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# FROM NEURONS TO NEIGHBORHOODS:

## *What's in It for You?*

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**L**egend has it that some 2000 years ago, Rabbi Hillel was challenged by Roman soldiers, on pain of death, to recite the Torah while standing on one foot. His followers were aghast, but the Rabbi was unperturbed. Lifting one leg, he said, "Do not do unto others that which you would not have them do unto you. The rest is commentary. Now go forth and study."

What does this story have to do with you, as a potential reader of *From Neurons to Neighborhoods: The Science of Early Childhood Development*? *NtoN* (as ZERO TO THREE staff have nicknamed the report) lays no claim to sacred inspiration or eternal truth, It was, however, designed to serve as a bible in the lower-case sense of the word – a book accepted as authoritative, informative, and reliable. So if the sages who developed *NtoN* were challenged to stand on one foot and integrate the biologic and behavioral science evidence related to early development, what would they say?

In our day, the sound bite has replaced the "on one foot" summary. *NtoN*'s editors, Jack Shonkoff and Deborah Phillips, have crafted several "take-home messages" for professional and general audiences and media, among them:

- Nature and nurture are inextricably intertwined.
- Early environments matter, and nurturing relationships are essential.
- Society is changing, and the needs of young children are not being addressed.

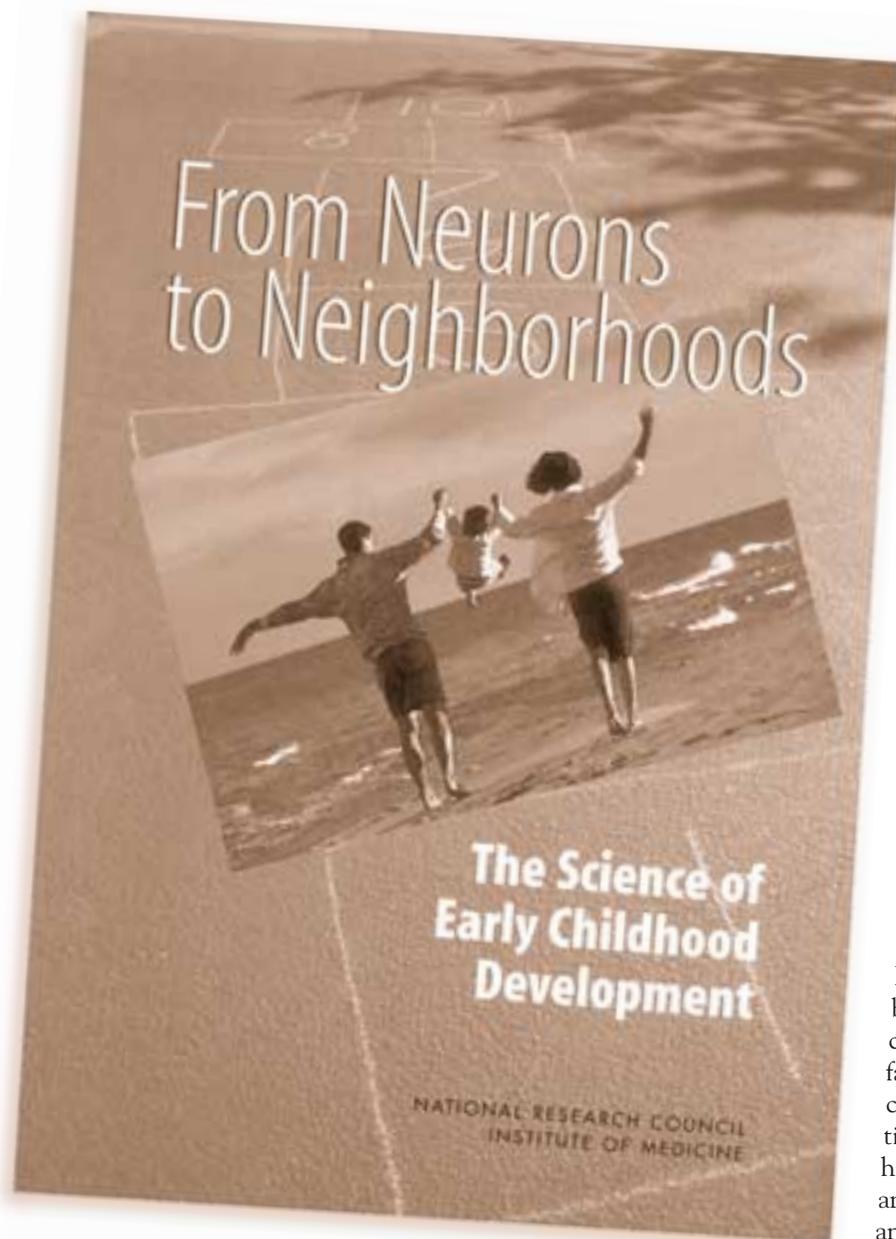
- Children's emotional and social development is as important to school readiness as their cognitive and language development.

Undergirding these messages is the one that gives them their authority — the Committee's conclusion that, indeed, there is an integrated science of early childhood development. State-of-the-art knowledge about early childhood development is characterized as multidimensional and cross-disciplinary, derived from quantitative and qualitative research methods, as well as from extensive professional experience. *NtoN*'s conclusions rest on rigorously scrutinized scientific evidence.

"The rest is commentary. Now go forth and study," said Hillel. Students of the Torah spend a lifetime studying and responding to text and commentary. In our busy, information-overloaded lives, how do we in the

### at a glance

- Taking the time to explore *From Neurons to Neighborhoods* in depth is a wise investment in professional development for anyone in the infant/family field.
- *NtoN*'s conceptualization of "foundational capabilities" encourages exploration of both commonalities and differences in cultural expectations of early development.
- The report challenges the early childhood intervention field to rigorously and appropriately evaluate our current "best practice" and, using what we learn, improve upon it.



infant/family field respond to the gift of a 588-page, four-pound bible? Study groups would not be a bad idea, actually. But the photograph on the cover of *NtoN*, featuring an exuberant-looking man, woman, and baby at the seashore, suggests another strategy—would some foundation please send every practitioner, professor, and student concerned about very young children, their families, and their communities, in multidisciplinary groups, on a week's paid vacation with *NtoN* as beach reading? Time to read, reflect, and talk with each other about what our field really knows and how we can learn more would be a sound investment in professional development.

But in the real world, most of us will turn to the Executive Summary.

And this would be a pity. The Executive Summary of *NtoN* may be fine for executives. But if you have experience (and/or curiosity) as a teacher, student, or practitioner in the infant/family field, limiting your reading of *NtoN* to the

Executive Summary is like taking a half-hour tour of the National Gallery of Art. Skim the Executive Summary. But don't stop there.

The answer to the question, "*From Neurons to Neighborhoods*—what's in it for you?" is likely to be somewhat different for every reader. You need time to browse, read, and reflect (even if it's on the subway, not the beach). Many readers will first delve into *NtoN* driven by immediate need. You are looking for language for a briefing paper, ideas for a reading list, or references for a grant application. These can be found, in abundance, in the book—whether your chief interest is in neurons, neighborhoods, or areas in between and beyond. But I hope that once your immediate needs are satisfied, you will find time to further explore the abundance of *NtoN*.

My own copy of *NtoN* bristles with inch-long, tangerine-colored, flexible plastic tabs marking my favorite passages. In time, some of these markers may become unnecessary—like a well-loved cookbook, *Neurons to Neighborhoods* will fall open, at the slightest touch, to pages I consult regularly. But I expect that I'll continue to add new tabs, as I discover (or have brought to my attention) paragraphs and pages overlooked in earlier readings and skimmings of *NtoN*. For the moment, I'd like simply to introduce *Zero to Three* readers to half a dozen sections of *NtoN*.

These passages entranced me at first reading and keep reverberating through conversations with colleagues. Some of them are being quoted in professional journals and the general media. But this is an idiosyncratic selection, based on my own interests, needs, and curiosity. By sharing my personal favorite passages, I hope to entice you to wonder what you might find in this rich resource.

This sampling of passages from all parts of *NtoN* may encourage you to explore it and find your own favorite passages to mark and quote.<sup>1</sup> I hope that you will use *Zero to Three's* Letters to the Editor column to let colleagues know of your discoveries.

<sup>1</sup> All page and chapter numbers refer to National Research Council and Institute of Medicine (2000). *From Neurons to Neighborhoods: The Science of Early Childhood Development*. Committee on Integrating the Science of Early Childhood Development. Jack P. Shonkoff and Deborah A. Phillips, eds. Board on Children, Youth, and Families, Commission on Behavioral and Social Sciences and Education. Washington, DC: National Academy Press.

## The Nature and Tasks of Early Development

For many of us in the infant/family field, the notion of “developmental milestones” has become a millstone around our necks. The conventional charts and checklists reflect fragmented, rather than integrated knowledge; ignore individual differences among children; and are oblivious to varying cultural expectations of development in the early years. But all of us – parents, practitioners, researchers, and policymakers – grapple with the question of what constitutes healthy development in the first years of life – what it means to get off to a good start.

In addressing early development, the *NtoN* Committee saw its task as identifying and discussing “early developmental tasks that, if mastered, appear to get children started along adaptive pathways and, if seriously delayed or problematic, can lead a child to falter” (p. 91). They chose to emphasize three domains among the many accomplishments that characterize the years from birth to age 5:

- **Negotiating the transition from external to self-regulation, including learning to regulate one’s emotions, behaviors, and attention.** The capacity for self-regulation, ranging from sleeping and settling in the earliest weeks of life to the preschooler’s emerging capacity to manage emotions, inhibit behavior, and focus attention on important tasks, reflects young children’s transition from helplessness to competence. Stated simply, early development entails the gradual transition from extreme dependence on others to manage the world for us to acquiring the competencies needed to manage the world for oneself (pp. 92, 121).
- **Acquiring the capabilities that undergird communication and learning.** This includes the early development of language, reasoning, and problem solving – the underlying capacities that make it possible for children to learn. The motivation and capacity of the newborn to act on and learn about the surrounding world and the people in it flourish during the early childhood years and ultimately transform the newborn into a 5-year-old who is usually well prepared to take on the formal school curriculum. Under typical circumstances, parents around the globe seem intuitively to talk to children in ways that work quite well in fostering language development and to provide children with the interactions and materials that promote early learning (pp. 92, 161-2).
- **Learning to relate well to other children and forming friendships.** This highlights the emerging capacity

**Established knowledge is determined by strict rules of evidence and rigorous peer review. It evolves continually over time. Reasonable hypotheses are educated guesses that are derived from, but extend beyond the boundaries of established knowledge.**

to trust, to love and nurture, and to resolve conflict constructively. Learning to play nicely, make friends, and sustain friendships are not easy tasks, and children who do them well tend to have well-structured experiences with peer interactions starting in toddlerhood and preschool, and, in particular, opportunities to play with familiar and compatible peers. They are also more likely to have secure relationships with their parents who, in turn, believe they have an instrumental role to play in fostering their children’s social relationships (p. 92, 180).

The Committee’s strategy and choice of these three domains to emphasize seem inspired, for several reasons. First of all, these domains *integrate* knowledge from many disciplines and many ways of knowing. A list with three items may attract attention and encourage discussion simply because it is short. Had the Committee tried to develop

some comprehensive list of expectable early achievements, the result, however inclusive, would have been mind-boggling. Second, the focus is on *development* – emergence, acquiring capabilities, and learning – rather than on developmental milestones. This emphasis on “foundational capabilities” (p. 5) encourages exploration of both commonalities and differences in cultural expectations of early development, and of the many pathways to competence. Finally, *NtoN*’s articulation of the scientific evidence for the developmental importance of these

domains validates both a functional approach to developmental assessment of individual children and a focus on these domains in program design and evaluation. Attention to the three *NtoN* domains is a powerful way of linking “developmental science” to “intervention science.”

### Core Concepts

In 1990, ZERO TO THREE published *Preparing Practitioners To Work With Infants, Toddlers and Their Families* (Fenichel & Eggbeer, 1990). This was the report of a 10-member interdisciplinary parent/professional work group whose charge was to identify the specialized knowledge and skills needed by all practitioners who work with children 0-3 and their parents. In addition to opportunities for direct observation, reflective supervision, and collegial support, we recommended that the training of all practitioners planning to work with very young children and their families include a set of core concepts that have “emerged as powerful integrators of information across fields of inquiry and as general guides for practice useful to many disciplines” (p. 13).

Building on the thinking of Sally Provence and Audrey Naylor, we grouped the concepts into seven areas. Ten years later, *NtoN* identifies 10 core concepts that frame

our understanding of the nature of human development during the earliest years of life:

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 development.
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 adaptive outcomes (pp. 23-32).

*NtoN* introduces these concepts in a succinct 10 pages. The section includes more than 40 citations published between 1925 and 2000, by a list of pioneering and contemporary researchers from Gesell to Garcia Coll, and Ainsworth to Zax. Subsequent chapters take up each concept in more detail. (The complete *NtoN* list of references, by the way, is 118 pages long.) What better foundation for a syllabus for an interdisciplinary course on early childhood development?

Clearly, each concept on the list and the list as a whole warrant study. I am reminded, however, that as we began disseminating the principles of *Preparing Practitioners* and incorporating them into *ZERO TO THREE*'s own training activities, we emphasized that "concepts help to organize what is known about infants and families and to suggest *what is yet to be discovered or understood*" (p. 13, emphasis added). "A concept," we found ourselves saying over and over again, "is not a fact." "But our students *want facts*," replied many of our colleagues. In my view, one of *NtoN*'s most valuable gifts to our field – and to the nation – is its

discussion of "how we know" as well as "what we know," and the limitations of our current knowledge base.

Defining the boundaries of science in early childhood development. . . can be facilitated for policy makers, practitioners and parents by differentiating among established knowledge, reasonable hypotheses, and unwarranted assertions (Shonkoff, 2000). **Established knowledge** is determined by strict rules of evidence and rigorous peer review. It evolves continually over time. **Reasonable hypotheses** are educated guesses that are derived from, but extend beyond the boundaries of established knowledge. Although they may be confirmed or disproved by subsequent investigation, they make up a large proportion of the knowledge base that guides responsible policy, service delivery, and parenting practices at any given point in time. . .

Understanding of child development is based on multiple sources of knowledge that include theoretical models, empirical research, program evaluation, and professional experience. . .

The discussion (of ten core concepts). . . reflects the prevailing views of researchers, theorists, and clinicians who study young children. This multi-dimensional knowledge base has grown exponentially over the past 25 years, fueled by an explosion of scholarly work across a wide variety of disciplines. Its richness lies in the extent to which diverse perspectives have converged on a set of core concepts. Its limitations rest on the extent to which the science is based largely on studies of typical development in white, middle-class samples and developmental vulnerability in samples that do not disentangle race, ethnicity, or socioeconomic status (pp. 22-23).

The challenge for the infant/family field, this statement suggests, is not only to study and translate into practice what is now known about early childhood development, but also to expand our inquiry to reflect the enormous diversity of children, families, communities, and life circumstances in this country.

### The Context for Early Development

"Early interventions are premised on a belief in the power of environmental influences on early development" (p. 219). This is the opening statement of the five chapters of *NtoN* that discuss contextual influences on development – nurturing relationships, family resources, child care experiences, neighborhood and community, and interventions designed to promote healthy development. Readers of *Zero to Three* will have no difficulty finding "what's in it for them" in *NtoN*'s discussions of the impacts of parenting, poverty, child care, and community on early development. Rather than attempting to summarize these chapters, I have simply chosen some brief excerpts to encourage exploration of them. One of the pleasures of spending

time with *NtoN* is the chance to discover clear, quotable sentences that elegantly summarize a body of research. For example:

**Nurturing Relationships** (Chapter 9):

- A vast store of research...has confirmed that what young children learn, how they react to the events and people around them, and what they expect from themselves and others are deeply affected by their relationships with parents, the behavior of parents, and the environment of the homes in which they live (p. 226).
- An appreciation of the broad range of circumstances in which parents rear young children brings with it tremendous admiration for those who do it well (p. 249).

**Family Resources** (Chapter 10):

- One of the most consistent associations in developmental science is between economic hardship and compromised child development (p. 275).
- The toll that low socioeconomic status takes on parents' mental health appears to have important effects on child well being. This implies a pressing need to integrate economic and mental health policy at numerous levels, ranging from federal decision making to the implementation and evaluation of both economic interventions, such as welfare reform, and early interventions for children and families in local communities (p. 292).

**Growing Up in Child Care** (Chapter 11):

- Early and extensive enrollment in child care has become the norm in U.S. society (p. 297).
- It is the quality of care and, in particular, the quality of the daily transactions between child care providers and the children for whom they are responsible, that carry the weight of the influence of child care on children's development (p. 310).
- The positive relation between child care quality and virtually every facet of children's development that has been studied is one of the most consistent findings of developmental science (p. 313).

**Neighborhood and Community** (Chapter 12):

- The combination of family poverty and neighborhood poverty poses double risk to a substantial minority of black children and, to a lesser extent, to Hispanic children, who are much more likely than white children to grow up in these circumstances (pp. 335-6).
- For children residing outside the nation's inner cities, neighborhood conditions appear to be far less consequential for children's development than conditions within the family. Population-based studies are consis-



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tent in showing much more variation in achievement, behavior, and parenting *within* rather than *across* neighborhoods (p. 336).

### **Promoting Healthy Development Through Intervention: Theories of Change**

The central professional concerns of the infant/family practitioners, program developers, and intervention researchers are addressed most directly in Chapter 13 of *NtoN*, "Promoting Healthy Development Through Intervention." Characteristically, the chapter's opening paragraph manages to offer a worldview in four sentences:

The care and protection of young children are shared responsibilities. At their most intimate level, they require the investment and attention of a limited number of adults. In their broadest context, they depend on an environment that supports the child-rearing function of families. In the final analysis, healthy child development is dependent on a combination of individual responsibility, informal social supports, and formalized structures that evolve within a society (p. 337).

A brief discussion of the diversity among early childhood interventions found in the United States is followed by one of the most remarkable pages in *NtoN* – an eight item, 417-word "shared theory of change" for the field of early intervention. Drawing on the work of Carol Weiss, the Committee observes that all successful interventions are guided by a theoretical model that specifies the rela-

tion between their stated goals and the strategies employed to achieve them. The Committee then states:

After more than a quarter century of remarkable growth and continuing maturation, the basic sciences of child development and neurobiology have converged with the learned experiences of a broad array of intervention policies and programs to generate sufficient knowledge to build an intellectually rigorous, common theory of change for the field (p. 340).

*NtoN's* theory of change is not easy reading. But it could not have been an easy task to find 417 words that integrate the 10 *NtoN* core concepts, the information in the report, and “decades of creative theoretical formulations about the process of human development” (p. 340) by such individual thinkers, collaborators, and groups as Belsky, Bronfenbrenner, Dunst, Guralnick, Lerner, Ramey, Cicchetti and Cohen, Garnezy and Rutter, Sameroff and Chandler, Werner and Smith, and the MacArthur Network on Psychopathology and Development. Here are the central features of *NtoN's* shared theory of change:

- All strategies of intervention, regardless of the target group or the desired outcomes, can be derived from normative theories of child development. That is to say, the general principles of development apply to all children, independent of their biological variability or the range of environments in which they live.
- All domains of development unfold under the interactive influences of genetic predisposition and individual experience. The trajectories of experience-expectant skills (e.g., motor development) are relatively less susceptible to intervention effects and those of experience-dependent skills (e.g., literacy) are affected more significantly, but no area of human competence is completely predetermined by intrinsic factors.
- Young children’s relationships with their primary caregivers have a major impact on their cognitive, linguistic, emotional, social, and moral development. These relationships are most growth promoting when they are warm, nurturing, individualized, responsive in a contingent and reciprocal manner, and characterized by a high level of “goodness of fit.”
- A young child’s environment is both physical and social. Its impact on development is mediated through the nature and quality of the experiences that it offers and the daily transactions that transpire among people inside and outside the home.
- The ability of caregivers to attend to the individualized needs of young children is influenced by both

their internal resources (e.g., emotional health, social competence, intelligence, educational attainment, personal family history) and the external circumstances of their lives (e.g., family environment, social networks, employment status, economic security, experience with discrimination). The cumulative burden of multiple risk factors and sources of stress compromises the capacity of a caregiver to promote sound health and development. The buffering function of protective factors and sources of support enhances it.

- Early intervention programs are designed to affect children directly (through the provision of structured experiences) and indirectly (through their impact on the caregiving environment).

Child-focused interventions involve developmentally guided educational opportunities or specifically prescribed therapies or both. Caregiver-focused interventions include varying combinations of information, instruction, emotional support, and assistance in securing needed resources and related services.

- The determination of appropriate child and family outcomes, and their assessment, require an appreciation of the importance of individual differences among children, an understanding of the extent to which the caregiving environment is changeable, and a realistic appraisal of the match between the resources of the service program and the goals of the intervention.
- The success of an intervention is determined by the soundness of the strategy, its acceptability to the intended recipients, and the quality of its implementation.

Applying this shared theory of change to the analysis and strengthening of early childhood intervention policies and programs in this country is a major part of “translating what we know into what we do” to support the healthy development of young children and families. Michael Guralnick (this issue) offers a comprehensive approach to enhancing the connections between developmental science and intervention science in community-based intervention programs. An “intellectually rigorous common theory of change” should guide us in strengthening the connection between goals and strategies in our individual work with young children and families as well.

### **Promoting Healthy Development Through Intervention: The Effectiveness of Intervention**

There are two passages from *NtoN* that I marked as very important, but hardly ranked among my “favorites”

**One of the most consistent associations in developmental science is between economic hardship and compromised development.**

when I first encountered them. Consider first this cautious statement from the chapter on promoting healthy development through intervention:

In the final analysis, there is considerable evidence to support the notion that model programs that deliver carefully designed interventions with well-defined goals can affect both parenting behavior and the developmental trajectories of children whose life course is threatened by socioeconomic disadvantage, family disruption, or diagnosed disability (p. 379).

The restatement of this point in the list of “scientific conclusions” highlighted for public education is even more restrained:

The early detection of problems and the prompt provision of an appropriate intervention can improve developmental outcomes (i.e., shift the odds) for both children living in high-risk environments and children with biologically based disabilities. However, not all interventions are effective, when they do work they are rarely panaceas, and (unlike immunizations followed by an occasional booster) they do not confer a lifetime of protection (p. 413).

“Faint praise! Thin gruel!” I thought at first reading. Infant/family practitioners want to make a real difference – not just “shift the odds.” And how many of us work in “model programs”? Are the rest of us wasting our time?

On reflection, I realized that these terse judgments on the effectiveness of early childhood intervention, based as they are on *NtoN*’s rigorous standards of scientific evidence, reminded me of the pitiless verdicts of the scale at the doctor’s office. We can find ways to deny or discount the scale’s reading, but false self-reassurance is not likely to be good for our health. As Jack Shonkoff suggests (this issue), what is surely more useful than “we’re sure we’re right” advocacy for an intervention approach is to step back and question what we are doing.

As a beginning, consider the features of intervention that the Committee has identified as essential to effectiveness. *NtoN* recommends paying much closer attention to these features in program design, implementation, and evaluation:

- **Individualization of service delivery:** Extensive research from a variety of service system perspectives converges on the principle that effective intervention demands an individualized approach that matches well-defined goals to the specific needs and resources of the children and families who are served. Thus,

there is scant support for a one-size-fits-all model of early childhood intervention (p. 360).

- **Quality of program implementation:** The quality of the intervention that is actually delivered and received by target children and families is of fundamental importance. . . The premature assessment of an intervention impact before one is confident that it can be faithfully implemented is likely to be both a waste of money and a demoralizing influence on those who are trying to develop promising new programs (p. 362).
- **Timing, intensity, and duration of intervention:** The Committee notes that the research literature on service intensity (usually defined as the amount of professional time spent with families or children), duration, and age of initiation is perhaps the most complex and inconclusive aspect of the early childhood intervention knowledge base. In addition, questions about intensity and duration must always be considered in the context of assessing the ratio of costs to

benefits, but the data needed to assess this issue are quite limited (p. 363-4).

- **Provider knowledge, skills, and relationship with the family:**

In many if not most programs serving young children and families, the ultimate impact of any intervention is dependent on both staff expertise and the quality and continuity of the personal relationship established between the service provider and the family that is being served (p. 365).

- **Family-centered, community-based, coordinated orientation:**

Although the empirical evidence for these concepts is thin, the theoretical and experiential support is strong. . . (There is a) critical need for more descriptive, exploratory investigations in this area, including both qualitative and quantitative research (pp. 366-7).

Not surprisingly, these are the elements of early childhood intervention to which ZERO TO THREE as an organization and the growing infant/family field as a whole are devoting our most concentrated attention. Evidence from classic longitudinal studies and decades of professional experience with infants, toddlers and families remind us repeatedly of the uniqueness of every child and family, the importance of continuity of care by competent providers, and that “how you are is as important as what you do.” *NtoN*’s Chapter 4, “Making Causal Connections” and Appendix B, “Defining and Estimating Causal Effects,” provide conceptual tools and guidance for both basic and applied research – developmental science and intervention

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Rabbi Hillel and his colleagues believed that study, work, and acts of compassion could transform the world. In other words, “going forth to study” includes the mandate to translate knowledge into action. But, as the Committee notes, in the United States today this is no simple matter. Although “the development of children must be viewed as a matter of intense concern for both their parents and for the nation as a whole,” the science of early childhood development has been “viewed through highly personalized and sharply politicized lenses” (p. 414). The Committee calls for “a new national dialogue focused on rethinking the meaning of both shared responsibility for chil-

science — in the infant/family field. Our challenge is to rigorously and appropriately evaluate our current “best practice” and, using what we learn from these evaluations, improve upon it. As reasonable hypotheses become established knowledge, we may be able to shift the odds sufficiently for vulnerable young children and families so that we can make a genuine positive difference in their lives.

### **Knowledge Into Action: Calling for a New National Dialogue**

The Committee on Integrating the Science of Early Childhood Development was established to “update scientific knowledge about the nature of early development and the role of early experience, 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” (p. 3). In its final chapter, *NtoN* offers 11 scientific conclusions to inform the public and this summary of its findings:

(T)he well-being and “well-becoming” of young children are dependent on two essential conditions. First is the need for stable and loving relationships with a limited number of adults who provide responsive and reciprocal interaction, protection from harm, encouragement for exploration and learning, and transmission of cultural values. Second is the need for a safe and predictable environment that provides a range of growth-promoting experiences to promote cognitive, linguistic, social, emotional, and moral development. The majority of children in the United States today enjoy the benefits of both. A significant number do not. (p. 413).

children and strategic investment in their future” and shaping a shared agenda that will involve families, communities, and local, state, and federal governments in enhancing the quality of children’s caregiving environments and early experiences, ensuring “both a rewarding childhood and a promising future for all children” (Ibid).

The mission of ZERO TO THREE is to promote the healthy social, emotional and intellectual development of our nation’s infants and toddlers by supporting and strengthening families, communities, and those who work on their behalf. We look forward to doing all we can to encourage and participate in a national dialogue about young children, families, and communities, and to helping to create and implement a shared agenda of responsibility. ♣

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