

NLWJC - Kagan

DPC - Box 071 - Folder-001

0-3 Conf - Background



Little scientific research shows that early experiences—particularly in the first three years of life—have a dramatic impact on brain development and establishing a lifelong pattern of learning. We know that the greatest opportunities for development and learning occur during the early years of life and that we adults have a unique role to play in helping young children develop fully.

Not all children will be "Academic All-Stars"; however, all children can develop their innate abilities to the fullest extent and become productive students throughout their public school career. Lessons learned as a preschooler often carry lifelong implications and set the path for future growth and development.

"Early experience has enduring impact on brain development." Dr. Donald Cohen, Director of Yale University Child Study Center at the White House Conference on Early Childhood

be taught through cooking the family dinner. The child can assist with measuring (fractions) and mixing (chemistry principles). These are fun ways for parent and child to spend productive time together in a learning experience, which seems more like play.

Social skills are an important part of early development

In order for a child to successfully participate in school, certain social skills are necessary. Young children must learn how to work in a group, get along with others and cooperate effectively. All of these skills are learned through trial and error as children mature and grow. A two-year-old who plays alone while in a group quickly matures into a 4-year-old who can share and play with other children.

THE FIRST YEARS LAST FOREVER: TIPS FOR PARENTS AND CAREGIVERS

Each family is different. Each family has traditions and cultural expectations of their children. We know that there are certain things that all families can do to support their child's development. This can be done within the context of the home, childcare, church or other institutions that support families in your community.

"Babies are born to learn. It is our job to be good partners in the learning process." Dr. Patricia Kuhl, Chair of Speech and Hearing Sciences at the University of Washington.

1. Be warm loving and responsive

We now know that children's early attachments actually affect the way their brains work and grow. When children receive warm, responsive care, they are more likely to feel safe and secure with the adults who take care of them. Researchers call these strong relationships "secure attachments" and they are the basis of the child's future relationships.

2. Respond to the child's cues and clues.

The cues and clues that infants send are the sounds they make, the ways they move, and the facial expressions they use. Children become securely attached when parents and other caregivers try to read these signals and respond with sensitivity. There are simple steps parents can take to build trust in their young children: the child smiles and someone smiles back; they are upset and someone comforts them; they are hungry and someone feeds them. Parents who respond to their children's needs for attention, during both active as well as quiet times, help their children form secure attachments.

BABIES ARE BORN TO LEARN

Children can develop their innate abilities to the fullest extent and become productive students throughout their public school career. Lessons learned as a preschooler often carry lifelong implications and set the path for future growth and development.

WHAT DO WE KNOW ABOUT YOUNG CHILDREN & WHAT THEY NEED?

Young children develop at different stages and levels

Each child is unique and develops both physical and mental skills at their own pace. Some children walk earlier than others; some children are early talkers. There is no right or wrong pace of development and, unless there is some physical or mental impairment which causes delayed development, each child will eventually attain all the skills necessary to function well as an adult.

Physical development is as important during the early years as cognitive development

Physical skills go hand-in-hand with mental development. Young children may be mentally able to draw a certain picture; however, their fine motor skills (ability to hold a pencil or crayon) is not sufficient to allow them the control necessary to reproduce the figure. A child may know all their colors and numbers but not be able to use a pair of scissors successfully.

The family plays a critical role in the development of young children

Parents are the child's first teachers. Children with actively involved parents who take the time to read or to provide stimulating activities, develop quickly and typically surpass the achievement of children whose home environment is not as stimulating.

Young children learn best through hands-on activities and active learning

Young children learn most effectively through manipulation of objects and active learning experiences. For example, basic math principles can



Cc: Nicole Elena ✓

0-3 Cont Background



3. Talk, sing and read to your child.

Telling stories about daily events, reading children's books aloud, singing songs about the people and places your child knows, describing what is happening during daily routines—all of these interactions give your child a solid basis for later learning.

4. Establish routines.

Daily routines are reassuring for children. Teach your child to know it's nap time by performing a routine that the child can recognize. For example, sing a song and close the curtains everyday when it's time for a nap. Or, before bed, read a story to your child. These routines help children learn what to expect from their environment, and how to understand the world around them a little more easily. Repeated positive experiences provide children with a sense of security. Children who have safe and predictable interactions with others have been found to do better in school later on.

5. Encourage exploration and play.

As young children grow, they begin to explore the world beyond their parents and caregivers. Parents and caregivers should encourage this exploration and be receptive when the child needs to return to them for questions and security. While many of us think of learning as simply acquiring facts, children actually learn through playing.

6. Make television watching selective.

Television by itself can't teach a young child language and it can't teach a child how to communicate. Be selective and involved in your children's television habits. Don't use TV as a babysitter. Whenever possible, sit and watch programs together with your child and talk about what you're viewing.

7. Use discipline as an opportunity to teach.

As children explore their ever-expanding world, they need limits and consistent, loving adult supervision. Studies reveal that the way in which adults provide discipline is crucial to their children's later development. Many approaches to setting limits can work, as long as they are intended to help and teach children.

8. Recognize that each child is unique.

Children grow at different rates. Their ideas and feelings about themselves reflect, in large measure, parents' and caregivers' attitudes toward them. When children receive concrete praise, they begin to see the connections between their actions and your response. Parents and caregivers who are sensitive to their particular child's cues and clues will have children with positive self-esteem.

9. Choose quality childcare and stay involved.

To make a good childcare choice, visit and observe how providers respond and interact with the babies and children in their care. Seek a provider who responds warmly and responsively to your baby's needs.

select someone who cares about children, is eager to learn about their development, and will give children individual attention and engage them in creative play and exploration. Find a setting that is clean and safe, and carefully check the provider's references.

"I tell parents that when you go into a classroom to observe child care, don't watch what they're doing with your child, watch what they're doing with other children." Dr. Richard Clifford, National Center for Early Development and Learning, University of North Carolina, Chapel Hill.

10. Take care of yourself.

Parents and caregivers need care too. When you are exhausted, preoccupied, irritable or depressed, you will probably have a harder time meeting the needs of young children. When you feel overwhelmed, take care of yourself. Reach out and get some help. Families, friends, neighbors, pediatricians, childcare providers and others—all can assist you in fostering your child's healthy development.

Parent Tip excerpted from materials developed for the I AM YOUR CHILD campaign.

LET US KNOW HOW WE CAN HELP

The Arkansas Early Childhood Commission was created to ensure that the young children of Arkansas have access to high quality, developmentally appropriate early childhood programs. We are working to ensure that all young children in Arkansas are "ready" for school and that early childhood programs provide the best quality care possible.

We can help if:

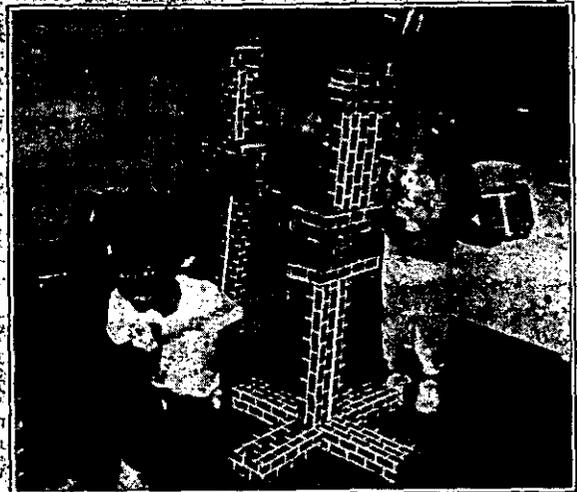
- You're trying to find an early childhood or child care program for your child. Call us at 682-4891 or 1-800-445-3316 and we'll provide you with a list of all registered and licensed child care programs in the area. This list will include homes, churches and day care centers.
- You need information on how to find parenting classes or other informational workshops. We'll give you information on who is offering this type of service and who to call.
- You have concerns that your child is not developing normally or is delayed. We'll provide you the names and numbers of organizations which will assist you in determining if your child could use some special help or is just taking his or her time!
- You have any questions about parenting or children. If we can't answer your question, we'll find someone who can.

We're here to help you and during the next six months will be expanding our services into a new Division of Child Care and Early Childhood Education at the Department of Human Services. The State of Arkansas realizes the value of its young children and is actively working to support your efforts to ensure our future citizens are prepared for the next millennium. Let us know if we can help.

Hoggard, who taught at Caldwell Elementary in Benton always got involved with the kids. She didn't just sit at her desk. She sat on the floor with us and played with us. She made the learning fun."

MINDY ROGERS of North Little Rock remembers her sitter, a Mrs. Fryer. "She was almost like a grand-mother. We were with her all through the day. We had a lot of special attention. She was real in touch with how we behaved. She was just a precious, precious lady."

LEE CHUNG of Lincoln, the son of South Korean immigrants, says his big sister, Ise, "taught me how to read and do math before I entered elementary, and taught me how to speak English. She was a big inspiration."



ARKANSAS
EARLY CHILDHOOD
COMMISSION

682-4891 • 1-800-445-3316

11/11/91



DEPARTMENT OF HEALTH & HUMAN SERVICES

0-3 Conference
Background

Office of the Secretary

Office of Assistant Secretary
for Planning and Evaluation
(Human Services Policy)
Washington, D.C. 20201

May 13, 1997

Elena,

When I saw you last I mentioned that HHS was involved with a National Academy of Science Project around the science of Early Childhood Development as one follow-up activity to the White House Conference. Here is a copy of the invitation material we sent out.

Ann Rosewater

cc: Jen K
Nicole R
(+ return)



May 8, 1997

Ms. Deanna Gomby
Director of Research and Grants, Child Development
Center for the Future of Children,
The David and Lucile Packard Foundation
300 Second Street
Suite 102
Los Altos, CA 94022

Dear Ms. Gomby:

We are writing to invite you to a half-day meeting at the National Academy of Sciences to discuss support for a major new study focused on Integrating the Science of Early Childhood Development (see attached prospectus). The study has been developed by the Board on Children, Youth, and Families, which is poised to initiate the study as soon as sufficient funds are received. The purpose of this meeting is to inform you about the goals and plan of work for this study and to learn about your possible interest in joining us as a funder.

The meeting will take place from 1:00 - 4:00 p.m. on June 3, 1997 in Room 130 of the Green Building (2001 Wisconsin Ave.) of the National Academy of Sciences in Washington, D.C.

This is an opportune moment to define the basic science of early childhood development and to identify its implications for parents and professionals who are responsible for the care and rearing of young children. A national poll released just last month revealed that parents are unsure about what they should be doing to promote healthy emotional, social, and intellectual development. In the wake of widespread national attention to new research on early neurological development, it is critical that this evidence be placed in the context of other research on the cognitive-linguistic and social-emotional development of young children, as well as into the context of later development. The implications of this research for parenting education, early intervention, professional training, and standards of practice across a range of early childhood services must also be carefully and clearly articulated.

The Board's study will accomplish these tasks. Specifically it aims to:

- (1) define the scientific knowledge base for understanding child development in the infant, toddler, and preschool years (ages 0 to 5), including neurobiology, cognitive-linguistic development, and social-emotional competence;

- (2) delineate the implications of this knowledge for public education efforts focused on parenting and informal family support, as well as for professional development and practice; and
- (3) develop an integrated research agenda to advance both the basic science of early childhood and the applied science of health promotion and developmental facilitation for young children.

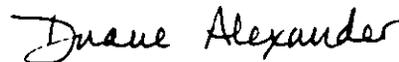
At the meeting, Jack Shonkoff, vice-chair of the Board and author of the study proposal, will discuss the study. Deborah Phillips, director of the Board, will describe how studies of this nature are accomplished at the Academy. We will then discuss our specific interests in this study, followed by ample time for you to ask questions and to explore your possible interest in the study. Jack and Deborah are particularly interested in hearing about the issues that you would most like to see addressed in the study and the audiences that you would want to have kept in mind as the study proceeds.

Please let us know if you can attend the meeting by calling Drusilla Barnes at (202) 332-3829 no later than May 26th. We hope to see you in early June.

Warm regards,



Ann Rosewater
Deputy Assistant Secretary
for Human Services Policy



Duane Alexander
Director
National Institute of Child Health and
Human Development

cc: Jack Shonkoff
Deborah Phillips

Enclosure

PROSPECTUS

Committee on Integrating the Science of Early Childhood Development

**Board on Children, Youth, and Families
Commission on Behavioral and Social Sciences and Education
National Research Council
and
Institute of Medicine**

Contact:

**Deborah Phillips, Ph.D.
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Board on Children, Youth, and Families
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Project Summary

The Board on Children, Youth, and Families proposes to conduct a study to define the basic science of early childhood development and to identify its implications for individuals (parents and professionals) and institutions responsible for the care and rearing of young children ages 0 to 5. The overarching goal of this project is to guide efforts to promote child health and development in the first five years of life. The aims of the study are to:

(1) define the scientific knowledge base for understanding child development in the infant, toddler, and preschool years, including the underlying neurobiology of development, cognitive-linguistic development, and social-emotional competence.

(2) delineate the implications of this knowledge for (a) public education efforts focused on parenting and informal family support, (b) organized programs and systems that provide early childhood intervention and formal family support, and (c) professional training and development, as well as for standards of practice, and

(3) develop an integrated research agenda to advance both the basic science of early childhood and the applied science of health promotion and developmental facilitation for young children.

The Board will appoint a study committee of up to 12 members from relevant disciplines and practitioner communities who will meet 6 times over the course of the 24-month study. The committee will analyze the relevant empirical and theoretical literature on the development of human competence in the first five years of life, as well as study its utility for parenting and for a wide range of early childhood services. Guidelines will then be developed for the application of this knowledge base to broad-based public education efforts and to the design and evaluation of the next generation of early childhood programs. The current knowledge base will also provide a point of departure for identifying promising next steps for both basic and applied research on early child development.

Origin and Background

The science of early childhood development has grown considerably over the past several decades. This continually expanding knowledge base is informed by a rich diversity of disciplines, including developmental psychology, psycholinguistics, anthropology, psychiatry, and neurobiology. Although much of our current understanding of the early roots of human competence is derived from the social sciences, a recent surge of interest in the biology of brain development, and the extent to which it is influenced by individual experience, has underscored the need for a thoughtful, cross-disciplinary assessment of what we know and of how to apply that knowledge constructively to promote human well-being.

Within this context, questions about the concepts of neuroplasticity, “experience-expectant” (i.e., universal) and “experience-dependent” (i.e., affected by individual differences) neural networks, and sensitive versus critical periods in the domains of cognitive-linguistic and social-emotional development are particularly compelling, and have important implications for policy decisions regarding the provision of early preventive services for young children. Are there windows of opportunity when particular experiences are necessary for optimal development? What are these experiences and, if missed, can compensatory actions be effective later in life? What are the cumulative impacts of varying experiences over the first few years of life? What are the implications for later development?

The dissemination of our growing knowledge has extended beyond academia to the general public, where its application to the tasks of child rearing has been facilitated by the proliferation of a diversity of educational materials, including parenting and “women’s” magazines, television and radio talk shows, and a range of popular books authored by respected authorities such as Brazelton, Leach, and Spock. The consequences of this knowledge explosion include greater public awareness of the importance of the early years, increased interest in integrated, family-centered support services, and thoughtful concern about the degree to which misuse of available knowledge can lead to unnecessary elevations in parental anxiety.

Beyond the basic care and protection provided by parents and other primary caregivers, formal services designed to promote the health and development of young children and their families in the United States are widespread and expanding. Although they draw upon a common knowledge base, these services have evolved within a highly fragmented infrastructure of categorical programs embedded in a broad array of public and private systems (Shonkoff & Meisels, 1990). Examples of these separate service streams include: (1) health promotion and primary medical care for all children, (2) child care for children of working parents, (3) preventive intervention and family support for children living under conditions of poverty and/or social disadvantage, (4) therapeutic/educational interventions and family support for children with developmental delays or diagnosed disabilities, and (5) specialized mental health services for a wide variety of clinical conditions including child physical, emotional, or sexual abuse, child neglect, maternal

psychopathology, and maternal substance abuse.

Despite their long-standing tradition of independent operation, all human service systems designed to serve young children and their families currently face growing demands for greater integration and a recognition of the need to define best practices in order to guide the allocation of finite public resources. These pressures, in turn, have underscored the need for a strong, unified knowledge base about the fundamental developmental tasks and needs of young children to guide the design and delivery of new service initiatives, training and professional development, and standards of practice.

The current knowledge that is available to guide both parenting and professional practice within early childhood service programs is derived from three sources: (1) developmental theory, (2) empirical data, and (3) professional experience. Although there is lively debate among those who bring the perspectives of different parenting and service experiences, a core set of theoretical and empirically-validated principles can be identified that could support a common framework for public education programs for all parents as well as for the development of more integrated early childhood services for selected family subgroups. The following three core principles, for example, are firmly grounded in developmental theory:

- (1) The process of human development is fundamentally transactional in nature; i.e., individuals are influenced by their life experiences and they, in turn, exert a reciprocal impact in shaping the environment in which they live (Bronfenbrenner, 1979; Sameroff & Chandler, 1975).
- (2) Early caregiving relationships have a particularly important and enduring impact on the foundations of cognitive, emotional, and social competence (Sameroff & Emde, 1989).
- (3) Intrinsic developmental vulnerability (e.g., low birth weight) can be moderated by the influence of extrinsic protective factors (e.g., a nurturant home environment) that increase the probability of positive adaptation (Garmezy & Rutter, 1983; Werner & Smith, 1982).

In contrast to its rich theoretical underpinnings, the empirical knowledge base on the efficacy of early childhood intervention is relatively uneven. The diversity of target populations and service models that have been studied and the varied backgrounds of the professionals involved in research and services contribute to the lack of consistency in the existing data base. Furthermore, much of the available literature is compromised by methodological deficiencies (Farran, 1990). Nevertheless, several decades of credible research have generated four basic findings about environmental effects on early development:

- (1) Early brain development unfolds through a highly regularized process that is controlled by a dynamic interplay between genetic predisposition and environmental influences (Greenough & Black, 1992; Nelson & Bloom, in press).
- (2) In the absence of formal intervention, there is a predictable emergence of social class differences on standardized cognitive measures between 18 and 24 months of age (Golden & Birns, 1976; McCall, 1979).
- (3) Well designed early intervention programs can enhance the performance of children living in poverty such that their standardized test scores and ratings of social development remain comparable to those of their more advantaged peers (Honig & Lally, 1992; Ramey & Campbell, 1984).
- (4) Structured interventions can promote significant short-term gains on standardized cognitive and social measures for young children with documented developmental delays or disabilities (Casto & Mastropieri, 1986; Shonkoff & Hauser-Cram, 1987).

The time is ripe for assembling this science of early childhood development and subjecting it to a critical analysis with the aim of informing parenting and professional practice. The ultimate products of such a project would include: (1) an integrated knowledge base built on shared insights from the biological, medical, and social sciences, and based on studies of both normative and atypical populations; (2) a clear set of implications of this knowledge base for the childrearing roles of parents, pediatricians, early care providers, and others with responsibility for facilitating varying aspects of early childhood development; (3) a more focused, cross-field research agenda to guide future empirical study.

Proposed Activity

The Board on Children, Youth, and Families proposes to accomplish the following tasks:

- (1) Review and define the basic science of early childhood development, including the neurobiology of development, cognitive-linguistic development and social-emotional competence.
- (2) Apply this analytic task to the articulation of a core knowledge base (i.e., theory, empirical data, and professional experience) to guide public education efforts focused on parenting and professional guidelines that affect the delivery of a range of early childhood supports and services.

- (3) Identify central questions for the design of a unified research agenda for the early childhood field.

In developing this study, the committee will draw upon information and expertise collected within earlier NRC studies related to this topic, including Placing Children in Special Education: A Strategy for Equity (1982), Who Cares for America's Children (1990), Effective Services for Young Children (1991), and Improving Instruction and Assessment in Early Childhood Education (1991), as well as other relevant materials from past CBASSE and IOM studies and federal, state, and local agency reports.

Plan of Action

To conduct this study, the National Research Council would form a new committee, titled the Committee on Integrating the Science of Early Childhood Development. The committee would be composed of up to 12 members who represent a range of relevant fields of expertise (including developmental psychology, psycholinguistics, neurobiology, early childhood and special education, pediatrics, child psychiatry, child care, public health, family systems. A special effort will be made to include experts familiar with different ethnic and racial groups. The study committee will meet 6 times during the 24-month study period.

Three two-day workshops will be organized to facilitate the committee's work, as follows:

- (1) The Basic Science of Early Childhood Development. This workshop will bring together distinguished scholars from the biological, medical and social sciences. The agenda for the group will focus on the frontiers of each discipline, and the basis for cross-disciplinary integration of existing knowledge.
- (2) Lessons from Basic Science. This workshop will examine the implications of the basic science for the childrearing roles of parents, pediatricians, early care providers, and others with responsibility for facilitating varying aspects of early childhood development. It will be organized around commissioned papers/presentations by researcher-practitioner pairs.
- (3) Construction of an Integrated Early Childhood Research Agenda. This workshop will explore the frontiers of the basic and applied sciences of early childhood, and will focus on the articulation of promising strategies for creative collaborative research. Presentations will focus on: (1) defining the most important questions in developmental psychology and neurobiology as they address the infant and preschool years; (2) assessing what has been learned from research on environmental influences on development, including

both basic and intervention research; (3) assessing the methodological limitations of previous research and examining persistent problems regarding measurement technology; and (4) articulating cutting-edge areas for future investigation. In view of the wide diversity of target populations and agendas among public education efforts and discrete service streams, the identification of convergent findings will be of particular interest in this third workshop.

The study will produce stand-alone summaries from the first two workshops. The final two meetings of the study committee will be directed at completing the final report. The last phase of the study will be devoted to NRC report review, production and dissemination of the final report and executive summary, possible preparation of journal manuscripts summarizing portions of the report for specialty audiences, and a series of dissemination meetings with key policy, professional, and research groups.

Products

This project will produce three reports: (1) a report on the basic science of early childhood development based on the first workshop (2) a report that summarizes the implications of this knowledge base for parenting and professional practice based largely on the second workshop (3) a final committee report that synthesizes material from the first two reports and adds a discussion of future research directions. Each of the reports will be subject to the usual NRC report review procedures. The commissioned papers and workshop sessions will provide supplementary materials that will constitute interim information for sponsors and other interested audiences. The project will include a series of informal progress briefings with the Board on Children, Youth, and Families, and relevant CBASSE and IOM boards and committees. The materials produced by the committee will be disseminated broadly to policymakers, service providers, directors of professional training programs, and academic researchers across a broad array of early childhood disciplines through briefings and presentations at pertinent meetings. In addition, materials will be prepared for the general public and will be disseminated widely through a variety of popular media.

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PROJECT SUMMARY

RAND COST-BENEFIT ANALYSIS

When coming out?

Currently in progress

Funded by The California Wellness Foundation

Principal Investigators: Drs. Peter W. Greenwood and Lynn A. Karoly

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An ever growing body of scientific literature and plain common sense support the importance of early childhood development. A caring and supportive environment during these early years benefits the individual child, the child's family, its community, and the larger society. Many of these benefits accrue over a number of years, are not easily associated with particular aspects of development, and in some cases, are rather indirect. Hence, they are neither easy to measure nor apparent. This makes it especially difficult to measure or estimate the benefits of programs that are designed to compensate for deficiencies in family and community support for children in these early years. Moreover, in this area there are only a few programs that are well suited for rigorous empirical evaluation. There are, nonetheless, analytically sound methods for assessing the effects of these programs in those cases where good data are available and where assumptions about downstream benefits are well founded.

RAND is undertaking an analysis designed to provide an objective assessment of concrete, financial and other benefits of early childhood interventions. The study will draw on the array of analyses that have documented the impact of early childhood interventions on developmental, economic, and social outcomes. It will synthesize these results in a form that is both understandable to a lay audience and supportable by science. Examples of these potential benefits include:

- For the *child*, improved health, educational attainment, enhanced cognitive growth, behavioral maturity, avoidance of substance abuse and other antisocial behavior, and in adulthood, increased income;
- For the *parent(s)*, enhanced employment success, greater educational attainment, better mental health, improved marital stability, fertility control, and avoidance of substance dependence and child abuse;
- For the *community and society*, increased economic participation by parents and the consequent increase in tax receipts, lower welfare costs, increased public safety, reduced costs to the justice system, and reduced expenditures on a wide range of public programs such as special education, foster care, and child protective services.

As part of the project, the RAND team is conducting the following tasks:

- Reviewing the literature on the importance of early childhood development and the measurement of program effects. This review is focusing especially on (a) those attributes of development that are amenable to enhancement through policy/program interventions; (b) the effects of early childhood interventions on outcomes early and later in life; and (c) the methods for linking and estimating downstream benefits of interventions.
- Preparing a matrix of benefits in the three categories (child, parent, community and society). The matrix indicates the specific nature of the expected benefit, its magnitude in economic or other terms, the time stream of the benefit, and the strength of the scientific evidence supporting both the nature of the benefit and its magnitude.
- Developing models that enable the estimation and aggregation of all benefits for each candidate developmental intervention where measurement is both feasible and empirically supportable.
- Documenting the principal findings through an annotated briefing that also includes all supporting analyses and model output.

Draft

EXECUTIVE SUMMARY

Rethinking the Brain

New Insights into Early Development

Conference Report

*Brain Development in Young Children:
New Frontiers for Research, Policy and Practice*

Organized by the Families and Work Institute
June 1996

Funded by

Carnegie Corporation of New York
The Charles A. Dana Foundation, Inc.
The Harris Foundation
Robert R. McCormick Tribune Foundation

A father comforts a crying newborn. A mother plays peekaboo with her ten-month-old. A teacher reads to a toddler. And in a matter of seconds, these children's growing brains respond. Brain cells are "turned on," activated by this particular experience. Existing connections among brain cells are strengthened, and at the same time, new connections are formed, adding more definition and complexity to the intricate circuitry that will remain in place for the rest of these children's lives.

We didn't always know it worked this way. Until recently, it was not widely believed that the brains of newborns could be so active and so complex. Nor did we realize how flexible the brain is. Only 15 years ago, neuroscientists assumed that by the time babies are born, the structure of their brains was genetically determined. They did not recognize that the experiences that fill a baby's first days, months and years have such a decisive impact on the architecture of their brains, or on the nature and extent of their adult capacities. Today, thanks in part to decades of research on brain chemistry and sophisticated new technologies, neuroscientists are providing evidence for assertions that would have been greeted with polite skepticism ten or twenty years ago.

Until recently, it

In June 1996, a two-day conference was convened at the University of Chicago by the Families and Work Institute to discuss new knowledge about early brain development and its implications for children in the United States. Entitled *Brain Development in Young Children: New Frontiers for Research, Policy and Practice*, the conference affirmed that the nation as a whole has a vital stake in its youngest children's learning and healthy development. The conference brought together professionals from the neurosciences, developmental and clinical psychology, medicine, education, human services, the media, business, and public policy to look at what we know about the brain and how that knowledge can and should inform our efforts to improve results for children and their families. The proceedings and a range of background materials provided by participants and other researchers served as the basis for the conference report, which is summarized here.

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I. Breakthroughs in Neuroscience — Why Now?

Every field of endeavor has peak moments of discovery and opportunity—when past knowledge converges with new needs, new insights, and new technologies to produce stunning advances. For neuroscience, this is one such moment. Certainly, the development of new research tools has been a crucial factor. New brain imaging technologies have made it possible to investigate—and get a glimpse of—how the brain develops and how it works.

Brain research has been stimulated, in part, by growing concern about the status of children in America—not only their academic achievement, but also their health, safety, and overall well-being. Two decades of research in diverse fields have confirmed the importance of the first few years of life. Given these findings, more Americans are expressing misgivings about the effectiveness of investments and educational reform efforts that begin only when children reach the age of five. There is growing consensus, among

decision makers in many fields, that efforts to recast policy and reconsider the best use of public resources must begin with clearheaded thinking about how brains develop.

II. What Have We Learned?

The literature and the research presented at the June 1996 conference point to five key lessons that have the potential to reframe research, policy, and practice in diverse fields.

1. Human development hinges on the interplay between nature and nurture.

Much of our thinking about the brain has been dominated by old assumptions—that the genes we are born with determine how our brains develop, and that in turn how our brains develop determines how we interact with the world. Recent brain research disproves these assumptions. Neuroscientists have found that throughout the entire process of development, beginning even before birth, the brain is affected by environmental conditions, including the kind of nourishment, care, surroundings, and stimulation an individual receives. The impact of these environmental factors on the young is dramatic and specific, not merely influencing the general direction of development, but actually affecting how the intricate circuitry of the human brain is “wired.” And because every individual is exposed to different experiences, no two brains are wired the same way.

The developing brain produces many times more neurons (brain cells) and more synapses (connections among brain cells) than it will eventually need. Most of the extra neurons are shed by the time a baby is born. But in normal growth and development the number of synapses increases markedly in the first four years, and then holds steady throughout the first decade of life. In this way, a child’s brain becomes super-dense, with twice as many synapses than it will eventually need. Brain development is, then, a process of pruning: those synapses that are formed and reinforced by virtue of early experience tend to become permanent; the synapses that are not used tend to be eliminated. In this way, as babies and toddlers gain more experience, positive or negative, the brain’s wiring becomes more defined. This process requires considerable energy; for most of the first decade of life, children’s brains are more than twice as active as those of adults.

New knowledge about brain function should end the “nature or nurture” debate once and for all. A great deal of new research leads to a single conclusion: how humans develop and learn depends critically and continually

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on the interplay between nature (an individual's genetic endowment) and nurture (the nutrition, surroundings, care, stimulation, and teaching that are provided or withheld). The impact of nature and nurture in shaping human development should not be measured quantitatively; genetic and environmental factors have a more dynamic, qualitative interplay that cannot be reduced to a simple equation. Both are crucial.

2. Early care has decisive and long-lasting effects on how people develop and learn, how they cope with stress, and how they regulate their own emotions.

Some people have long known—and psychological studies have shown—that babies thrive when they receive warm, responsive early care; now we are beginning to understand the biological mechanisms that underlie this knowledge. Recent brain research suggests that warm and responsive care is not only comforting for an infant; it plays a vital role in healthy development. Warm and responsive care means meeting babies' basic needs for food and shelter as well as responding to their moods and efforts to communicate. The care children receive directly affects the formation of neural pathways.

In particular, individuals' capacities to control their own emotional states appear to hinge, to a significant extent, on biological systems shaped by their early experiences and attachments. There is no single "right" way to create this capacity; sensitive care can take many forms. But children who are emotionally neglected or abandoned very early in life often have difficulty with such brain-mediated functions as empathy, attachment, and emotional expression.

Neuroscientists are finding that a strong, secure attachment to a nurturing adult can have a protective biological function, helping a growing child withstand the ordinary stresses of daily life. These are the implications of studies that have gauged children's reactions to stress by measuring the levels of a steroid hormone called cortisol in their saliva. Researchers have found that adverse or traumatic events, whether physical or psychological, can elevate an individual's cortisol level. Chronically high cortisol levels can make a child vulnerable to processes that lead to the loss of some neurons and, just as importantly, reduce the number of synapses in certain parts of the brain. And in fact, children with chronically high cortisol levels have been shown to experience more delays in cognitive, motor, and social development than other youngsters. But new research shows that babies who receive warm and responsive care in the first year of life are less likely to respond later to minor stress by producing cortisol than other children. And when they do react to stress by producing cortisol, they can turn off the response more quickly and efficiently. This protective effect appears to last throughout childhood and beyond.

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3. The human brain has a remarkable capacity to change, but timing is crucial.

There is mounting evidence of the brain's neuroplasticity. This means that the brain has the capacity to change in important ways in response to experience. We now have scientific evidence that the brain is not a static entity, and that an individual's capacities are not fixed at birth. There are few preset limits to an individual's learning potential. The brain itself can be altered—or helped to compensate for problems—with appropriately timed, intensive intervention. In the first decade of life, the brain's ability to change and compensate are especially remarkable.

Because the brain has the capacity to change, parents and other family members, friends, child care providers, teachers, doctors, and others have ample opportunities to promote and support children's healthy growth and development. But timing is critical. While learning continues throughout the life cycle, there are optimal periods of opportunity—"prime times" during which the brain is particularly efficient at specific types of learning. For example, the brain is best able to acquire language skills during the first decade of life, when synapse density and metabolic activity in the part of the brain that processes language are very high. In the neurobiological literature, these times are called "critical periods."

4. The brain's plasticity also means that there are times when negative experiences or the absence of appropriate stimulation are more likely to have serious and sustained effects.

(E0) New knowledge about the vulnerability of the developing brain to environmental factors suggests that early exposure to nicotine, alcohol, and drugs (in utero and in the postnatal environment) may have even more harmful and long-lasting effects on young children than was previously suspected.

A number of studies indicate that maternal smoking during pregnancy can, in some cases, affect brain development, inhibiting neuron growth. It can also have an impact on the brain's biochemistry and can alter DNA and RNA synthesis in the brain. Children exposed to nicotine before birth appear to be at higher risk of developmental delays or impairments. And in fact, research suggests that the children of mothers who smoke during pregnancy have somewhat higher rates of neurobehavioral difficulties, including inattention, impulsivity, and hyperactivity.

To an even greater degree than nicotine, exposure to cocaine in utero may affect the brain's biochemistry. Early in gestation, it can disrupt the migration of neurons up the cortical wall. Later in the prenatal period,

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After birth, exposure to adverse environmental conditions can also have harmful effects on brain development. Early experiences of trauma or ongoing abuse, whether in utero or after birth, can interfere with development of the subcortical and limbic areas of the brain, resulting in extreme anxiety, depression, and/or the inability to form healthy attachments to others. Adverse experiences throughout childhood can also impair cognitive abilities, resulting in processing and problem-solving styles that predispose an individual to respond with aggression or violence to stressful or frustrating situations.

A number of researchers have focused their attention on specific circumstances that may interfere with warm and responsive care during critical periods, including maternal depression. While not all babies of depressed mothers show negative effects, maternal depression can impede healthy brain development, particularly in the part of the brain associated with the expression and regulation of emotions. Post-partum depression that lasts only a few months does not appear to have a lasting impact; but babies who are from six to eighteen months old when their mothers suffer from depression appear to be at greater risk. When mothers are treated for or recover from depression, their young children's brain activity and their behavior can improve significantly.

Many of the risk factors described above occur together, thereby jeopardizing the healthy development of young children. Research additionally shows that many of these risk factors are associated with or exacerbated by poverty. Today, fully a quarter of American children under the age of six are growing up in poverty. Economic deprivation affects their nutrition, access to medical care, the safety and predictability of their physical environment, the level of family stress, and the quality and continuity of their day-to-day care.

5. Evidence amassed by neuroscientists and child development experts over the last decade point to the wisdom and efficacy of prevention and early intervention.

Study after study shows that well-designed programs created to promote healthy cognitive, emotional, and social development can improve the prospects—and the quality of life—of many children, and in some cases can even ameliorate conditions once thought to be virtually untreatable, such as autism or mental retardation.

A number of widely-known, well-documented studies of programs designed to help infants and toddlers and their families, suggest that well-conceived,

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well-implemented programs can brighten children's futures. The efficacy of early intervention has been demonstrated and in some cases replicated in diverse communities across the nation. Children from families with the least formal education appear to derive the greatest cognitive benefits from intervention programs. Moreover, the impact of early intervention appears to be long-lasting, particularly when there is follow-up during the elementary school years.

Intensive, developmental care also improves the prospects of preterm infants, who come into the world with brains that have had less time to mature in the protected intrauterine environment, and are therefore even more vulnerable to the environment. Traditionally, these babies have spent their first weeks in incubators or isolettes, with bright lights, beeping monitors, and little human contact. Research has shown that responsive care in a more soothing environment can significantly increase preterm infants' chances for physical and mental health, while substantially reducing hospital stays and costs.

New insights into the brain's early development and functioning have allowed some researchers to address neurological impairments with greater precision. For example, with the aid of brain imaging (MRI) studies, researchers have been able to study and detect auditory processing problems in babies six to nine months old before language impairment becomes evident. Once a problem has been pinpointed, specific, individualized interventions can be introduced at a time when the brain's plasticity is particularly marked.

III. Where Do We Go From Here?

In most spheres of knowledge, what we don't know far exceeds what we do know. Brain research is no exception. Coming years promise to yield new discoveries about how the brain develops and how children's capacities grow and mature. Neuroscientists are likely to shift their attention from general questions about how brain circuitry is formed to more specific investigations of the functions of specific regions of the brain—including how, and how much, they are influenced by the environment.

There appeared to be considerable agreement among conferees around key assertions summarized in this report, including the importance of the interplay between nature and nurture; the extent and rapidity of early development; the brain's remarkable plasticity; the importance of strong, secure early attachments; and the efficacy of prevention and early intervention. In addition, three key principles of societal response emerged in the discussions:

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First do no harm. New insights into the brain suggest that the principle that guides medical practice should be applied just as rigorously to all policies and practices that affect children: first do no harm. That means allowing parents to fulfill their all-important role in providing and arranging for sensitive, predictable care for their children. Any and all policies or practices that prevent parents from forming strong, secure attachments with their infants in the first months of life need urgent attention and reform. At the same time, parents need more information about how the kind of care they provide affects their children's capacities. First do no harm also means mounting urgent, intensive efforts to improve the quality of early care and education.

Prevention is best, but when a child needs help, intervene quickly and intensively. Knowing that early experience has such a strong influence on brain development, parents may worry that every unpleasant sensation or upsetting experience will become a neurological nightmare. Families may rest assured that in most cases, a history of consistent, warm and responsive care cushions children from the occasional bumps and bruises that are inevitable in everyday life. In most cases, children can recover even from serious stress or trauma. And if they are given timely and intensive help, many can overcome a wide range of developmental problems. To have the greatest impact, interventions must be timely and must be followed up with appropriate, sustained services and support. More detailed knowledge about specific aspects of brain development and functioning will allow the design of interventions that more closely match children's needs.

Promote the healthy development and learning of every child of every age, every demographic description, and every risk category. If we miss early opportunities to promote healthy development and learning, later remediation may be more difficult and expensive, and may be less effective given the knowledge and methods that are currently available. However, this theme was sounded repeatedly: risk is not destiny. Numerous cases were cited of individuals who have thrived despite adverse conditions. The medical, psychological, and educational literatures contain sufficient examples of people who develop or recover significant capacities after critical periods have passed to sustain hope for every individual, and to support ongoing efforts to enhance the cognitive, emotional, and social development of youth and adults in every phase of the life cycle.

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Implications for Policy and Practice

New insights into early development confront policy makers and practitioners in many fields with thorny questions and difficult choices. As we move into the next century, our children need and deserve policies that reflect the importance of the early years, and that embody the principles that emerged from the brain conference: first do no harm; use prevention, but if a

child needs help, intervene quickly and intensively; and promote the healthy development of every child.

In particular, new knowledge about early development adds weight and urgency to the following policy goals:

Improve health and protection by providing health care coverage for new and expectant parents. Neuroscientists emphasize that the prenatal period is an active period of development. And yet, about one in four pregnant women receives little or no prenatal care. The first three years of life are also filled with opportunity and risk, but some three million children in this age span are uninsured or underinsured.

Promote responsible parenthood by expanding proven approaches. All parents can benefit from solid information and support as they raise their children; some need more intensive assistance. There is research evidence that certain parent education/family support programs promote the healthy development of children, improve the well-being of parents, and are cost-effective.

Safeguard children in child care from harm and promote their learning and development. Researchers have found that the nation's youngest children are the most likely to be in unsafe, substandard child care. More than one third are in situations that can be detrimental to their development, while most of the rest are in settings where minimal learning is taking place. We can do better. Studies show that it is possible to improve quality, creating settings in which children can thrive and learn.

Enable communities to have the flexibility and the resources they need to mobilize on behalf of young children and their families. Efforts are now underway across the nation to mobilize communities on behalf of young children and their families. Many localities are bringing together decision makers to create a vision of the kind of community they want to be part of, to develop goals and sustainable strategies for achieving that vision, to determine how to finance their efforts, and to make provisions for gauging results. These efforts need and deserve support from national, state, and local leaders, as well as from leaders of business, the media, community organizations, and religious institutions.

* * * *

In short, new insights into early brain development suggest that as we care for our youngest children, as we institute policies or practices that affect their day-to-day experience, the stakes are very high. But we can take comfort in the knowledge that there are many ways that we as parents, as caregivers, as citizens, and as policy makers can raise healthy, happy, smart children. We can take heart in the knowledge that there are many things that we as a nation can do, starting now, to brighten young children's future and ours.

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