Supratentorial Matters Associated With Obesity

2021

Learning Objectives

- Discuss the long- and short-term physiological effects of obesity on the individual, including effects on mental health, sleep, aging, and pain
- Describe the cycle in which obesity is caused by and causes fundamental changes in neurocircuitry and can contribute to neurocognitive impairment and disease
- Recognize how weight bias, stigma, and adverse childhood experiences negatively contribute to the mental and physical effects of obesity
- Identify the connections between pain, obesity, and racial and gender identity discrimination, and how pain intensity and interference are experienced by affected individuals

Obesity may reduce COVID-19 vaccine efficacy, say researchers

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By Dr. Liji Thomas, MD Mar 3 2021

COMMENTARY • WOMEN IN THE WORKFORCE

COVID-19 has driven millions of women out of the workforce. Here's how to help them come back

BY KWEILIN ELLINGRUD AND LIZ HILTON SEGEL

February 13, 2021 10:00 AM EST

Remnants of Ida unleash deadly and damaging flash flooding in Mid-Atlantic and Northeast

STRINGER/EPA-EFE/SHUTTERSTOCK

Taliban show off captured weapons at Kandahar victory parade

Obes Med. 2020 Sep;19:100282. doi: 10.1016/j.obmed.2020.100282. Epub 2020 Jul 21.

"Covibesity," a new pandemic

Moien Ab Khan [1] [2], Jane Elizabeth Moverley Smith [3]

Obesity (Silver Spring). 2020 Sep;28(9):1606-1612. doi: 10.1002/oby.22923.

Obesity is Associated with Worse Outcomes in COVID-19: Analysis of Early Data from New York City

Kaveh Hajifathalian [1], Sonal Kumar [1], Carolyn Newberry [1], Shawn Shah [1], Brett Fortune [1], Tibor Krisko [1], Shiara Ortiz-Pujols [2], Xi Kathy Zhou [3], Andrew J Dannenberg [1], Rekha Kumar [2], Reem Z Sharaiha [1]

Nutrients. 2020 Nov 16;12(11):3525. doi: 10.3390/nu12113525.

Weight Gain in a Sample of Patients Affected by Overweight/Obesity with and without a Psychiatric Diagnosis during the Covid-19 Lockdown

Serena Marchitelli [1], Cristina Mazza [2], Andrea Lenzi [1], Eleonora Ricci [2], Lucio Gnessi [1], Paolo Roma [3]

Obesity (Silver Spring). 2021 Feb;29(2):438-445. doi: 10.1002/oby.23066. Epub 2020 Dec 18.

The Impact of COVID-19 Stay-At-Home Orders on Health Behaviors in Adults

Emily W Flanagan [1], Robbie A Beyl [1], S Nicole Fearnbach [1], Abby D Altazan [1], Corby K Martin [1], Leanne M Redman [1]

Obesity (Silver Spring). 2020 Sep;28(9):1576-1577. doi: 10.1002/oby.22904. Epub 2020 Aug 6.

COVID-19-Related Home Confinement in Adults: Weight Gain Risks and Opportunities

Surabhi Bhutani [1], Jamie A Cooper [2]

Obesity Disease Model

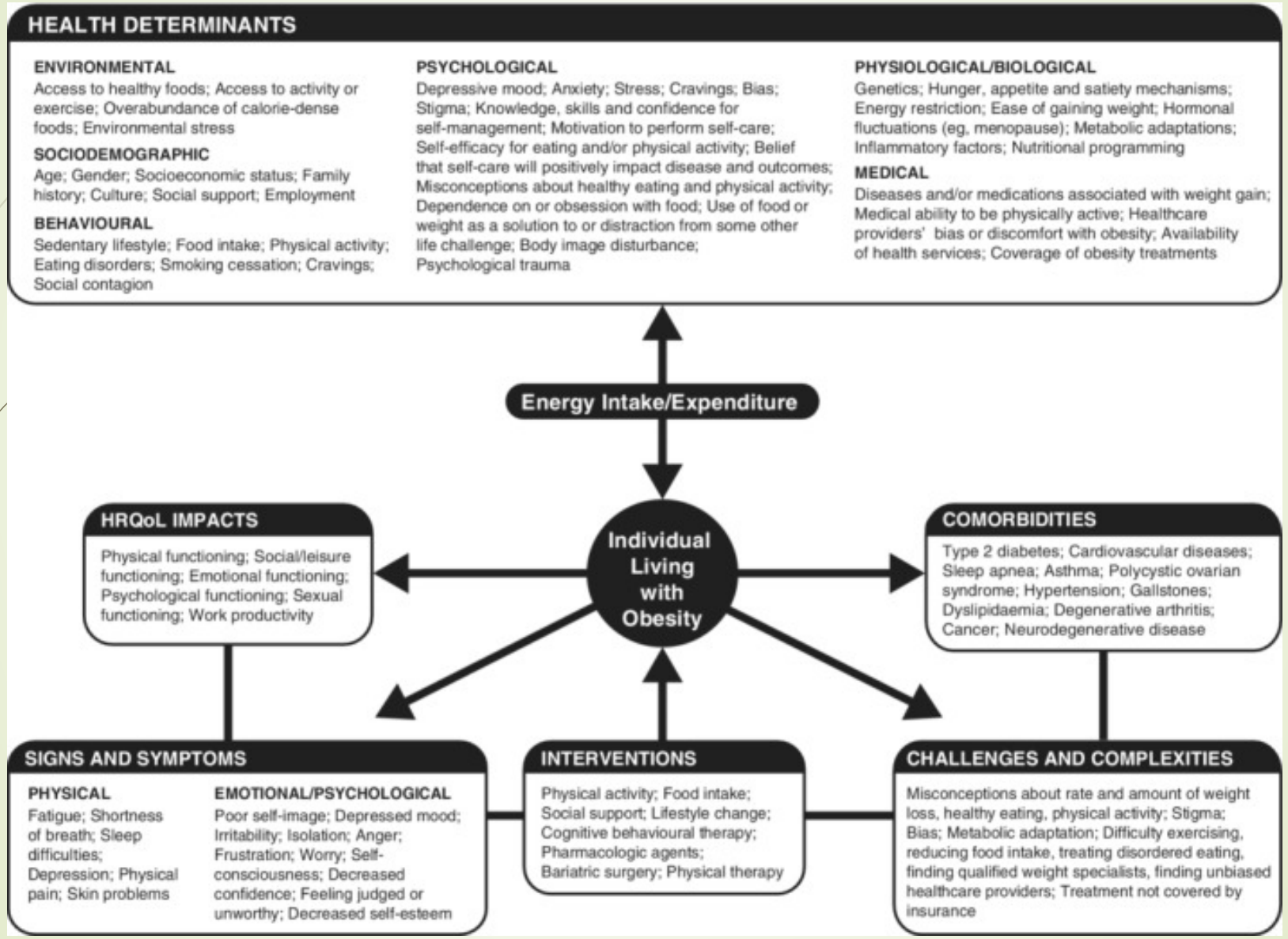


Image: Fastenau J, et al. *Clin Obes*. 2019;9(3):e12309.

↑ Risk for Neurodegenerative Diseases (e.g., AD, PD)

Stress & Anxiety/depression →

- ↑ cortisol → ↑ visceral adiposity
- Disrupted sleep
- Altered eating habits
- Altered sleep patterns
- Neurocognitive impairment

- **↑ Visceral Adiposity →** pro-inflammatory state
- **↑ Insulin Resistance →** nerve damage → ↑ pain

Maternal Obesity

Impacts on the Developing Fetus:

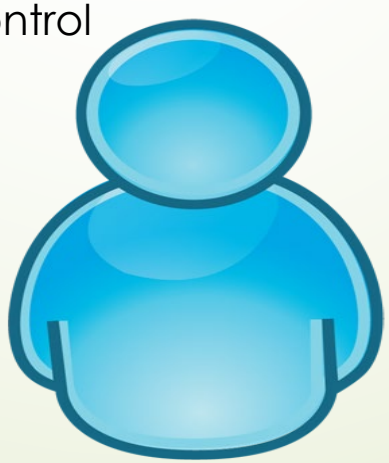
- Oxidative toxins cross BBB → ↑ risk for childhood and adult obesity
- ↑ risk of CVD
- ↑ risk of ADHD, autism, impaired neurocognitive development, impaired impulse control

Adverse Childhood Experiences →
↑ risk for childhood/ adolescent & adult obesity

Impaired impulse control →
↓ efficacy of WL interventions

↑ Risk of Discrimination & Bias →

- Body dysmorphia
- ↓ utilization of health services
- ↓ adherence & shared decision making
- Weight bias internalization



↑ Pain →

- ↑ depression
- ↓ activity
- ↑ fatigue
- ↑ substance abuse

Stages of Change

Pre-contemplation

- Unaware of the problem

Contemplation

- Thinking of change
- Action within the next 6 months

Preparation

- Making plans to change

Action

- Active plan/ implementation of change

Maintenance

- Continued change without relapse

Relapse

- Return to unfavorable behaviors.
- Will need to restart in order to re-establish favorable behaviors

From: https://obesitymedicine.org/obesity-algorithm/ (Accessed February 2021)

Motivational Interviewing

Motivation to change

- Key component of the behavior change
- Helps to set the groundwork for shared decision making
- Helps to identify what and why someone wants to change
- Allows for identification in strengths and barriers that may facilitate or hinder change
- Establishes actionable steps to promote change

5 A's of Obesity Management	
Ask	• Explore readiness to make the changes to begin to lose weight
Assess	• Assess anthropometrics and class of obesity • Identify obesity-related conditions and/or medications that may impact weight loss
Advise	• Advise on the health benefits of weight loss and on the need for this to be a life-long journey
Agree	• Agree on next steps and set up realistic expectations and targets
Arrange/ Assist	• Assist in identifying and addressing barriers • Provide resources • Assist in finding and consulting with appropriate providers, as needed • Arrange follow-up

Mental Health, Obesity and Aging

Mental Health and Obesity are Inextricably Interconnected

- Many with obesity also suffer from mental health issues
- Significant cause of functional impairment
- Some of the weight interventions to achieve WL may exacerbate MH → eating disorders

Aging, Mental Health & Obesity

- People with mental health disorders have an increased risk of obesity
- This risk ↑ with age

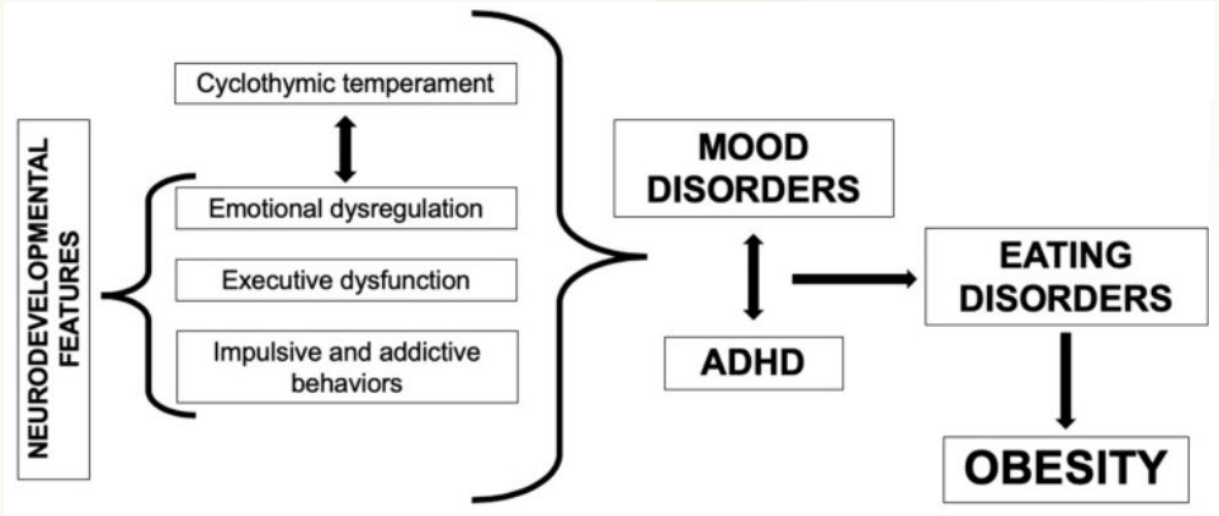
Depression in Midlife & Obesity

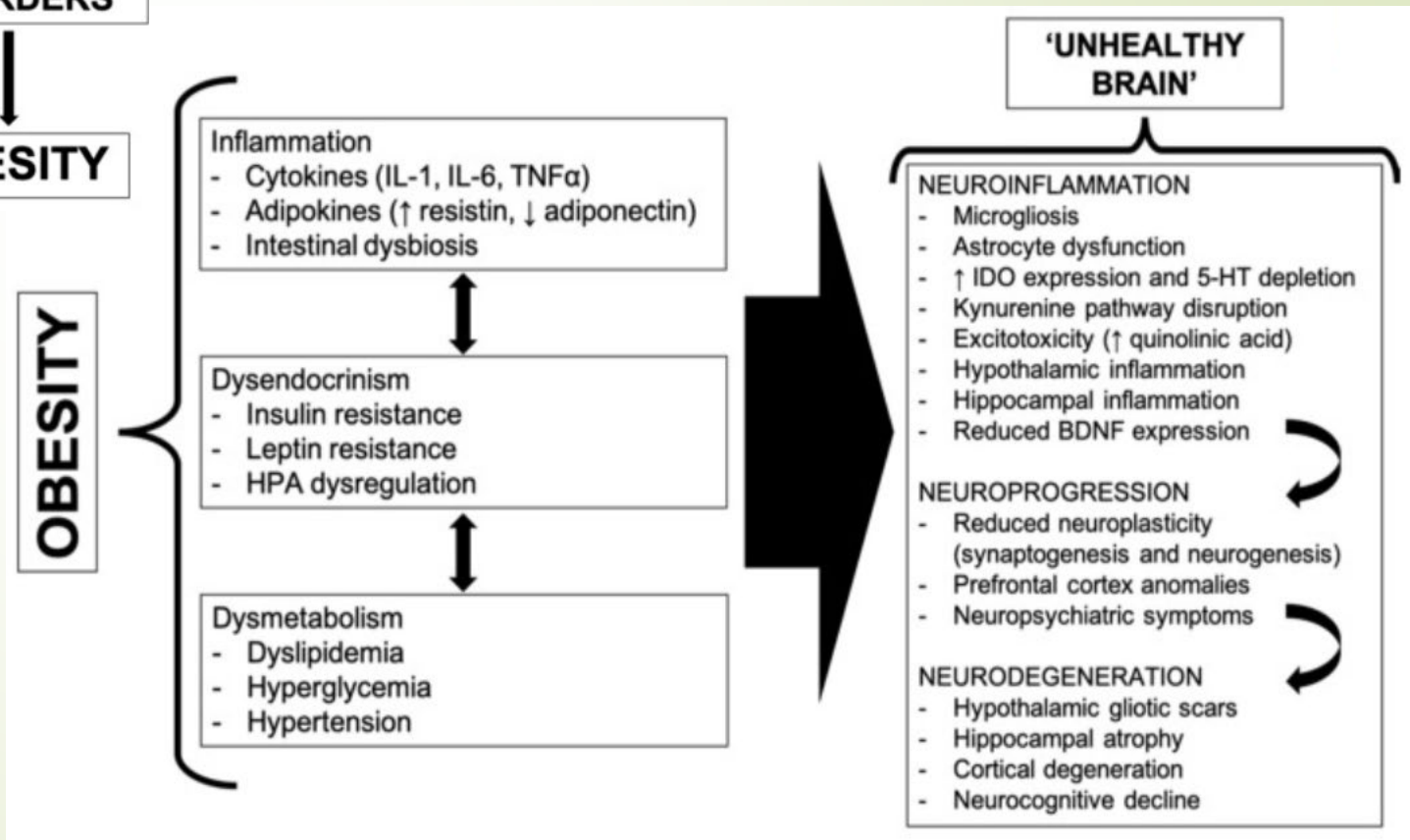
- Both general and central obesity at 45 years are associated with higher odds of depressive symptoms.
  - Relationship is more pronounced in women vs. men
- **We need to be aware of these trends and direct some of our questioning to find out how we can help people get the help that they need.**

Mental Health after Bariatric Surgery

- There is an increased prevalence of alcohol use and alcohol abuse after bariatric surgery
  - Although male sex is a predictor of alcohol use disorder, more women than men receive bariatric surgery and are also having an increase incidence of alcohol use
- For many, there is an improvement in mental health after bariatric surgery
  - Others have a recurrence of psychiatric disorders
- Mental health conditions are another pre-op predictor of weight regain or insufficient weight loss
  - Especially: binge eating disorder

Obesity is Caused by, and Causes, Fundamental Changes In Neurocircuitry





Figures: Weiss F, et al. *J Clin Med*. 2020;9(8):2344. Published 2020 Jul 23. doi:10.3390/jcm9082344

Emotional Regulation and Eating and Obesity

- **Definitions:**
  - Gorging – eating a large amount of food three times a day
  - Snacking – frequent consumption of snacks in between meals (often highly processed)
  - Grazing – repeated consumption of small amounts of food over an extended period of time – "lack of control over this eating"
  - Binge – loss of control of food intake, accompanied by mood disorder and body dysmorphia

Eating disorders contribute to ↑ in anxiety

→ loss of control of food intake

→ ↑ feelings of guilt

→ ↑ internalization of weight bias

Brain Structure, Obesity and Mental Health

- Obesity → metabolic problems → change in nerve fibers
  - Dopamine receptor ↓ → ↓ sensitivity to natural rewards

- Reward processes play a critical role in regulating human eating behavior and food intake.
  - ↓ in dopamine receptor activity → sharp ↑ in the consumption of high-fat foods
  - ↓ structural connectivity among frontal-temporal regions in the obese subjects

Treatment Of Anxiety Helps To Promote Weight Loss

- Stress/anxiety reducing strategies can augment weight reduction strategies
  - Stress → ↑ cortisol → ↑ visceral adiposity
  - ↓ Stress → greater adoption of healthier dietary patterns

Eating Disorders and Obesity

- High prevalence of eating disorders in people with high BMIs
  - Most prevalent is binge eating disorder
  - Binge eating → worsens mental health
- Cannot successfully manage weight without also managing eating disorder

Weight Bias/Stigma

Weight Bias and Obesity

- Weight stigma = Social rejection and devaluation that occurs to those who do not comply with prevailing social norms of adequate body weight and shape
- Most common sources of weight bias:
  - Family members
  - Classmates/Peers
  - Physicians, nurses, medical students and dieticians
- ***These experiences were most frequent and distressing during childhood and adolescence***
- ***Women*** — particularly stigmatized due to their weight across multiple sectors, including employment, education, media, and romantic relationships, etc.

Weight Bias and Obesity (cont.)

- **Weight stigma ↑ all-cause mortality**
  - People who reported experiencing weight discrimination had a 60% ↑ risk of dying, independent of BMI
- *Nationally representative US data shows that people who perceived that they have experienced weight bias are ~ 2.5x as likely to experience mood or anxiety disorders*

Weight Bias/Stigma and Consequences

- Weight bias/stigma is problematic
  - People with obesity face it from their peers, their communities, their health professionals, and from themselves
- Weight bias affects the quality of care that people with obesity receive because:
  - Less time is spent with the person
  - Avoidance of delivery health care and preventive services, e.g., pap smears
  - Clinicians may not offer the full array of options due to implicit bias
    - *"They won't do it anyway …"*
- Weight stigma may promote further weight gain and make mental health conditions worse
  - Use food to cope with stress
  - Avoid going to the gym
  - Have an unhealthy body image
  - Report higher stress

We are part of the problem…

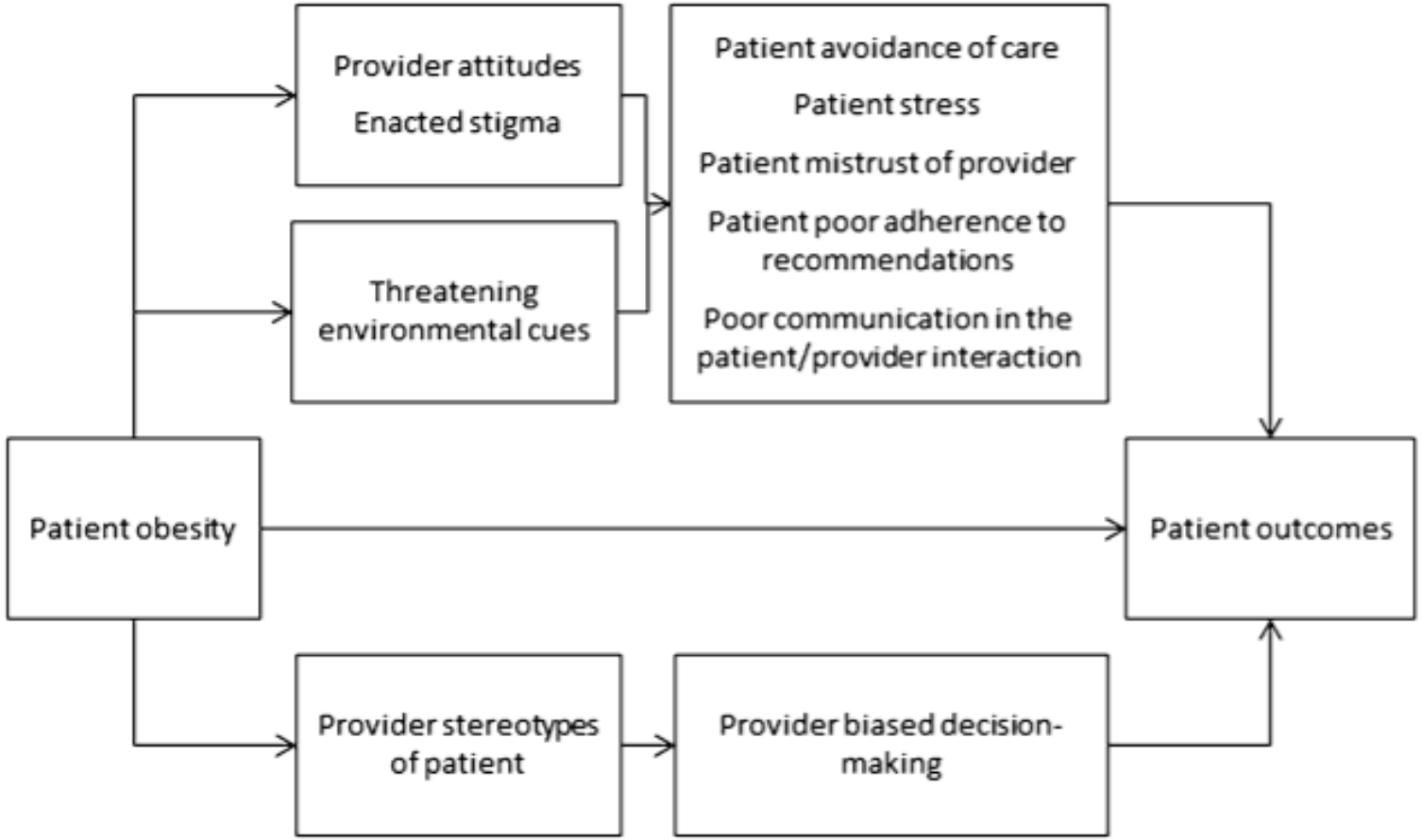


Figure 1 A conceptual model of hypothesized pathways whereby the associations between obesity and health outcomes are partially mediated by healthcare providers' attitudes and behaviours about obese patients, and patients' response to feeling stigmatized.

Figure: Phelan SM, et al. *Obes Rev*. 2015 Apr;16(4):319-26. doi: 10.1111/obr.12266. Epub 2015 Mar 5.

The Cycle of Obesity

Obesity, Maternal Health and Their Offspring

- Maternal obesity affects the health of the mother and of the child
  - Maternal impacts:
    - ↑ rate of miscarriage, pre-eclampsia, gestational diabetes, and thromboembolism
  - On the unborn child:
    - Compromised placental health, embryonic and fetal health
  - Effects that persist after birth:
    - ↑ BMI in childhood → adolescence → adulthood
    - ↑ risk of coronary disease, diabetes, stroke, asthma
    - Neurodevelopment (disrupted DNA methylation) → ↑ risk of depression and other mental illness and schizophrenia
    - Poor cognitive performance
    - Internalization problems
    - Problems with self-regulation (e.g., ADHD), autism

Adverse Childhood Experiences (ACEs) and Obesity

- ACEs are associated with obesity throughout a child's life, as well as well as poor neurocognitive health
  - ↑ ACEs associated with > obesity (**in particular abdominal adiposity**) and poorer neurocognitive effects (especially ≥4 ACEs)
- ACEs impairs one's ability to self-regulate
- ACEs can also affect a person's weight loss efforts

- **Remember: Weight bias and stigma may lead to ACEs**

ACEs and Risk of Obesity

- Girls may be more sensitive to obesity-related effects of ACEs than boys
- Sexual abuse appears to have a greater effect on childhood obesity than other ACEs
- Co-occurrence of multiple ACEs may be associated with ↑ childhood obesity risk
- The effects of ACEs may not be immediate, but are enduring
  - The effect of ACEs on development of childhood obesity may take 2–5 years to manifest
- LGBTQ adolescents are at ↑ risk for victimization and substance abuse
  - Also, at ↑ risk for weight victimization from family and peers

Neurodegenerative Diseases

Neurodegenerative Diseases and Obesity

- **Obesity and neurologic diseases have common processes that affect brain cell death**
- ↑ adiposity → inflammation + impaired insulin signaling → hyperglycemia → impaired cognitive processes
- Inflammation → ↑ oxidative damage → impaired mitochondrial function → neurotransmission dysfunction → cell death
- Obesity impairs neurodevelopment, memory and fine-motor skills
  - Associated with neurodegenerative diseases, e.g., AD, PD, and Huntington's disease
  - Associated with neurodevelopmental diseases such as autism, schizophrenia, and fragile X syndrome
- Maternal obesity affects cognitive function and mental health of offspring
  - Maternal obesity → inflammatory mediators → cross BBB during fetal development → ↑ risk for schizophrenia, ADHD and ASD

Neurodegenerative Diseases and Obesity

- The common mechanisms/pathways:
  - Insulin resistance
  - Pro-inflammatory cytokines
  - Oxidative damage → impaired brain development or cell death
- Independent of age, obesity is a risk factor for mild cognitive impairment
- Obesity doubles the risk for AD (diabetes may also contribute to this risk)
- Metabolic syndrome (central obesity, T2DM, HTN, HLD) ↑ risk for PD

Sleep Disorders

Mental Health and Sleep Disorders

- Stress → desire to eat carbohydrate rich of foods
- Stress → disrupted sleep
- Sleep modulates ghrelin and leptin, which affect appetite
  - ↑ ghrelin and ↓ leptin → ↑ appetite

Sleep Disturbances and Obesity

- Sleep durations:
  - Normal sleep: 7-9 hours
  - Short sleep: < 7 hours
  - Long sleep: >9 hours
- Short sleep is associated with overweight and ↑ intake of carbohydrates, total sugar, total cholesterol and total saturated fat
- Short and long sleep are associated with obesity
  - *Especially in women*
- Sleep deprivation → impaired secretion of satiety regulatory hormones
  - ↓ leptin (anorexic hormone)
- Prolonged wakefulness →
  - More time and possibility for food intake
  - ↑ the risk of weight gain

Brief Discussion on Pain

Neuropathic Pain and Obesity

- Obesity does not only cause musculoskeletal pain (i.e., associated with axial loading)
  - Knee pain is the #1 source of ambulatory visits for MSK complaints and # joint replacement in people with obesity
    - **Remember: 1lb of weight loss offloads 4lbs of force off the knees**
- Obesity is associated with neuropathic pain caused by nerve damage induced by inflammatory and oxidative damage, e.g.:
  - Migraines
  - Fibromyalgia
    - Neuropathic pain is often managed by weight promoting agents, e.g. gabapentin
- Some studies suggest that depressive mood disorder is considered a major risk factor for the development of pain
- Pain limits ADLs → even more pain

Pain and Bias and Discrimination (Part 1)

Key Findings from a Baseline Analysis Study: Racial and Weight Discrimination Associations with Pain Intensity and Pain Interference in an Ethically Diverse Sample of Adults with Obesity

– Merriweather E, et al. 28 June 2021, doi.org/10.21203/rs.3.rs-610924/v1.

- Adults and Non-Hispanic Blacks (NHB) with obesity have a **disproportionate burden of chronic pain.**
  - ~ 75% of adults with obesity have chronic pain compared with 20.4% of the U.S. population.
- High prevalence (59.1%) of moderate pain (4/10 or higher) and pain interference in adults with obesity.
- Experiences with racial discrimination (RD) – **significant predictors of pain intensity and pain interference** in NHB and Hispanic/Latino/a/x adults with obesity having various chronic pain conditions.
- Association between pain interference and racial discrimination is **moderated by gender identity.**
  - Results suggest that in an ethnically diverse sample of adults with obesity, men report more frequent experiences with racial discrimination. However, the association between the frequency of experiences with racial discrimination and pain interference is stronger in women.
- Participants who reported to have experienced weight discrimination had **significantly greater pain interference, higher pain intensity, more experiences with racial discrimination, and higher BMI.**
  - However, weight discrimination was not a significant predictor of pain intensity or pain interference after statistical adjustment for experiences with racial discrimination, age, and BMI.
- **From these findings, we can infer that weight and racial discrimination are experientially distinct phenomena, and thus, have a differential impact on the pain experience in adults with obesity.**

Pain and Bias and Discrimination (Part 2)

Key Findings from a Baseline Analysis Study: Racial and Weight Discrimination Associations with Pain Intensity and Pain Interference in an Ethically Diverse Sample of Adults with Obesity

– Merriweather E, et al. 28 June 2021, doi.org/10.21203/rs.3.rs-610924/v1.

- No racial or gender differences in pain intensity or pain interference.
- Chronic pain prevalence is **higher in NHB adults** compared with NHW adults in experimental and clinical settings.
- Further, Hispanic/Latino/a/x adults, particularly older adults, tend to have **lower pain ratings** and report less interference with functional activities compared with NHB and NHW adults.
- Results highlight the need to query the magnitude and impact of pain so that pain interventions could be successfully incorporated into a weight management program.
- Potential reason for the differences in the reported instances of racial discrimination between NHB and Hispanic/Latino/a/x adults with obesity:
  - Hispanic/Latino/a/x adults are not often specifically asked about the salient features of their experiences with racial discrimination such as language concordance, level of acculturation, and immigration status.

Physical Disabilities & Obesity

- People with physical disabilities also have a higher prevalence of obesity
  - Higher healthcare utilization
  - 50% of all healthcare utilization attributed to obesity come from adults with physical disabilities

Obesity Often Runs in the Family

It's not just biology …

- Just like with diabetes and other chronic conditions, there are genetic factors that can increase one's risk of developing obesity
  - However, just as important, there are societal, ethnic and racial factors that impact one's perception of body and weight
  - Access to healthy food, green spaces, level of activity, etc. also contribute to one's risk for developing obesity

- **We have a unique opportunity to impact familial obesity given that most of our guests are women.**
  - **Women can greatly influence and change many of the drivers of obesity.**

Questions???