

Breastfeeding and Obesity

- Relative to formula feeding, breast feeding reduces the odds ratio for later obesity
- Breast feeding is associated with decreased risk for type 2 diabetes
- Non-breastfed infants displayed a fatty acid composition similar to insulin resistant adults
- Pediatric asthma is associated with less exclusive breast feeding
- Obesity is a risk factor for asthma
- Breast milk contains anti-inflammatory hormones, leptin and adiponectin



From: **Appetite and Growth: A Longitudinal Sibling Analysis**

JAMA Pediatr. 2014; [ePub ahead of print] doi:10.1001/jamapediatrics.2013.4951

Figure 1. **Growth Trajectories in Siblings With Higher (Top Curve) and Lower (Bottom Curve) Food Responsiveness (FR)**

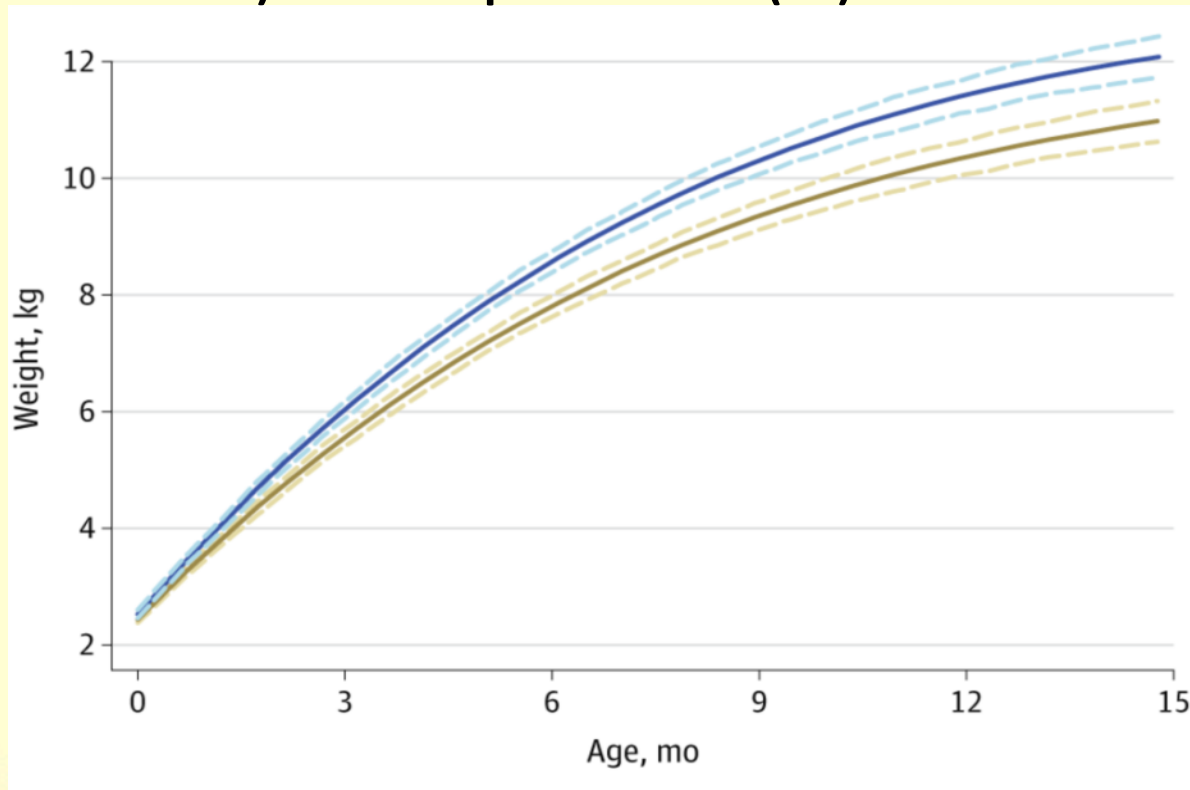


Figure Legend: N = 456 (228 same-sex DZ twin pairs who were appetite discordant, e.g. 1-SD difference for FR or SR). The 95% CIs are indicated by the dashed lines.

Vitamin D Insufficiency and Childhood Obesity

- Vitamin D levels are insufficient in 35% of children 4-18 years of age.
- Children who play outdoors less than one half hour per day or watch more than 2.5 hours per day of TV are more likely to have Vitamin D insufficiency
- Vitamin D insufficiency is associated with childhood obesity, insulin resistance, high cholesterol and blood pressure.



Physical Activity and Prevention and Management of Childhood Obesity?



Vigorous, intermittent physical activity is shown to reduce components of the metabolic syndrome in pre-pubertal children.

Fedewa, et al, 2013; Brambilla, et all, 2011; Barre, et al, 2006; Owens, 2006; Barbeau, et al, 2007; Yu, et al,, 2005; Kahle, 1996; Shaibi, et al, 2006, 2009, 2011; Nassis, 2005

Position Statement: American Academy of Pediatrics: Play Promotes Healthy Development in Children

Play is essential to the social, emotional, cognitive, and physical wellbeing of children beginning in early childhood.....

It is essential that parents, educators, and pediatricians recognize the importance of lifelong benefits that children gain from play.....

Regardless of their socio-economic status, all children have the right to engage in safe and regular physical activity that will decrease the incidence of lifelong health disparities



Children are not Little Adults

- Movement is required for cognitive development
- Enjoy unstructured physical activity (play)
- Play fosters healthy emotional development
- Unable to stay focused for long periods of time
- Lower oxygen uptake
- **Immature metabolic systems**



Sothorn, M. Profile of the Overweight Child, in Safe and Effective Exercise for Overweight Youth, CRC Press, 2014; Milteer, et al, AAP, 2012

Study of Insulin sensitivity in Louisiana Low, High and Normal Weight Pre-pubertal Youth, 7-9 Years (SILLY)

African American
N = 200

Low/High Birth Weight

Normal Birth Weight

Caucasian
N = 200

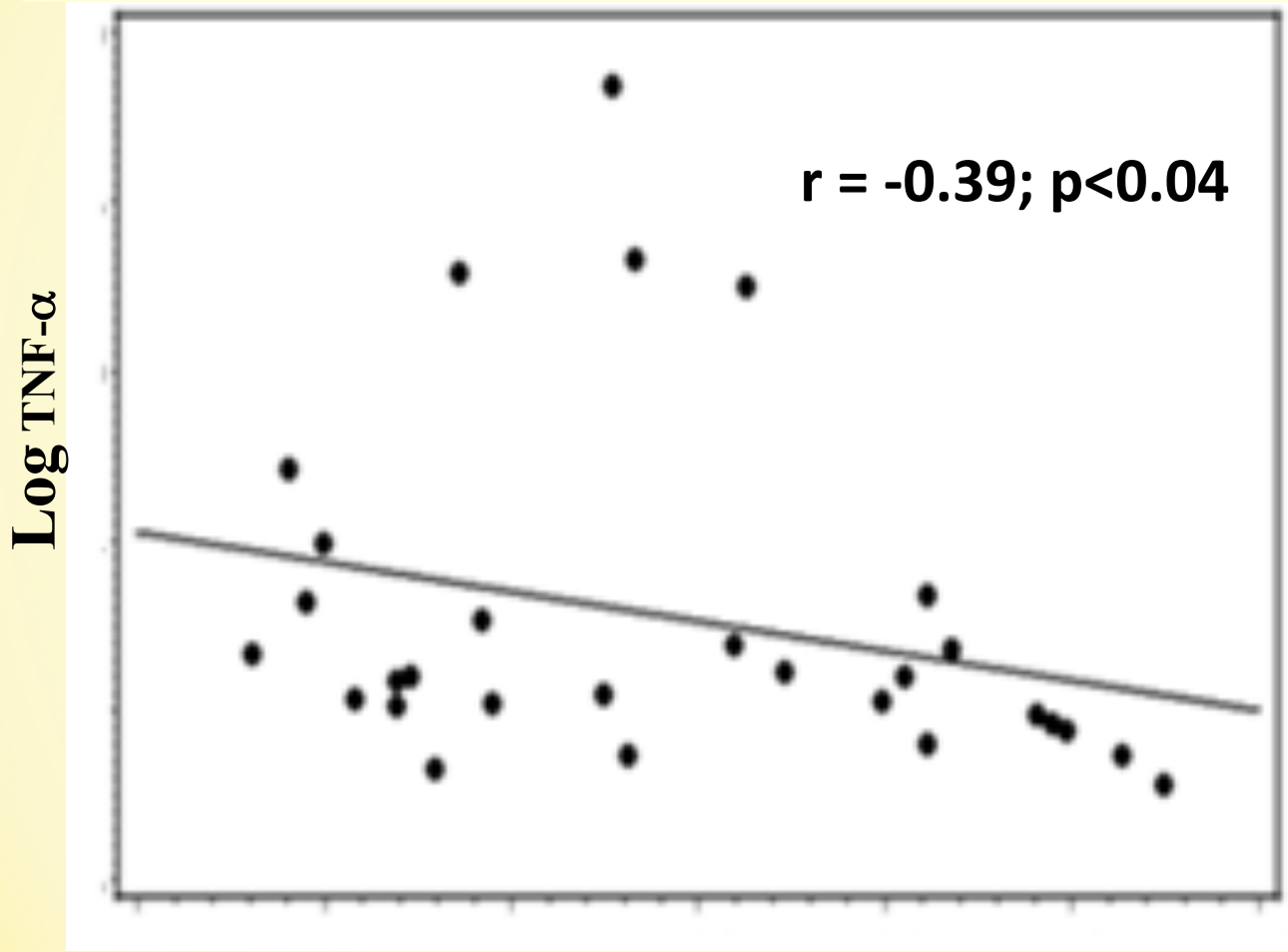
Low/High Birth Weight

Normal Birth Weight

- Social Disadvantage Concentrated Index (CDI)**
- Inflammatory Adipokines (IL8, TNF@, IL6, IL1B, etc)**
- Insulin Sensitivity (FSIGTT)**
- Insulin Resistance (HOMA)**
- Intramyocellular (IMCL) and Intrahepatic (IHL)**
- Lipids (¹H-MRS)**
- Visceral Obesity (MRI; waist)**
- Body Fat (DEXA)**
- Blood Pressure**
- Lipid Profile (TC, HDL, LDL)**
- Fat Oxidation via Respiratory Quotient (Indirect Calorimetry)**
- Physical Activity (Accelerometry)**

Research sponsor: U. S. National Institutes of Health/NICHD (HD41071; HD49046); NIDDK; NIMHD; LSUHSC Jim Finks Endowed Chair in Health Promotion.

Results: Inverse correlation of serum pro-inflammatory markers with metabolic parameters in healthy, Black and White pre-pubertal youth



Pairs of markers with significant inverse Spearman's correlation. Logarithmic scale is used for the correlations between TNF- α and Intrahepatic Lipid; adjusted for race and gender.

Log body Intrahepatic Lipid (% water peak; ¹H-MRS)

Methods: Social Disadvantage

Concentrated Index (Sampson, Raudenbush & Earls, 1997)

- Using Census Data from the American Community Survey an index score for each study participant's residence was created using the following variables:
 - Percent of Individuals:
 - Below The Poverty Line
 - Receiving Public Assistance
 - Female-Headed Households
 - Unemployed
 - Less Than Age 18 Years of Age
 - Percent minority

Results: Concentrated Disadvantage Index (CDI)

CDI was negatively associated with:

- z-BMI (-0.234, $p=0.023$)
- body fat (-.228, $p=0.028$, $n=95$)
- VAT (-.241, $p=0.042$, $n=74$)

*relationships remained significant in Caucasian children only after adjustment for race

Of the seven CDI variables the strongest predictors in Caucasian children only were:

- female head of households
- unemployed parents
- parents < 18 years



Children are not Little Adults

- **Appetite hormones increase following PA and compensatory mechanisms promote normal growth.**
- **Adapt food intake to maintain normal energy balance**
- **Nutritional adaptations to both physical and sedentary activities**



Sothorn, M. Profile of the Overweight Child, in Safe and Effective Exercise for Overweight Youth, 2014; MacKelvie, et al, 2007; Cecil et al, 2005; Thivel, et al, 2013)