

# The relationship between pain catastrophizing and experimental pain sensitivity across the menstrual cycle

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## Introduction

Pain catastrophizing is a maladaptive coping strategy associated with enhanced pain. The menstrual cycle is also known to influence pain, with increased pain sensitivity generally experienced during the luteal phase compared to the follicular phase. Participants attended 3 laboratory visits. During Visit 1, participants were instructed how to monitor their menstrual cycle and completed the Pain Catastrophizing Scale (PCS) with traditional instructions to assess trait-like pain catastrophizing (T-Catas). Visits 2 & 3 were pain testing sessions conducted during follicular and luteal phases. During each testing session, pain sensitivity was assessed from the nociceptive flexion reflex (NFR) threshold, electrocutaneous pain threshold and tolerance, and MPQ sensory and affective ratings of electrocutaneous stimuli. Moreover, situation-specific catastrophizing (SS-Catas) was assessed at each testing session by asking participants to fill out the PCS while thinking back on their catastrophic cognitions during the electrocutaneous stimulations. This study assessed whether pain catastrophizing and the pain catastrophizing-pain sensitivity relationship varies by menstrual cycle phase.

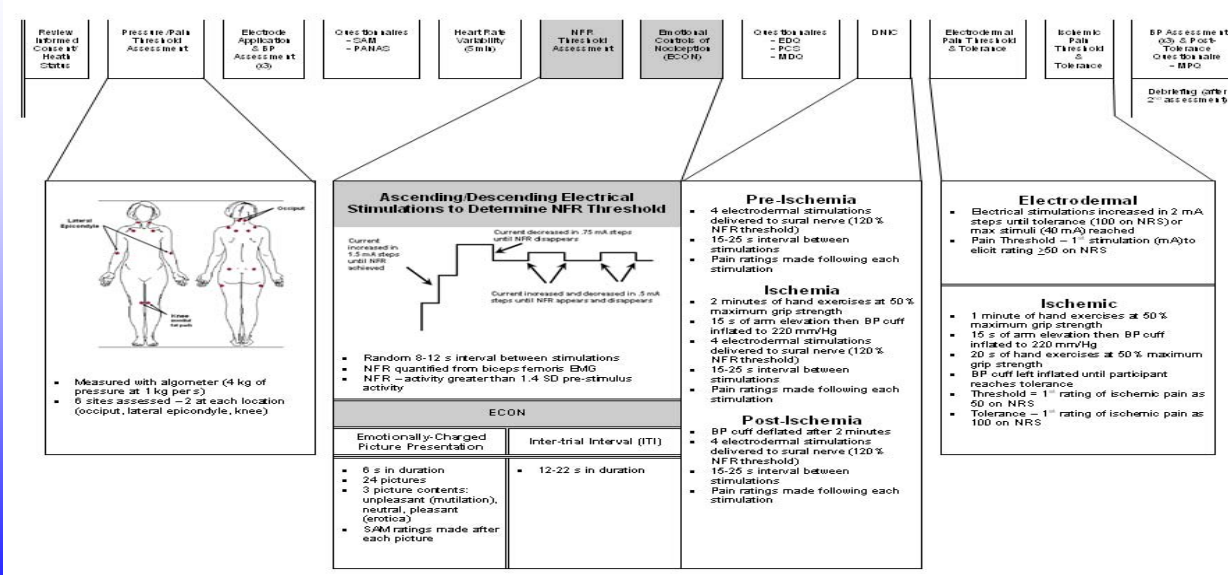
## Objective

To assess T-Catas and SS-Catas predict pain sensitivity (pain threshold, pain tolerance, McGill sensory/affective pain ratings) across the menstrual cycle  
Determine if relationships between catastrophizing and pain sensitivity measures vary depending on the menstrual cycle

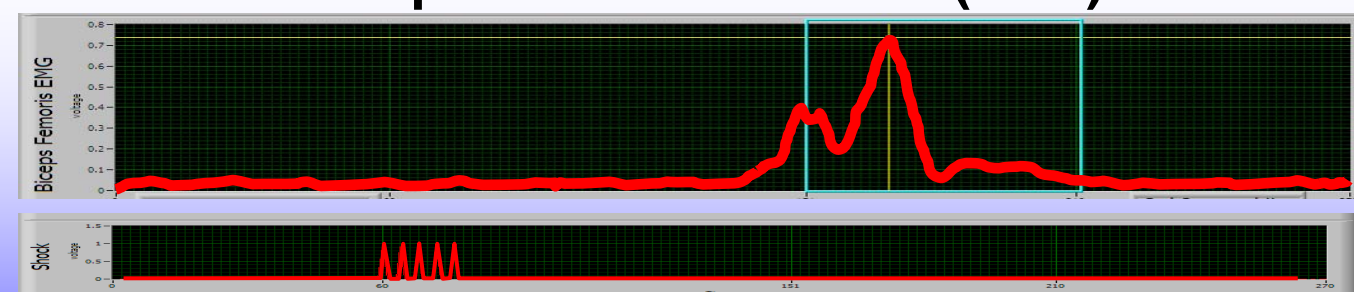
## Participants

- 41 Healthy Female Participants
  - Participant Characteristics: White, non-Hispanic (71%); married (73%); employed full-time (56%); yrs of education = 15 (SD = 1.79); average age = 31 yrs (SD = 8.86); average menstrual cycle length = 29 days (SD = 3.28); average length of luteal phase = 15 days (SD = 3.48)
- Exclusion Criteria:
  - <18 years of age
  - Failure to regularly cycle within 2 months of study inclusion
  - Use of hormone preparations within past 6 months
  - Pregnant within past 6 months
  - Menopausal or post-menopausal
  - Current acute illness
  - Cardiovascular, neurological, circulatory and/or hearing problems
  - Chronic pain condition (e.g., back pain)
  - Recent use of analgesic medication
  - Current use of anxiolytic and/or antihypertensive medication
  - Recent psychological trauma

## Experimental Procedure



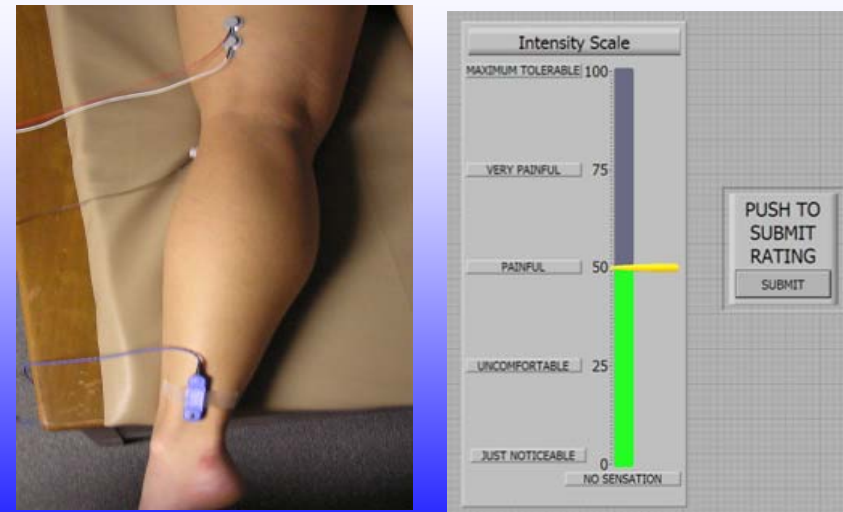
## Nociceptive Flexion Reflex (NFR)



- NFR is a spinal reflex elicited by the activation of A-delta fibers
- NFR threshold correlates with pain threshold
- Used as a measure of spinal nociception
- NFR defined as biceps femoris EMG activity in the 90-150 ms post-stimulus interval that exceeds baseline activity by 1.4 SD

## Measurement of Subjective Pain

- NFR recording electrodes - left biceps femoris muscle
- Stimulating electrodes - over left sural nerve
- Pain Ratings made after each stimulation



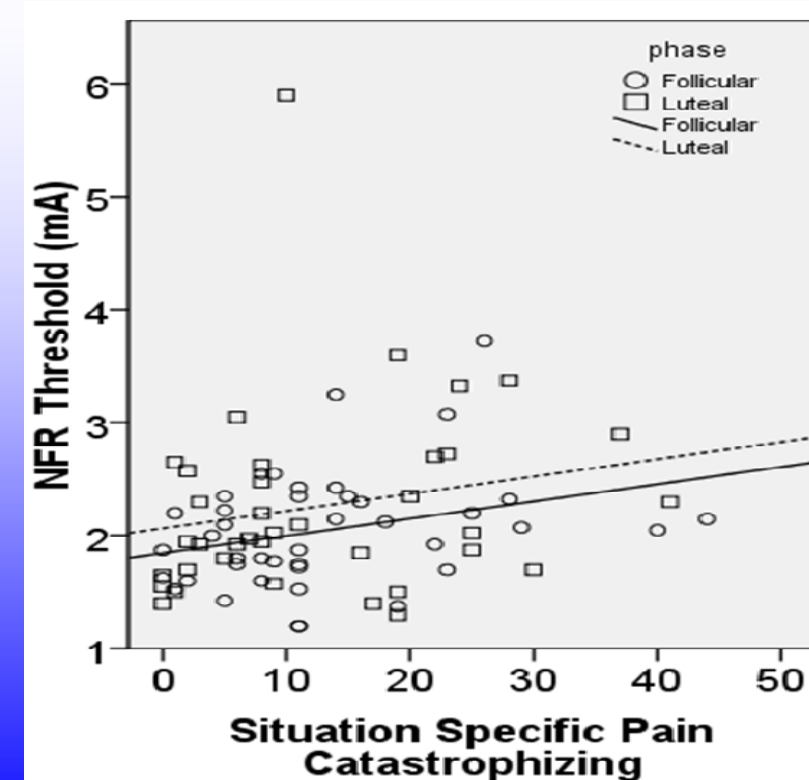
## Pain Outcomes Defined

Pain Outcome Variable	Definition
Pain Tolerance	Stimulus level (in mA) that participant rated as 100 or 50 mA maximum
NFR Threshold	Stimulus level (in mA) required to reliably elicit NFR
Pain Threshold	Stimulus level (in mA) that participant rated $\geq 50$
McGill Sensory Pain	Questionnaire used to assess sensory aspect of pain experience (e.g., throbbing, burning)
McGill Affective Pain	Questionnaire used to assess affective aspect of pain experience (e.g., tiring, fearful)

## Pain Catastrophizing Scale

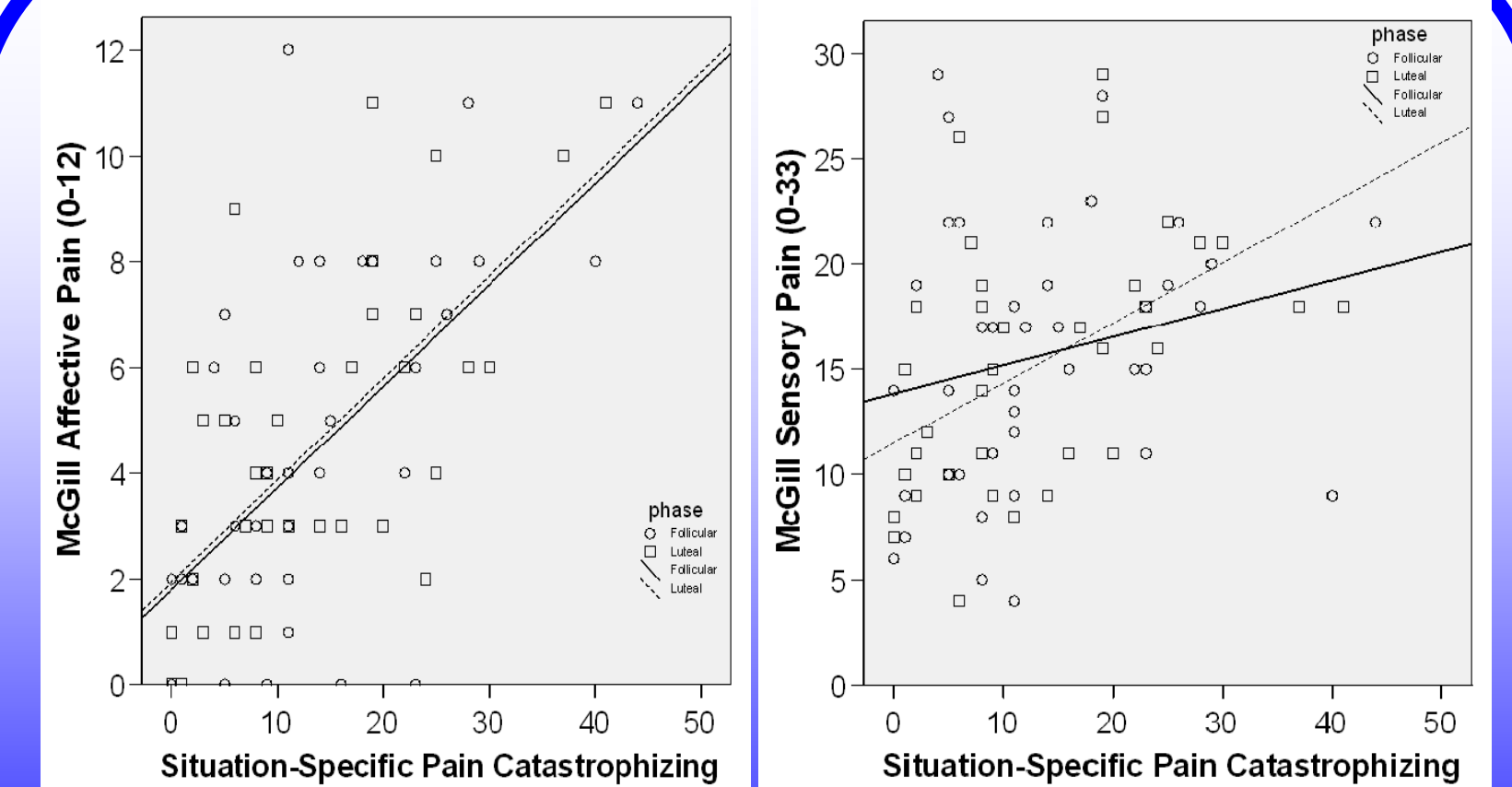
- 13 item self-report measure for use in clinical and non-clinical samples; used for persons with and without pain
- Subscales:
  - Rumination:** (e.g., I can't stop thinking about the pain.)
  - Magnification:** (e.g., I worry that the pain will get worse.)
  - Helplessness:** (e.g., There's nothing I can do.)
- Internal consistency: alphas for PCS total and subscales range from .66 to .87
- Pre-test PCS Instructions: "Please indicate the degree to which you have these thoughts and feelings when you are experiencing pain."
- Post-test PCS Instructions: "Thinking back to your experience during the electric stimulations, please indicate the degree to which you had these thoughts and feelings."

## Results: SS Catastrophizing and NFR Threshold



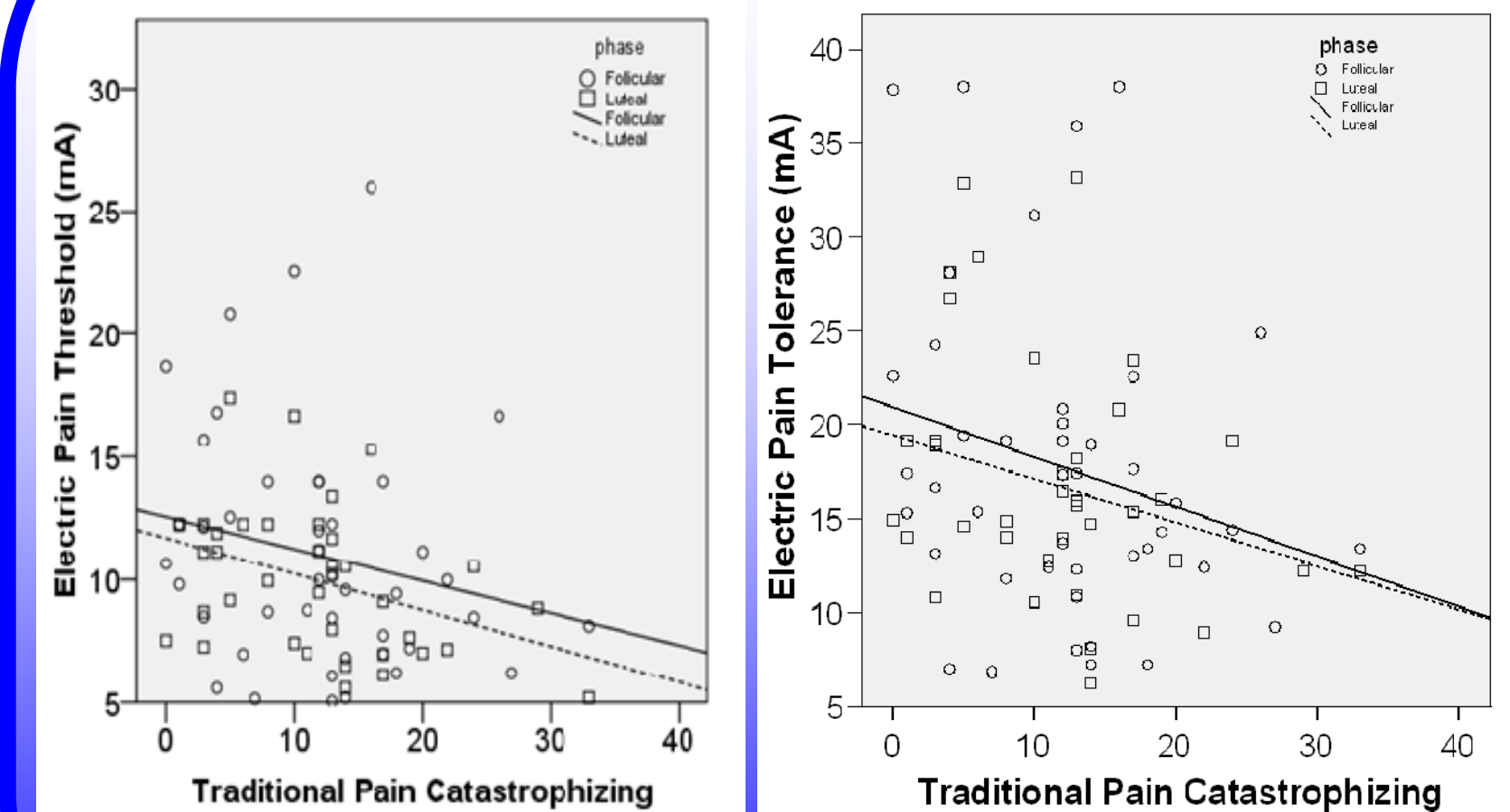
- SS Catastrophizing was associated with higher NFR thresholds ( $p=0.009$ ). This relationship did not vary by menstrual phase.
- There was no significant relationship between NFR threshold and Traditional Pain Catastrophizing.

## Results: SS Catastrophizing and McGill Pain



- SS-Catastrophizing was associated with higher affective pain ( $p<.001$ ). This relationship did not vary by menstrual phase.
- SS-Catastrophizing was associated with higher sensory pain ( $p<.001$ ) and the relationship was stronger during follicular phase ( $p<.001$ ).

## Results: T-Catastrophizing and Electrocutaneous Pain Outcomes



- T-Catastrophizing was associated with higher electrocutaneous pain threshold ( $p<.03$ ). This relationship did not vary by menstrual phase.
- T-Catastrophizing was associated with higher electrocutaneous pain tolerance ( $p<.03$ ). This relationship did not vary by menstrual phase.

## Conclusions

- Results indicate T-Catas is a better predictor of pain sensitivity (threshold and tolerance), whereas SS-Catas is a better predictor of retrospective pain evaluations (sensory and affective ratings).
- Results also indicated SS-Catas may exacerbate pain during the luteal phase by augmenting the sensory component of pain.
- These results suggest that SS-Catas may predict the increase in women's reports of pain during the luteal phase.