Simultaneously Assessing the Influence of Habituation and Emotion on Pain and Nociceptive Processes


Department of Psychology, The University of Tulsa, 800 South Tucker Drive, Tulsa, OK 74104

Introduction
Emotional processing is associated with a complex supraspinal circuit that has substantial overlap with, and connections to, nociceptive systems. Given that emotion is known to influence pain modulation, it is important to have reliable experimental models to study their interactions. Across 3 independent studies our laboratory has shown that emotional pictures reliably modulate pain and physiological nociceptive responses (Nociceptive flexion reflex (NFR), heart rate (HR) acceleration, skin conductance response (SCR)), a procedure referred to as emotional controls of nociception (ECON). Randomly-ordered emotionally-charged pictures were presented while noxious electrocutaneous stimuli were delivered. Consistent across these studies, pleasant pictures inhibited pain and unpleasant pictures enhanced pain. This study attempts to demonstrate that the interpretation of emotional modulation is not confounded by habituation of pain-related responses.

Objective
To determine if habituation of pain-related responses confounds, the interpretation of emotional modulation, given that multiple noxious stimuli are delivered during picture presentation.

Participants
120 Healthy Participants
- Characteristics: 47 Male, 73 Female; White non-Hispanic (n=157), single (n=195), employed full-time (n=91), average yrs education = 15 yrs (n=2.66), average age = 35 yrs (n=15).

Procedure
Picture-Viewing: Emotion Induction
The International Affective Picture System (IAPS; Center for the Study of Emotion and Attention, 1999).

Data Analysis
- Analysis of habituation: ANOVA with stimulus as independent variable.
- Analysis of emotion modulation: 3 (picture valence: unpleasant, neutral, pleasant) x 4 (picture Block) mixed effects ANOVA.
- Simple effects of Picture Valence were conducted using Bonferroni adjusted mean comparisons for unpleasant vs. neutral and pleasant vs. neutral.

Results
Measurement of Subjective Pain
- NFR magnitude: average biceps femoris EMG in the 50-150 ms post-shock interval minus the average EMG response during the 60 ms pre-shock interval divided by the pooled S.D.s of the two intervals.

- Blink reflexes decreased between block 3 and 4.

Conclusions
- Valence and arousal ratings demonstrate that the pictures effectively manipulated emotion within and across picture blocks.
- The main effect of Block was noted for NFR, blink reflexes, and HR, suggesting significant habituation over time for these measures.
- The Picture Valence x Picture Block interaction was not significant in pain-evoked responses, indicating habituation does not pose a problem for affective modulation of pain/nociception as long as the picture presentation design takes into account NFR, blink reflexes, and HR response.