Further Validation of the Emotional Controls (ECON) Paradigm: What Types of Emotional Picture Contents Best Modulate Pain and Nociception?

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Introduction

In previous studies, emotion generated by a picture-viewing protocol has been shown to reliably modulate pain and physiological nociceptive reactions. The present study used 7 picture contents (mutilation, attack, death/trauma, neutral, families, sports/adventure, erotica) that ranged in valence (unpleasant to pleasant), as well as in arousal (low to high), to determine how each emotional category regulates pain/nociception. Given our previous knowledge that emotion modulates pain, and that the most reliable modulation of pain and nociceptive reactions occurs during the most emotionally intense pictures, this study sought to enhance our understanding of this phenomenon.

Noxious Stimuli and Subjective Pain

Picture-Viewing: Emotion Induction

The International Affective Picture System (IAPS; Center for the Study of Emotion and Attention, 2006) was used to elicit a range of unpleasant to pleasant valence (unpleasant to pleasant), as well as in arousal (low to high), to determine how each emotional category regulates pain/nociception. Given our previous knowledge that emotion modulates pain, and that the most reliable modulation of pain and nociceptive reactions occurs during the most emotionally intense pictures, this study sought to enhance our understanding of this phenomenon.

Objective

The aim of this study was to examine the effect of picture content on pain modulation and nociception, and also to extend previous work by demonstrating which picture contents elicit the strongest emotional modulation.

Participants

- 120 Healthy Participants
  - Characteristics: 47 Men, 73 Women; White non-Hispanic (76%), single (75%), employed (76%), average yrs education = 15 yrs (SD=2.56), average age = 35 yrs (SD=15.00)
  - Exclusion Criteria: < 18 years of age
  - Current acute illness
  - Cardiovascular, neurological, and/or circulatory problems
  - Recent use of analgesic, antidepressant, anxiolytic, or antihypertensive medication
  - Recent psychological trauma
  - Specific phobia of snakes or spiders (picture-viewing)
  - Any chronic pain
  - Raynaud’s disease

Procedure

- 108 pictures presented in pseudorandom order
- Stimulating electrodes
- Noxious stimulations to sural nerve
- Pain-Evoked Skin Conductance: most reliable modulation of pain and nociceptive reactions occurs during “mutilation” pictures and the greatest inhibition occurred during “erotic” pictures
- Nociceptive Flexion Reflex (NFR) Magnitude
- Pain-Evoked Heart Rate
- Pain-Evoked Blink

Results

- Main effect of Picture Content on Pain-Evoked Skin Conductance: $F = 6.32, p < 0.001$
- Main effect of Picture Content on Pain-Evoked Heart Rate Acceleration: $F = 11.93, p < 0.001$
- Pain-Evoked Blink
  - Main effect of Picture Content on Pain-Evoked Blink: $F = 6.12, p < 0.001$

Conclusions

- As expected, relative to neutral pictures, unpleasant pictures led to greater displeasure and pleasant pictures lead to greater pleasure
- Moreover, there was significant variability in reported arousal from unpleasant contents (mutilation>attack>death) and pleasant contents (erotica>adventure>families)
- The most reliable modulation of pain and nociceptive reactions occurred during the most emotionally intense pictures: greatest facilitation of pain and nociceptive reactions occurred during mutilation pictures and the greatest inhibition occurred during erotic pictures
- These results support past research, suggesting that the ECON paradigm is a valid and reliable methodology for studying emotional modulation of pain and nociception
- This study extends that work by demonstrating that mutilation and erotica are the categories that elicit the strongest emotional modulation