Brainstorming scientific opportunities: Synthesis on topics

Development over the lifecourse

What is in development?

- Development = Process
  - Change over time
  - Dynamic
  - Non-linearities?

- Dimensions
  - Social
  - Psychological
  - Behavioral
  - Physiological
  - Extra-individual factors (environments – family, friends, school, work, etc)
The Challenge: Updating Theories

- Theory building in lifecourse developmental science
  - **Gap**: Disciplinary fragmentation, life stage fragmentation
  - Appreciate nonlinear dynamics and multilevel processes in lifecourse development
  - To explain/model trajectories across multiple levels
    - What produces trajectories, what alters them, e.g. fetal programming
    - **Common mechanisms** of lifecourse developmental change across multiple systems?
    - Are there critical periods? Is there early embedding?
    - How do we understanding cumulative effects?

The Challenge: Plasticity

- **Understanding mechanisms underlying trajectories of change**
  - How is plasticity manifest at different life stages?
  - How are later stages conditional on early stages?
    - Examples: Gene-environment correlation; epigenetic effects; fetal programming
  - How do changes at one level impact other levels?
    - Extending concepts related to “neural plasticity” to other levels of analysis – social, behavioral, psychological
    - How large scale environmental changes – like rapid technological advances, economic policy – impact plasticity in systems of cognition, behavior, etc.?
The Challenge: Tools
• Analytic Tools and Data Resources
  – Need for large complex databases to model plasticity and multiple trajectories over time
  – Need to integrate and standardize/harmonize data and methods to span the stages of the lifecourse
  – Need new models and analytic methods (or adapting models from other areas of science) to evaluate complex interaction processes underlying various developmental trajectories within the population
    • Over levels, over time and space, interactions
    • Capturing dynamic intra-individual change over time, beyond average exposure

The Challenge: People
• Capacity building
  – Interdisciplinary Networks
  – Training – Interdisciplinary T32s
  – Leverage CTSAs to incorporate bBSSR
The Opportunity: Why Now?

• Better conceptual and substantive appreciation of these complexities
• Newly available methods to examine these (imaging, ambulatory monitoring, temporal modeling at multiple timescales)
• Bridging of laboratory and survey science providing foundations for multilevel analysis in commonly used data resources
• Willingness to engage in interdisciplinary research

What does this concept provide that is lacking or needed to advance the field?

• Leveraging this emerging understanding of non-linear trajectories of development over the lifecourse in a wide range of behavioral, psychological, neurobiological and social domains
• Understanding plasticity in these systems
  – Entry points and mechanisms of change
• Essential for identifying effective targets and subgroups for intervention!