CHILDHOOD OBESITY
The Causes & What We Can Do to Fight It

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MEASURING OVERWEIGHT & OBESITY

Body Mass Index (BMI) Percentile for sex-and-age

Most commonly used indicator of obesity based on height & weight of children & adolescents (2-19 years of age)

- Underweight: Less than the 5th percentile
- Normal or Healthy Weight: 5th percentile to less than 85th percentile
- Overweight: 85th to less than 95th percentile
- Obese: Equal to or greater than the 95th percentile

http://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html
CHILDHOOD OBESITY IN THE UNITED STATES

PREVALENCE OF OBESITY IN U.S. CHILDREN & ADOLESCENTS AGED 2-19 YEARS: 2011-2014

Florida # 27 in Nation:
A little more than half of the states are doing better than Florida regarding childhood obesity

CHILDHOOD OBESITY IN THE UNITED STATES

PREVALENCE OF OBESITY IN U.S. CHILDREN & ADOLESCENTS AGED 2-19 YEARS: 2011-2014

OBESITY CAN AFFECT...

- PHYSICAL HEALTH
  - Type 2 Diabetes
  - Cardiovascular Disease
  - Some Types of Cancer

- SOCIAL HEALTH
  - Stigmatization
  - Discrimination

- EMOTIONAL HEALTH
  - Low Self-Esteem
  - Negative Body Image
  - Depression
IMMEDIATE HEALTH RISKS

High blood pressure/High cholesterol
- 70% w/ >1 Cardiovascular risk factor
- 39% w/ >2 Cardiovascular risk factors

Increased risk of impaired glucose tolerance
- Insulin resistance
- Type 2 diabetes

Breathing problems
- Sleep apnea
- Asthma

CHILDOOD OBESITY

IMMEDIATE HEALTH RISKS

Joint problems & musculoskeletal discomfort

Impact on internal organs

- Fatty Liver Disease
- Gallstones
- Gastro-esophageal reflux

FUTURE HEALTH RISKS

Obese children are more likely to become obese adults.

Obesity in adulthood is likely to become more severe.

The medical care costs of obesity in the United States are high. In 2008 dollars, these costs were estimated to be $147 billion.

WHAT ARE THE FACTORS THAT INFLUENCE OBESITY?
OBESITY: A MULTIFACTOR DISEASE

SOCIAL DETERMINANTS OF OBESITY

- Resources Available
- Social
  - Education
  - Neighborhood
  - Built Environment
  - Socioeconomic Status
  - Subjective Social Status
  - Sex/Gender
  - Disability Status
  - Age
  - Race/Ethnicity

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Implementation Science
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Comparative Effectiveness Research
Population Health
ACCURACY OF WEIGHT LOSS INFORMATION IN SPANISH SEARCH ENGINE RESULTS ON THE INTERNET

Michelle I. Cardel, Sarah Chavez, Jiang Bian, Eribeth Peñaranda, Darci R. Miller, Tianyao Huo, François Modave

Objective
Assess quality of weight loss information Spanish speakers in the U.S. access on the Internet.

Methods
Evaluated quality of information for websites in Spanish in 5 dimensions: Nutrition, Physical Activity, Behavior, Pharmacotherapy, & Surgical Recommendations.

Results
• ~1.5% of sites scored greater than 8 (out of 12) on nutrition, physical activity, & behavior content.
• Unsubstantiated claims were made on 94% of the websites.
• All content quality scores were lower for Spanish websites relative to English websites.

Conclusions
• Weight loss information accessed in Spanish Web searches is poor and relatively worse than information accessed in English.
• U.S. Spanish speakers accessing weight loss information online may be provided with incomplete & inaccurate information.

SOCIAL DETERMINANTS OF OBESITY

- Education
- Neighborhood
- Built environment

RESOURCES AVAILABLE

- Subjective social status
- Socioeconomic status

SEX/GENDER
- Disability status
- Age
- Race/ethnicity
Accessibility to grocery stores is associated with reduced obesity risk.

Access to Healthy Food
- 6.5 million children, live in low-income areas at least one mile from a supermarket
- Convenience stores – Poor options

Walkability
- Overweight & obesity found to be lowest in the most walkable neighborhoods
- Lack of sidewalks-higher prevalence of obesity

Communities in Low-Income Neighborhoods

Built Environment

- Safety
- Parks/recreation centers
- Public transit may not be an option

Half of US children do not have access to neighborhood parks, community centers, or sidewalks (CDC, 2010).

FIGURE 2. Prevalence of obesity among women, by own socioeconomic status and socioeconomic status of origin.

PREVALENCE OF OBESITY AMONG CHILDREN & ADOLESCENTS AGED 2-19 YEARS BY POVERTY INCOME RATIO, SEX, & RACE/ETHNICITY

Socioeconomic Status versus Subjective Social Status

- Define Socioeconomic Status (SES)
- Define Subjective Social Status (SSS)
- SES may not be a good measure in youth
  - Lack youth specific indicators
- SSS can more fully capture the cumulative influences of social hierarchy on health by taking into account:
  - Earlier life circumstances
  - Family history
  - Perceived future trajectories and opportunities
- SSS may be a more sensitive and relevant measure of social position in youth

Adler et al. 2000; Goodman et al. 2001
MAYBE IT’S THE SOCIO-RATHER THAN THE ECONOMIC

In adolescents, one study characterized the associations between SES, SSS, and adolescent obesity
  o Cross-sectional study of 1,491 black and white youth

| Table 2. Spearman rank correlation coefficients among social status indicators |
|---------------------------------------------|-------------------|
| School SSS  | Parent education  | Household income |
| Societal SSS | 0.39*             | 0.25*             | 0.27*             |
| School SSS  | 0.17*             | 0.15*             |
| Parent education | 0.60*             |

* p < 0.001.

- Objective indicators of SES were highly correlated
  - Modestly correlated with societal SSS
  - Weaker correlation with school SSS
    - Suggesting that students differentiated the two ladders appropriately

All analysis adjust for age, sex, race, and school site
Goodman et. al 2003
MAYBE IT’S THE SOCIO-RATHER THAN THE ECONOMIC

Though Parental Education, Income, and School SSS were each independently associated with obesity, SSS was the strongest predictor.

Suggests that SSS is a better predictor of obesity in youth than SES.

All analysis adjust for age, sex, race, and school sit
Goodman et. al 2003
SIGNIFICANT RESEARCH GAPS IN ANALYSIS OF SOCIAL STATUS AND OBESITY

- Cross-sectional and observational
- Limited research has investigated mechanisms underlying the relationship between social status and obesity-related outcomes.
- Experimental studies are needed to help identify causal mechanisms underlying low social status as a pathway for obesity.

No experimental studies had been conducted.
Investigated eating behavior following experimental manipulation of social status using a game of Monopoly

Objective: To investigate the effect of experimentally manipulated social status on *ad libitum* acute energy intakes and eating behavior

- Used a randomized crossover design to place participants in experimental high and low social status conditions

Hypothesis: In the low social status condition, individuals would consume a greater number of calories, fat, sodium, and sugar when compared to the high social status condition.
THE EFFECTS OF EXPERIMENTALLY MANIPULATED SOCIAL STATUS ON ACUTE EATING BEHAVIOR

When participants returned for their second study visit, the protocol was identical, but they were placed in the opposite social status condition.

RESULTS


*Different from HIGH, P < 0.05; **Different from HIGH, P < 0.10
First studying evaluating experimental manipulation of social status on dietary intakes and risk for obesity

- Experimentally manipulated low social status resulted:
  - Increased consumption of calories, % of calorie needs, saturated fat, and sodium
  - Corroborated by recent publication demonstrating that when individuals are randomized and primed to a “rich” or “poor” condition, they ate significantly more calories

Currently confirming findings in a randomized controlled trial (n = 150)

- Future Directions: To explore how social factors can be incorporated into effective obesity prevention and intervention efforts

WHAT ARE THE CURRENT APPROACHES TO OBESITY PREVENTION?
“Food preferences & attitudes may be established as early as age 15.”

“The choices adolescents make during that stage establish a lifetime diet pattern, which could influence weight gain over time.”

Interventions often used include educational, promotional, & psychological strategies in community, school, & home settings (n=55 studies).

Types of interventions often include programs that focus on diet/nutrition, exercise/physical activity, lifestyle and/or social support.

Studies reported one or more of the following primary outcomes:

- Weight/Height
- Percent body fat
- BMI
- Data Collection
- Interventions
- Skin-fold thickness
- Prevalence of overweight/obesity
WHAT TYPES OF INTERVENTIONS SHOW PROMISE FOR THE FUTURE?

1. School curriculums that include healthy eating, physical activity, & body image
2. Increased sessions for physical activity & the development of fundamental movement skills throughout the school week
3. Improvements in nutritional quality of the food supply in schools

WHAT TYPES OF INTERVENTIONS SHOW PROMISE FOR THE FUTURE?

4. Environments & cultural practices that support children eating healthier foods & being active throughout each day

5. Support for teachers & other staff to implement health promotion strategies & activities (e.g., professional development, capacity building activities)

6. Parent support & home activities that encourage children to be more active, eat more nutritious foods, & spend less time in screen-based activities

WHAT WORKS IN TREATING OBESITY?
CURRENT APPROACHES TO OBESITY MANAGEMENT

Primary Care Interventions in Children 2-18 Years

- Clinically meaningful outcomes were demonstrated with intensive behavioral counseling.
- Approaches including patient-centered communication, patient education, regular visits & phone calls show marginal effects in reduction of overweight/obesity.
- Comparable BMI reduction effectiveness to results in family-based behavioral weight management treatments.

CURRENT APPROACHES TO OBESITY MANAGEMENT

School-Based Interventions in Elementary Students

- Target moderators for BMI improvement: increased physical activity, lowered sugar-sweetened beverage intake, increased fruit intake, reduction in sedentary activity
- Teacher-led interventions were effective for improvement of BMI

CURRENT APPROACHES TO OBESITY MANAGEMENT

Family-based Behavioral Treatment Programs

- Targets diet, physical activity, behavioral interventions, & parenting skills to support child weight loss
- Treatment targets both parent & child behavioral changes

Strong predictors of child weight loss include active parent engagement & weight loss (Wrotniak, 2004).

CURRENT APPROACHES TO OBESITY MANAGEMENT

Family-based Behavioral Treatment Programs

- Parents asked to model healthy eating behaviors
- Parents asked to modify parenting techniques during mealtimes
- Includes parental praise & positive reinforcement from parents to children
- Includes structured goals/rewards for calories & quality of food consumed

# TRAFFIC LIGHT DIET

| GO                  | Eat as much as you like.  
<table>
<thead>
<tr>
<th></th>
<th>Low energy, High Nutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fruits/Vegetables</strong></td>
<td></td>
</tr>
</tbody>
</table>

| SLOW                | Eat some every day.        
<table>
<thead>
<tr>
<th></th>
<th>High energy, High nutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Foods w/ protein or starch:</strong> meat, eggs, cheese, milk, bread, nuts, beans</td>
<td></td>
</tr>
</tbody>
</table>

| STOP                 | Eat very occasionally.     
<table>
<thead>
<tr>
<th></th>
<th>High energy, Low nutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High sugar foods:</strong> sweetened fruit juice, fizzy drinks, sweets</td>
<td></td>
</tr>
</tbody>
</table>

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**CHILDHOOD OBESITY**

**Fruits/Vegetables**

**Foods w/ protein or starch:** meat, eggs, cheese, milk, bread, nuts, beans

**High sugar foods:** sweetened fruit juice, fizzy drinks, sweets

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**Population Health**
ACCEPTANCE-BASED BEHAVIORAL TREATMENT (ABT)

Characterized by free choice, recognition of discomfort & reduction of pleasure, mindfulness, & cue awareness

Acceptance-Based vs. Standard Behavioral Treatment for Obesity: Results from the Mind your Health RCT

- 190 participants ages 18-70 with overweight/obesity
- Randomized to 25 sessions of ABT or SBT over 1 year w/ measures taken at baseline, 6 months, &/or 12 months & weight measured each session
- ABT group attained significantly greater 12-month weight loss than SBT group (13.3% vs. 9.8%)
- Clinically significant 36% increase in weight lost for ABT group

WHAT COULD WORK ON A POLICY LEVEL?
What strategies are effective for improving nutritional status of SNAP participants?

Does incentivizing the purchase of fruits/vegetables &/or prohibiting purchase of less nutritious foods in a food benefit program improve participants’ diet/nutritional quality of foods consumed?
RANDOMIZATION CONDITIONS

**INCENTIVE**
30% financial incentive for fruits/vegetables purchased using food benefits

**RESTRICTION**
Not allowed to buy sugar-sweetened beverages, sweet baked goods, or candies w/ food benefits

**INCENTIVE + RESTRICTION**
30% financial incentive on fruits/vegetables & restriction of purchase of sugar-sweetened beverages, sweet baked goods, or candy w/ food benefits

**CONTROL**
No incentive or restrictions on foods purchased w/ food benefits

EFFECTS OF SUBSIDIES & PROHIBITIONS ON NUTRITION IN A FOOD BENEFIT PROGRAM

INCENTIVE + RESTRICTION

- Reduced intake of discretionary or “empty” calories
- Reduced intake of sugar sweetened beverages, sweet baked goods, & candies
- Increased intake of solid fruit
- Improved Healthy Eating Index score

- More improvements were seen in this group than in the incentive only & restriction only groups
- Pairing incentives w/ restrictions may improve diet & nutritional quality of foods consumed

COMBATING OBESITY ON A POLICY LEVEL

Soda Taxation

ARGUMENT FOR TAXATION

- Childhood & adolescent obesity is associated with serious adverse lifetime health consequences & its prevalence has increased rapidly. Soft drink consumption has also expanded rapidly, so much so that soft drinks are currently the largest single contributors to energy intake.
- Want soda to be a “sin tax” & comparisons between soft drink taxation & cigarette taxation have been made

CONSUMPTION OF SUGAR-SWEETENED BEVERAGES (SSBs)

- Higher rates of SSB consumption associated w/ higher overall BMI in children
- SSBs are largest “empty calorie” contributor in children ages 2-18
- Soft drinks account for 13% of a teen’s caloric intake

Research in parent-child dyads demonstrates a familial relationship with regards to beverage consumption patterns (Pinard, 2011).


COMBATING OBESITY ON A POLICY LEVEL

ARGUMENT AGAINST TAXATION

Soda Taxation

Warning and Nutritional Notice:
Soda pop and sports drinks may contain calories. If consumed without any activity or exercise, you will gain weight. (This warning applies to all foods.)

After telling margarine on bagels in New York, the New York Department of Health is attacking soft drinks. The latest attack is a soda tax.

Big Apple or Big Brother?

ConsumerFreedom.com

For more information, go to
WHAT DOES THE RESEARCH SAY?

- In 2013, Mexico’s congress passed a one-peso-per-liter tax on sugary beverages
- Raised prices by 10%
- 8% sales tax on junk foods including chips, cookies, candy, & ice cream
- Both taxes went into effect in January 2014
  - During the first year of the tax, the average volume of taxed beverages purchased monthly was 6% lower in 2014 than would have been expected without the tax.
  - The reduction was the greatest among the households of the lowest socioeconomic status.

M Arantxa Colchero, Barry M Popkin, Juan A Rivera, Shu Wen Ng. Beverage purchases from stores in Mexico under the excise tax on sugar sweetened beverages: observational study. BMJ 2016;352:h6704
WHAT DOES THE RESEARCH SAY?

- In November of 2014, Berkeley, California became the first US jurisdiction to pass an SSB

- $0.01-per-ounce tax on SSBs, including soda; energy, sports, & fruit-flavored drinks; sweetened water, coffee, & tea; & syrups used to make SSBs (non-SSBs such as diet soda are not taxed).

- Used neighboring San Francisco & Oakland as comparison cities to account for secular trends locally (different from what was done in Mexico)

WHAT DOES THE RESEARCH SAY?

- Focused on low-income & minority populations, who are more likely to consume SSBs & suffer related health consequences.

- Selected 2 large, low-income neighborhoods that yielded the highest combined proportion of African American & Hispanic residents according to 2010 census tract data.

WHAT DOES THE RESEARCH SAY?

- Consumption of SSBs decreased 21% in Berkeley & increased 4% in comparison cities ($P = 0.046$)

- Water consumption increased more in Berkeley (+63%) than in comparison cities (+19%; $P < 0.01$)

- Suggests that Berkeley’s excise tax reduced SSB consumption in low-income neighborhoods

RESEARCH NEEDED

- Evaluating SSB taxes in other cities will improve understanding of their public health benefit & their generalizability (high SES, more health-conscious).

- Assessing changes in social norms

- What beverages, beyond water were they replacing SSB with?

- Is this enough to have an effect on obesity? TBD
WHO Calls for Sugar Tax to Fight Obesity and Diabetes

Obesity more than doubled worldwide between 1980 and 2014

October 11, 2015
WHAT’S NEXT?
FUTURE DIRECTIONS

- Determine if acceptance-based behavioral treatment (ABT) works in children
- Determine if changes in SNAP & soda taxation actually result in improved obesity rates/BMI

MOVING FORWARD:
- Studies of longer duration in children & adolescents
- Additional RCTs & family-based interventions
THANK YOU!

Please feel free to contact me with any comments or questions:

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