Epidemiologic Risk Factors for Childhood Obesity: Implications for Future Obesity and Caries Prevention Research

Session I: Overview of the Science
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November 3, 2016
Washington, DC

Disclosure and Presentation Support

The author and co-authors have no financial or other conflicts of interest to disclose

This presentation was supported by a grant from the Robert Wood Johnson Foundation
**Childhood Obesity in the U.S.**

* U.S. Centers for Disease Control and Prevention
  * Obesity  \( \text{BMI} \geq 95^{\text{th}} \) percentile
  * Overweight  \( \text{BMI} 85^{\text{th}} \) to \( 95^{\text{th}} \) percentile
* 1/3 U.S. children: 17% obesity, 16% overweight
* 2- to 3-fold increase since 1970s
* Rates have remained constant
* Persistent race and income inequalities
* Physical and psychosocial consequences over the life course

**Obesity and Caries**

* Is obesity associated with caries?
  * Theoretical mechanism
  * Highly prevalent childhood diseases
  * Is this the right question?
* Common risk factors: reframing the issue
**Study Goals**

* Identify **modifiable** and **non-modifiable** risk factors for childhood obesity

* Develop a **conceptual common risk factors model** for obesity and caries

* Outline **strategies for dental professionals** to develop programs that address obesity and caries

**Methods**

* Scoping review of obesity risk factors (<12 years)

* PubMed and Embase

* N=180 studies

* Qualitative content analytic methods to organize risk factors into domains

* Domains as modifiable or non-modifiable

* ID common risk factors
**Biological, Developmental, Sociodemographic**

- Genes and epigenetics
  - AMY1
  - rs1421085
  - GRK4 + high sodium intake

- Developmental disabilities
- Early onset puberty

- Minority race/ethnicity
- Low income
- Low parent education
- Parent unemployment
- Public school
- Food insecurity

**Cultural and Community Factors**

- No English home
- Increased acculturation

- Minority neighborhood
- Neighborhood poverty
Behavioral – Diet

**Ages 0-2 Years**
- No breastfeeding, shorter duration
- High protein infant formula
- Finishing bottle content
- Early introduction of solid foods
- Sugar sweetened beverages (SSBs)

**Ages 2-12 Years**
- Increased appetite, eating speed, number of meals
- Increased sodium, carbohydrates, protein, cholesterol, triglycerides, caffeine, SSBs, total energy
- Low vegetable and fruit intake
- Restrictive feeding practices
- Fewer family meals, less engagement during meals
- Watching TV during meals
- Skipping breakfast
- Eating out, fast food consumption
- Snacking

Behavioral – Physical Activity and Weight

- Lower activity
- Sedentary lifestyle
- No involvement in sports
- Increased TV viewing
- Computer and videogaming

- Parental obesity and overweight
- Increased pregnancy weight
- Greater birthweight, rapid weight gain during infancy
Psychosocial and Medical

- Maternal stress
- Social risks (domestic violence, parent incarceration, substance abuse)
- Childcare (age at entry, daycare, primary caregiver)
- Child temperament (low inhibitory control, poor self-regulation)
- Gestational hypertension
- Antibiotic exposure
- Maternal depression, diabetes
- Caesarian section
- Caregiver smoking
- Shorter sleep duration

Conceptual Model on Obesity Risk Factors

Non-Modifiable Risk Factors
- Biological and Developmental
  Genes, Developmental Disabilities, Puberty
- Sociodemographic
  Minority Race and Ethnicity, Low Educational Attainment, Household Income
- Cultural
  Degree of Acculturation, Religion
- Community
  Neighborhood Wealth, Area-Level Racial Composition

Modifiable Risk Factors
- Behavioral
  Diet, Physical Activity, Weight
- Psychosocial
  Parenting Practices, Stress, Child Temperament
- Medical
  Gestational Diabetes and Hypertension, Poor Sleep, Medication Use

Childhood Obesity and Overweight
What Can Oral Health Professionals Do?

Common Risk Factors (CFR) Model

Non-Modifiable Risk Factors
- Biological and Developmental
  - Developmental Disabilities
- Sociodemographic
  - Minority Race and Ethnicity, Low Educational Attainment, Household Income
- Cultural
  - Degree of Acculturation

Modifiable Risk Factors
- Behavioral
  - Diet
- Psychosocial
  - Stress

Childhood Obesity and Caries

Example: targeting SBBs
### Modifiable Risk Factors

- Target of interventions
- Behavioral interventions
- Health behavior change theory
- Interdisciplinary teams

### Non-Modifiable Risk Factors

- Targeted Interventions: developmental disabilities, race/ethnicity, income
- Tailored Methods: acculturation
SSB Intervention for Alaska Native Children

Non-Modifiable Risk Factors
- Biological and Developmental Disabilities
- Developmental Disabilities
- Sociodemographic:
  - Minority Race and Ethnicity, Low Educational Attainment, Household Income
- Cultural
  - Degree of Acculturation

Modifiable Risk Factors
- Behavioral
  - Diet
- Psychosocial
  - Stress

Childhood Obesity and Caries

Maximum Daily Sugar Intake
3 teaspoons/day
American Heart Association
Average Intake

49 teaspoons/day =

range: 27 to 81


The Proposed Intervention

* **Individual, Home, and Community-Based**
  Intervention in Alaska Native Communities (multilevel)

* **Indigenous Community Health Worker**
  (community-based participatory research)

* **Target:** Self-Efficacy and Health Literacy (behavioral)

* **Outcomes:** Caries and Obesity (common risk factor)
“Non-Modifiable” Risk Factors

- Long-term modifiability
- Health Equity and Social Policies: education, income
- Intense debate in poverty literature

Comprehensive CRF Approach

- Obesity
- Physical Activity
- Diet
- Fluoride Exposure
- Caries

Multiple Behaviors
Non-Overlapping Risk Factors
Complexity, Mechanisms, Cost
Clinical Implications

- Limitations of private practice dental offices: Screening, Brief Intervention, Referral for Treatment (SBIRT)
- Developing interdisciplinary models of care within academic settings, community health centers, federally qualified health centers
- Home and community-based interventions
- Collaborating with community partners

Study Limitations

- Gaps in the model (social factors)
- Main effect correlations and causal inference
- Relationships among risk factors unspecified
* Common risk factors associated with childhood obesity and caries
* Potential for dental health professionals to work with obesity researchers to develop targeted and tailored community-based behavioral interventions
* Importance of supporting broader social policies to address poverty