# Obesity as a Disease, Pathophysiology, Bias & Stigma

Valerie M. O'Hara, DO, FAAP, ABOM
Allen F. Browne, MD, FACS, FAAP, ABOM

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## Objectives

1. Update the Concept of Obesity as a disease in children and the pathophysiologic mechanisms

2. Review the significance of bias and stigma in Obesity Treatment

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# Obesity as a Disease

**Allen F. Browne, MD**

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## Historical Etiologies

- Personal failing
- Personal choice
- Poor self control
- Poor choices
- Food processors' fault
- Media’s fault

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# Why

- The disease of obesity is a manifestation of dysfunction of a normal (homeostatic) energy regulation system (ERS) resulting in metabolic derangements and excess energy storage.
- Physiological derangement - ERS gone awry
- Over 230 complications
- Best predictor of your body composition - your identical twin

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# Why

- Hard to gain weight “voluntarily”
- Bears

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## So What?

- Prevention needs to be based on physiology
- Treatment needs to be based on physiology

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## Education

- Needs to be updated
- For patients, parents, healthcare workers, payers, policy makers, and public

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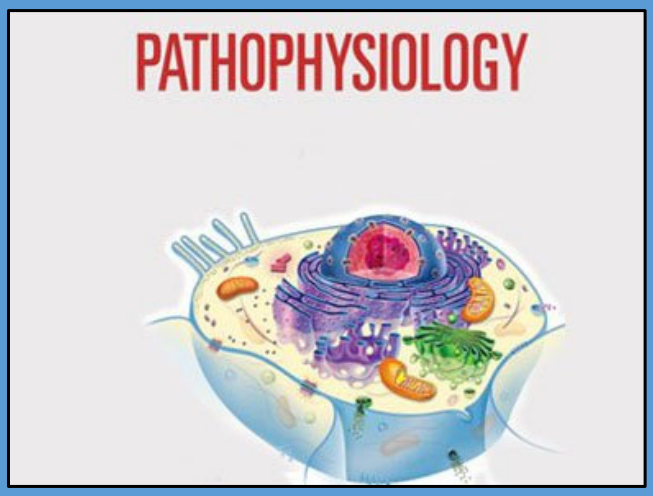
# Obesity




Valerie O'Hara, DO

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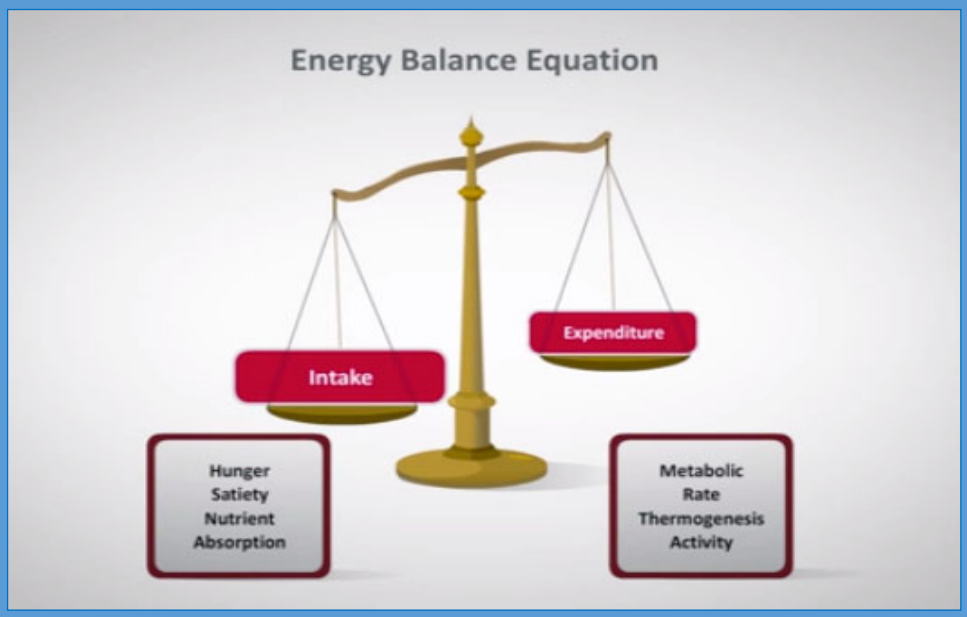


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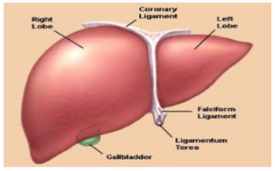
## The Body Seeks a Stable Fat Mass

**Homeostasis**:
Serum Sodium
Heart rate
Body Temperature
Blood pressure
Body Water

Similar to other regulated tissue




Liver

Red blood cells

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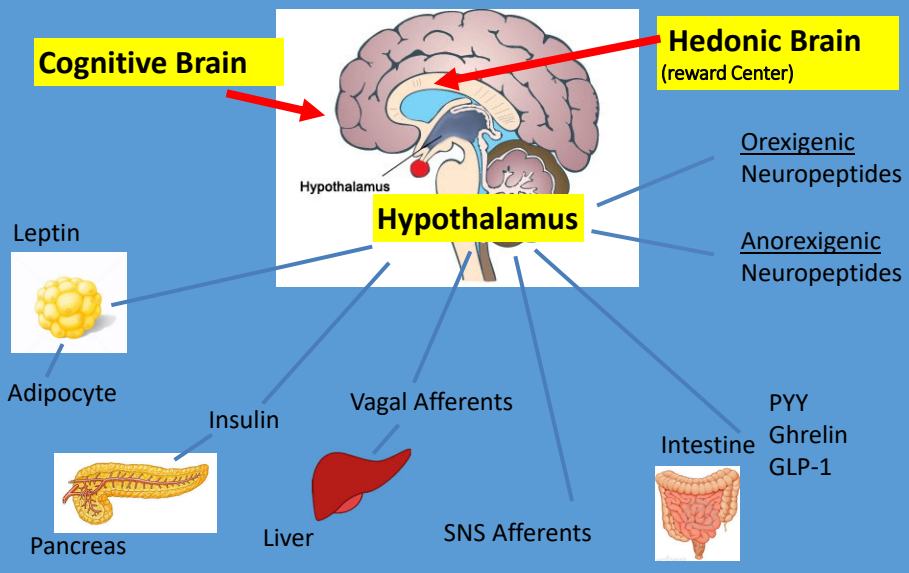
## ERS Physiology Drives Behavior

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# Hypothalamus

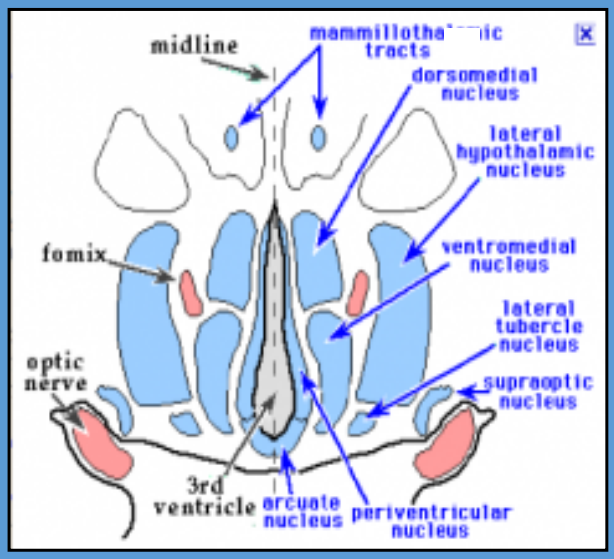
## Nuclei of Interest

Lateral hypothalamus - LH

Ventromedial hypothalamus - VMN

Paraventricular hypothalamus - PVN

Arcuate Nucleus - ARC

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# Arcuate Nucleus: 1st Order Neurons

### POMC/CART neurons

- Anorexigenic
  - decreases food intake
  - increases energy expenditure via (-) AgRP/NPY & (+) neurons in PVN via MC3R
  - Insulin and leptin receptors

### Serotonin receptors

- decrease appetite and increase EE

### AgRP, NPY neurons

- Orexigenic
  - increases food intake
  - decreases energy expenditure via
    - (-) anorexigenic neurons in LH & PVN (POMC/CART) via MC3R and MC4R
    - (+) orexigenic neurons in LH and PVN via NPY
    - Ghrelin receptors

**POMC:** Proopiomelanocortin
**CART:** Cocaine- amphetamine regulated transcript
**AgRP:** Agouti-related Peptide
**NPY:** Neuropeptide Y

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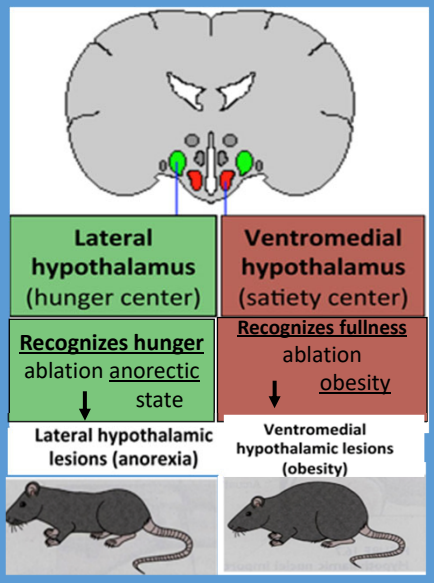
# Hypothalamus LHA and VMH: 2nd Order Neurons

**Paraventricular Hypothalamus:**

- MC4R deficiency or mutation leads to obesity
- Decreases appetite
- Increases energy expenditure via SNS stimulation

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# The Energy Regulatory System (ERS): Hormonal and Neural control, modulated by Environmental factors

**Hormonal Control:**
**Leptin**
**Adiponectin**
**Insulin**
**Glucagon**
**Ghrelin**
**GLP-1, GIP**
**PYY**
**Cortisol**

Hormonal Control

ERS

Neural Control

**Neural Control:**
**Cognitive Brain (Executive)**
**Hedonic Brain**
**Homeostatic Brain (hypothalamus)**

**Microbiota**
**Inflammation**
**Infection**
**Obesogens**
**Physical Activity**

Environmental Modulation

**Food type**
**Food availability**
**Circadian Rhythm**
**Thermoregulation (brown Fat)**
**Stress**

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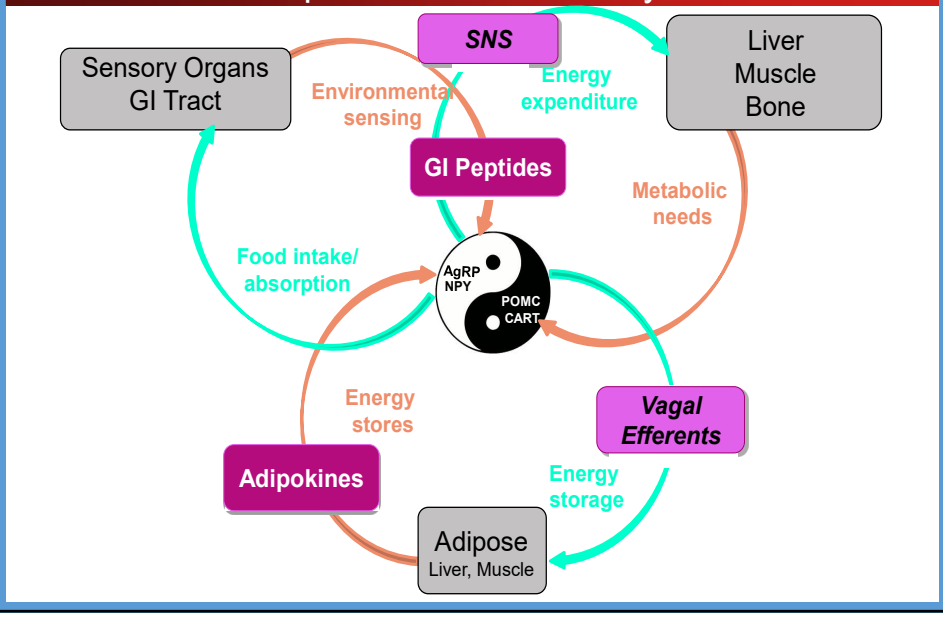
## Homeostatic regulation of energy balance: a complex and redundant system

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## Human Energy Regulatory System (ERS)

- Physiology of normal energy regulation
  - Complex
  - Tightly regulated
  - Dynamic
  - Neural and hormonal control
  - Set Point

Set Point


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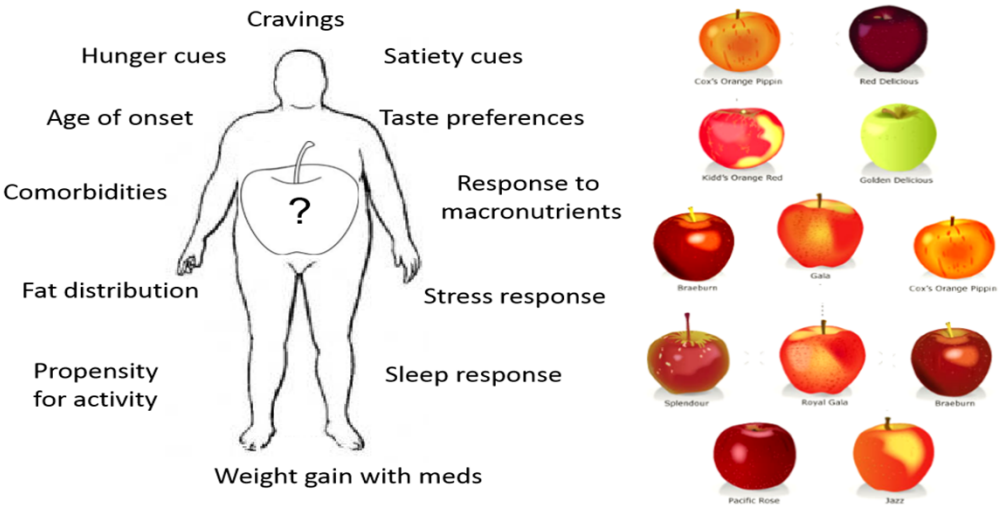
## Multiple Types of Obesity ("The Obesities")

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## Obesity 1.0
## Behavioral-Driven Model (Former)

- "Gluttony and slothfulness"
- Individual's voluntary behavioral problem
- Correlations
  - OR...

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## Obesity 2.0
## Physiological-Driven Model (Current)

- Energy Regulatory System – **dysfunction**
- Where there is physiology there can be **PATHOphysiology**
- Resulting in **Set point defending an unhealthy level**

**Obesity** drives **Overeating**

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## Bias and Stigma
**Allen Browne, MD**

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"Biases are the opinions/ideas/judgements/thoughts we make up about people before we know who they actually are"

Adapted from Verna Myers

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## Cultural Attitudes: Obesity

- Poor choices
- Poor self-control

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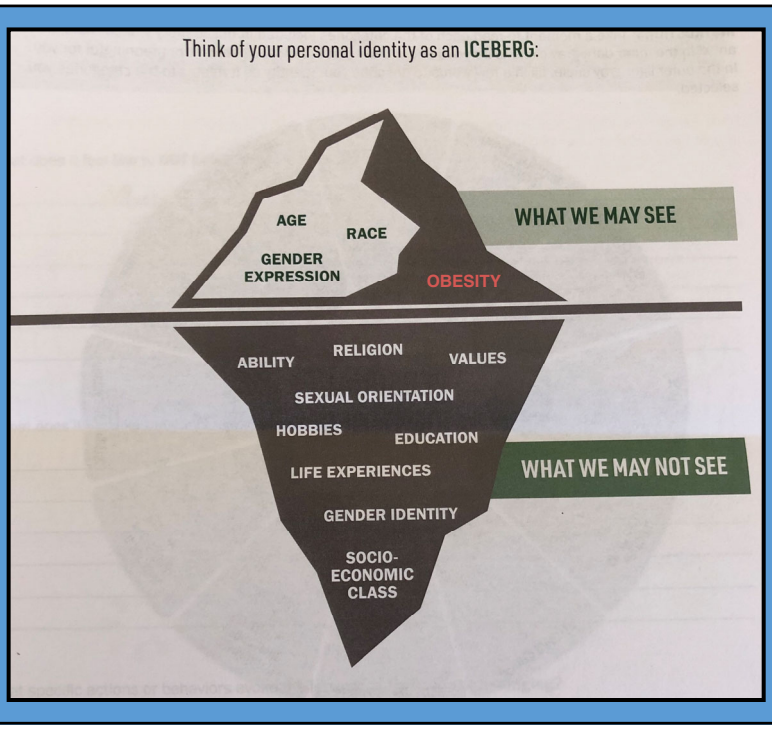


Adapted from Verna Myers

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# Cultural Attitudes

- Simple problem
- Eat less and exercise more
- Voluntary behavior

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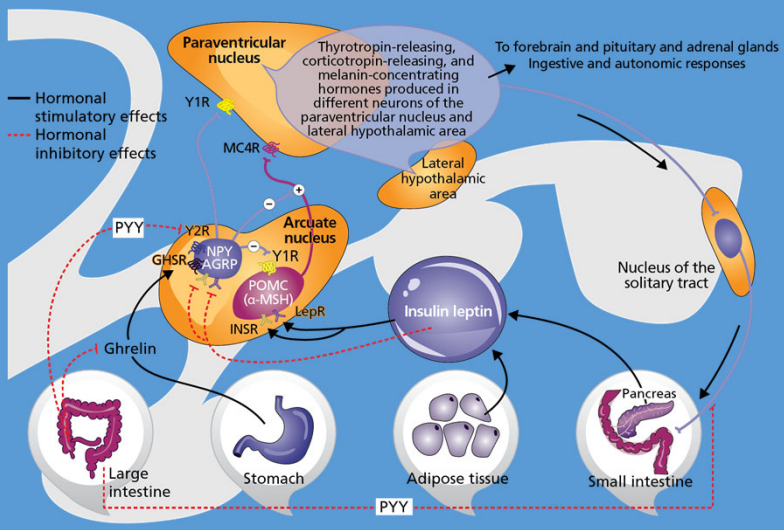
# "? Simple Problem"

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# ? Voluntary behavior

- 95% of energy regulation is subconscious
- Physiology wins over behavior
- Obesity drives overeating

(Berthoud, 2017; Kaplan, 2018)

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## Cultural Attitudes

- “It’s your/my fault"
- "You/I am to blame"
- "It’s your/my responsibility"

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## Bias and Stigma

- BIAS - a particular tendency, trend, inclination, feeling, or opinion, especially one that is preconceived or unreasoned
- STIGMA - a mark of disgrace or infamy; a stain or reproach, as on one's reputation

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## Bias and Stigma - Children

- Lower quality of life than children with cancer
- Psycho-social issues more apparent than clinical issues

(Schwimmer et al., 2003)

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## Bias and Stigma - Adults

- Mental health problems
- Economic productivity problems
- Internalized bias

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## Bias & Stigma – Patients (and Parents)

- Recognizing & appreciating their internalized bias

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## Bias and Stigma - Policy Makers

- Recognizing that they have a cultural understanding of the disease

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## Bias and Stigma - Payors

Recognize the need to take responsibility for financial support for prevention and treatment of the disease

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## Bias and Stigma - Public

Open to the concept of the complexity and impact of the disease

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## Stigma and Bias - Healthcare Providers

Recognition of how historical & cultural influences may impact clinical interactions with patients with the disease of obesity

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## Responses to Weight Bias & Stigma

- Physiological
- Stress
- Weight Gain

- Behavioral Responses
- Unhealthy eating
- Body dissatisfaction
- Decrease physical activity

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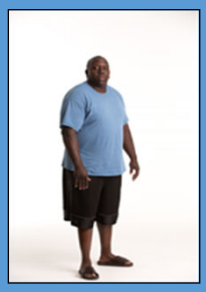
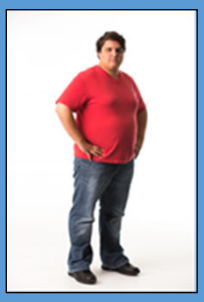
## Results of Bias and Stigma

**~80 million adults with obesity**



**<1% receive a prescription (Rx) for Anti Obesity Medication in a given month**



**~195,000 people per year receive bariatric surgery**

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## Interventions

- Adjust office environment (as needed)
- Professional organization involvement
- Advocacy at community, state, and national level
  - Policy
  - Education

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19:57 Tue Sep 1
60%
Francesco Ru...
nature medicine
CONSENSUS STATEMENT
https://doi.org/10.1038/s41591-020-0803-x
Check for updates
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Joint international consensus statement for ending stigma of obesity
Francesco Rubino[1,2], Rebecca M. Puhl[3,47], David E. Cummings[4,5,47], Robert H. Eckel[6,7], Donna H. Ryan[8], Jeffrey I. Mechanick[9,10], Joe Nadglowski[11], Ximena Ramos Salas[12,13], Phillip R. Schauer[8], Douglas Twenefour[14], Caroline M. Apovian[15,16], Louis J. Aronne[17], Rachel L. Batterham[18,19,20], Hans-Rudolph Berthoud[21], Camilo Boza[22], Luca Busetto[23], Dror Dicker[24,25], Mary De Groot[26], Daniel Eisenberg[27], Stuart W. Flint[28,29], Terry T. Huang[30,31], Lee M. Kaplan[32], John P. Kirwan[33], Judith Korner[34], Ted K. Kyle[35], Blandine Laferrère[36], Carel W. le Roux[37], LaShawn McIver[38], Geltrude Mingrone[1,39,40], Patricia Nece[11], Tirissa J. Reid[41], Ann M. Rogers[42], Michael Rosenbaum[43], Randy J. Seeley[44], Antonio J. Torres[45] and John B. Dixon[46]
People with obesity commonly face a pervasive, resilient form of social stigma. They are often subject to discrimination in the workplace as well as in educational and healthcare settings. Research indicates that weight stigma can cause physical and psychological harm, and that affected individuals are less likely to receive adequate care. For these reasons, weight stigma dam-
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