Relation Between Weight Status, Gender, Ethnicity and the Food and Activity Choices of 6th and 9th Grade Students

Pediatric Grand Rounds
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Overview of the Presentation

- Identification of the Problem
- Purpose of the Research
- Method
- Results and Discussion
- Limitations & Implications
- Directions for Future Research
Identification of the Problem

- Over the past 30 years, the proportion of young Americans who are overweight has increased from approximately 5% in the early 1970s to 15% in 2000 (Sorof & Daniels, 2002).

National Health and Nutrition Examination Survey

NHANES

Identification of the Problem

- Overweight has increased fastest among minorities and southerners
- Race-ethnic differences are observed for both sexes
- SES differences are observed such that low-SES is a risk factor for overweight
Ethnic Differences by Gender

Boys:
- Mexican Americans (14.1%)
- Caucasians (11.3%)
- African Americans (10.7%)

Girls:
- African Americans (16.3%)
- Mexican Americans (13.5%)
- Caucasians (8.9%)

National Longitudinal Survey of Youth
(Strauss & Pollack, 2001)

Overall Prevalence of Overweight

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>6 – 11</td>
<td>7%</td>
<td>11%</td>
<td>15%</td>
</tr>
<tr>
<td>12 – 19</td>
<td>5%</td>
<td>11%</td>
<td>15%</td>
</tr>
<tr>
<td>&gt;20</td>
<td>15%</td>
<td>23%</td>
<td>31%</td>
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</tbody>
</table>
Consequences of Overweight in Adolescents

– The more overweight in adolescence, the more likely to be overweight as adult

– Rising type II diabetes mellitus rate

– Other health consequences:
  - Obstructive sleep apnea, osteoarthritis, increased blood pressure, adverse lipoprotein profiles, ovarian cysts, liver disease

Adolescent Dietary Intake Trends

- Males and females may eat similar servings of fruits and vegetables

- Boys more likely to consume more of their total energy from fat

- Results of ethnic differences are mixed

- High SES and high parental education associated with adequate fruit and vegetable consumption
Physical Activity

- Nationwide, 33% of students (grades 9-12) went to PE classes daily while in school (25% in FL; 22% in Hillsborough County)
- Nationwide, 54.2% of students (grades 9-12) reported participating in physical education classes (39% in FL; 31.4% in Hillsborough County)
- 9th graders report highest levels of engagement in PE (70%) and 12th graders lowest (38%)
- Boys report higher levels of engagement in vigorous activity, exercise programs and sports across all ethnic groups


Physical Activity

- African American and Hispanic youth report lower levels of activity and significantly higher levels of inactivity (TV viewing and computer use)
- African Americans and Hispanics more likely to take P.E. classes
- As grade level increases, the general trend is a decrease in T.V. watching and computer use (≥ 3 hours/day)
- Older adolescents may spend more time in part-time jobs, with friends, text messaging

Purpose

What is the relationship between the independent variables BMI, gender and ethnicity and the dependent variables

– dietary intake (fruit/vegetables, dairy, meat/beans, grains, and junk foods) among adolescents?
– physical activity (vigorous activity and moderate activity) among adolescents?
– sedentary activity among adolescents?

Method

Participants:
– Data collected by Steps to a Healthier Hillsborough Staff
– Students in grades 6 and 9
– 3 middle schools; 2 high schools
– 535 participants
Method

Instruments
- Body Mass Index (BMI)
- Nutrition and Exercise Survey for Students

Method-Instruments

Body mass index (BMI)
- Weight in kg/height in m²
- Conducted by school nurses
- No shoes or heavy jackets
- Weight categories based on BMI percentiles
  - Expected weight = BMI < 85th percentile and ≥ 5th percentile
  - At-risk for overweight = BMI ≥ 85th percentile and BMI < 95th percentile
  - Overweight = BMI ≥ 95th percentile
Method-Instruments

Survey
- Nutrition and Exercise Survey for Students
  - Three sections: Demographics, Dietary Intake, Physical Activity
  - Total of 26 items (see attached copy of survey)

Method

Procedures
- Approval by county school district
- Students screened for BMI between October-February of 2005-2006 academic year
- Students completed surveys in health or physical education classes
Method

Data analyses
- SPSS 11.5
- Descriptive statistics
  - Report on assumptions
- Factorial MANOVA- 3 (Weight Category) X 2 (Gender) X 3 (Ethnicity)
- Interactions
- Main effects

Method

Data analyses-
- Follow-up MANOVA with series of ANOVAs
- Tukey tests on levels of ethnicity
- Effect Sizes
- Alpha was set at the .05 level of probability to control for Type I error.
## Descriptive Statistics- Sample Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Overweight BMI ≥ 95th percentile</th>
<th>At-Risk BMI ≥ 85th percentile &lt; 95th percentile</th>
<th>Expected BMI &lt; 85th percentile ≥ 5th percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI Percentile, No. (%)</td>
<td>115 (21.5)</td>
<td>100 (18.7)</td>
<td>320 (59.8)</td>
</tr>
<tr>
<td>Ethnicity, No. (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>58 (20.4)</td>
<td>50 (17.7)</td>
<td>175 (61.8)</td>
</tr>
<tr>
<td>White</td>
<td>44 (24.2)</td>
<td>36 (19.8)</td>
<td>102 (56)</td>
</tr>
<tr>
<td>Latino</td>
<td>13 (18.6)</td>
<td>14 (20)</td>
<td>43 (61.4)</td>
</tr>
<tr>
<td>Gender, No. (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>59 (20.9)</td>
<td>55 (19.6)</td>
<td>167 (59.4)</td>
</tr>
<tr>
<td>Female</td>
<td>56 (22)</td>
<td>45 (17.7)</td>
<td>153 (60.2)</td>
</tr>
<tr>
<td>Grade, No. (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6th</td>
<td>82 (23)</td>
<td>58 (16)</td>
<td>216 (61)</td>
</tr>
<tr>
<td>9th</td>
<td>32 (19)</td>
<td>40 (24)</td>
<td>95 (57)</td>
</tr>
</tbody>
</table>

**Comparison of percent of males and females who were overweight by ethnic group**

![Comparison of percent of males and females who were overweight by ethnic group](image)

Figure 1. Sample sizes for males: Black, n = 26; Latino, n = 26, and White, n = 7; Sample sizes for females: Black, n = 32; Latino, n = 18, and White, n = 6.
Interactions for 6th Graders

There was an interaction between gender and ethnicity, Wilks Lambda = .93, $F(10, 664) = 2.47, p = .007$. 

Figure 2. Sample sizes for males: Black, n = 27; Latino, n = 20, and White, n = 8; Sample sizes for females: Black, n = 23; Latino, n = 16, and White, n = 6.
### Probability Values for Between-Subjects Effects

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Fruit/Vegetables</th>
<th>Dairy</th>
<th>Meat/Beans</th>
<th>Breads</th>
<th>Junk Food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender*Ethnicity</td>
<td>.404</td>
<td>.000*</td>
<td>.047</td>
<td>.099</td>
<td>.051</td>
</tr>
<tr>
<td>Weight Category</td>
<td>.814</td>
<td>.964</td>
<td>.006*</td>
<td>.120</td>
<td>.003*</td>
</tr>
<tr>
<td>Gender</td>
<td>.435</td>
<td>.027</td>
<td>.003*</td>
<td>.354</td>
<td>.131</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>.908</td>
<td>.287</td>
<td>.712</td>
<td>.354</td>
<td>.131</td>
</tr>
</tbody>
</table>

*Note. n = 354. Significant at .01 level.*

### Interaction between Ethnicity and Gender

**Figure 3.** Males’ and females’ mean scores by ethnicity on dairy. Males (n = 188), (black, n = 91), (Latino, n = 75), (white, n = 22); females (n = 167), (black, n = 78), (Latino, n = 67), (white, n = 22).
Hypothesis 1a: Dietary Intake

- Overweight adolescents will consume more dairy products, meat/beans, and junk food and less fruit/vegetables and grain products as compared to their expected weight peers

  - Main effects were observed for weight category, Wilks Lambda = .93, $F(10, 664) = 2.59$, $p = .004$, Univariate follow-up F-tests significant

Main Effect for Weight Category on Meat/Beans and Junk Food Consumption

- Hypothesis that overweight category would report increased servings of meat/beans, dairy, and junk foods not supported
- Expected weight reported highest consumption on meat/beans and junk foods
Dietary Intake among Weight Groups for 6th Grade Males

USDA Recommendations: F & V (3-5); Milk (2-3); M & B (1); Breads (6); Junk food (sparingly)

Dietary Intake among Weight Groups for 6th Grade Females

USDA Recommendations: F & V (3-5); Milk (2-3); M & B (1); Breads (6); Junk food (sparingly)
Hypothesis 1b: Dietary Intake

- Males are more likely than females to consume the daily recommended servings of dairy products
  - Follow-up test of between subjects not significant at predetermined p-value due to familywise Bonferroni adjustment

Main Effect for Gender on Meat/Bean Consumption

- There was a statistically significant effect for gender, Wilks Lambda = .97, $F(5, 332) = 2.39, p = .038$.
- Meat/Bean Consumption, $p = .003$
  - Males: $M = 4.15, SD = 2.04$
  - Females: $M = 4.02, SD = 1.86$
  - The effect size was small, $d = .07$
Question 2: Physical Activity

- Overweight adolescents will engage in less physical activity (vigorous and moderate activity) than expected weight peers

  - No main effect for weight category
  - Means
    - Overweight females reported fewer bouts than expected weight peers
    - Overweight males reported more bouts than expected weight peers

Females’ mean scores on physical activity variables by weight category ($n = 111$). Overweight ($n = 29$) and expected weight ($n = 82$).
Males' mean scores on physical activity variables by weight category \( (n = 66) \). Overweight \( (n = 12) \) and expected weight \( (n = 54) \).

Hypothesis 2a: Physical Activity

- Males are more likely than females to meet the weekly recommendations
  - Main effect for vigorous activity
    - Males: \( M = 4.15, SD = 2.22 \)
    - Females: \( M = 2.55, SD = 2.00 \)
    - Effect size, \( d = 0.77 \) (medium/large)
  - Similar means for moderate activity
    - Males: \( M = 2.80, SD = 2.35 \)
    - Females: \( M = 2.33, SD = 2.13 \)
    - Effect size, \( d = 0.22 \) (small)
Hypothesis 2b: Physical Activity

- African American and Latino/Hispanic females are less likely than Caucasian females to meet the weekly recommendations
  - No interactions
  - Caucasian females, on average, met vigorous activity guideline
  - All 3 groups were below moderate activity guideline

Hypothesis 2c: Physical Activity

- Latino/Hispanic males are less likely than African American and Caucasian males to meet the weekly recommendations
  - No interaction
  - Males across 3 groups met vigorous activity guideline
Hypothesis 3a: Sedentary Activity

- Overweight adolescents will engage in more sedentary activity as compared to their expected weight peers
  - No main effect
  - Overweight reported the same number of hours of sedentary activity per day

Females' mean scores on sedentary activity variable by weight category ($n = 111$). Overweight ($n = 29$) and expected weight ($n = 82$).
Males' mean scores on sedentary activity variable by weight category ($n = 66$). Overweight ($n = 12$) and expected weight ($n = 54$).

**Question 3b: Sedentary Activity**

- African American and Latino/Hispanic adolescents will engage in higher levels of sedentary activity than Caucasian adolescents.
  - Main effect not statistically significant
  - Pairwise Tukey tests were significant ($p = .002$)
  - Caucasians ($M = 3.65, SD = 1.60$) versus African Americans ($M = 4.69, SD = 1.39$), $d = 0.65$
  - Latinos ($M = 3.94, SD = 1.70$) versus African Americans, $d = 0.46$
Strengths of Study

- First to compare weight categories across all dietary intake variables
- Ethnically diverse sample
- BMIs were conducted by professionals
- Survey items included specific examples of a serving size for each variable

Limitations

- External validity
  - Population and ecological transferability
  - Small sample (n = 179)
Limitations

- Internal validity
  - Body Mass Index as a measure
    - Athletes with muscle mass can have elevated BMIs
  - Food frequency questionnaire
    - Lack of research on reliability and validity-tend to overestimate
    - Items included may not represent all cultural groups
  - Self-report by adolescents

Implications for School Psychology

- Awareness of prevalence of pediatric overweight and associated consequences and use of data
- Development of accommodation plans
- Use consultation skills to help create environments that promote positive health behaviors
  - Consult with nutritionists, school nurses at building and district level
  - Elimination of vending machines that sell soda and unhealthy snacks
  - Offer options for healthier lunches (healthy lunch cart, vegetarian choices)
  - Create exercise programs with incentives
  - School staff to role model healthful behaviors
Implications for School Psychology

- Conduct needs assessments to identify barriers to engagement in healthy behaviors
- Collaboration with medical professionals (especially school nurse)
- Develop interventions in collaboration with school health personnel

Directions for Future Research

- Conduct studies in other school districts within and outside of state and other regions of U.S.
- Larger sample size
- Studies in districts with passive consent policies or perhaps at a university
- Develop culturally sensitive instrument using student input
- Include a combined physical activity question
- Control for high BMIs due to sports participation
- Ethnicity versus Race
This research was supported by a grant from the USF Collaborative for Children, Families & Communities

Discussion/Questions