

INTRODUCTION

The exact mechanisms for the catastrophizing-pain relationship are unknown. However, catastrophizing does not correlate with the nociceptive flexion reflex (NFR) threshold – a measure of spinal nociception. This suggests catastrophizing does not directly activate descending mechanisms that alter afferent nociception at spinal levels. Alternatively, catastrophizing may alter ascending nociception and pain indirectly through emotional processes.

Research in our laboratory has shown that positive emotions inhibit nociception, whereas negative emotions enhance it. Hence, catastrophizing could enhance pain by exacerbating negative emotional responses, inhibiting positive emotional responses, or both. However, catastrophizing could also enhance pain by altering the influence of emotion on pain without necessarily altering emotional responses themselves (by influencing mechanisms of negative affect-induced facilitation or positive affect-induced inhibition).

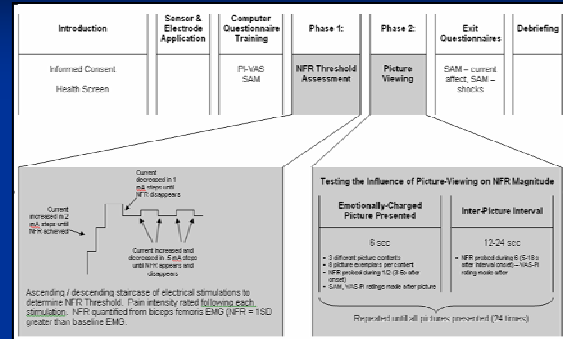
OBJECTIVES

- To determine whether catastrophizing moderated participants' emotional reactions to emotionally-charged stimuli
- To determine whether catastrophizing moderated the influence of emotion on nociceptive reactions

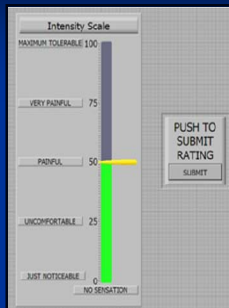
PARTICIPANTS

- 53 Undergraduates
 - Combined data from two similar studies
 - Females (N=38), Males (N=15), White, non-Hispanic (77%), Single (87%), Average Years of Education (15), Average Age (22)
- Exclusion Criteria
 - < 18 years of age
 - Chronic medical problems (diabetes, Raynaud's disease, neurological disorders, kidney disorders)
 - Cardiovascular problems (history of heart attack, stroke, or heart surgery; angina; arteriosclerosis; atherosclerosis; heart arrhythmia; carditis or endocarditis; hypertension)
 - Circulatory problems
 - Chronic pain
 - Recent use of analgesic, antidepressant, or anxiolytic medication
 - Specific phobia of snakes or spiders
 - Recent psychological trauma
 - Current acute illness

PROCEDURE

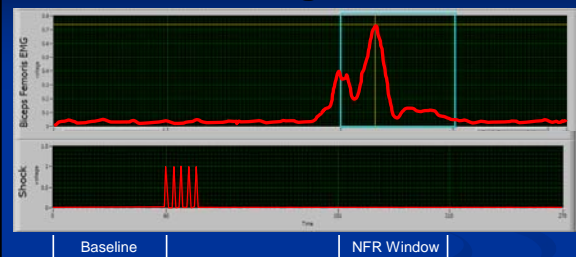


NOCICEPTIVE REACTION: NFR And Pain Measurement




- **Stimulating Electrode**
 - Placed over retromalleolar pathway of sural nerve on left ankle
 - 5 rectangular wave pulses of 1-ms duration with 3-ms ITI
- **Recording Electrodes**
 - Placed over left biceps femoris muscle 10 cm superior to popliteal fossa
- **Visual Analogue Scale**
 - Pain ratings made after each stimulation

NOCICEPTIVE REACTION: NFR Magnitude



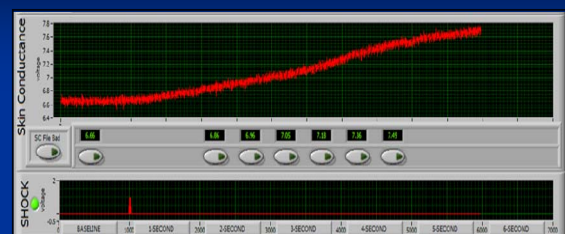
- NFR Magnitude = mean of biceps femoris EMG in 90-150 ms post-stimulus interval minus mean of 60 ms pre-stimulus interval

NOCICEPTIVE REACTION: Heart Rate Acceleration



- Electrocardiogram (ECG) – recorded from left and right forearms
- ECG was converted offline to heart rate in beats per minute from interbeat interval
- HR Acceleration defined as the maximum increase in the 1-5 s post-stimulation window


NOCICEPTIVE REACTION: Skin Conductance Response



- Measure of sympathetic arousal
- Sensors attached to palmar surface of index and middle fingers
- SCR defined as maximum increase in 1-4 s post-stimulation window

PICTURE-VIEWING

The International Affective Picture System (IAPS)
(Center for the Study of Emotion and Attention, 1999)




Unpleasant Neutral Pleasant

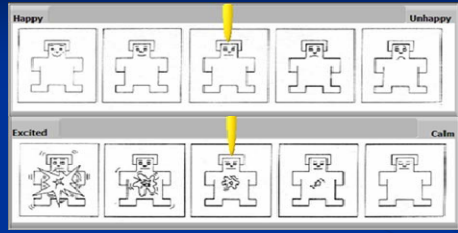
- 24 pictures presented in pseudorandom order
- 8 pictures per category
- Pictures presented for a duration of 6 s

PICTURE-VIEWING

- Noxious Stimulations to Sural Nerve of Left Ankle
 - Intensity = 1.2x NFR threshold
 - Delivered 3-5 s following picture onset during 50% of pictures (balanced across picture content)
 - Pain ratings made following each stimulation



EMOTION-INDUCTION: Manipulation Checks



- (SAM) Self-Assessment Manikin (Lang, 1980)
 - Valence (Pleasure) Ratings: 1 (Unhappy) to 9 (Happy)
 - Arousal Ratings: 1 (Calm) to 9 (Excited)
 - Subjective emotional reactions assessed following presentation of each picture

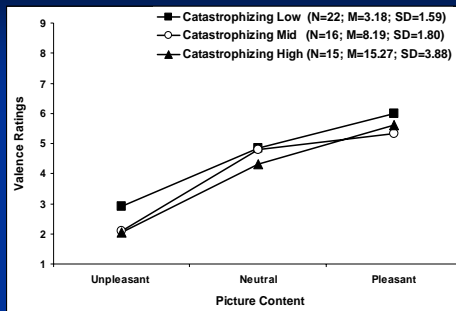
DATA REDUCTION

- Four nociceptive reactions to electric stimulations were assessed (subjective pain, nociceptive flexion reflex magnitude, heart rate acceleration, skin conductance response), standardized, and averaged by picture valence

ANALYSES

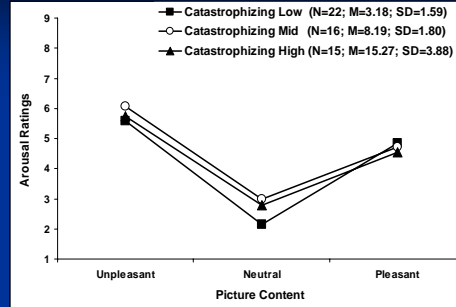
- Valence and Arousal analyses: Individual 1-way (Picture Content) ANCOVAs
- Nociceptive Reactions analysis: 3 (Picture Content) x 4 (Nociceptive Reactions) MANCOVA
- Catastrophizing entered as a covariate into models to test Catastrophizing x Picture Content interaction
- Wilk's Lambda interpreted to overcome sphericity
- Partial eta-squared (η^2) reported as effect size

RESULTS: Valence Ratings



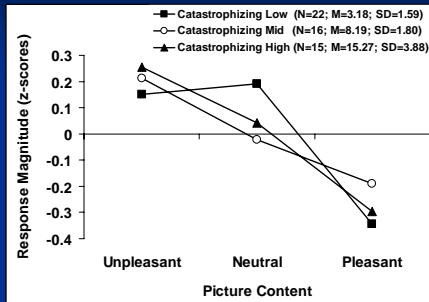
The effect of catastrophizing on valence ratings was not significant, $F(2,50)=1.46$, $p=.241$, $\eta^2=.47$

RESULTS: Arousal Ratings



The effect of catastrophizing on arousal ratings was not significant, $F(2,50)=1.27$, $p=.291$, $\eta^2=.53$

RESULTS: Multivariate Combination of Nociceptive Reactions



The effect of catastrophizing on nociceptive reactions was not significant, $F(2,50)=1.08$, $p=.346$, $\eta^2=.24$

CONCLUSIONS

- The Catastrophizing and Picture Valence interaction was not significant in any model
 - Catastrophizing does not influence pain by indirectly altering emotional reactivity
 - Catastrophizing does not moderate the influence of emotion on nociceptive reactions (subjective pain, nociceptive flexion reflex magnitude, heart rate acceleration, skin conductance response)