the integration of children's cognitive and emotional development, and more.Authoritative yet accessible, From Neurons to Neighborhoods presents the evidence about "brain wiring" and how kids learn to speak, think, and regulate their behavior. It examines the effect of the climate-family, child care, community-within which the child grows.

Executive Summary

Scientists have had a long-standing fascination with the complexities of the process of human development. Parents have always been captivated by the rapid growth and development that characterize the earliest years of their children's lives. Professional service providers continue to search for new knowledge to inform their work. Consequently, one of the distinctive features of the science of early childhood development is the extent to which it evolves under the anxious and eager eyes of millions of families, policy makers, and service providers who seek authoritative guidance as they address the challenges of promoting the health and well-being of young children.

PUTTING THE STUDY IN CONTEXT

Two profound changes over the past several decades have coincided to produce a dramatically altered landscape for early childhood policy, service delivery, and childrearing in the United States. First, an explosion of research in the neurobiological, behavioral, and social sciences has led to major advances in understanding the conditions that influence whether children get off to a promising or a worrisome start in life. These scientific gains have generated a much deeper appreciation of: (1) the importance of early life experiences, as well as the inseparable and highly interactive influences of genetics and environment, on the development of the brain and the unfolding of human behavior; (2) the central role of early relationships

as a source of either support and adaptation or risk and dysfunction; (3) the powerful capabilities, complex emotions, and essential social skills that develop during the earliest years of life, and (4) the capacity to increase the odds of favorable developmental outcomes through planned interventions.

Second, the capacity to use this knowledge constructively has been constrained by a number of dramatic transformations in the social and economic circumstances under which families with young children are living in the United States: (1) marked changes in the nature, schedule, and amount of work engaged in by parents of young children and greater difficulty balancing workplace and family responsibilities for parents at all income levels; (2) continuing high levels of economic hardship among families, despite overall increases in maternal education, increased rates of parent employment, and a strong economy; (3) increasing cultural diversity and the persistence of significant racial and ethnic disparities in health and developmental outcomes; 4) growing numbers of young children spending considerable time in child care settings of highly variable quality, starting in infancy; and (5) greater awareness of the negative effects of stress on young children, particularly as a result of serious family problems and adverse community conditions that are detrimental to child well-being. While any given child may be affected by only one or two of these changes, their cumulative effects on the 24 million infants, toddlers, and preschoolers who are now growing up in the United States warrant dedicated attention and thoughtful response.

This convergence of advancing knowledge and changing circumstances calls for a fundamental reexamination of the nation's responses to the needs of young children and their families, many of which were formulated several decades ago and revised only incrementally since then. It demands that scientists, policy makers, business and community leaders, practitioners, and parents work together to identify and sustain policies and practices that are effective, generate new strategies to replace those that are not achieving their objectives, and consider new approaches to address new goals as needed. It is the strong conviction of this committee that the nation has not capitalized sufficiently on the knowledge that has been gained from nearly half a century of considerable public investment in research on children from birth to age 5. In many respects, we have barely begun to use our growing research capabilities to help children and families negotiate the changing demands and possibilities of life in the 21st century.

THE COMMITTEE'S CHARGE

The Committee on Integrating the Science of Early Childhood Development was established by the Board on Children, Youth, and Families of the National Research Council and the Institute of Medicine to update scien-

tific knowledge about the nature of early development and the role of early experiences, to disentangle such knowledge from erroneous popular beliefs or misunderstandings, and to discuss the implications of this knowledge base for early childhood policy, practice, professional development, and research.

The body of research that the committee reviewed is extensive, multidisciplinary, and more complex than current discourse would lead one to believe. It covers the period from before birth until the first day of kindergarten. It includes efforts to understand how early experience affects all aspects of development—from the neural circuitry of the maturing brain, to the expanding network of a child's social relationships, to both the enduring and the changing cultural values of the society in which parents raise children. It includes efforts to understand the typical trajectories of early childhood, as well as the atypical developmental pathways that characterize the adaptations of children with disabilities.

The committee's review of this evidence addresses two complementary agendas. The first is focused on the future and asks: How can society use knowledge about early childhood development to maximize the nation's human capital and ensure the ongoing vitality of its democratic institutions? The second is focused on the present and asks: 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 first agenda speaks to society's economic, political, and social interests. The second speaks to its ethical and moral values. The committee is clear in our responsibility to speak to both.

CORE CONCEPTS OF DEVELOPMENT

As the knowledge generated by interdisciplinary developmental science has evolved and been integrated with lessons from program evaluation and professional experience, a number of core concepts, which are elaborated in the report, have come to frame understanding of the nature of early human development.

1. Human development is shaped by a dynamic and continuous interaction between biology and experience.
2. Culture influences every aspect of human development and is reflected in childrearing beliefs and practices designed to promote healthy adaptation.
3. The growth of self-regulation is a cornerstone of early childhood development that cuts across all domains of behavior.

4. Children are active participants in their own development, reflecting the intrinsic human drive to explore and master one's environment.

5. Human relationships, and the effects of relationships on relationships, are the building blocks of healthy development.

6. The broad range of individual differences among young children often makes it difficult to distinguish normal variations and maturational delays from transient disorders and persistent impairments.

7. The development of children unfolds along individual pathways whose trajectories are characterized by continuities and discontinuities, as well as by a series of significant transitions.

8. Human development is shaped by the ongoing interplay among sources of vulnerability and sources of resilience.

9. The timing of early experiences can matter, but, more often than not, the developing child remains vulnerable to risks and open to protective influences throughout the early years of life and into adulthood.

10. The course of development can be altered in early childhood by effective interventions that change the balance between risk and protection, thereby shifting the odds in favor of more adaptive outcomes.

POLICY AND PRACTICE

The committee's conclusions and recommendations are derived from a rich and extensive knowledge base and are firmly grounded in the following four overarching themes:

- All children are born wired for feelings and ready to learn.
- Early environments matter and nurturing relationships are essential.
- Society is changing and the needs of young children are not being addressed.
- Interactions among early childhood science, policy, and practice are problematic and demand dramatic rethinking.

All Children Are Born Wired for Feelings and Ready to Learn

From the time of conception to the first day of kindergarten, development proceeds at a pace exceeding that of any subsequent stage of life. Efforts to understand this process have revealed the myriad and remarkable accomplishments of the early childhood period, as well as the serious problems that confront some young children and their families long before school entry. A fundamental paradox exists and is unavoidable: development in the early years is both highly robust and highly vulnerable. Although there have been long-standing debates about how much the early years really matter in the larger scheme of lifelong development, our con-

clusion is unequivocal: What happens during the first months and years of life matters a lot, not because this period of development provides an indelible blueprint for adult well-being, but because it sets either a sturdy or fragile stage for what follows.

Conclusions

- From birth to age 5, children rapidly develop foundational capabilities on which subsequent development builds. In addition to their remarkable linguistic and cognitive gains, they exhibit dramatic progress in their emotional, social, regulatory, and moral capacities. All of these critical dimensions of early development are intertwined, and each requires focused attention.

- Striking disparities in what children know and can do are evident well before they enter kindergarten. These differences are strongly associated with social and economic circumstances, and they are predictive of subsequent academic performance. Redressing these disparities is critical, both for the children whose life opportunities are at stake and for a society whose goals demand that children be prepared to begin school, achieve academic success, and ultimately sustain economic independence and engage constructively with others as adult citizens.

- Early child development can be seriously compromised by social, regulatory, and emotional impairments. Indeed, young children are capable of deep and lasting sadness, grief, and disorganization in response to trauma, loss, and early personal rejection. Given the substantial short- and long-term risks that accompany early mental health impairments, the incapacity of many early childhood programs to address these concerns and the severe shortage of early childhood professionals with mental health expertise are urgent problems.

Recommendations

- **Recommendation 1** — Resources on a par with those focused on literacy and numerical skills should be devoted to translating the knowledge base on young children's emotional, regulatory, and social development into effective strategies for fostering: (1) the development of curiosity, self-direction, and persistence in learning situations; (2) the ability to cooperate, demonstrate caring, and resolve conflict with peers; and (3) the capacity to experience the enhanced motivation associated with feeling competent and loved. Such strategies and their widespread diffusion into the early childhood field must encompass young children both with and with-

out special needs. Successful action on this recommendation will require the long-term, collaborative investment of government, professional organizations, private philanthropy,and voluntary associations.

- **Recommendation 2 —** School readiness initiatives should be judged not only on the basis of their effectiveness in improving the performance of the children they reach, but also on the extent to which they make progress in reducing the significant disparities that are observed at school entry in the skills of young children with differing backgrounds.
- **Recommendation 3 —** Substantial new investments should be made to address the nation's seriously inadequate capacity for addressing young children's mental health needs. Expanded opportunities for professional training, as recently called for by the Surgeon General, and incentives for individuals with pertinent expertise to work in settings with young children are essential first steps toward more effective screening, early detection, treatment, and ultimate prevention of serious childhood mental health problems.

Early Environments Matter and Nurturing Relationships Are Essential

The scientific evidence on the significant developmental impacts of early experiences, caregiving relationships, and environmental threats is incontrovertible. Virtually every aspect of early human development, from the brain's evolving circuitry to the child's capacity for empathy, is affected by the environments and experiences that are encountered in a cumulative fashion, beginning early in the prenatal period and extending throughout the early childhood years. The science of early development is also clear about the specific importance of parenting and of regular caregiving relationships more generally. The question today is not whether early experience matters, but rather how early experiences shape individual development and contribute to children's continued movement along positive pathways.

Conclusions

- The long-standing debate about the importance of nature *versus* nurture, considered as independent influences, is overly simplistic and scientifically obsolete. Scientists have shifted their focus to take account of the fact that genetic and environmental influences work together in dynamic ways over the course of development. At any time, both are sources of human potential and growth as well as risk and dysfunction. Both genetically determined characteristics and those that are highly affected by experience are open to intervention. The most important questions now concern how environments influence the expression of genes and how genetic

makeup, combined with children's previous experiences, affects their ongoing interactions with their environments during the early years and beyond.

• Parents and other regular caregivers in children's lives are "active ingredients" of environmental influence during the early childhood period. Children grow and thrive in the context of close and dependable relationships that provide love and nurturance, security, responsive interaction, and encouragement for exploration. Without at least one such relationship, development is disrupted and the consequences can be severe and long-lasting. If provided or restored, however, a sensitive caregiving relationship can foster remarkable recovery.

• Children's early development depends on the health and well-being of their parents. Yet the daily experiences of a significant number of young children are burdened by untreated mental health problems in their families, recurrent exposure to family violence, and the psychological fallout from living in a demoralized and violent neighborhood. Circumstances characterized by multiple, interrelated, and cumulative risk factors impose particularly heavy developmental burdens during early childhood and are the most likely to incur substantial costs to both the individual and society in the future.

• The time is long overdue for society to recognize the significance of out-of-home relationships for young children, to esteem those who care for them when their parents are not available, and to compensate them adequately as a means of supporting stability and quality in these relationships for all children, regardless of their family's income and irrespective of their developmental needs.

• Early experiences clearly affect the development of the brain. Yet the recent focus on "zero to three" as a critical or particularly sensitive period is highly problematic, not because this isn't an important period for the developing brain, but simply because the disproportionate attention to the period from birth to 3 years begins too late and ends too soon.

• Abundant evidence from the behavioral and the neurobiological sciences has documented a wide range of environmental threats to the developing central nervous system. These include poor nutrition, specific infections, environmental toxins, and drug exposures, beginning early in the prenatal period, as well as chronic stress stemming from abuse or neglect throughout the early childhood years and beyond.

Recommendations

- **Recommendation 4** — Decision makers at all levels of government, as well as leaders from the business community, should ensure that better public and private policies provide parents with viable choices about how to allocate responsibility for child care during the early years of their children's lives. During infancy, there is a pressing need to strike a better balance between options that support parents to care for their infants at home and those that provide affordable, quality child care that enables them to work or go to school. This calls for expanding coverage of the Family and Medical Leave Act to all working parents, pursuing the complex issue of income protection, lengthening the exemption period before states require parents of infants to work as part of welfare reform, and enhancing parents' opportunities to choose from among a range of child care settings that offer the stable, sensitive, and linguistically rich caregiving that fosters positive early childhood development.
- **Recommendation 5** — Environmental protection, reproductive health services, and early intervention efforts should be substantially expanded to reduce documented risks that arise from harmful prenatal and early postnatal neurotoxic exposures, as well as from seriously disrupted early relationships due to chronic mental health problems, substance abuse, and violence in families. The magnitude of these initiatives should be comparable to the attention and resources that have been dedicated to crime prevention, smoking cessation, and the reduction of teen pregnancy. They will require the participation of multiple societal sectors (e.g., private, public, and philanthropic) and the development of multiple strategies.
- **Recommendation 6** — The major funding sources for child care and early childhood education should set aside a dedicated portion of funds to support initiatives that jointly improve the qualifications and increase the compensation and benefits routinely provided to children's nonparental caregivers. These initiatives can be built on the successful experience of the U.S. Department of Defense.

Society Is Changing and the Needs of Young Children Are Not Being Addressed

Profound social and economic transformations are posing serious challenges to the efforts of parents and others to strike a healthy balance between spending time with their children, securing their economic needs, and protecting them from the many risks beyond the home that may have an adverse impact on their health and development.

Conclusions

- Changing parental work patterns are transforming family life. Growing numbers of young children are being raised by working parents whose earnings are inadequate to lift their families out of poverty, whose work entails long and nonstandard hours, and whose economic needs require an early return to work after the birth of a baby. The consequences of the changing context of parental employment for young children are likely to hinge on how it affects the parenting they receive and the quality of the caregiving they experience when they are not with their parents.

- The developmental effects of child care depend on its safety, the opportunities it provides for nurturing and stable relationships, and its provision of linguistically and cognitively rich environments. Yet the child care that is available in the United States today is highly fragmented and characterized by marked variation in quality, ranging from rich, growth-promoting experiences to unstimulating, highly unstable, and sometimes dangerous settings. The burden of poor quality and limited choice rests most heavily on low-income, working families whose financial resources are too high to qualify for subsidies yet too low to afford quality care.

- Young children are the poorest members of society and are more likely to be poor today than they were 25 years ago. Growing up in poverty greatly increases the probability that a child will be exposed to environments and experiences that impose significant burdens on his or her well-being, thereby shifting the odds toward more adverse developmental outcomes. Poverty during the early childhood period may be more damaging than poverty experienced at later ages, particularly with respect to eventual academic attainment. The dual risk of poverty experienced simultaneously in the family and in the surrounding neighborhood, which affects minority children to a much greater extent than other children, increases young children's vulnerability to adverse consequences.

Recommendations

The challenges that arise at the juxtaposition of work, income, and the care of children reflect some of the most complex problems of contemporary society. Rather than offer recommendations for specific actions, many of which have been made before and gone unheeded, the committee wishes to underscore the compelling need for a focused, integrative, and comprehensive reassessment of our nation's child care and income support policies.

- **Recommendation 7** — The President should establish a joint federal-state-local task force charged with reviewing the entire portfolio of public investments in child care and early education. Its goal should be to develop a blueprint for locally responsive systems of early care and education for the coming decade that will ensure the following priorities: (1) that young children's needs are met through sustained relationships with qualified caregivers, (2) that the special needs of children with developmental disabilities or chronic health conditions are addressed, and (3) that the settings in which children spend their time are safe, stimulating, and compatible with the values and priorities of their families.
- **Recommendation 8** — The President's Council of Economic Advisers and the Congress should assess the nation's tax, wage, and income support policies with regard to their adequacy in ensuring that no child who is supported by the equivalent of a full-time working adult lives in poverty and that no family suffers from deep and persistent poverty, regardless of employment status. The product of this effort should be a set of policy alternatives that would move the nation toward achieving these fundamental goals.

Interactions Among Early Childhood Science, Policy, and Practice Are Problematic and Demand Dramatic Rethinking

Policies and programs aimed at improving the life chances of young children come in many varieties. Some are home based and others are delivered in centers. Some focus on children alone or in groups, and others work primarily with parents. A variety of services have been designed to address the needs of young children whose future prospects are threatened by socioeconomic disadvantages, family disruptions, and diagnosed disabilities. They all share a belief that early childhood development is susceptible to environmental influences and that wise public investments in young children can increase the odds of favorable developmental outcomes. The scientific evidence resoundingly supports these premises.

Conclusions

- The overarching question of whether we can intervene successfully in young children's lives has been answered in the affirmative and should be put to rest. However, interventions that work are rarely simple, inexpensive, or easy to implement. The critical agenda for early childhood intervention is to advance understanding of what it takes to improve the odds of positive outcomes for the nation's most vulnerable young children and to determine the most cost-effective strategies for achieving well-defined goals.

• The scientific knowledge base guiding early childhood policies and programs is seriously constrained by the relatively limited availability of systematic and rigorous evaluations of program implementation; gaps in the documentation of causal relations between specific interventions and specific outcomes and of the underlying mechanisms of change; and infrequent assessments of program costs and benefits.

• Model early childhood programs that deliver carefully designed interventions with well-defined objectives and that include well-designed evaluations have been shown to influence the developmental trajectories of children whose life course is threatened by socioeconomic disadvantage, family disruption, and diagnosed disabilities. Programs that combine child-focused educational activities with explicit attention to parent-child interaction patterns and relationship building appear to have the greatest impacts. In contrast, services that are based on generic family support, often without a clear delineation of intervention strategies matched directly to measurable objectives, and that are funded by more modest budgets, appear to be less effective.

• The elements of early intervention programs that enhance social and emotional development are just as important as the components that enhance linguistic and cognitive competence. Some of the strongest long-term impacts of successful interventions have been documented in the domains of social adjustment, such as reductions in criminal behavior.

• The reconciliation of traditional program formats and strategies—many of which emphasize the importance of active parent involvement and the delivery of services in the home setting—with the economic and social realities of contemporary family life is a pressing concern. Particularly urgent is the need to ensure access to these intervention programs for parents who are employed full-time, those who work nonstandard hours, and those who are making the transition from public assistance to work.

• Early childhood policies and practices are highly fragmented, with complex and confusing points of entry that are particularly problematic for underserved segments of the population and those with special needs. This lack of an integrative early childhood infrastructure makes it difficult to advance prevention-oriented initiatives for all children and to coordinate services for those with complex problems.

• The growing racial, ethnic, linguistic, and cultural diversity of the early childhood population requires that all early childhood programs and

medical services periodically reassess their appropriateness and effectiveness for the wide variety of families they are mandated to serve. Poor "take-up" and high rates of program attrition that are common to many early intervention programs, while not at all restricted to specific racial, ethnic, or linguistic groups, nonetheless raise serious questions about whether those who design, implement, and staff early childhood programs fully understand the meaning of "cultural competence" in the delivery of health and human services.

- The general political environment in which research questions are formulated and investigations are conducted has resulted in a highly problematic context for early childhood policy and practice. In many circumstances, the evaluation of intervention impacts is largely a high-stakes activity to determine whether policies and programs should receive continued funding, rather than a more constructive process of continuous knowledge generation and quality improvement.

- As the rapidly evolving science of early child development continues to grow, its complexity will increase and the distance between the working knowledge of service providers and the cutting edge of the science will be staggering. The professional challenges that this raises for the early childhood field are formidable.

Recommendations

- **Recommendation 9** — Agencies and foundations that support evaluation research in early childhood should follow the example set by the nation's successful approach to clinical investigation in the biomedical sciences. In this spirit, the goals of program-based research and the evaluation of services should be to document and ensure full implementation of effective interventions, and to use evidence of ineffectiveness to stimulate further experimentation and study.
- **Recommendation 10** — The time is long overdue for state and local decision makers to take bold actions to design and implement coordinated, functionally effective infrastructures to reduce the long-standing fragmentation of early childhood policies and programs. To this end, the committee urges two compelling first steps. First, require that all children who are referred to a protective services agency for evaluation of suspected abuse or neglect be automatically referred for a developmental-behavioral screening under Part C of the Individuals With Disabilities Education Act. Second, establish explicit and effective linkages among agencies that currently are

charged with implementing the work requirements of welfare reform and those that oversee the provision of both early intervention programs and child and adult mental health services.

- **Recommendation 11** — A comprehensive analysis of the professional development challenges facing the early childhood field should be conducted as a collaborative effort involving professional organizations and representatives from the wide array of training institutions that prepare people to work with young children and their families. The responsibility for convening such a broad-based working group or commission should be shared among the fields of education, health, and human services.

RESEARCH AND EVALUATION

Research has historically played a significant role in enhancing human development and preventing, ameliorating, and treating a range of conditions that can begin prenatally, at birth, or during the early years of life. To identify priorities among the many possible recommendations that could be made for promising further research, the committee was guided by three goals.

First, it is clear that the capacity to increase the odds of favorable birth outcomes and positive adaptation in the early childhood years would be strengthened considerably by supporting creative collaborations among child development researchers, neuroscientists, and molecular geneticists. Second, there is a pressing need to integrate basic research aimed at understanding developmental processes with intervention research that assesses efforts to influence developmental outcomes. Such collaborative initiatives hold the promise of advancing both understanding of environmental effects on development and improving the effectiveness of the nation's early intervention strategies. Third, the entire early childhood evaluation enterprise warrants a thorough reassessment in order to maximize opportunities for valid causal inference and generalization, to assess what has been learned cumulatively across the full array of evaluation studies, and to establish a constructive environment for discussion of ongoing research and its application to policy. The themes and issues presented below are elaborated in the committee's full complement of research priorities in the final report.

Integrating Child Development Research, Neuroscience, and Molecular Genetics

Enormous potential exists at the intersection of child development research, neuroscience, and molecular and behavioral genetics to unlock some of the enduring mysteries about how biogenetic and environmental factors interact to influence developmental pathways. These include: (a)

understanding how experience is incorporated into the developing nervous system and how the boundaries are determined that differentiate deprivation from sufficiency and sufficiency from enrichment; (b) understanding how biological processes, including neurochemical and neuroendocrine factors, interact with environmental influences to affect the development of complex behaviors, including self-regulatory capacities, prosocial or antisocial tendencies, planning and sustained attention, and adaptive responses to stress; (c) describing the dynamics of gene-environment interactions that underlie the development of behavior and contribute to differential susceptibility to risk and capacity for resilience; and (d) elucidating the mechanisms that underlie nonoptimal birth outcomes and developmental disabilities.

Integrating the Basic Science of Human Development and the Applied Science of Early Childhood Intervention

There are currently few avenues for integrating knowledge gained from basic developmental science and from evaluations of early interventions. Yet both enterprises ultimately seek to improve children's early outcomes and life opportunities. A great deal stands to be gained from deliberate efforts to forge ongoing interactions among scientists engaged in these complementary yet largely disconnected research traditions. Among the important objectives to be addressed are: (a) enhanced understanding, detection, and treatment of early precursors of psychopathology; (b) improved preventive and ameliorative interventions for women and children who are exposed to biological insults and adverse environmental conditions, as well as for children with identified disabilities; (c) the identification of modifiable mechanisms that link impoverished family resources to both adverse outcomes for individual children and persistent disparities across groups of children in learning skills and other developmental capacities; and (d) refined understanding of how interventions and the staff that implement them can work effectively with families that differ along dimensions defined by race and ethnicity, immigration status, religion, or other cultural characteristics. The capacity of research to address these objectives will hinge in part on investments in improving the available tools for measuring important, but generally neglected early developmental outcomes, such as the multiple components of self-regulatory and executive capacities, and the ability to make friends and engage with others as a contributing member of a group, as well as on increased efforts to evaluate the biological systems that are affected by early interventions.

Improving Evaluations of Early Childhood Interventions

To improve the nation's capacity to learn from evaluations of early childhood interventions, the committee recommends substantially increased attention to program implementation as an integral component of all early childhood evaluation research, the adoption of higher standards for the use of rigorous and appropriate evaluation study designs, the inclusion of early childhood outcomes in evaluations of broad-based community and economic interventions, and the convening of regular forums at the National Institutes of Health to synthesize evaluation research evidence across programs and strategies that share similar developmental aims.

CONCLUDING THOUGHTS

As this report moved to completion, it became increasingly clear to the members of the committee that the science of early childhood development has often been viewed through highly personalized and sharply politicized lenses. In many respects, this is an area in which personal experience allows everyone to claim some level of expertise. Moreover, as a public issue, questions about the care and protection of children confront many of the basic values that have defined our country from its founding—personal responsibility, individual self-reliance, and restrained government involvement in people's lives. In a highly pluralistic society that is experiencing dramatic economic and social change, however, the development of children must be viewed as a matter of intense concern for both their parents and for the nation as a whole.

In this context, and based on the evidence gleaned from a rich and rapidly growing knowledge base, we feel an urgent need to call for a new national dialogue focused on rethinking the meaning of both shared responsibility for children and 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.

The charge to this 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 productive future for the nation.

From Neurons to Neighborhoods

The Science of Early Childhood Development

Committee on Integrating the Science of
Early Childhood Development

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Board on Children, Youth, and Families

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The **National Research Council** was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both Academies and the Institute of Medicine. Dr. Bruce M. Alberts and Dr. William A. Wulf are chairman and vice chairman, respectively, of the National Research Council.

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From Neurons to Neighborhoods is the product of a two-and-a-half-year project during which 17 individuals, as a committee, evaluated and integrated the current science of early childhood development. In view of the wide range of scientific and policy considerations that fall within the scope of the committee's mandate, it is particularly significant that the funding for this project was provided by a broad diversity of public and private sponsors: Administration for Children and Families, Administration on Children, Youth, and Families, Assistant Secretary for Planning and Evaluation, Centers for Disease Control and Prevention, Maternal and Child Health Bureau of the Health Resources and Services Administration, National Institute for Child Health and Human Development, National Institute of Mental Health, National Institute of Nursing Research, and the Substance Abuse and Mental Health Services Administration, all of the U.S. Department of Health and Human Services; Office of Special Education Programs in the U.S. Department of Education; The Commonwealth Fund; Irving B. Harris Foundation; Heinz Endowments; and Ewing Marion Kauffman Foundation. The committee wishes to express particular appreciation to Duane Alexander, director of the National Institute of Child Health and Human Development, and Ann Rosewater, regional director of the U.S. Department of Health and Human Services for Region IV, who played a critical role in organizing an early meeting with potential federal sponsors and demonstrated unwavering faith in the ability of the committee to address its very ambitious charge.

Beyond the expertise and diligence of the committee, we had the ex-

traordinary good fortune of working with a number of highly knowledgeable people who shared our enthusiasm for this project. We are deeply indebted to the intellectual insights and support that they provided.

In June 1999 the committee convened a two-day Workshop on the Science of Developmental Promotion and Early Childhood Intervention. Participants included leading researchers and practitioners from the fields of pediatric primary care and nursing, child care and early childhood education, child welfare, mental heath, public health, early intervention for children living in poverty, and early intervention for children with developmental disabilities: Kathryn Barnard, University of Washington; Barbara T. Bowman, Erikson Institute, Chicago; Jeanne Brooks-Gunn, Columbia University; Mary Beth Bruder, University of Connecticut Health Center; Mary Dozier, University of Delaware; Dale Farran, Vanderbilt University; Veronica Feeg, George Mason University; Barbara Howard, Johns Hopkins University School of Medicine; Jane Knitzer, Columbia University; Samuel Meisels, University of Michigan; Craig Ramey, University of Alabama at Birmingham; Arnold Sameroff, University of Michigan; Ruby Takanishi, Foundation for Child Development; Deborah Klein Walker, Massachusetts Department of Public Health; Mark Wolery, University of North Carolina at Chapel Hill; and Hiro Yoshikawa, New York University. All of the workshop participants, both in their prepared written comments and through their contributions during the discussion sessions, added valuable scientific input to the committee's work. Two additional workshops organized by the Board on Children, Youth, and Families, one on home visiting interventions and another on early precursors of antisocial behavior, also contributed greatly to our work. The committee and staff are grateful to everyone who participated in these meetings.

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In addition to formal workshops, a number of individuals were invited to make presentations and participate in discussions at committee meetings. In December 1998, H. Hill Goldsmith, University of Wisconsin at Madison, Kathleen R. Merikangas, Yale University, and David Reiss, George Washington University Medical Center, participated in a panel on the genetics of early development, which informed the committee about cutting-edge research on a range of issues in this area. In July 1999, Joseph Campos, University of California at Berkeley, addressed the interplay of experience and early brain development, and Robert LeVine, Harvard University, spoke about the promise of cross-cultural research, the symbiotic development of individuals and societies, and the importance of integrating knowledge and research methods from a variety of disciplines.

A number of experts assisted the committee by responding in writing to questions about the relations among culture, early childhood development, and early interventions. We are grateful to the following individuals for their thoughtful comments on this issue: Catherine Cooper, University of California at Santa Cruz; Doris Entwisle, Johns Hopkins University; Andrew Fuligni, New York University; Harriette McAdoo, Michigan State University; Suzanne Randolph, University of Maryland at College Park; Diana Slaughter-Dafoe, University of Pennsylvania; Paul Spicer, University of Colorado Health Sciences Center; Ruby Takanishi, Foundation for Child Development; and Thomas Weisner, University of California at Los Angeles.

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Shortly after the initiation of the study process, the committee interviewed a broad cross-section of individuals involved in early childhood policy and service delivery (in contrast to research) to ensure that the final report would be responsive to the issues that practitioners and local and state government officials are dealing with every day. We are grateful to the following people for taking the time to share their expertise: Douglas Baird, Associated Day Care Services; Hedy Chang, California Tomorrow; Veronica Feeg, George Mason University; Andrea Genser, Center for Career Development in Early Care and Education, Wheelock College; Stacie Goffin, National Association for the Education of Young Children; Douglas Howard, Family Independence Agency, State of Michigan; Elizabeth Iida, SRI International; Barbara Ferguson Kamara, Office of Early Child-

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This report has been reviewed by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the Report Review Committee of the National Research Council. The purpose of this independent review is to provide candid and critical comments that will assist the authors and the National Research Council/Institute of Medicine in making the published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process.

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Contents

From Neurons to Neighborhoods