Are bulimia nervosa traits associated with emotional modulation of pain and spinal nociception?

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Introduction

Research has shown that individuals with eating disorders evidence differences in pain sensitivity, but the mechanism(s) behind such differences are currently unknown. Additionally, bulimia nervosa (BN) is associated with mood lability and difficulty regulating affect. One potential mechanism that may explain differences in pain processing in BN specifically could be a disruption of emotional modulation of pain and spinal nociception given that: 1) pain is modulated by emotions and 2) BN is associated with emotion dysregulation. Prior studies have relied exclusively on subjective reactions to thermal and mechanical pain stimuli; therefore, assessing a different pain modality (electric) and a physiological correlate of nociceptive processing could help clarify these mechanisms. The present study used a well-validated paradigm to examine emotional modulation of pain and the nociceptive reflex (NFR).

Objective

To determine if there is a relationship between bulimia nervosa traits and emotional modulation of pain and spinal nociception.

Participants

- Healthy female participants: N = 35
- Endorsed symptoms (e.g., bingeing behavior) characteristic of bulimia nervosa (BN): n = 19
- Healthy controls (HC): n = 16

Exclusion Criteria:
- Age < 18 years
- BMI > 35
- Current acute illness
- Cardiovascular, neurological, and/or circulatory problems
- Chronic pain condition (e.g., back pain)
- Recent use of anxiolytic medication
- Current diagnosis of anorexia nervosa
- Recent psychological trauma

Procedure

- Informed consent obtained & Eating Disorders Inventory 3 (EDI-3) administered
- Electrode applied to the ankle over the sural nerve, EMG sensors applied to the biceps femoris muscle
- NFR threshold and pain threshold assessed by sending electrical stimulations to the left ankle over the sural nerve
- Level of stimulation intensity set at 120% of nociceptive flexion reflex threshold or pain threshold, whichever was greater
- Viewed series of emotionally-charged pictures while randomly receiving electric stimulations to each picture

Data Analysis

- Linear Mixed Models procedure in SPSS 17.0 was used
- Group (Controls vs. BN) was entered as a between-subjects variable
- Picture content (Mut, Neu, Food, & Ero) was entered as a within-subjects variable

Results: Pain & NFR

- Both groups showed a similar pattern of valence ratings (p < .001)
- Relative to neutral, mutilation pictures were rated as the most unpleasant, while food and neutral pictures were rated as the most pleasant

- BN had higher arousal ratings in response to food pictures, compared to controls (p < .001)

Conclusions

- The group difference is spinal nociceptive processing in BN relative to controls may stem from emotional dysregulation in BN, possibly contributing to differences in pain processing in this group
- Emotional dysregulation may promote sensitization of nociception at the spinal level

Methods: Nociceptive Flexion Reflex (NFR)

- Stimulating electrode over sural nerve
- Biceps femoris EMG sensors

- Nociceptive Flexion Reflex (NFR) Threshold: Biceps femoris EMG activity in the 90-150 ms post-stimulus window
- NFR Magnitude = mean of Biceps femoris EMG in 90-150 ms post-stimulus interval (max/min of 60 ms pre-stimulus interval
- NFR magnitude correlates with pain ratings
- Pain Threshold: Defined as the stimulation intensity at which pain is first experienced and is rated 50 on the NRS

- Unpleasant (Mutilation; Mut)
- Neutral (Neu)
- Pleasant (Food)
- Pleasant (Erotopics; Ero)

Picture Viewing: Emotion-Induction

- 32 pictures presented in pseudorandom order
- 8 pictures per content (mutilation, neutral, food, & erotic)
- Pictures presented for 5, 12-22 s inter-picture interval
- Valence and arousal ratings made after the presentation of each picture

- Self-Assessment Manikin (Bradley & Lang, 1994)
- Valence Ratings: 1 (unhappy) to 9 (happy)
- Arousal Ratings: 1 (calm) to 9 (excited)
- Subjective emotional reactions assessed following presentation of each picture

Results: Valence & Arousal

- Both groups showed a similar pattern of valence ratings (p < .001)
- Relative to neutral, mutilation pictures enhanced pain and erotic pictures inhibited pain, but food pictures did not modulate pain in either group

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