The Role of Exercise in the Management of Obesity in Children and Adolescents

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Objectives

• Exercise as a therapeutic approach for treating pediatric obesity

• Effects of exercise on obesity-related disease risk factors in youth

• Recommendations for promoting exercise in obese children and adolescents
Definitions

• Obesity Prevention (Primary Prevention)
  – Preventing obesity in those not yet obese

• Obesity Treatment
  – Treating obesity in those already obese

• Obesity (weight) Management
  – Improving the health of those already obese
  – Preventing or delaying onset of chronic disease
Physical Activity vs. Exercise

Children vs. Adolescents
Lifestyle Treatment of Obesity

Energy Balance

- Excessive energy intake
  - Diet
- Inadequate energy expenditure
  - Exercise

First law of Thermodynamics
What is the Role of Exercise?

• Obesity Prevention
  – Non-obese youth
  – adult obesity

• Obesity Treatment / Weight Management
  – Lowering levels of adiposity
  – Reducing weight gain (regain)

• Disease Prevention
  – Improving health indicators / reducing risk factors
Treatment of Obesity

- Gutin / Owens 5x’s / wk of AT >150 BPM for 4 months
- Treuth 3x’s / wk of RT 50-70% 1RM for 5 months
- Watts 3x’s / wk of CT 65-85% HRmax for 8 weeks

Watts et al. Sports Med 2005
Key Findings Regarding Effects of Exercise

• Significant reductions in % body fat (small)
• No effects on weight, BMI, or WC
• NNT – 3.5 to see an effect on % fat
Exercise and Disease Prevention

- Cardiovascular Disease
- Type 2 diabetes
- Psychosocial Health
Purpose: To examine the effects of high-intensity interval training on cardiac function in obese adolescents.
Methodology

• 10 Obese Adolescents participating in HIIT
  – 4 sets of 4 minutes on treadmill @90-95% HRmax
  – 3 minutes active rest between (70% HRmax)
  – 5 minute recovery (total of 40 minutes)
  – Twice / week for 13 weeks

• Cardiac function measured before and after training via echocardiography
  – Stroke Volume
  – Global Strain Rate
Conclusions

• Impaired myocardial function in obese adolescents can be improved with high-intensity interval training

• Weight-loss is NOT necessary

• Is this exercise prescription feasible in this population??????
  – 85% compliance
Purpose: To examine the effects of circuit training on vascular function in obese adolescents
Methodology

• 19 obese adolescents

• 8 weeks of circuit training
  – 3 x’s / week for 1-hr
  – Cycle ergometer (65-85% max HR)
  – Resistance training (55-75% 1 RM)

• Endothelial function by brachial Artery FMD

Watts et al Journal American College Cardiology 2004
Conclusions

• Endothelial dysfunction can be normalized without weight loss via exercise.

• Thought to be the earliest indicator of atherosclerotic process
  – Importance CV timeline

• Precedes and predicts future cardiovascular events

Watts et al. Journal American College Cardiology 2004
Purpose: To examine the effects of resistance training on insulin sensitivity in obese adolescent males
Methodology

- 22 Obese Adolescents Males (RCT)
- 12-weeks whole-body resistance training
- Strength by 1-RM (bench press and leg press)
- Body Composition by DEXA
- Insulin Sensitivity by the FSIVGTT
## Results

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Pre</th>
<th>Post</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>15.1 ± 0.5</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Fat mass (kg)</td>
<td>31.4 ± 3.4</td>
<td>30.1 ± 3.2</td>
<td>-1.3 ± 0.9</td>
</tr>
<tr>
<td>Lean mass (kg)</td>
<td>54.4 ± 3.2</td>
<td>58.1 ± 3.1</td>
<td>3.7 ± 0.9</td>
</tr>
<tr>
<td>Body fat (%)</td>
<td>35.3 ± 2.4</td>
<td>32.8 ± 2.1</td>
<td>-2.5 ± 0.8</td>
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<tr>
<td>Bench (lbs)</td>
<td>95.5 ± 6.6</td>
<td>118.6 ± 6.7</td>
<td>23.2 ± 3.4†</td>
</tr>
<tr>
<td>Leg (lbs)</td>
<td>404.6 ± 26.7</td>
<td>516.5 ± 34.7</td>
<td>111.9 ± 16.1†</td>
</tr>
</tbody>
</table>

Data are means ± SEM.  
*P < 0.05 vs. corresponding pre value*  
†*P < 0.05 vs. control group*
Changes in Insulin Sensitivity

45.1%

$p < 0.05$

Shaibi Medicine Science Sports Exercise 2006
Individual Changes in Insulin Sensitivity

Insulin Sensitivity (x10^{-4} min^{-1} / uU/ml)

10 / 11 increase in insulin sensitivity

Shaibi Medicine Science Sports Exercise 2006
Conclusions

• Resistance training can significantly improve insulin sensitivity in obese youth independent of changes in body composition.

• 96% attendance rate

• Other modalities and populations???
Last set...add more WEIGHT BRO

Yeah bro add more #crossfit #CrossfitKids
• Purpose: To evaluate effects of aerobic exercise on psychosocial functioning in obese adolescents
Methodology

• 30 obese adolescents

• 10 weeks of aerobic exercise
  – 2 x’s / week for 60 minutes
  – Interactive video game or stationary cycling
  – Intensity and duration were not prescribed

• Psychosocial functioning via questionnaire
  – Social competence
  – Appearance and weight esteem

Goldfield et al Journal Pediatric Psychology 2012
Changes in Social Competence Following Exercise

Goldfield et al Journal Pediatric Psychology 2012
Changes in Appearance Esteem following Exercise

41.4%

p < 0.005

Goldfield et al Journal Pediatric Psychology 2012
Exercise is Medicine™

- Dosage
  - Frequency
  - Intensity
  - Duration
  - Mode

- Population
Effects of Exercise on the Reynolds Child Depression Scale in Obese Youth

Effects of Exercise on Liver Fat in Obese Boys

Take Away Points

• Exercise can improve body composition, insulin sensitivity, cardiovascular health, psychosocial health, and liver fat

• Exercise may mitigate risk independent of weight loss in obese youth

• Limited evidence to support beneficial effects on weight, BMI, fasting glucose, LDL, HDL, blood pressure
Recommendations

• 60 min daily MVPA physical activity (exercise)
  – Age-appropriate
  – HR > 150 bpm
  – Can be done in 10 minutes bouts
  – May have to work towards this target

• Resistance exercise 2-3 times / week
  – Whole-body movements (weight as resistance)
    • Push-ups, lunges, squats

• Turn off the TV, computer, iPad (<1hr /day)
  – Take out of the bedroom
Thank You!

MUST. LOSE. BABY. WEIGHT.