Beyond Move More, Eat Less: Considerations in Pediatric Obesity Prevention and Treatment

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I have no relevant financial relationships or affiliations with commercial interests to disclose.
After attending this presentation, participants will be able to:

1. Recognize the complex biological underpinnings of obesity
2. Discuss obesity within an ecological framework
3. Describe the *Division of Responsibility for Feeding*
4. Explain the relationship of Adverse Childhood Experiences to chronic disease
5. Identify practical therapeutic interventions which are consistent with the Tenets of Osteopathic Medicine
Tenets of Osteopathic Medicine

The body is a unit, the person is a unit of body, mind, and spirit

The body is capable of self-regulation, self-healing, and health maintenance

Structure and function are reciprocally interrelated

Rational treatment is based upon an understanding of the basic principles of body unity, self-regulation and the interrelationship of structure and function.
An Ecobiodevelopmental Framework

Objective #1

Recognize the complex biological underpinnings of obesity
Energy Homeostasis

Intake:
- Hunger + Satiety

Output:
- Metabolic rate + Activity

Metabolic rate + Activity in out
Peripheral signals to the CNS

Adapted from Stanley et al., Physiol Rev 2005
Hypothalamic Hormone Systems and Energy Homeostasis

**HPA axis**
- **cort** → ↑ lipolysis
- ↓ insulin sensitivity
- ↑ gluconeogenesis

**GH** → ↑ lipolysis
- ↑ gluconeogenesis

**T₃/T₄** → ↑ metabolic rate
- ↑ thermogenesis
- ↑ lipolysis
- ↑ gluconeogenesis

**HPG axis**
- **E2** → ↑ metabolic rate
- ↑ locomotor activity
- ↓ food intake
Autonomic Nervous System and Energy Homeostasis

- Sympathetic
  - ↑ energy usage
  - ↑ availability
- Parasympathetic
  - ↓ energy usage
  - ↑ energy storage
Adaptive Responses to Weight Loss

↓ leptin
↓ insulin
↓ CCK
↓ PYY
↑ ghrelin
↑ hunger
↓ satiety

↑ food intake

↓ SNS activity
↑ PNS activity
↓ metabolic rate

↓ energy expenditure (resting & total)

maintain body weight

(energy expenditure (resting & total))
Adaptive Responses to Weight Loss

Chow & Hall: Physiology and Behavior, 2014
Adaptive Responses to Weight Loss

1981 Irish Republican Army hunger strikers

<table>
<thead>
<tr>
<th>Age</th>
<th>Name</th>
<th>Days</th>
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</thead>
<tbody>
<tr>
<td>27</td>
<td>BOBBY</td>
<td>Sands</td>
</tr>
<tr>
<td>25</td>
<td>FRANCIS</td>
<td>Hughes</td>
</tr>
<tr>
<td>24</td>
<td>RAYMOND</td>
<td>McCree</td>
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<tr>
<td>23</td>
<td>PATSY</td>
<td>O'Hara</td>
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<tr>
<td>29</td>
<td>JOE</td>
<td>McDonn</td>
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<td>24</td>
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<td>25</td>
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<tr>
<td>23</td>
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<td>McElw</td>
</tr>
<tr>
<td>27</td>
<td>MICHAEL</td>
<td>Devin</td>
</tr>
</tbody>
</table>
So, with dieting and weight loss...

Hunger goes up
Satiety goes down
Energy expenditures decrease

This effect last for years!
Osteopathic Approach
Objective #2

Discuss obesity within an ecological framework
The social ecological model recognizes multiple levels of influence and the idea that behaviors both shape and are shaped by the social environment. -NIH

The social determinants of health are the circumstances in which people are born, grow up, live, work and age, and the systems put in place to deal with illness. These circumstances are in turn shaped by a wider set of forces: economics, social policies, and politics. -WHO
Osteopathic Approach
Objective #3

Describe the *Division of Responsibility for Feeding*
Families Correlates of Child Obesity

**Family Functioning Domain**
1. Family meals
2. Family closeness/connectedness
3. Family weight teasing

**Parental Domain**
1. Parental modeling
2. Parenting styles & practices
3. Parental perceptions

**Sibling Domain**
1. Sibling weight teasing
2. Sibling relationships (intimacy & conflict)

**Obesity & Weight-Related Outcomes**
1. Weight status
2. Dietary intake
3. Physical activity
4. Weight control behaviors

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Parental Styles

![Parental Styles Diagram](image)

- **Authoritative**
  - Respects child's opinions but maintains boundaries.
  - "Firm but flexible."
- **Permissive**
  - Indulgent without discipline
- **Authoritarian**
  - "Strict disciplinarian"
- **Neglectful**
  - Emotionally uninvolved and does not set rules
Parental Feeding Practices

• Parental modeling of health behaviors
  – Associated with lower BMI & healthy dietary intake
  – Contributes to children’s increased liking of novel foods.

• Parental feeding practices related to weight gain:
  – Restriction/control
    • Regulation of when, what and how much children eat
  – Pressure/prompting to eat
    • Pushing to eat
  – Instrumental/emotional feeding
    • Food for reward or emotion regulation
Sibling weight teasing
- Positively associated with female weight status, body dissatisfaction, disordered eating behaviors, low self-esteem, and depression

Sibling relationships
- Intimacy related to healthy attitudes and exercise behaviors
- Conflict associated with an increased risk of overweight
  - Strongest in sibling pairs with older brothers

Senguttuvan, et al 2014
Family Functioning Domain

- Family emotional closeness/connection
  - Associated with lower BMI, breakfast consumption, frequent family meals, & lower eating related parent-child conflict

- Family weight teasing
  - Associated with higher BMI, disordered eating, low body satisfaction, low self-esteem, high depressive symptoms, & suicide ideation
Division of Responsibility for Feeding

• Parents take the lead on the WHAT, WHEN, AND WHERE of feeding

• Child determines how much and if they are going to eat what is provided

• Encourage and model family, structured, sit-down meals and snacks
Osteopathic Approach
Objective #4

Explain the relationship of Adverse Childhood Experiences to chronic disease
The Adverse Childhood Experiences (ACE) Study examined the impact of abuse, neglect, exposure to intimate partner violence and other household dysfunction during childhood on adult health risk behaviors and chronic disease development.

Over half of respondents had at least one adverse childhood experiences with over 6% having at least 4.

The study found that “the impact of adverse childhood experiences on adult health status is strong and cumulative”

Felitti, et al 1998
Adverse Childhood Experiences

Felitti, et al 1998

Mechanisms by Which Adverse Childhood Experiences Influence Health and Well-being Throughout the Lifespan
**Adverse Childhood Experiences and Obesity**

- Compared with an ACE score of 0, individuals with an ACE score of 4 are nearly twice as likely to be severely obese (BMI ≥ 35)

- Overeating is a means of coping

- Food has psychoactive benefits

- Obesity is protective socially, sexually, and physically

# Protective and Compensatory Experiences (PACEs)

<table>
<thead>
<tr>
<th>Relationships and connections</th>
<th>Environmental conditions and resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you have someone who loved you unconditionally (you did not doubt that they cared about you)?</td>
<td>Did you have an engaging hobby -- an artistic or intellectual pastime either alone or in a group?</td>
</tr>
<tr>
<td>Did you have at least one best friend (someone you could trust, had fun with)?</td>
<td>Did you have an adult (not a parent) you trusted and could count on when you needed help or advice?</td>
</tr>
<tr>
<td>Did you do anything regularly to help others or do special projects in the community to help others?</td>
<td>Did you live in a home that was typically clean and safe with enough food to eat?</td>
</tr>
<tr>
<td>Were you regularly involved in organized sports groups or other physical activity?</td>
<td>Did your school provide the resources and experiences you needed to learn?</td>
</tr>
<tr>
<td>Were you active in at least one social or civic (non-sport) group with peers?</td>
<td>Were there routines and rules in your home that were clear and fairly administered?</td>
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Osteopathic Approach
Consider all causes of weight gain, weight regain, or failed weight loss attempts

Consider obesity from an ecology prospective

Take an osteopathic approach to obesity prevention and treatment
Resources

• University of Connecticut Rudd Center for Food Policy and Obesity “Preventing Weight Bias: Helping Without Harming in Clinical Practice”  http://www.uconnruddcenter.org/

• Strategies to Overcome and Prevent (STOP) Obesity Alliance “Why Weight? A Guide to Discussing Obesity and Health With Your Patients”  http://www.stopobesityalliance.org/


• Obesity Action Coalition  http://www.obesityaction.org/

• Project Implicit  https://implicit.harvard.edu/implicit/

• Ellyn Satter Institute  https://www.ellynsatterinstitute.org/
References

- Zheng, H, Berthoud, H. Neural Systems Controlling the Drive to Eat: Mind Versus Metabolism. Physiology Apr 2008, 23(2) 75-83; DOI:10.1152/physiol.00047.2007
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