Motivating Adolescents with Technology to CHOOSE Health

“A school-based childhood obesity intervention with clinical implications”

ECU Pediatric Healthy Weight Research and Treatment Center
Healthy Weight Forum
Oct 8, 2018

Suzanne Lazorick, MD, MPH
Professor
Departments of Pediatrics and Public Health

With acknowledgement of:
Tim Hardison
MATCH Program Director
Relevant financial disclosure:

- Dr. Lazorick owns equity stock in MATCH Wellness, the private company that controls the intellectual property of the MATCH program
Objectives

- Brief background information about childhood obesity in NC
- Overview of the MATCH program
  - Theoretical basis
  - How it is implemented
- Expansion over time
- Methods of evaluation and results of prior studies
- Ongoing results with clinical implications
- Next steps
### BMI Classifications in Kids

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\leq 5^{th})</td>
<td>Underweight</td>
</tr>
<tr>
<td>5-84(^{th})</td>
<td>Normal</td>
</tr>
<tr>
<td>85-94(^{th})</td>
<td>Overweight</td>
</tr>
<tr>
<td>(\geq 95^{th})</td>
<td>Obese</td>
</tr>
</tbody>
</table>

**New AMA Classification** - **Extreme Obesity** \(\geq 99^{th}\) percentile
The problem of childhood obesity 1971 to 2014: percent of children at each BMI percentile ≥ 85

Figure. The percentage of the US pediatric population aged 7 to 18 years at body mass index (BMI; calculated as weight in kilograms divided by height in meters squared) percentiles within the overweight/obese range. The blue bars represent percentages based on National Health and Nutrition Examination Survey (NHANES) data from 1971 to 1975, before the obesity epidemic in the United States, and the red bars represent percentages based on the most recent NHANES data from 2009 to 2010. The green bars represent percentages from MATCH, 2013 and 2014. The largest increases have occurred at the extremes of the BMI percentile range (95th to 99th percentiles). The percentages are weighted percentages that account for the complex survey design of the NHANES.
What is MATCH?
Plain and Simple… \emph{It Works!}

- Most successful published school-based childhood obesity invention
- BMI improves in almost 7 of 10 overweight adolescents
- Developed by a teacher, not researchers
- Produces sustainable results years later
- Teaches individual \textit{behavior change skills}
- Aligned with Common Core and Essential Standards
- Based on Social Cognitive and Self-Determination Theories
- Integrates Brain-based Learning Strategies, STEM, and SIOP
- Web-based curriculum and real-time data management for evaluation

Why MATCH?
**Education Concepts**

- **Blooms Taxonomy**
  - Remembering
  - Understanding
  - Applying
  - Analyzing
  - Evaluating
  - Creating

- **4 C’s - 21st Century Skills**
  - Critical Thinking
  - Creativity
  - Communication
  - Collaboration

- **Interdisciplinary Themes**
  - Global Awareness
  - Financial, Business Literacy
  - Environmental Literacy
  - Health Literacy
  - Civic Literacy

**Behavioral Psychology**

- **Social Cognitive Theory**
  - External Modeling
  - Comparing to Standards
  - Goal-Setting
  - Self-Monitoring
  - Rewards

- **Self Determination Theory**
  - Relatedness
  - Competence
  - Autonomous

- **Trans-Theoretical Model**
  - Stage of Change
  - Motivational Interviewing

**STUDENT**

- Student Centered
- Data Driven
- Rigorous, Relevant Curriculum

**FUN, ENGAGING, REWARDING**

Empowers students to make Healthy Choices!

**Prevention of Chronic Disease**

Positive Behavioral CHANGE!

Prevention of Chronic Disease
## Essential Elements of Curriculum

<table>
<thead>
<tr>
<th>Essential Elements</th>
<th>Examples of Intervention Components</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conceptual Knowledge</strong> (Learn “why”)</td>
<td>Interdisciplinary Wellness Kickoff Unit, lessons and activities embedded within standard curricula</td>
</tr>
</tbody>
</table>
| **Health Skills** (Learn “how”)     | • Daily Physical Activity, pedometers  
• Self tracking of physical activity in PA Log  
• Food intake record and analysis  
• Energy Balance activities |
| **Individualized Tasks** (Apply the skill) | • Calculate BMI, determine weight category  
• Fitness testing  
• Self-evaluation of health behaviors |
| **Motivational Strategies** (Reinforce the skill) | • Individual goal setting with action plans  
• Graphical dashboard of personal performance  
• Recognition through leaderboards and clubs  
• Earn badges in MyTrophy Case, gamification |
PowerPoint Slides
Cornell Notes style Lessons (student & teacher versions)
Lesson Quizzes (student & teacher versions)
Reference Materials

Hardcopy Workbook and Online pages. Downloadable and/or printable Core Lessons, Quizzes, PowerPoint Presentations, Links, and Supplemental and Reference Materials.
Existing MATCH / USDA Connection

2015 US Dietary Guidelines

USDA Recommendations

ChooseMyPlate.gov

USDA Tip Sheets
Calculating Body Mass Index

Body Mass Index (BMI) is an anthropometric index of weight and height. BMI is commonly accepted for classifying adiposity (fatness) in adults and is recommended for use in children and adolescents. It is a relationship between a person’s weight and their height. BMI is a screening tool, and not used for diagnosis. It is calculated as follows:

\[
\text{BMI} = \frac{\text{Weight (lbs) } \times 703}{\text{Height}^2 \text{ (in)}}
\]

Example: Weight = 120 lbs, Height = 62 in

\[
\text{BMI} = \frac{120 \text{ lbs } \times 703}{(62)^2 \text{ in}}
\]

BMI = 21.95 lbs/in²

Problems

1. Calculate the BMI of a person that is 70 inches tall and weighs 160 pounds.

\[
\text{BMI} = \frac{160 \times 703}{70^2} = \frac{120540}{4900} = \text{BMI} = 25.5
\]

2. Calculate the BMI of a person that is 65 inches tall and weighs 140 pounds.

\[
\text{BMI} = \frac{140 \times 703}{65^2} = \frac{18420}{4225} = \text{BMI} = 23.3
\]

3. What is the weight of a person with a BMI of 29 and a height of 64 inches.

\[
\text{BMI} = \frac{W \times 703}{64^2} \quad \text{and} \quad \frac{29 \times 703W}{64^2} = \frac{20688}{703} = W = 169 \text{ lbs.}
\]

4. How many pounds must the person in problem 3 lose to have a BMI of 28?

\[
\text{BMI} = \frac{28 \times 703}{64^2} \quad \text{and} \quad \frac{28 \times 703}{64^2} = \frac{114888}{703} = W = 5.8 \text{ lbs.}
\]

5. Using your height and weight measured at baseline, calculate your BMI. Graph this data point on the gender appropriate chart in the Evaluation section. Note your percentile, and look up your BMI for age percentile in the Weight Management lesson. Record this data on your MATCH Goal Sheet.
Students calculate and graph BMI to determine percentile-for-age.
A can of 12 oz. soda, a bottle of 20 oz. water, and a 32 oz. Big Gulp are compared. The measurements are as follows:

- 12 oz. can of soda: 11 tsp
- 20 oz. bottle: 18 tsp
- 32 oz. Big Gulp: 28 tsp
### MATCH Lesson Topics and Skills

<table>
<thead>
<tr>
<th>Science or Health</th>
<th>Language Arts</th>
<th>Social Studies</th>
<th>Math</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Energy balance</td>
<td>• Reading and writing on wellness topics</td>
<td>• Synthesize info from a variety of sources</td>
<td>• Ratios and proportions</td>
<td>• Spreadsheets: exercise log, time usage, caloric expenditure, target heart rates</td>
</tr>
<tr>
<td>• Weight categories</td>
<td>• Peer accountability contracts</td>
<td>• Refine understanding and use of arguments</td>
<td>• Percent change</td>
<td>• Pedometer counts</td>
</tr>
<tr>
<td>• Health effects of obesity</td>
<td>• Self-evaluation of behaviors and journaling</td>
<td>• Critical thinking skills</td>
<td>• Calculating target heart rate for exercise</td>
<td>• Database skills: sorting and querying</td>
</tr>
<tr>
<td>• Cardiovascular: risks for heart disease</td>
<td>• Evaluating media</td>
<td></td>
<td>• BMI calculation</td>
<td>• Creating multi-media projects</td>
</tr>
<tr>
<td>• Pulmonary: effects of smoking</td>
<td>• Final reflective essay</td>
<td></td>
<td>• Check book registry for energy balance</td>
<td></td>
</tr>
</tbody>
</table>
Access Your Data for Evidence-Based Decisions

Pre BMI Percentile for Age
 Schools: All
 Year: 2014-2015
 Gender: All
 Race: All

All Obese (203) 31%
All Overweight (327) 50%

<table>
<thead>
<tr>
<th></th>
<th>Extreme Obesity</th>
<th>Obese</th>
<th>Overweight</th>
<th>Normal</th>
<th>Underweight</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count(n)</td>
<td>46</td>
<td>157</td>
<td>124</td>
<td>314</td>
<td>12</td>
<td>653</td>
</tr>
<tr>
<td>Percent</td>
<td>7</td>
<td>24</td>
<td>19</td>
<td>48</td>
<td>2</td>
<td>100</td>
</tr>
</tbody>
</table>
### SEAT Survey Analysis Options - Pre SEAT Survey

**Category:** Technology Usage  
At home, which of the following are available to you? Check all that apply.

<table>
<thead>
<tr>
<th>Responses</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. A computer with internet access</td>
<td>68.58</td>
</tr>
<tr>
<td>B. A tablet with internet access</td>
<td>58.81</td>
</tr>
<tr>
<td>C. A smartphone</td>
<td>77.02</td>
</tr>
<tr>
<td>D. A tablet without internet access</td>
<td>11.82</td>
</tr>
<tr>
<td>E. None of the above</td>
<td>4.40</td>
</tr>
</tbody>
</table>
# Bullying Reports for Early Interventions

<table>
<thead>
<tr>
<th>School/State ID</th>
<th>Last Name</th>
<th>First Name</th>
<th>q31</th>
<th>q32</th>
<th>q33</th>
<th>q34</th>
<th>q35</th>
</tr>
</thead>
<tbody>
<tr>
<td>16209</td>
<td>Student 1</td>
<td></td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>10051</td>
<td>Student 2</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>10052</td>
<td>Student 3</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>10053</td>
<td>Student 4</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>10054</td>
<td>Student 5</td>
<td></td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>10056</td>
<td>Student 6</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>10057</td>
<td>Student 7</td>
<td></td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>10058</td>
<td>Student 8</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>10059</td>
<td>Student 9</td>
<td></td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
### Pre PACER Fitness Classification Report

**Schools:** All  
**Year:** 2014-2015  
**Gender:** All  
**Race:** All  
**BMI Range:** All

<table>
<thead>
<tr>
<th>PACER Classification</th>
<th>High Fitness</th>
<th>At Standard</th>
<th>Needs Improvement</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count(n)</td>
<td>2</td>
<td>172</td>
<td>279</td>
<td>453</td>
</tr>
<tr>
<td>Percent</td>
<td>0</td>
<td>38</td>
<td>62</td>
<td>100</td>
</tr>
</tbody>
</table>
Welcome to MATCH!

As you use the MATCH website you can earn badges for things like logging in, taking a SEAT survey, logging activities in your PA Log, and competing against your classmates! Check back regularly to see what badges you have earned!

Reminders
- Check MyTrophyCase to see your latest rewards
- Update your PA Log
- PANT Available, Take now

MyTrophyCase
- 13 badges earned

Coolest badges:

MyPANT
- 1 PANT survey taken

MyPACER
- 1 PACER completed

MyPA Log
- Earned: 3.00 miles
- 497.00 miles to go!

And you’re off! Don’t forget your water bottle! Did you know that being dehydrated reduces exercise performance?
Student Trophy Case

My Trophy Case

PACER CLUBS
- Pacer 10 Laps
- Pacer 20 Laps
- Pacer 30 Laps
- Pacer 40 Laps
- Pacer 50 Laps
- Pacer 60 Laps
- Pacer 70 Laps
- Pacer 80 Laps
- Pacer 90 Laps
- Pacer 100 Laps
- Pacer 110 Laps
- Pacer 120 Laps

MILEAGE CLUB
- 10 Mile Club
- 25 Mile Club
- 50 Mile Club
- 100 Mile Club
- 150 Mile Club
- 200 Mile Club
- 250 Mile Club
- 300 Mile Club

HEALTHY BEHAVIORS

SEAT
- Pre SEAT
- #1 SEAT

PANT
- #1 PANT
- #2 PANT

SPECIAL FITNESS RECOGNITIONS
- #1 PACER
- Top 10 PACER
- #1 SITUP
- Top 10 SITUP
- #1 PULLUP
- Top 10 PULLUP
- Top 10 FLEX
Chapter 5  Healthy Eating and Active Living

2) At least 2.5 hours (for elementary students) and 3.75 hours (for middle and high school students) per week of physical education.

c) The State Board of Education should require that:

1) Schools implement evidence-based educational curricula that are woven through different courses that teach students about healthy weight, good nutrition, and the importance of physical activity; and give students the skills to make healthy choices. Such curricula could include, but not be limited to, MATCH or CATCH.

2) The Healthful Living curriculum be updated to include evidence-based information about healthy weight, nutrition, and physical activity; and to teach students skills to make healthy choices.
MATCH is the ONLY middle school-based childhood obesity intervention that has received the "research tested" designation.

Center for Training, Research and Translation (Center TRT) at the UNC Prevention Research Center. (A center approved by the Centers of Disease Control to evaluate obesity interventions prior to consideration for dissemination).

Note: "Research-tested" is the highest of three possible designations and is achieved by less than 20% of reviewed interventions.
Existing Funding Source for NC MATCH Model

Supplemental Nutrition Assistance Program Education Guidance

Nutrition Education and Obesity Prevention Grant Program
Since Inception, MATCH has served over 29,000 Students
MATCH measures and outcomes

- Pre, Post-program:
  - Height, Weight, BMI; primary outcome is BMI z-score
  - Fitness testing (PACER test for aerobic fitness)
  - Self-reported health behaviors
    - Nutrition (Beverage and Snack Questionnaire), Physical Activity,
    - Technology use;
  - Stage of change for healthy eating and PA
- Lesson delivery (number and sequence)

3. Lazorick S., et. al., Improved BMI measures following a middle school-based obesity intervention- The MATCH program. *(J of School Health, 2015)*
Quasi-experimental longitudinal cohort intervention study

For this study: 4 years results from two intervention schools vs. one control school

Outcomes: BMI Z-score: weight category change

Analyses: t-test, Chi square, and mixed models with fixed effects

Self-reported behaviors: an adapted Beverage and Snack Questionnaire®;

Analyses: Wilcoxon rank sum, Chi square

Study Design: 2009 cohort
## Cohort characteristics at baseline

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>MATCH (N=189) n (%)</th>
<th>Control (N=173) n (%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>120 (64)</td>
<td>127 (73)</td>
<td>0.054</td>
</tr>
<tr>
<td>School level - % National School Lunch Program</td>
<td>71</td>
<td>96</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Healthy weight</td>
<td>76 (40)</td>
<td>92 (53)</td>
<td></td>
</tr>
<tr>
<td>Overweight (OW)</td>
<td>43 (23)</td>
<td>29 (18)</td>
<td>0.068</td>
</tr>
<tr>
<td>Obese (OB)</td>
<td>69 (37)</td>
<td>51 (30)</td>
<td></td>
</tr>
</tbody>
</table>
**Long-term** (4 year) results* of MATCH 2009-2013, compared to a **Control School**

<table>
<thead>
<tr>
<th>Sub-group by weight category</th>
<th>Type of change in weight category</th>
<th>CONTROL GROUP N=117 (67% re-measured)</th>
<th>MATCH GROUP N=103 (54% re-measured)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy Weight at start</td>
<td>Incidence (new cases of Overweight or Obesity)</td>
<td>9/58=16%</td>
<td>4/40=10%</td>
</tr>
<tr>
<td>Either OW or OB at start</td>
<td>Remission (convert to Healthy Weight)</td>
<td>7/59=12%</td>
<td>14/62=23%</td>
</tr>
<tr>
<td>Overweight at start</td>
<td>Incidence of obesity</td>
<td>9/23= 39%</td>
<td>5/30= 17%</td>
</tr>
<tr>
<td></td>
<td>Remission to Healthy Weight</td>
<td>6/23= 26%</td>
<td>12/30= 40%</td>
</tr>
</tbody>
</table>
### Results - Nutrition measures

<table>
<thead>
<tr>
<th></th>
<th>MATCH Median (IQR)</th>
<th>Control Median (IQR)</th>
<th>P-value, Wilcoxon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweet drinks</td>
<td>10.8 (6.5, 20.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar free drinks</td>
<td>1.0 (0, 3.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td>3.3 (1, 7.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low fat snacks</td>
<td>1.0 (0, 2.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High fat snacks</td>
<td>12.8 (7.9, 21.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total snacks</td>
<td>14.9 (8.3, 24.7)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Results- Nutrition measures

<table>
<thead>
<tr>
<th></th>
<th>MATCH Median (IQR)</th>
<th>Control Median (IQR)</th>
<th>P-value, Wilcoxon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweet drinks</td>
<td>10.8 (6.5, 20.2)</td>
<td>17.9 (9.3, 39.1)</td>
<td>0.0026</td>
</tr>
<tr>
<td>Sugar free drinks</td>
<td>1.0 (0, 3.8)</td>
<td>1.0 (0, 5.3)</td>
<td>0.5512</td>
</tr>
<tr>
<td>Milk</td>
<td>3.3 (1, 7.0)</td>
<td>2.8 (1,5.5)</td>
<td>0.2394</td>
</tr>
<tr>
<td>Low fat snacks</td>
<td>1.0 (0, 2.8)</td>
<td>2.8 (1,5.5)</td>
<td>0.0006</td>
</tr>
<tr>
<td>High fat snacks</td>
<td>12.8 (7.9, 21.6)</td>
<td>15.6 (8.9, 29.2)</td>
<td>0.0521</td>
</tr>
<tr>
<td>Total snacks</td>
<td>14.9 (8.3, 24.7)</td>
<td>19.5 (12.3, 33.1)</td>
<td>0.0113</td>
</tr>
</tbody>
</table>
### Results - Nutrition measures

<table>
<thead>
<tr>
<th></th>
<th>MATCH Median (IQR)</th>
<th>Control Median (IQR)</th>
<th>P-value, Wilcoxon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweet drinks</td>
<td>10.8 (6.5, 20.2)</td>
<td>17.9 (9.3, 39.1)</td>
<td>0.0026</td>
</tr>
<tr>
<td>Sugar free drinks</td>
<td>1.0 (0, 3.8)</td>
<td>1.0 (0, 5.3)</td>
<td>0.5512</td>
</tr>
<tr>
<td>Milk</td>
<td>3.3 (1, 7.0)</td>
<td>2.8 (1, 5.5)</td>
<td>0.2394</td>
</tr>
<tr>
<td>Low fat snacks</td>
<td>1.0 (0, 2.8)</td>
<td>2.8 (1, 5.5)</td>
<td>0.0006</td>
</tr>
<tr>
<td>High fat snacks</td>
<td>12.8 (7.9, 21.6)</td>
<td>15.6 (8.9, 29.2)</td>
<td>0.0521</td>
</tr>
<tr>
<td>Total snacks</td>
<td>14.9 (8.3, 24.7)</td>
<td>19.5 (12.3, 33.1)</td>
<td>0.0113</td>
</tr>
</tbody>
</table>
## Results- Physical Activity Measures

<table>
<thead>
<tr>
<th>Physical Activity Measure</th>
<th>MATCH Median (IQR)</th>
<th>Control Median (IQR)</th>
<th>P-value, Wilcoxon</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA sweat</td>
<td>3.0 (2.0, 5.0)</td>
<td>4.0 (2.0, 6.0)</td>
<td>0.1743</td>
</tr>
<tr>
<td>PA no sweat</td>
<td>2.0 (1.0, 4.0)</td>
<td>3.0 (1.0, 5.0)</td>
<td>0.0605</td>
</tr>
<tr>
<td>Days 60 min PA</td>
<td>3.0 (1.0, 5.0)</td>
<td>3.0 (1.0, 5.0)</td>
<td>0.5349</td>
</tr>
<tr>
<td>Weekday TV</td>
<td>10.0 (5.0, 15.0)</td>
<td>15.0 (10.0, 20.1)</td>
<td>0.0372</td>
</tr>
<tr>
<td>Weekday Comp/video</td>
<td>5.0 (2.5, 15.0)</td>
<td>10.0 (2.5, 15.0)</td>
<td>0.2903</td>
</tr>
<tr>
<td>Weekend TV</td>
<td>6.0 (2.0, 8.0)</td>
<td>4.0 (4.0, 8.0)</td>
<td>0.8627</td>
</tr>
<tr>
<td>Weekend Comp/video</td>
<td>4.0 (1.0, 6.0)</td>
<td>2.0 (1.0, 6.0)</td>
<td>0.2421</td>
</tr>
</tbody>
</table>
## Results - Physical Activity Measures

<table>
<thead>
<tr>
<th></th>
<th>MATCH Median (IQR)</th>
<th>Control Median (IQR)</th>
<th>P-value, Wilcoxon</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA sweat</td>
<td>3.0 (2.0, 5.0)</td>
<td>4.0 (2.0, 6.0)</td>
<td>0.1743</td>
</tr>
<tr>
<td>PA no sweat</td>
<td>2.0 (1.0, 4.0)</td>
<td>3.0 (1.0, 5.0)</td>
<td>0.0605</td>
</tr>
<tr>
<td>Days 60 min PA</td>
<td>3.0 (1.0, 5.0)</td>
<td>3.0 (1.0, 5.0)</td>
<td>0.5349</td>
</tr>
<tr>
<td>Weekday TV</td>
<td>10.0 (5.0, 15.0)</td>
<td>15.0 (10.0, 20.1)</td>
<td>0.0372</td>
</tr>
<tr>
<td>Weekday Comp/video</td>
<td>5.0 (2.5, 15.0)</td>
<td>10.0 (2.5, 15.0)</td>
<td>0.2903</td>
</tr>
<tr>
<td>Weekend TV</td>
<td>6.0 (2.0, 8.0)</td>
<td>4.0 (4.0, 8.0)</td>
<td>0.8627</td>
</tr>
<tr>
<td>Weekend Comp/video</td>
<td>4.0 (1.0, 6.0)</td>
<td>2.0 (1.0, 6.0)</td>
<td>0.2421</td>
</tr>
</tbody>
</table>
Limitations

- Small sample
- Differences in baseline characteristics and retention rates between groups
- Cross-sectional measures of lifestyle behaviors
- No objective measures of lifestyle change
### Consistent Results Over Time:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td># Schools</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>12</td>
<td>17</td>
<td>15</td>
<td>35</td>
<td>46</td>
</tr>
<tr>
<td># Reached</td>
<td>274</td>
<td>634</td>
<td>660</td>
<td>789</td>
<td>1065</td>
<td>1308</td>
<td>1386</td>
<td>3116</td>
<td>3852</td>
</tr>
<tr>
<td>% OWOB Success*</td>
<td>60</td>
<td>56</td>
<td>58</td>
<td>69</td>
<td>68</td>
<td>66</td>
<td>64</td>
<td>62</td>
<td>64</td>
</tr>
<tr>
<td>% Improving from obese to overweight</td>
<td>10% (8/82)</td>
<td>9% (14/159)</td>
<td>10% (20/208)</td>
<td>7% (12/168)</td>
<td>10% (31/314)</td>
<td>13% (51/400)</td>
<td>12% (45/435)</td>
<td>14% (118/857)</td>
<td>13% (135/1072)</td>
</tr>
<tr>
<td>% Improving overweight to healthy weight</td>
<td>14% (7/51)</td>
<td>17% (18/105)</td>
<td>10% (15/155)</td>
<td>24% (23/95)</td>
<td>20% (38/192)</td>
<td>24% (61/253)</td>
<td>22% (58/290)</td>
<td>22% (137/613)</td>
<td>27% (192/710)</td>
</tr>
<tr>
<td>% Converting: Healthy Weight to overweight (undesirable change)</td>
<td>5% (5/103)</td>
<td>5% (16/292)</td>
<td>3% (10/337)</td>
<td>4% (11/269)</td>
<td>3% (15/500)</td>
<td>5% (29/629)</td>
<td>7% (40/580)</td>
<td>6% (88/1574)</td>
<td>7% (130/1971)</td>
</tr>
</tbody>
</table>

*Defined in overweight/obese participants as post-measure Z-score lower than baseline*
“If MATCH were implemented statewide with similar results, NC Medicaid could save up to $330 million over a 5-year period on just CHARGES occurred by 7th Graders.”

Facts and calculations sheet prepared by Lee R Mobley, PhD, RTI International, February 2010
NC Medicaid Savings from MATCH OUTCOMES vs. CONTROL

113,900 NC Students

Prevention

Remediation

50% HW

20% OW

30% OB

$998 M Total Accumulated Savings Over 10 years

4y Post-MATCH Intervention

6% Save $6.4M

22% $ Savings ???

11% Save $11.7M

Total Annual Medicaid Savings- $18.1 M
Clinical Implications of MATCH

- Magnitude of change in BMI z-score
- Comparison to clinical intervention
A BMI z-Score change of **-0.25** or more is reported to **positively impact risk factors** (total cholesterol/HDL ratio, improved insulin sensitivity, and blood pressure) associated with **Cardiovascular Diseases, and metabolic diseases such as obesity and Type II Diabetes.**\(^1\)

---

Clinical Implications of MATCH

- Comparison to POWER study results
  - Mean change in BMI z-score among obese children
  - % achieving threshold level of BMI z score change
POWE R (Pediatric Obesity Weight Evaluation Registry)

- Consortium of 31 hospital-based pediatric weight management programs as a centralized data repository
- Mission is to better understand and improve health outcomes through data sharing to identify effective programs
- Use a multi-disciplinary team approach to treat pediatric obesity (nutrition, physical activity and behavioral components)
- Weight Management Programs were AMA classified as Stage 3 and Stage 4 interventions
- Data included 6,000 individuals, age 2-18y
- Primary outcome variable is change in BMI z-score.

## POWER compared to MATCH Outcomes in Obese Children (≥95th %tile)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Reach</th>
<th>Follow up</th>
<th>Cost/kid</th>
<th>z-score</th>
<th>Threshold change</th>
<th>(-0.25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER</td>
<td>One on One</td>
<td>7-9 mon.</td>
<td>$2,000k+</td>
<td>-0.05*</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>MATCH</td>
<td>Grade level</td>
<td>7-8 mon.</td>
<td>$100</td>
<td>-0.12</td>
<td>13.1%</td>
<td></td>
</tr>
</tbody>
</table>

Clinical Implications of MATCH

- 2017 USPSTF recommendations for childhood obesity treatment
  - >= 26 hours of comprehensive, intensive behavioral intervention between 2-12 months were needed to be effective in weight loss
  - Provided components of effective programs
USPSTF Identified Elements of Effective Interventions

USPSTF

- Healthy Eating
- Safe Exercising
- Reading Labels
- Stimulus Control (limit screentime/certain foods)
- Goal Setting
- Self-monitoring
- Contingent Rewards
- Problem Solving
- Supervised Physical Activity

MATCH

26 hours

- 
- 
- 
- 
- 
- 
- 
- 

40 hours

- 
- 
- 
- 
- 
- 
- 
- 

26 hours

40 hours
Partnership History and Progress

- Started in 2007 in one school
- Dr. Lazorick (ECU) involved starting 2008
- First expansion to 4 schools, Jan 2009
- Tim joined ECU in 2010
- Hired 1 staff 2015, 2 more 2016, 1 more 2017
- Oct 1 2018... launch of private business model
  - ECU MATCH team (PI plus 2 staff) administers grant-funded and research programs
  - MATCH Wellness, private company (Director plus 2 staff), provides workbook and website, and will administer additional private-funded programs
- Capacity for substantial expansion
In Summary

- MATCH was developed in a rural, economically challenged area of NC, using existing USDA materials as a framework for the curriculum.
- MATCH is a proven, successful school-based obesity intervention that is now in 55 schools.
- The ongoing MATCH expansion, if successful, has potential to improve the health of children and the future workforce using existing resources, while saving health care dollars.
Next Steps…

- Building procedures and infrastructure for large scale replication
- Launched business model to implement on large-scale
- Developing partnerships
- Studying academic outcomes… to be released soon
- Promoting MATCH as THE MODEL school-based solution to the childhood obesity epidemic regionally, statewide, and nationally
Questions and Discussion…