Social Determinants of Children’s Physical and Mental Health Disparities

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Health Disparities

• Health differences that are closely linked with social, economic, and/or environmental disadvantage
  —Healthy People 2020
Hughes Spalding Cerebral Palsy Clinic

- The Inner City Population of Atlanta in the 1990’s was low income, predominantly minority and decidedly underserved.

- In 1998 we started an interdisciplinary clinic for children with Cerebral Palsy.
In 2002 we surveyed the records of 260 children who had attended the clinic since its inception.

We found a complex set of medical, developmental and social complications.
Demographic and Etiological Findings

- A high rate of mothers using substances during pregnancy particularly in the lower birth weights and gestational age

- Most children live in single parent families with Mother
Percentage of Patients Whose Mothers Used Substances during Pregnancy, per Gestational Age Group

<table>
<thead>
<tr>
<th>Gestational Age in Weeks</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;28</td>
<td>25.58%</td>
</tr>
<tr>
<td>28-32</td>
<td>19.64%</td>
</tr>
<tr>
<td>33-35</td>
<td>18.18%</td>
</tr>
<tr>
<td>36-40</td>
<td>14.29%</td>
</tr>
<tr>
<td>41+</td>
<td>8.89%</td>
</tr>
</tbody>
</table>
The Child lives with…

- Mother: 64
- Grandparent(s): 58
- Foster/Adopt...: 18
- Both biologic..: 9
- Father: 3

Lives with...

- <28-35 Weeks: 1
- 36-41+ Weeks: 3
Poverty Disparities

• **Race:**
  – 12.3% of white children
  – 31.9% of Hispanic children
  – 37.1% of black children

• **Education:**
  – some college education, 13% are poor
  – less than a high school degree, 57% are poor

• **Employment:**
  – 1 parent works full-time, 9% are poor
  – no parent works full-time, 48% are poor

Mediators of Child Poverty Pascoe et al Pediatrics April 2016
Family Constellation

• The absence of fathers in the home is associated with a fourfold risk of poverty.
  – 42% of single female-headed families are poor
  – 12% for 2-parent families

• Children of single mothers are at greater risk for:
  – infant mortality
  – child maltreatment
  – failure to graduate from high school
  – incarceration

Mediators of Child Poverty Pascoe et al Pediatrics April 2016
Sociodemographic factors and environmental influences in early childhood have been demonstrated to have significant impact on development, mental health, and overall health throughout the lifespan.
Built Environment in Poor Communities

- Unsafe Neighborhoods due to: Traffic, Crime, Litter & Trash, Food Desert, Limited Green Space
  - 61% more likely to be Obese

- Older Houses in Poor Condition
  - 3.5x more likely to have lead toxicity

- Older Schools in Poor Condition
  - 50% less likely to graduate
  - 2x more likely to be unemployed
Poor Neighborhoods
the condition of building features in schools with the highest concentration of poverty are less than adequate compared to schools with the lowest concentration of poverty.
Graduation from High School

graduation rates in inner city and suburban schools

- Inner city: 50
- Suburban: 79
Poverty Effects on Cognitive and Educational Function

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Children Who Are Poor</th>
<th>Children Who Are Not Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developmental delay</td>
<td>5.00%</td>
<td>3.80%</td>
</tr>
<tr>
<td>Learning disability</td>
<td>8.30%</td>
<td>6.10%</td>
</tr>
<tr>
<td>Grade retention</td>
<td>28.80%</td>
<td>14.10%</td>
</tr>
<tr>
<td>Ever expelled or suspended</td>
<td>12.10%</td>
<td>6.10%</td>
</tr>
<tr>
<td>High school dropout rate in 1994</td>
<td>21.00%</td>
<td>9.60%</td>
</tr>
<tr>
<td>Not employed or in school at age 24</td>
<td>15.90%</td>
<td>8.30%</td>
</tr>
</tbody>
</table>
Smoking Prevalence and Education

- 5.6 percent with a graduate degree
- 9.1 percent with a college education
- 24.2 percent who do not graduate from high school

CDC, MMWR, 63(No. 47):1108-1112, November 28, 2014
Long-Term Consequences of Fetal and Neonatal Nicotine Exposure

• Studies suggest that nicotine may be a key chemical responsible for many long-term effects associated with maternal cigarette smoking on the offspring, such as
  – hypertension
  – type 2 diabetes, obesity
  – respiratory dysfunction
  – neurobehavioral defects
  – impaired fertility

Bruin et al Toxicological Sciences 116: 364-374 2010
Children at most risk for adverse health and developmental outcomes

- Poverty
- Lead & other toxins
- Exposure to Tobacco Smoke
- Unsafe neighborhood
- Stressed Single Mother
- Experiencing Violence
- Insecurity & Anxiety
- Limited Access to Healthcare

Health Equity and Children's Rights *Pediatrics*; March 29, 2010;
Adverse Childhood Experiences: CDC Study
• The Lifelong Effects of Early Childhood Adversity and Toxic Stress

• Volume 129, Number 1, January 2012
Neurobiological Underpinnings of Resilience and Vulnerability

Positive Stress
- Exhilarating challenge/outcome
- Mastery/control
- Good self esteem

Tolerable Stress
- Adverse life events
- BUT
  - Good social and emotional support
  - Can increase child’s ability to cope with adversity

Toxic Stress
- Chaos, abuse, neglect
- Poor emotional and social support
- Chemical exposures
- Negative effect on brain architecture and physical health into adulthood

Toxic Stress Outcomes

• Disorders of learning, memory and executive function
• Impaired decision-making
• Behavioral self-regulation
• Mood and impulse control
• Risk-taking behaviors
Long Term Outcomes

- School failure
- Unemployment
- Poverty
- Homelessness
- Substance abuse
- Gang membership
- Violent crime
- Incarceration
- Being single parents
Poor Health Outcomes

- Alterations in immune function and measurable increases in inflammatory markers, increasing risk for:
  - obesity
  - diabetes
  - hypertension
  - stroke
  - early death
### Children: Poverty & Vulnerability

<table>
<thead>
<tr>
<th>Child Outcomes</th>
<th>Risk for poor children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child abuse and neglect</td>
<td>6.8</td>
</tr>
<tr>
<td>Lead Poisoning</td>
<td>3.5</td>
</tr>
<tr>
<td>Birth to unmarried teenager</td>
<td>3.1</td>
</tr>
<tr>
<td>Depression</td>
<td>2.3</td>
</tr>
<tr>
<td>Experiencing violent crimes</td>
<td>2.2</td>
</tr>
<tr>
<td>Short-stay hospital episode</td>
<td>2.0</td>
</tr>
<tr>
<td>Grade repetition and high school dropout</td>
<td>2.0</td>
</tr>
<tr>
<td>Substance abuse</td>
<td>1.9</td>
</tr>
<tr>
<td>Low birth weight</td>
<td>1.7</td>
</tr>
</tbody>
</table>

From Neurons to Neighborhoods IOM 2000
**Cycle of Disadvantage and Disability**

**Potential Outcomes**
- Health concerns
- Neurodevelopmental disabilities
- Child neglect and abuse
- Foster care placement

**Environment**
- Poverty
- Poor community support
- Poor health services
- Poor education

**Risk Factors**
- Infant with increased needs
  - Medical needs
  - Developmental needs
  - Increased irritability
- Mother under stress
  - Increased demands
  - Lack of supports
  - Substance abuse

**Self Worth**
- Despair
- Substance abuse
- Promiscuity

**Pregnancy**
- Limited prenatal care
- Tobacco, alcohol & drug use
- Risk of STD's/HIV

**Newborn Infant**
- Prematurity
- Low birth weight
- Fetal Alcohol Syndrome
Can we make a Difference?

• Absolutely!!!!!!
• Positively!!!!!!!
a Low licking and grooming

---

b High licking and grooming

---

NGFI-A

![Diagram of NGFI-A](image)

M

M

 Nr3c1

↓ GR expression

High corticosterone levels
High anxiety
Low licking or grooming

---

↑ GR expression

Low corticosterone levels
Low anxiety
High licking or grooming

---

Next Generation

- The *high LG mother* rats had daughters that went on to lick and groom their own litters more frequently than the daughters of *low LG mothers*.
- But interestingly, when the offspring of a *low LG mother* is raised by the *high LG mother*, the rat adopts the high-licking behavior when it has babies of its own!
Home-Based Early Intervention

• Examined the impact of EI on children of high resource (HR) & low resource (LR) families
• LR children displayed greater improvement with EI than HR children
• LR children receiving EI did not differ significantly from HR children
Home-Based Early Intervention

![Graph showing the impact of home-based early intervention on cognitive development across different ages and resource levels.]

Early Intervention and Cognitive Development PEDIATRICS 137:4, April 2016
The Perry Preschool Program

- Poor children with low IQ
- Beginning at age 3 and lasting 2 years:
  - 2.5-hour preschool program weekdays during the school year,
  - supplemented by weekly home visits by teachers
- Follow-up at ages 15, 19, 27, and 40

The Perry Preschool Program

A. Data from the Perry Program collected when the individuals were 27 years old (High/Scope). >10th percentile achievement indicates children who scored above the lowest 10% on the California Achievement Test (1970) at age 14; HS Grad indicates number of children who graduated High School on time.

Value-Added Teachers and Student Outcomes

- Researchers in Economics at Harvard and Columbia universities
- Tracked one million children from a large urban school district from 4th grade to adulthood looking at the outcomes of having a Value-Added Teacher

Long-Term Impact on Student Outcomes

• Students assigned to higher VA teachers are more successful in many dimensions:
  – more likely to attend college,
  – earn higher salaries,
  – live in better neighborhoods, and
  – save more for retirement.

Economists from Harvard and Columbia Universities…..

• .......... argue for early and sustained investments in early care and education programs,
• particularly for children whose parents have limited education and low income,
• on the basis of persuasive evidence from cost-benefit analyses that reveal the costs of incarceration and diminished economic productivity associated with educational failure

We can make a difference!

Age

6 mo 12 mo 18 mo 24 mo 3 yrs 5 yrs

Ready to learn

Parent Ed./Emotional Health Lit

Poverty

Lack of support and services

Toxic Stress

Health Services

Appropriate Discipline

Reading to child

Pre-school

Health

Disorder

Adapted from Halfon & Hochstein Milbank Q. 2002
Rates of return to human capital investment

Skill Formation and the Economics of Investing in Disadvantaged Children
James J. Heckman in: Science June 30, 2006 VOL 312 page 1900
Resilience Promoting Factors

- Loving and supportive environment
- Positive relationships with adults and peers
- Supportive, attentive and responsible parenting
- Good education
- Healthy diet
- Healthy exposure to outdoor activities and communion with nature

Adapted from Wu et al Frontiers in Behavioral Neuroscience 2013
If you save the life of a single child it is as if you are saving the entire world!

Adapted from: Talmud, Sanhedrin 37a
Cycle of Environmental Health Disparities

Compounding Factors:
- Limited Educational Services
- Limited Health Care Services
- Limited Social Capital

Social & Economic:
- Limited Education
- Limited Employment Options
- Limited Empowerment
- Limited Income

Health Risk Factors:
- Pregnancy Vulnerability
  - Poor Prenatal Care
  - Intrauterine Insults
  - Low Birth Weight & Prematurity
- Physical Health
  - Neurodevelopmental Disorders
  - Asthma & Allergies
  - Obesity & Hypertension
- Mental Health
  - Toxic Stress & PTSD
  - Substance Abuse
  - Violence & Crime

Residential Options:
- Limited Choice
- Limited Infrastructure
- Limited Services

Residential Characteristics:
- Older Houses
- Adverse Environmental Factors
- Adverse Social Factors

Environmental Impact:
- Increased Toxins
- Increased Stress
A Leadership Development Program of:

PEHSU
Southeast
Pediatric Environmental Health Specialty Unit

EMORY University
Break the Cycle

- Raise Awareness of Children's Environmental Health
- Raise Awareness of Environmental Health Disparities
- Promote introduction of these topics into curricula of diverse University Departments
- Cultivate Future Leaders
Requirements from Break the Cycle Students

• Recruit Students from a variety of universities and disciplines to:
  – Develop a project
  – Identify a mentor
  – Conduct the study
  – Present results at a conference
  – Write a manuscript for publication
Break the Cycle Outcomes

• Increased Awareness of Children's Environmental Health

• Increased Awareness of Environmental Health Disparities

• Influenced Future Careers

Student Survey in Environmental Health Disparities 2016
To Date:
• 11 annual programs
• 10 states in USA, Latin America, Europe & Africa
• 103 students
• 30 university departments

Publications
• 9 international journal supplements
• 9 books
• We may not be required to complete a task but we are not allowed to desist from undertaking the challenge.