Overview of Add Health Study and Design

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PI and Director, Add Health
National Longitudinal Study of Adolescent Health

• On-going program project that began in 1994.
• Developed in response to a congressional mandate to fund a study of adolescent health.
• Funded by the National Institute of Child Health and Human Development (NICHD) with co-funding from 23 other federal agencies and foundations.
• Fourth wave of data collection funded in 2006.
Key Features of Add Health

• Nationally representative study that explores the causes of health and health-related behaviors of adolescents and their outcomes in young adulthood.
• Multi-survey, multi-wave inter-disciplinary design.
• Direct measurement of the social contexts of adolescent life and their effects on health and health behavior.
• Unprecedented racial and ethnic diversity and genetically informed sibling samples.
Initial Goal:
Putting the Individual Into Context
Sampling Structure

School Sampling Frame = QED

HS → Feeder → HS → Feeder → HS → Feeder → HS → Feeder

Sampling Frame of Adolescents and Parents N = 100,000+ (100 to 4,000 per pair of schools)

Genetic Samples
- Identical Twins
- Fraternal Twins
- Full Sibs
- Half Sibs
- Unrelated Pairs in Same HH

Main Sample 200/Community
- Disabled Sample
- High Educ Black
- Puerto Rican
- Chinese
- Cuban

Saturation Samples from 16 Schools

Ethnic Samples
Social, Behavioral, and Biological Linkages Across the Life Course

Cultural & Policy Environment

PEER

SCHOOL

NEIGHBORHOOD

FAMILY

Add Health Contextual model
Points Colored by Race

Unique Features of Study Design

- Ethnic oversamples produce
  - unprecedented diversity in race and ethnicity in a representative population of adolescents
  - large numbers of youth in immigrant families

- Embedded genetic sample enables researchers to sort out genetic from environmental effects and explore gene-environment interactions.
### Race and Ethnic Diversity in Add Health

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>1,767</td>
<td>8.5</td>
</tr>
<tr>
<td>Cuba</td>
<td>508</td>
<td>2.5</td>
</tr>
<tr>
<td>Central-South America</td>
<td>647</td>
<td>3.1</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>570</td>
<td>2.8</td>
</tr>
<tr>
<td>China</td>
<td>341</td>
<td>1.7</td>
</tr>
<tr>
<td>Philippines</td>
<td>643</td>
<td>3.1</td>
</tr>
<tr>
<td>Other Asia</td>
<td>601</td>
<td>2.9</td>
</tr>
<tr>
<td>Black (Africa/Afro-Caribbean)</td>
<td>4,601</td>
<td>22.2</td>
</tr>
<tr>
<td>Non-Hispanic White (Eur/Canada)</td>
<td>10,760</td>
<td>52.0</td>
</tr>
<tr>
<td>Native American (non-Hispanic)</td>
<td>248</td>
<td>1.2</td>
</tr>
<tr>
<td><strong>Total N</strong></td>
<td><strong>20,686</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Missing on race/ethnicity=59
Diversity of Family Forms at Wave I

- Two biological parents
- Two adoptive parents
- Bio Mom, Step Dad
- Bio Dad, Step Mom
- Two step/foster parents
- Single Mom
- Single Dad
- Surrogate parent(s)
Scientific Goals in Wave IV

• Bring together social and behavioral data with biological data relevant to the current and future health concerns of Add Health cohort at ages 24-32;

• Expand collection of biological data to understand genetics and predisease pathways, with a focus on obesity, stress, and health risk behavior;

• Broaden our trans-disciplinary reach into biomedical sciences to map health and developmental trajectories across the life course.
Integrative Life Course Theoretical Framework

- CONTEXT
- BEHAVIOR
- BIOLOGY

- HEALTH AND WELL-BEING

- Childhood → Adolescence → Emerging Adulthood → Young Adulthood
# Questionnaire Content Across Waves

<table>
<thead>
<tr>
<th>Waves I, II</th>
<th>Wave III</th>
<th>Wave IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic</td>
<td>Demographic</td>
<td>Demographic</td>
</tr>
<tr>
<td>Family, siblings, friends</td>
<td>Family, siblings, friends</td>
<td>Family, siblings, friends, military</td>
</tr>
<tr>
<td>Education, work</td>
<td>Education, work, military</td>
<td>Educ, work, military (records)</td>
</tr>
<tr>
<td>Physical and mental health</td>
<td>Physical and mental health</td>
<td>Physical and mental health</td>
</tr>
<tr>
<td>Daily activities and sleep</td>
<td>Daily activities and sleep</td>
<td>Daily activities and sleep</td>
</tr>
<tr>
<td>Relationships</td>
<td>Relationships</td>
<td>Relationships</td>
</tr>
<tr>
<td>Sexual, &amp; fertility histories</td>
<td>Sexual, &amp; fertility histories</td>
<td>Sexual, &amp; fertility histories</td>
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<tr>
<td>Substance use</td>
<td>Substance use</td>
<td>Substance use and abuse</td>
</tr>
<tr>
<td>Delinquency and violence</td>
<td>Involvmt w/criminal justice sys</td>
<td>Involvmt w/criminal justice sys</td>
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<tr>
<td>Attitudes, religion</td>
<td>Attitudes, religion</td>
<td>Work attitudes and chars, relig</td>
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<td>Economics, expectations</td>
<td>Economics, expectations</td>
<td>Economics, expectations</td>
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<td>Psychological, personality</td>
<td>Psychological, personality</td>
<td>Big 5 Personality, stressors</td>
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<tr>
<td>Children and parenting</td>
<td>Children and parenting</td>
<td>Children and parenting</td>
</tr>
<tr>
<td>Civic participation</td>
<td>Civic participation</td>
<td>Civic participation</td>
</tr>
<tr>
<td>Gambling</td>
<td>Gambling</td>
<td>Cognitive function</td>
</tr>
<tr>
<td>Mentoring</td>
<td>Mentoring</td>
<td>Psychosocial factors</td>
</tr>
</tbody>
</table>
# Biological Data Across Waves

<table>
<thead>
<tr>
<th>Adolescence</th>
<th>Young Adulthood</th>
<th>Adulthood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embedded genetic sample of 3,000 pairs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height, weight</td>
<td>Height, weight</td>
<td>Height, weight, waist</td>
</tr>
<tr>
<td>STI tests (urine)</td>
<td>Metabolic</td>
<td></td>
</tr>
<tr>
<td>HIV test (saliva)</td>
<td>Immune function</td>
<td></td>
</tr>
<tr>
<td>DNA (buccal cell)</td>
<td>Inflammation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cardiovascular</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DNA (buccal cell)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medications</td>
<td></td>
</tr>
</tbody>
</table>
Longitudinal Data in Add Health

Adolescence  Wave I  Wave II  Wave III  Wave IV  Adulthood
(12-19)  (13-20)  (18-26)  (24-32)

Social environmental data:
school  school  college  college
family  family  family  family
romantic rel  romantic rel  romantic rel  romantic rel
neighborhd  neighborhd  neighborhd  neighborhd
community  community  community  community
peer  peer  peer  peer

Biological data:
Biological resemblance to siblings in household on 3,000 pairs
height  height  height, weight, BMI
weight  weight  weight, BMI
BMI  BMI  STD test results

ht, wt, BMI
waist
bp, pulse
markers of CVD,
stress, diabetes
DNA
DNA
Add Health Wave IV

- Map health and developmental trajectories over the life course
- Understanding interplay between environment, behavior, and biology
- Origins of health problems and markers of future disease in early adulthood
- Origins of health disparities and what factors cause disparities to persist or decline
Design Features of Wave IV

• 90 minute computer-based survey instrument
• 30 minute biomarker collection
  – Anthropometrics
  – Blood pressure
  – Blood spots
  – Saliva
• IIV (Intra-Individual Variation) Study
Domains of Biological Measures

- Anthropometric: height, weight, BMI, waist & arm circumference
- Cardiovascular: blood pressure, pulse
- Metabolic processes: lipids, glucose, glycosylated hemoglobin
- Immune function: EBV
- Inflammatory processes: CRP
- Genetic: 10 candidate loci
Wave IV Locate and Interview Rates

- Data collection in 2008, ending January 2009
- Located 92% of sample members
- Interviewed 80% of eligible cases
- Wave IV sample size approximately 15,701
- Wave IV interview data released October 30, 2009
Wave IV Biospecimen Participation

- 96% of respondents consented to provide saliva for DNA
- 94% consented to provide blood spots
- For each specimen, 81% of those consenting to collection also consented to archiving
- Approx 12,200 DNA samples available for further testing
Add Health Accomplishments

- Data made available to more than 6,000 investigators for analyses
- 400+ grants awarded to analyze data
- 1,300+ peer-reviewed publications
- 2,000+ conference presentations, 15 books, and 80 book chapters based on Add Health data
- 320+ doctoral dissertations and masters theses
Add Health Co-Funders

- National Institute of Child Health and Human Development*
- National Cancer Institute*
- National Center for Health Statistics, Centers for Disease Control and Prevention, DHHS
- National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, DHHS*
- National Center for Minority Health and Health Disparities*
- National Institute of Allergy and Infectious Diseases*
- National Institute of Deafness and Other Communication Disorders*
- National Institute of General Medical Sciences
- National Institute of Mental Health
- National Institute of Nursing Research*
- National Institute on Aging*
- National Institute on Alcohol Abuse and Alcoholism*
- National Institute on Drug Abuse*
- National Science Foundation*
- Office of AIDS Research, NIH*
- Office of the Assistant Secretary for Planning and Evaluation, DHHS*
- Office of Behavioral and Social Sciences Research, NIH*
- Office of the Director, NIH
- Office of Minority Health, Centers for Disease Control and Prevention, DHHS
- Office of Minority Health, Office of Public Health and Science, DHHS
- Office of Population Affairs, DHHS*
- Office of Research on Women's Health, NIH*

*Wave 4 co-funders