## Introduction

Emotionally-charged stimuli have been shown to modulate pain and other reactions to noxious stimulation. Facial expressions are some of the most omnipresent emotional stimuli in the social environment. Evidence suggests that observing facial expressions results in the perceiver experiencing a similar emotion (i.e., emotional contagion) as well as amygdala activity. However, it is unclear whether facial expressions induce emotions strong enough to modulate nociceptive reactions. Indeed, research from our laboratory suggests that emotional stimuli must evoke significant emotional arousal (intensity) before nociceptive processes are modulated.

## The Present Study

- Examined the impact of viewing emotional facial expressions (fear, neutral, happy) on pain threshold and tolerance resulting from a cold pressor task.
- Hypothesis: Pain would be enhanced by fear faces (lower pain threshold and tolerance) and inhibited by happy faces (higher pain threshold and tolerance).

## Participants

- 38 healthy students
  - **Characteristics: Female (80%), White non-Hispanic (77%), single (89%), with an average age of 21.56 (SD=4.85) and an average education of 14.82 (SD=1.49).**
- Participants were excluded for:
  - **< 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**
  - **Raynaud's disease**

## Cold Pressor Pain

- 33ºF, circulated water
- Pain Tolerance:
  - Participants asked to submerge arm "for as long as you can tolerate it"
  - Latency (in seconds) from arm submersion to arm removal
- Pain Threshold:
  - Latency (in seconds) from arm submersion until first movement on mechanical visual analog scale (M-VAS) for pain unpleasantness

## Emotion-Induction: Emotional Facial Expressions

- Montreal Set of Facial Displays of Emotion (Beaupre, Cheung, & Hess, 2000)
- Participant randomly assigned to expression type


Fear


Neutral


Happy

## Emotion Manipulation Checks

- Subjective pleasure (valence) ratings
  - 1(unhappy) to 9 (happy)


- Subjective arousal ratings
  - 1(calm) to 9 (excited)

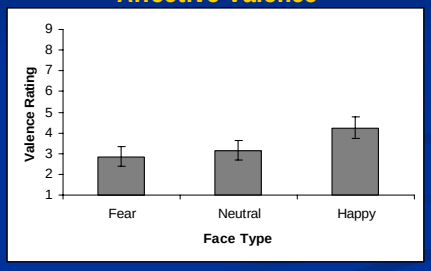

Bradley & Lang, 1994

## Procedure

| | | | | | |
|---|---|---|---|---|---|
| Electrode application | Training | Equilibrate arm temperature in warm pressor, view facial expressions | Participant randomly assigned to one facial expression type | View facial expressions while arm in the cold pressor | Rate emotional reactions to facial expressions |
| | | Fear, Neutral, and Happy | Either Fear, Neutral, or Happy | | SAM Ratings |

## Results: Manipulation Checks

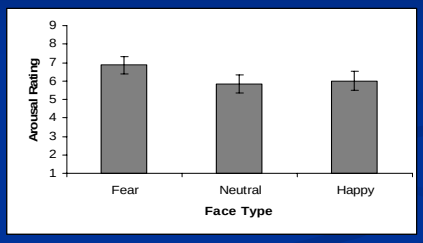
### Affective Valence




- Affective valence was not significantly manipulated by the facial expressions $F(2,22)=2.23$, $p=0.122$, $\eta^2=0.11$.

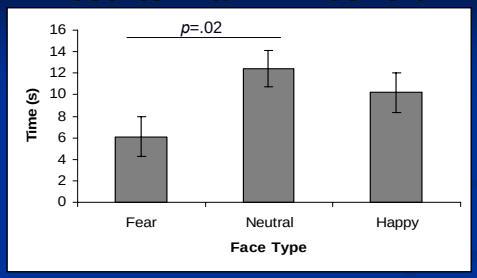
## Results: Manipulation Checks

### Affective Arousal



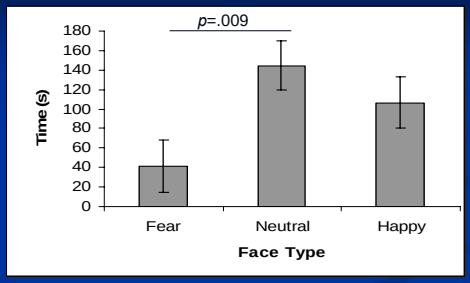

- Affective arousal was not significantly manipulated by the facial expressions, $F(2,22)=1.25$, $p=.298$, $\eta^2=0.65$.

## Results: Pain Threshold




- Pain threshold was marginally significant, $F(2,22)=3.28$, $p=0.057$, $\eta^2=0.23$.
- Pain threshold latency was shorter (enhanced pain) during fear expressions relative to happy and neutral expressions.

## Results: Pain Tolerance




- Pain tolerance was significant, $F(2,22)=4.05$, $p=0.03$, $\eta^2=0.25$.
- Pain tolerance latency was shorter (enhanced pain) during fear expressions relative to happy and neutral expressions.

## Conclusions

- Facial expressions did not significantly manipulate emotional valence or arousal.
- Fear expressions led to enhanced pain (lower pain threshold and pain tolerance), but happy expressions had no effect.
- Fear expressions may engage emotional processing outside of awareness that modulates pain.