The Impact and Promise of Early Childhood Science: The Federal Research Perspective

Alan E. Guttmacher, M.D.

Eunice Kennedy Shriver National Institute of Child Health and Human Development

Washington, DC
October 28, 2010
Examples of Studies Addressing NTN Goals

- **The National Longitudinal Study of Adolescent Health (Add Health)** – Combines longitudinal data on adolescents’ social, economic, psychological, and physical well-being with data on family, neighborhood, community, school, friendships, peer groups, and romantic relationships to study how such factors link to health and achievement.

- **National Children’s Study** – A unique resource to better understand the health and development of children and early antecedents of adult-onset disease. Will allow researchers to examine multiple effects of environmental influences and biological factors on the health and development of ~100,000 children across the U.S., from before birth to 21 years.
New Research Advances and Tools Provide Many Research Opportunities
For Instance, Genomics...
2007 1st quarter
2007 3rd quarter
2009 2nd quarter
We Need to Apply Such Approaches to Child Development

- But, it is crucial to remember that, even in the “Genome Era,” child development results from interactions among genetic/biological and “environmental” (broadly defined) factors.
- It is neither nature nor nurture, but both, and research must explore these interactions.
- To do so optimally, we need to perfect and expand genomics tools, develop better tools to study environmental factors, and support novel approaches to examine gene-environment interactions.
Two Examples of What We Could Do...
# Neural Plasticity

- Understanding how neuronal structure, function, and organization change in response to experience

- Research opportunities might include:
  - Neural circuit retraining: changes in structure and function that support enduring behavioral changes
  - Identification of genetic and epigenetic processes supporting neural plasticity
  - Identification of environmental experiences necessary for normal or optimal development in various sensitive periods of neurocognitive development
  - Plasticity in regeneration and recovery: rehabilitation and adaptation of function
Learning

- Understanding individual variation in learning
- Research opportunities might include:
  - Using new neuroimaging techniques to explore variation in learning
  - Conducting longitudinal studies of learning that look at the interaction of genetic variation and sociocultural influences
  - Determining how, or if, early learning experiences modify the child’s genome via epigenetic modification
  - Applying new research knowledge to improve early interventions for individuals with learning disabilities
NICHD’s Scientific Vision: The Next Decade
Purpose

The NICHD, in collaboration with our external communities, has embarked on a year-long process to identify the most promising scientific opportunities of the next decade across the breadth of the Institute’s mission.

Our aim is to develop a scientific vision that sets an ambitious agenda and inspires the Institute, the research community, and our many partners to achieve critical scientific goals and meet pressing public health needs.
Process

- Jan.-Mar. 2011: Series of nine workshops to gather input from external experts
- Apr.-May 2011: White papers from workshops synthesized to serve as foundation of Vision
- June 2011: Large, multidisciplinary science meeting to shape Vision further
- Sept. 2011: NICHD Council refines/vets Vision
- Dec. 2011: Target publication date
- Public comment welcome throughout the process
Scientific Themes

- Behavior
- Development
- Plasticity
- Reproduction
- Pregnancy & Pregnancy Outcomes
- Cognition
- Environment
- Developmental Origins of Health & Disease
- Diagnostics & Therapeutics
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Cross-Cutting Elements

- Analytical and measurement tools and methods
- Animal and computational models
- Bioethics
- Bioinformatics
- Biotechnologies/bioengineering, including high through-put, assistive and other related technologies
- Developmental trajectory
- Differences/disparities across populations
Cross-Cutting Elements

- Epigenetics/meta-genomics
- Functional status
- Global health
- Implementation science, including health economics
- Nutrition
- Prevention/personalized medicine
- Stem cells
- Systems biology
- Training and mentoring
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Conclusion

We have made progress since the release of *From Neurons to Neighborhoods* a decade ago.

But we still have a long way to go to understand early childhood development and the biological-environmental interactions that influence it, both for populations and individuals.

In the next decade, we must create and take advantage of new tools and approaches to further research efforts and inform interventions designed to improve children’s outcomes.