The Childhood Obesity Epidemic: Transmission Across Generations

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Childhood Obesity

• Defined as an unhealthy excess of body fat.

• In childhood, obesity causes Type II Diabetes and metabolic syndrome.

• Childhood obesity tracks into adulthood, where obesity causes:
  
  ➢ Cardio-vascular disease
  
  ➢ Cancer
  
  ➢ Type II diabetes
  
  ➢ Sleep apnea....
Defining Childhood Overweight and Obesity

- Data on BMI for age and gender are compared to CDC growth chart data, which are based on national data from the past 30 years.
- A percentile compared to this standard national population is calculated.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>85 – 94.9</td>
<td>At risk of overweight</td>
<td>Overweight</td>
</tr>
<tr>
<td>95 – 100</td>
<td>Overweight</td>
<td>Obese</td>
</tr>
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</table>
Obesity in NYC School Children: 2007-2008 Fitnessgram Data

- Brooklyn
- Bronx
- Manhattan
- Queens
- Staten Island

Percent Obese

Elementary
Middle
High

N=571,765
Childhood Obesity In NYC Elementary Schools (2007-2008)

N=311,953
Origins of Childhood Obesity

An epidemic of 1,000 paper cuts, in that, there are a multitude of factors prodding children towards higher energy consumption and lower energy expenditure.

- Structural, economic, environment, biological and social prompts for eating and sedentary behaviors.

One of the paper cuts: Substantial data showing a mother’s pre-pregnancy weight predicts the child’s weight throughout childhood.
Mean BMI Among Women Age 18 - 44 in New York City (2002 - 2006)
Columbia Center for Children’s Environmental Health (CCCEH)

- Followed from the 3rd trimester until age 10-11.
- Intensive collection of environmental data and biological samples.
- Anthropometric data collected at ages 5, 7 and 10-11.
- Physical activity and diet data collected at age 10-11
Body Size at Age 7 in CCCEH: BMI Z-score

Mean = 0.95
SD = 0.90
Body Size at Age 7 in CCCEH: BMI Percentile

Mean = 74th
% Obese = 18
Maternal Body Size, Birth Weight and the Child’s Weight at Age 7

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<tr>
<th>Risk Factor</th>
<th>Weight (kg) at Age 7 Beta, P-value</th>
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<tr>
<td>Mother’s pre-pregnancy weight (per Kg)</td>
<td>0.06, &lt;0.001</td>
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<td>Birth weight</td>
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</tr>
<tr>
<td>Tertile 1</td>
<td>Ref</td>
</tr>
<tr>
<td>Tertile 2</td>
<td>1.30, 0.42</td>
</tr>
<tr>
<td>Tertile 3</td>
<td>3.01, 0.06</td>
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Adjusted for exact age, gender, race/ethnicity, mother’s receipt of public assistance, and mother’s place of birth
Fat Mass versus Fat Free Mass

• Body Composition

  ➢ Fat mass – adipose tissue.

  ➢ Fat free mass – not adipose tissue (e.g. organs, bones, muscles, connective tissue).

• In adults, fat mass is associated with higher mortality and fat free mass is associated with lower mortality.

• In the CCCEH body composition is measured using bio-impedance.
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<td>0.36, 0.69</td>
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<td>Tertile 3</td>
<td>1.21 0.16</td>
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Understanding the Role of Mother’s Pre-pregnancy Weight

Does mother’s pre-pregnancy weight predict the child’s weight because:

1) It is a proxy for mother’s current weight and an obese-ogenic home environment, or

2) It somehow programs the child for weight gain?
### Understanding the Role of Mother’s Pre-pregnancy Weight

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<td>Mother’s pre-pregnancy weight (per Kg)</td>
<td>0.10, 0.001</td>
<td>0.06, 0.001</td>
<td>0.04, 0.002</td>
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* Adjusting for mother’s current BMI, fat mass, fat free mass, receipt of public assistance and child’s age at examination, gender, race/ethnicity, and birth weight.
Conclusions

• Mother’s pre-pregnancy weight and the child’s birth weight predict the child’s weight at age 7.

• These factors influence both fat mass and lean mass.

• Effect of maternal pre-pregnancy weight appears to be independent of current weight.
Collaborators

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Virginia Rauh
Robin Whyatt

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