

Neuropsychiatric Considerations in Treating Anorexia Nervosa Patients with Osteopathic Manipulative Medicine

Tara Talebi-Talghian OMS IV

Paulyna Schulz MS, OMS III

Teodor Huzij DO, FACN

Disclosures

Tara Talabi-Talghian – No disclosures

Paulyna Schulz – No disclosures

Dr. Teodor Huzij DO, FACN – No disclosures

Learning Objectives

1. Review the pathophysiology of anorexia nervosa.
2. Acknowledge the changes of touch perception in patients with anorexia nervosa.
3. Discuss the application of osteopathic manipulative medicine in the treatment of anorexia nervosa patients, with consideration of the associated pathophysiology.

Outline

Statistics

Anorexia nervosa

- Diagnostic criteria
- Pathophysiology

Touch perception


- CT afferents
- Processing affective touch

OMM and anorexia nervosa

Future research

A Moment
to Reflect





Every **52 minutes** a person dies due to consequences of an eating disorder.

Eating Disorder (ED) Statistics

- **28.8 million Americans** will develop an eating disorder in their lifetime
- Lifetime prevalence of EDs is 8.60% among females and 4.07% among males
- **Anorexia** has the highest case of mortality rate of ED and the **second-highest crude mortality of any mental illness.**
- Patients with anorexia nervosa are **18 times more likely** to commit suicide compared to those without eating disorders.

Anorexia Nervosa (AN)

Diagnostic Criteria

Deliberate restriction of energy intake, causing significantly low body weight.

- > 20yo: BMI < 18.5 kg/m²
- ≤ 20yo: BMI < 5th percentile for sex and age

≥ 1 of the following:

- Intense fear of weight gain
- Persistent behaviors that interfere with weight gain

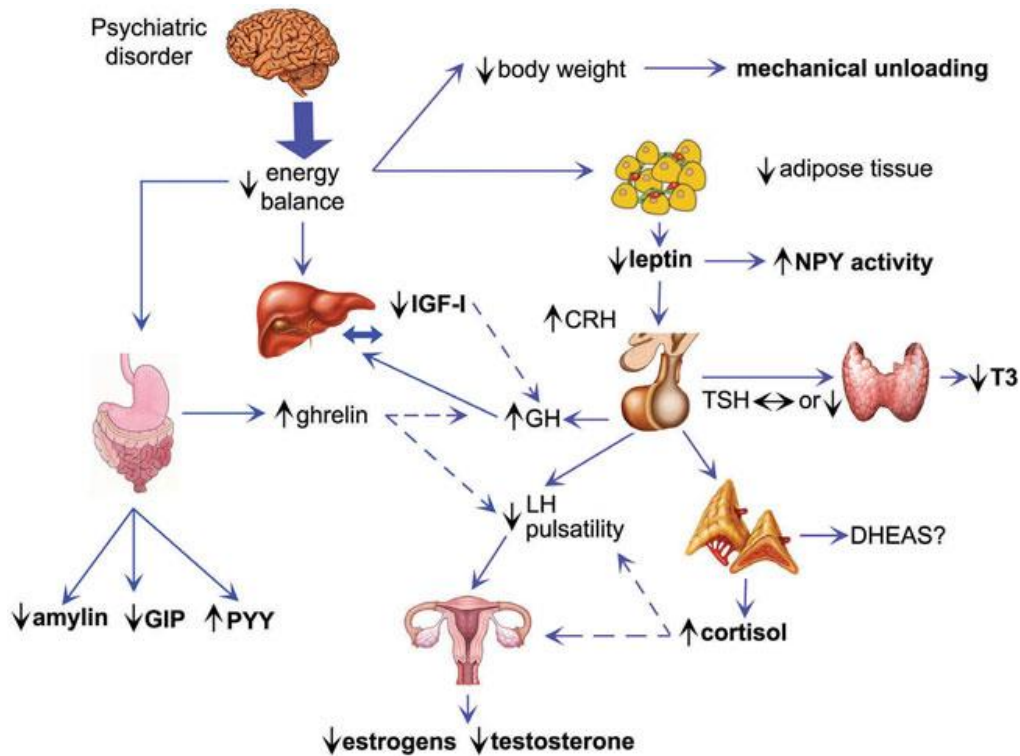
≥ 1 of the following:

- Body image disturbance
- Disproportionate impact of weight or body shape on self-evaluation
- Lack of acceptance of the seriousness of current low weight



Specifiers

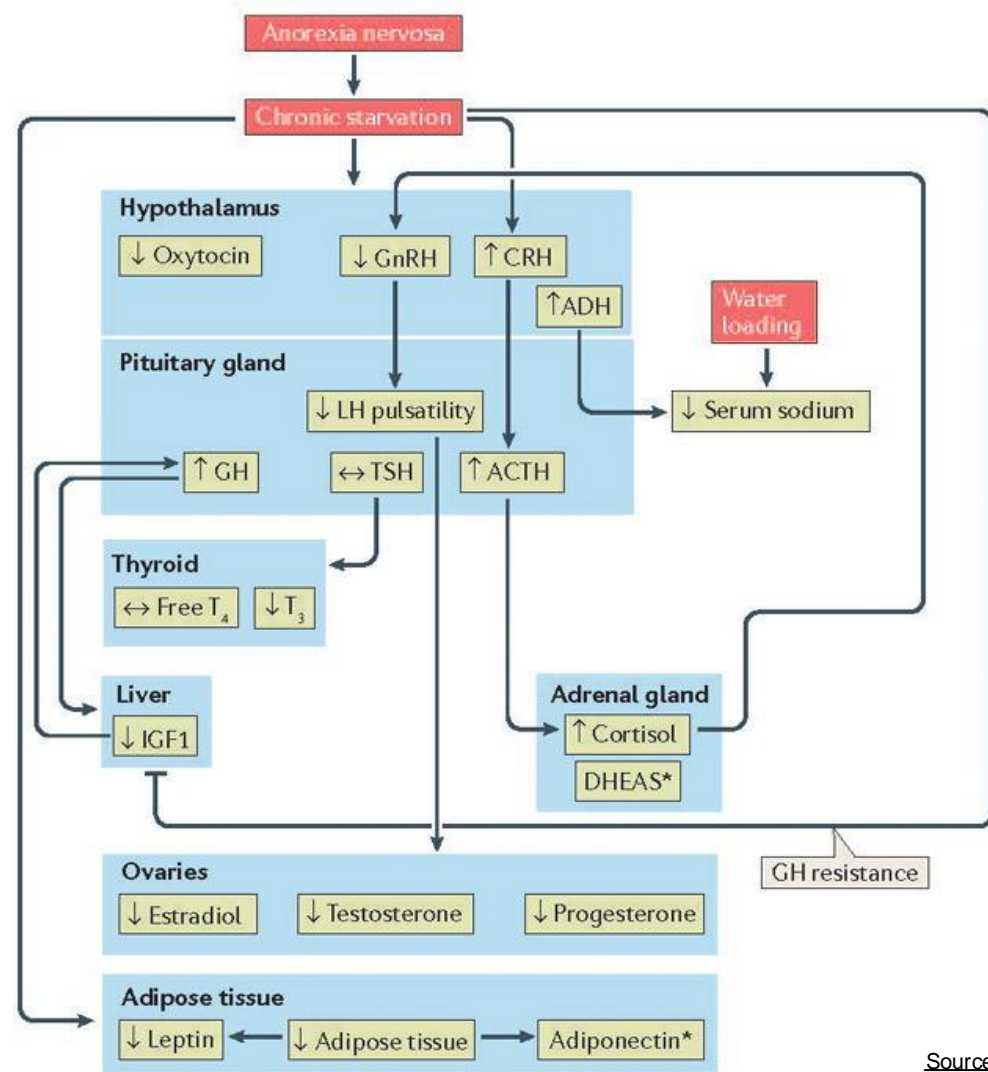
- **Restricting Type vs. Binge-Eating/Purging Type**
- **In Partial vs. Full Remission**
- **Severity**
 - Mild: BMI ≥ 17 kg/m²
 - Moderate: BMI 16-16.99 kg/m²
 - Severe : BMI 15-15.99 kg/m²
 - Extreme: BMI < 15 kg/m²



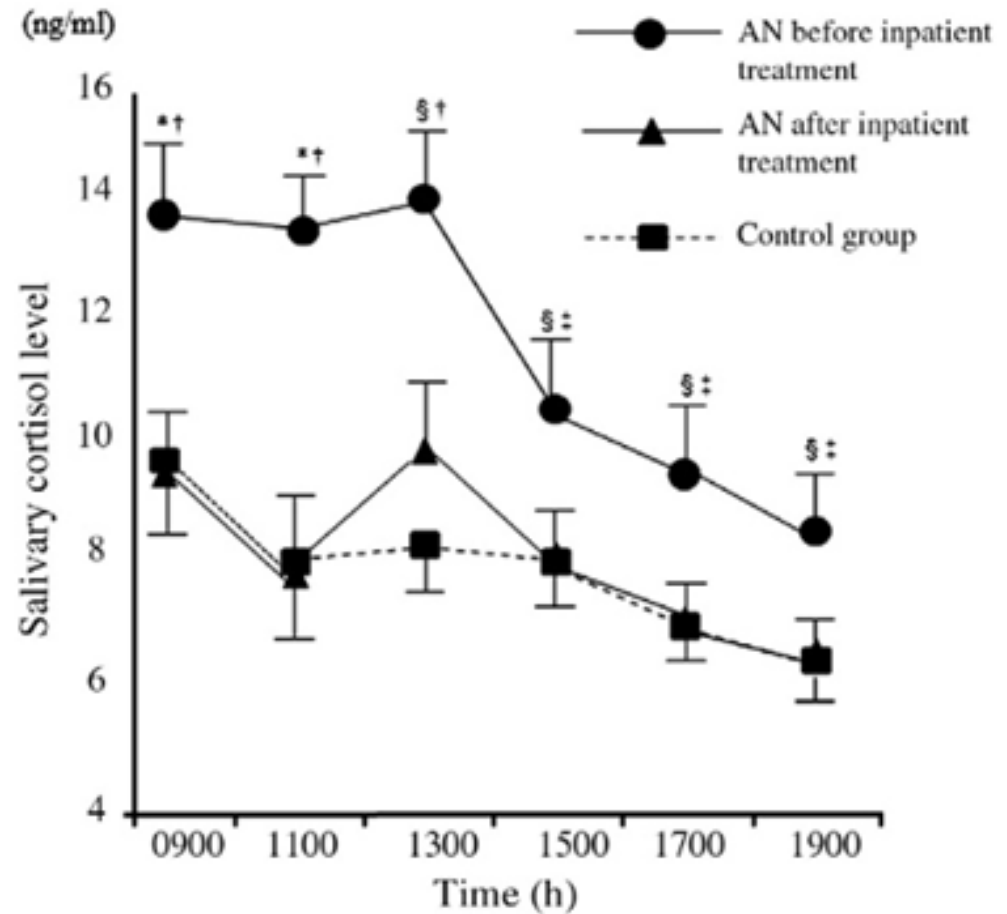
Pathophysiology of Anorexia Nervosa

Hypothalamus-Pituitary Adrenal (HPA) Axis and AN

- Increased levels of salivary/serum cortisol in adults with AN
 - Results in amenorrhea and low bone density
- Growth hormone resistance
 - Impacts longitudinal bone growth
- Nonthyroidal illness syndrome
- Hypoleptinemia

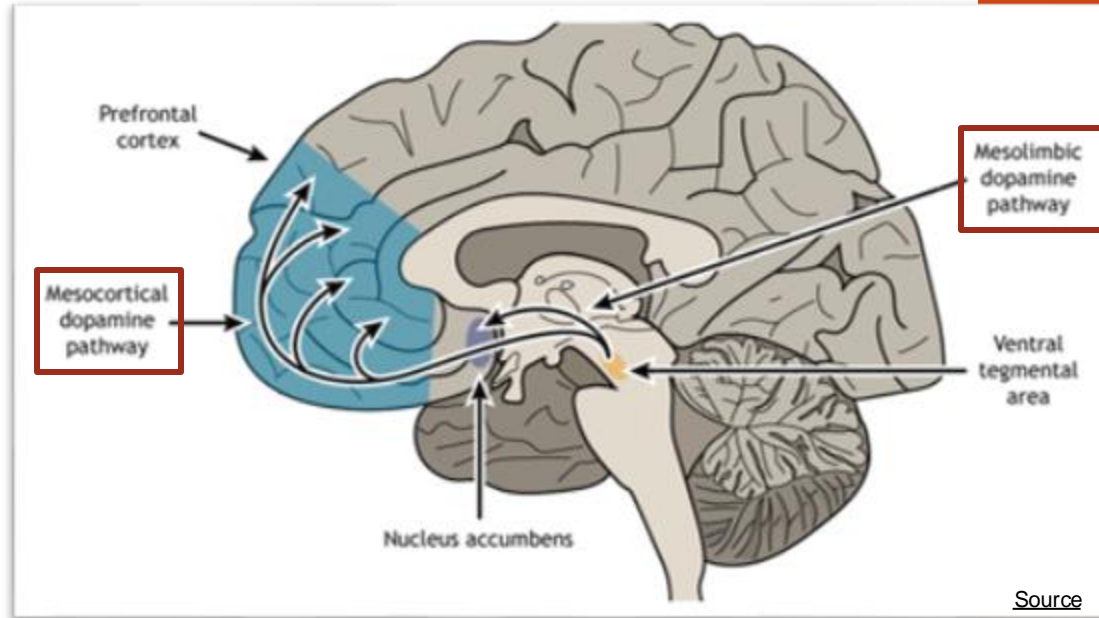


- 21 female adolescents with AN in Japan versus a control group
- Mean age 14.4 ± 1.4 years
- Treatment included weight restoration, normalization of eating, behavioral therapy and additional psychological therapies



Role of Dopamine

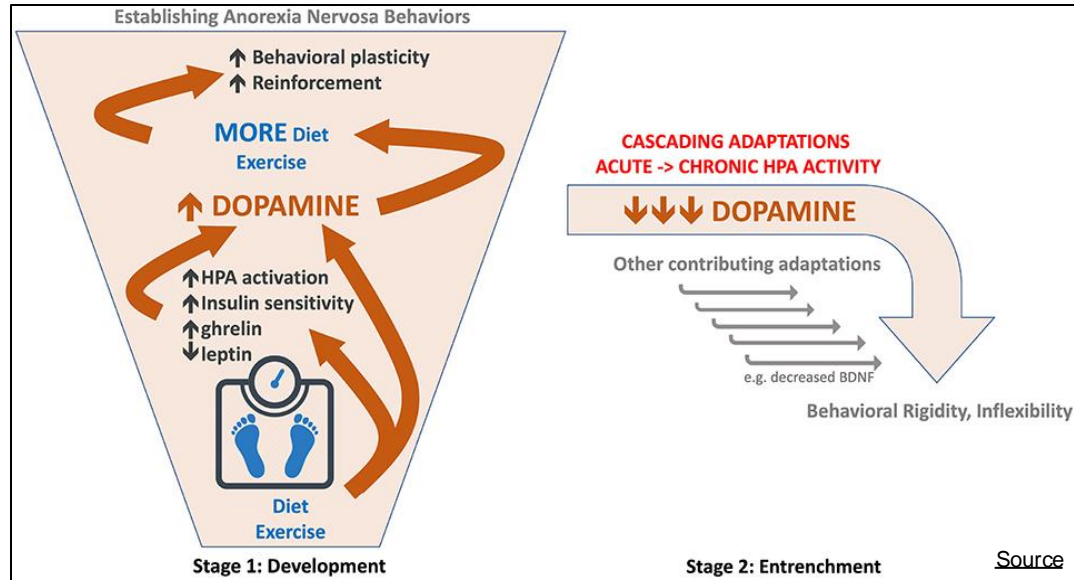
- Complicated and not completely understood
- Pathways involved in pathology: mesocortical and mesolimbic
 - Motivated behavior
 - Reward pathways
- AN patients have decreased homovanilic acid
- Negative correlation between striatal D2 receptors and body mass
- Weight restoration associated with increased D2/D3 receptor binding in the ventral striatum
- Leptin reduction in AN leads to increased dopamine signaling --> increase physical activity



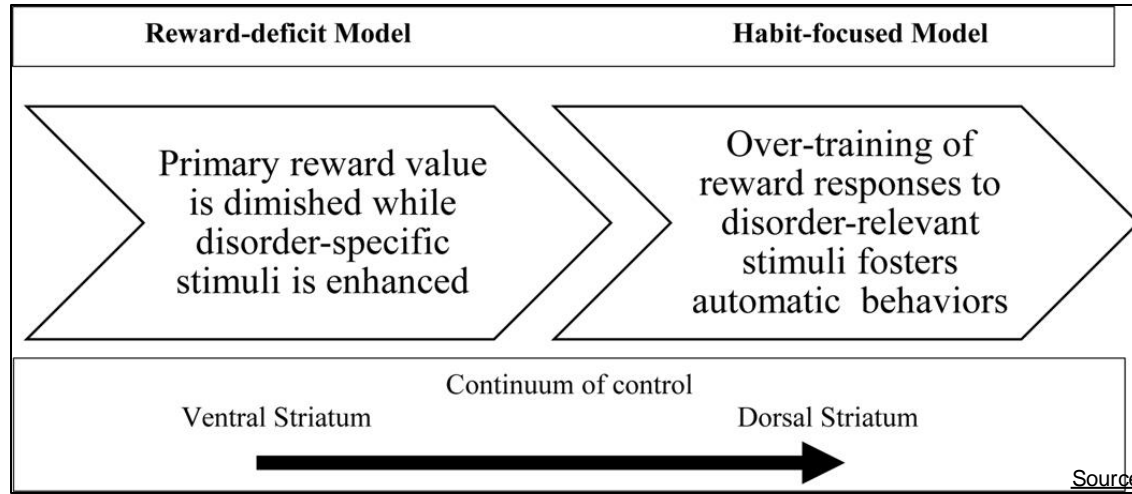
Source

Two Stage Theory of Dopamine

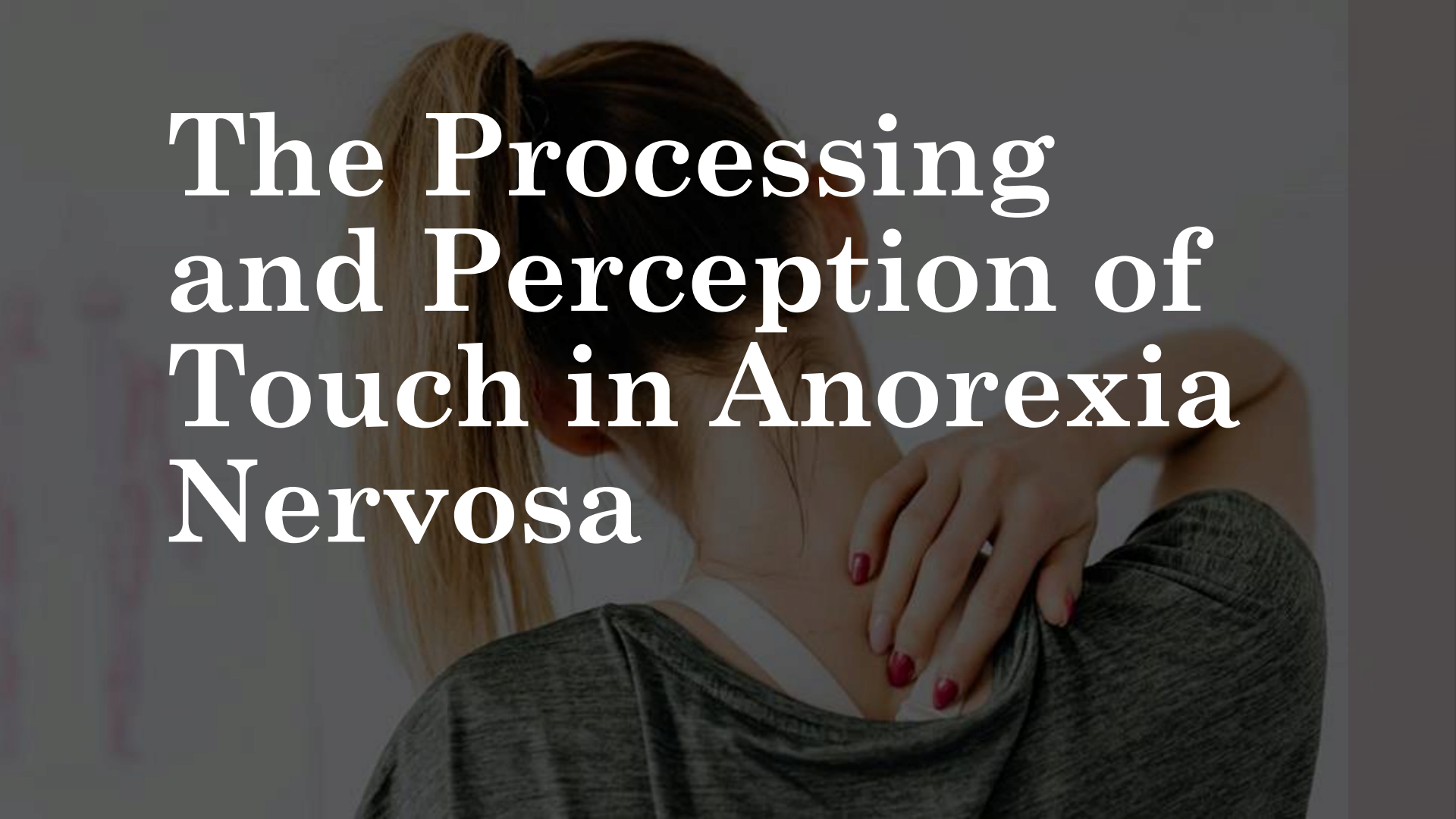
- Beeler & Burghardt (2022) theorize rise and fall of dopamine throughout the pathology of anorexia nervosa
- **Stage 1: Development of AN**
 - Rise in midbrain dopamine signaling
 - Acts like a psychostimulant fueling behaviors
- **Stage 2: Entrenchment of AN**
 - Dopamine falls due to chronic caloric restriction and HPA-axis activation



Reward-deficit Model vs. Habit-centered Model



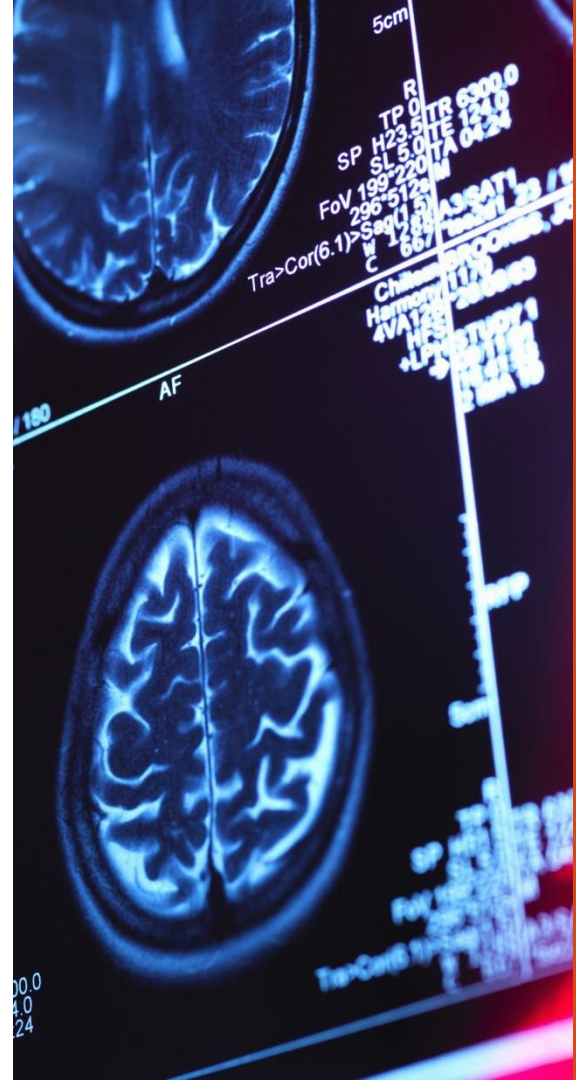
- Gorrell et al. (2020) published a review discussing dopaminergic activity in AN patients
 - Emphasis on driven exercise behavior seen in 80% of AN patients
 - **Reward-deficit model**
 - Alterations in the ventral frontostriatal network (reward-oriented) --> alters response to stimuli
 - **Habit-focused model**
 - Dysfunctions in the dorsal frontostriatal network take over --> behaviors become obligatory



The Processing and Perception of Touch in Anorexia Nervosa

What We Can't See

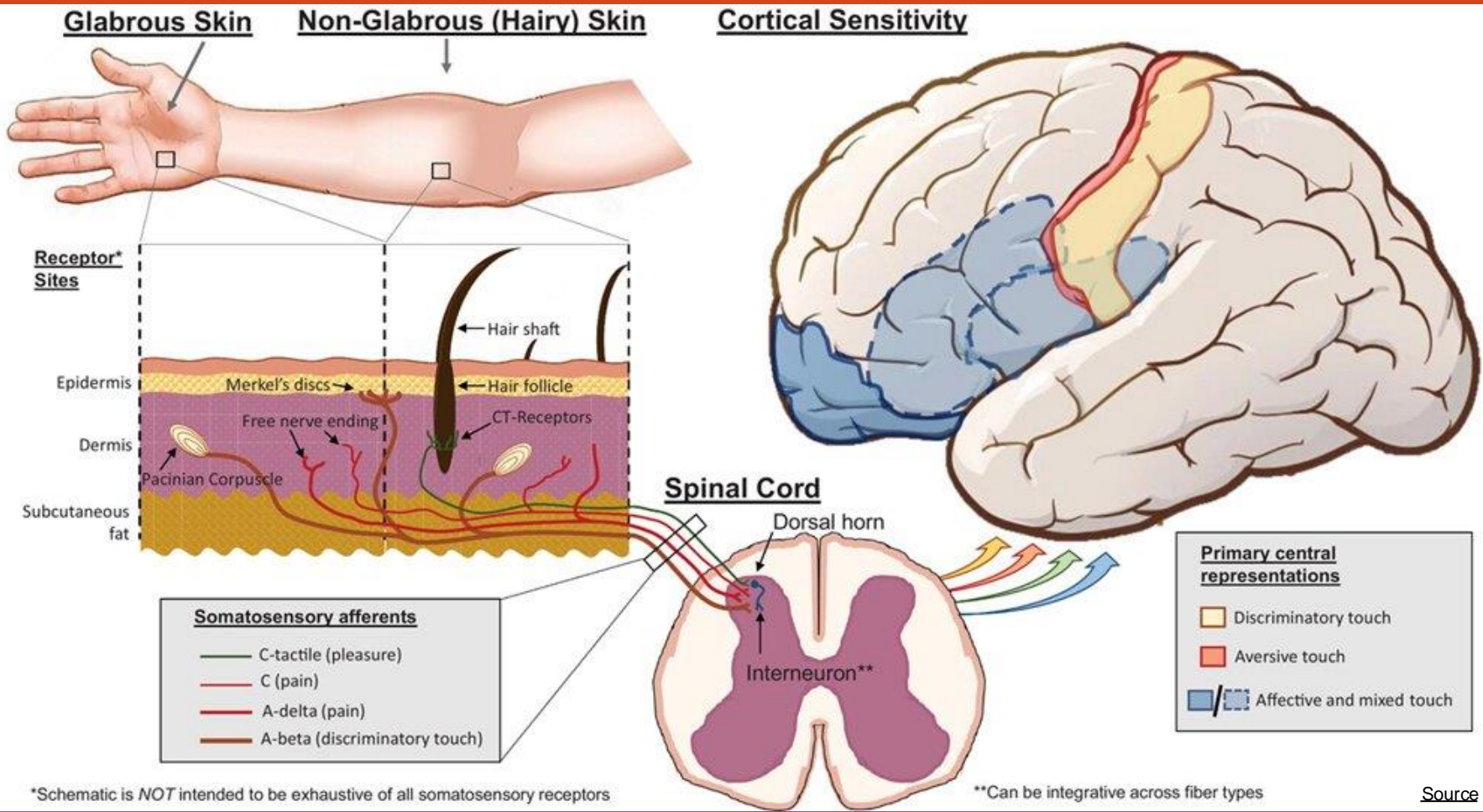
- Two-point discrimination studies
 - AN patients overestimate distance between tactile stimuli and images of body habitus.
- Body image disturbances linked to abnormal high-level neuronal processing of sensory information
 - Includes differences in perception of touch.



Exploring C Tactile (CT) Afferents

- **CT afferents:** unmyelinated low threshold mechanoreceptors involved in affective touch
- CTs play a major role in emotional regulation through contact with the posterior insular cortex, the gateway between sensory systems and emotional processing in the frontal lobe.
- Possible association with other regions of the brain that contribute to pleasantness, reward, safety, hunger and thirst.



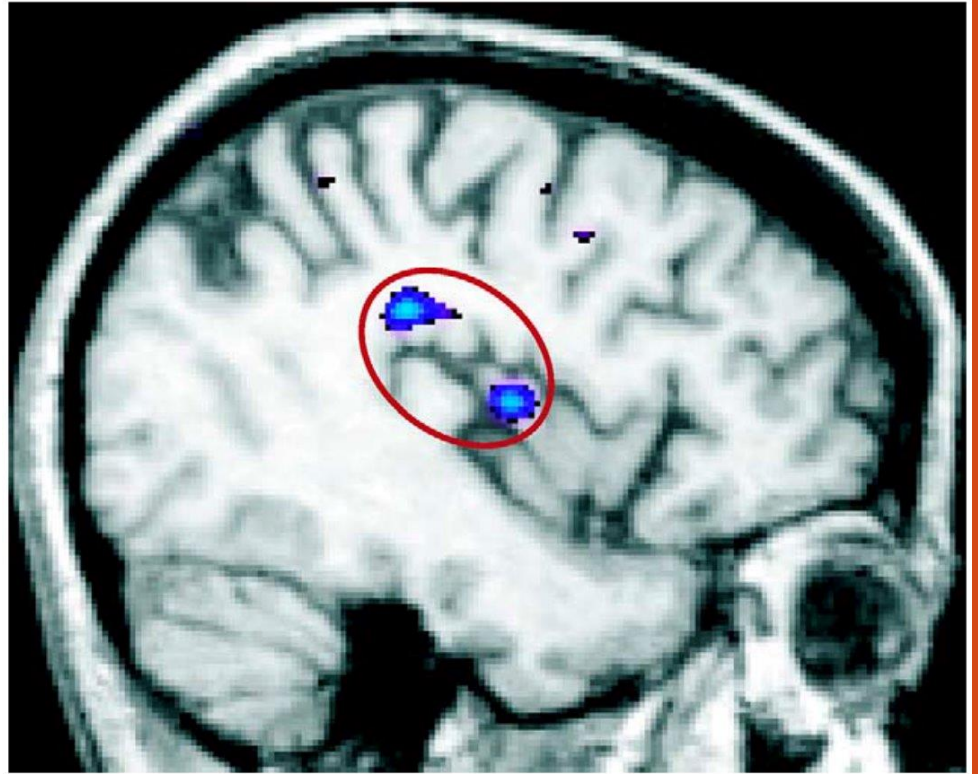


*Schematic is NOT intended to be exhaustive of all somatosensory receptors

**Can be integrative across fiber types

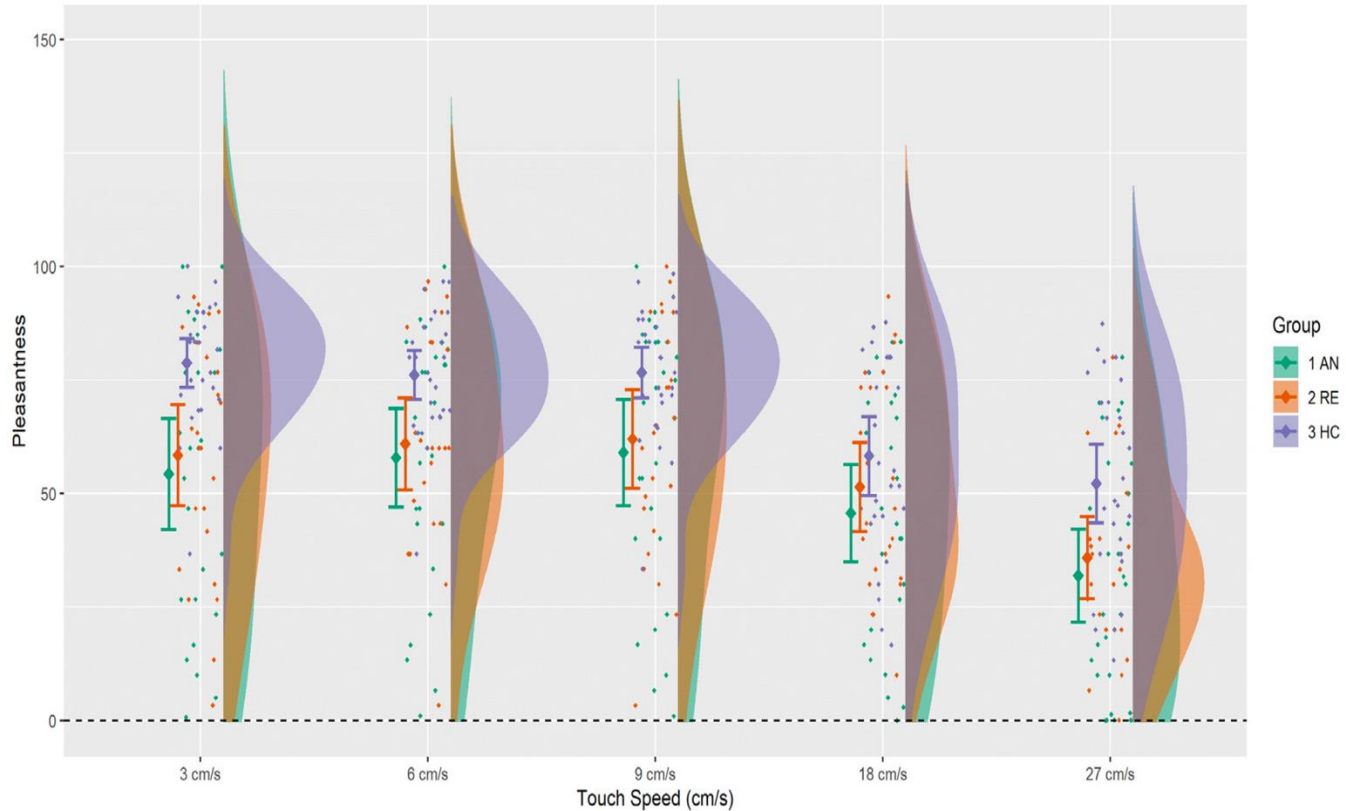
Processing Affective Touch

- Low threshold mechanoreceptors (AB) afferents and CT afferents play a role in touch sensation.
- CT afferents respond to slow and pleasant, gentle stimuli.
- Soft brush stroking involving CT afferents led to activation of the posterior insula

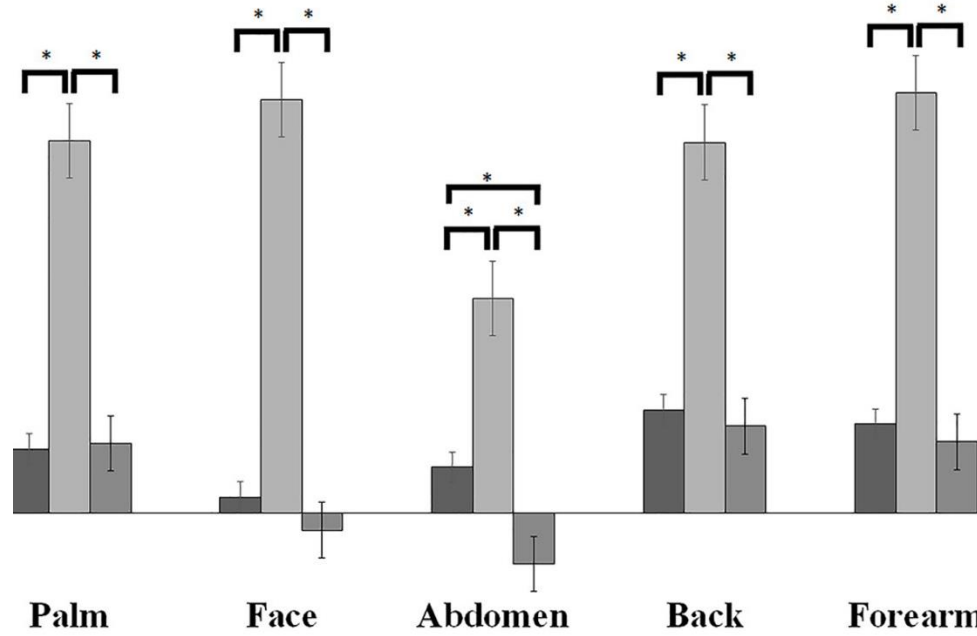


fMRI activation in posterior insular cortex evoked by CT afferent stimulation in subjects lacking AB afferents (Olausson, 2002)

Pleasantness Ratings Results



Touch Perception Across Body Sites



Using CTs to Find Abnormal Insula-Mediated Touch Processing in Patients with Anorexia Nervosa

- Davidovic et al., investigated the link between abnormal insula-mediated touch processing and altered perception of touch.
- Study compared AN patients to healthy controls (HC).
- Results reconfirmed that AN patients perceived touch as less pleasant than HC.
- Imaging showed reduced insular response in AN patients relative to HC.

Visuospatial and Somatosensory Cortical Processing

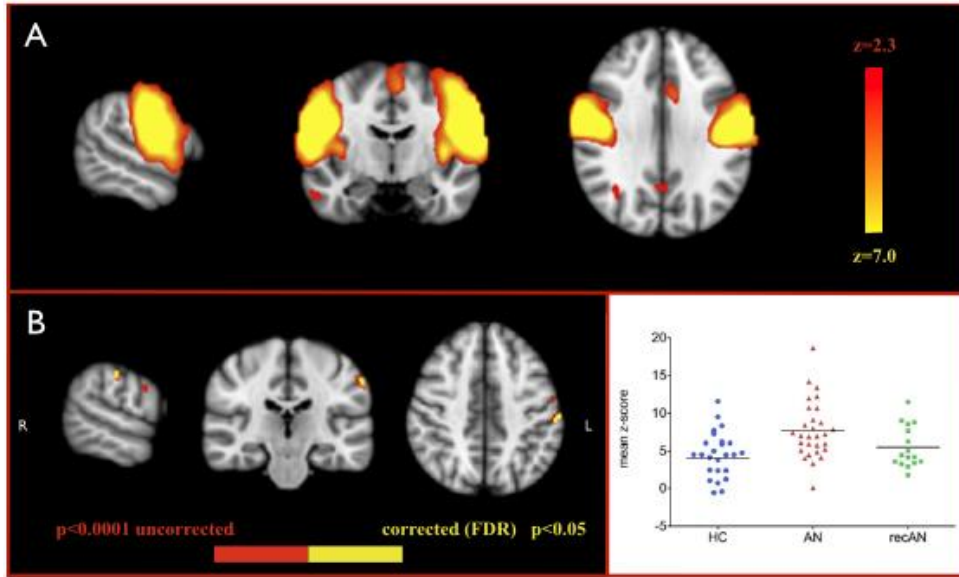
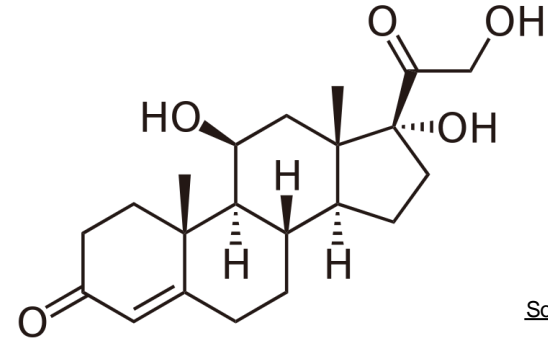


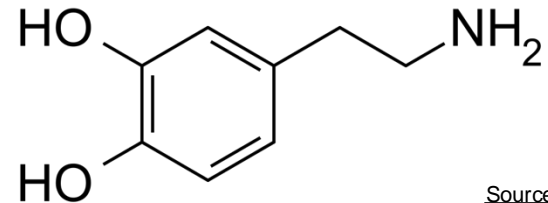
Figure 2. (A) Somatosensory network, threshold at $t > 2.3$; (B) area of significant difference (false discovery rate [FDR] corrected $p < .05$) between anorexia nervosa (AN) subjects and healthy women; peaks: $-60, -24, 42$ (Brodmann area 3), and $-39, -15, 66$ (Brodmann area 6); degree of coactivation increased on average by a factor of 3.5. Graph shows individual average coactivation in area of significant difference for the three groups. Analyses conducted with age, education, and handedness as covariates. HC, healthy control subjects; L, left; R, right; recAN, recovered anorexia nervosa group.

Pathophysiology Summary


- Alterations in the HPA-axis --> increased cortisol levels
- Mesocortical and mesolimbic dopamine pathways reinforce behaviors in AN
 - Increased D2/D3 receptor binding in the ventral striatum
 - Decreased leptin --> increased dopamine levels
- Insula and somatosensory cortex process sensory and emotional information through the activation of CT afferents.
 - Changes in CT-afferent processing
 - Reduced perceived pleasantness of touch
 - Lowest ratings of touch associated with the abdomen



Source



Source



OMM Requires Touch to Treat Patients

Touch Perception and Manipulative Treatment in Trauma Patients



Source

- PTSD patients
 - Increase release of oxytocin --> increased parasympathetic relaxation and decreased cortisol level
 - Improved emotional regulation
 - OMM helps normalize autonomic activity
 - Craniosacral therapy decreased headaches and anxiety-related symptoms
 - Potential exacerbation of PTSD specific symptoms
- Massage treatment for sexual abuse victims
 - Decreased depression, anxiety, and stress
 - Unchanged vs. increased negative attitudes towards touch

McGreevy, *European Journal of Integrative Medicine*. 2022

Field, *Journal of Bodywork and Movement Therapies*. 1997

Collebrusco, *Health*. 2018

Davis, *J Bodyw Mov Ther*. 2018

OMM in Anorexia Nervosa Patients

Osteopathic Approach to Anorexia Nervosa

1. The body is a unit; the person is a unit of body, mind, and spirit.
2. The body is capable of self-regulation, self-healing, and health maintenance.
3. Structure and function are reciprocally interrelated.
4. Rational treatment is based upon an understanding of the basic principles of body unity, self-regulation, and the interrelationship of structure and function

OMM in AN

- Sympathetics:
 - Rib raising
 - Viscerosomatics to thoracic spine
 - Adrenal
 - Gonadal
 - Ganglia
- Parasympathetics
 - Vagus
 - Sacral
- Cranial
 - Pituitary gland
- Lymphatics
 - Thoracic inlet
 - Diaphragms
 - Splenic and liver pump

Considerations of OMM in AN

- Location of treatment
 - Abdomen rated most unpleasant
- Increase levels of dopamine in AN
 - Benefit vs. concern?
- OMM could have its therapeutic effects via the CT afferents
 - Potential negative effects for AN patients due to altered perceptions of touch?



Questions?