



Diminished Pain Perception Following Embodied Imagination of a Positive Autobiographical Memory

Damon Abraham¹, Kateri McRae¹, Jill Fischer, Robert Bosnak, and Tor D. Wager²

¹University of Denver, ²University of Colorado at Boulder

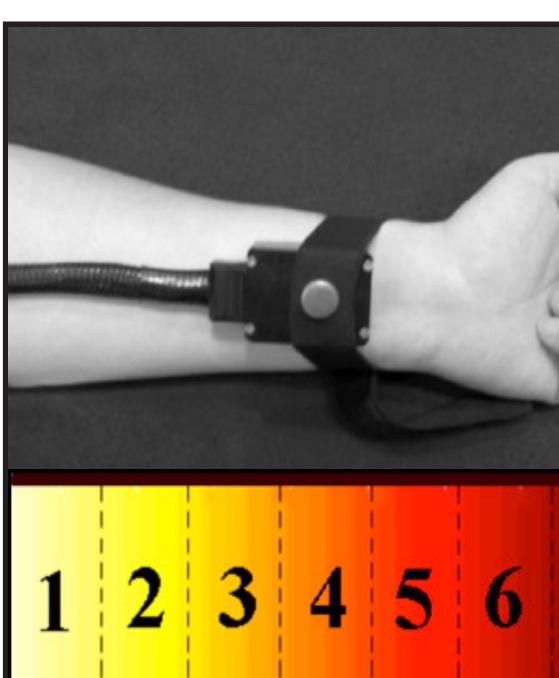
INTRODUCTION

- Pain is a multidimensional experience involving sensory discriminative, affective, and cognitive dimensions.
- Methods of managing pain span a wide breadth; from interventionist approaches (e.g., pharmaceutical opioids) to less-invasive psychological or psychotherapeutic interventions (e.g. placebo analgesia, mindfulness-based stress reduction (MBSR) etc.,) [1,2].
- One psychotherapeutic technique that has shown promise in clinical settings is a Jungian-based practice called Embodied Imagination (EI) [3].
- EI involves interoceptive body awareness and engagement with rich mental imagery from autobiographical memory as a means of adaptively shifting the experience of stress and negative affect related to pain.
- This is the first empirical test of the EI method in a laboratory setting utilizing experimentally controlled levels of acute pain.

Hypotheses

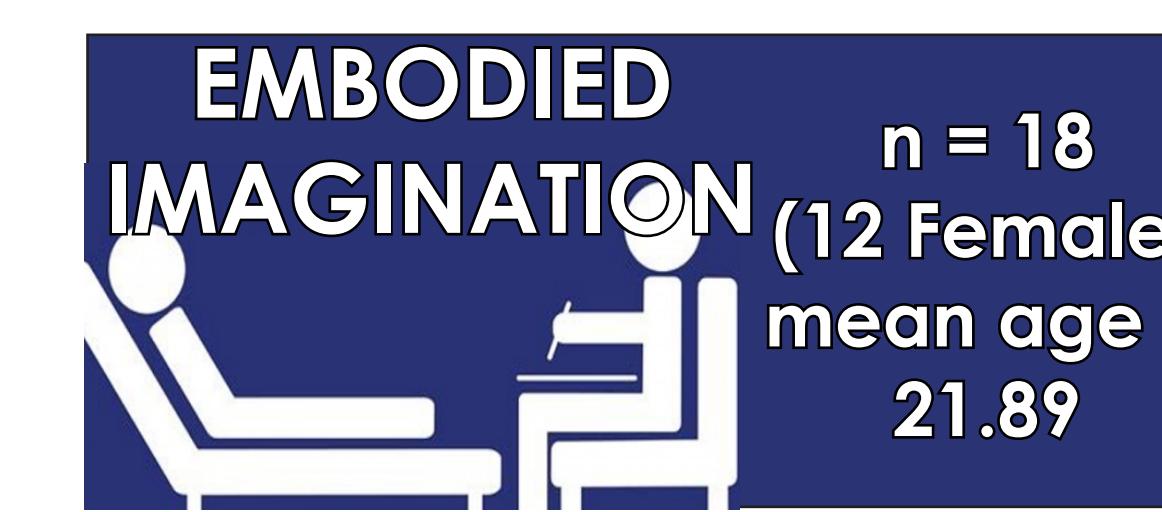
- Relative to a control condition, EI will reduce subjective levels of pain reported in response to noxious thermal stimulation.
- Reaching deeper levels of engagement with the imagined memory may take time. Therefore, we anticipate that the effect of the EI procedure will be most pronounced in the final block of trials (both in terms of the comparison with controls and relative to a baseline test within subjects)

METHODS & DESIGN



Pain was induced via thermal stimulation to the volar forearm and rated on an 8-pt scale. A calibration procedure (24 trials) identified participants' subjective pain tolerance and 3 temperatures (participant's level 2 "Low", 5 "Med", & 8 "High") were selected to be used throughout the experiment. Pain was tested in 3 subsequent blocks: A pre-manipulation baseline and 2 post-manipulation tests (see timeline).

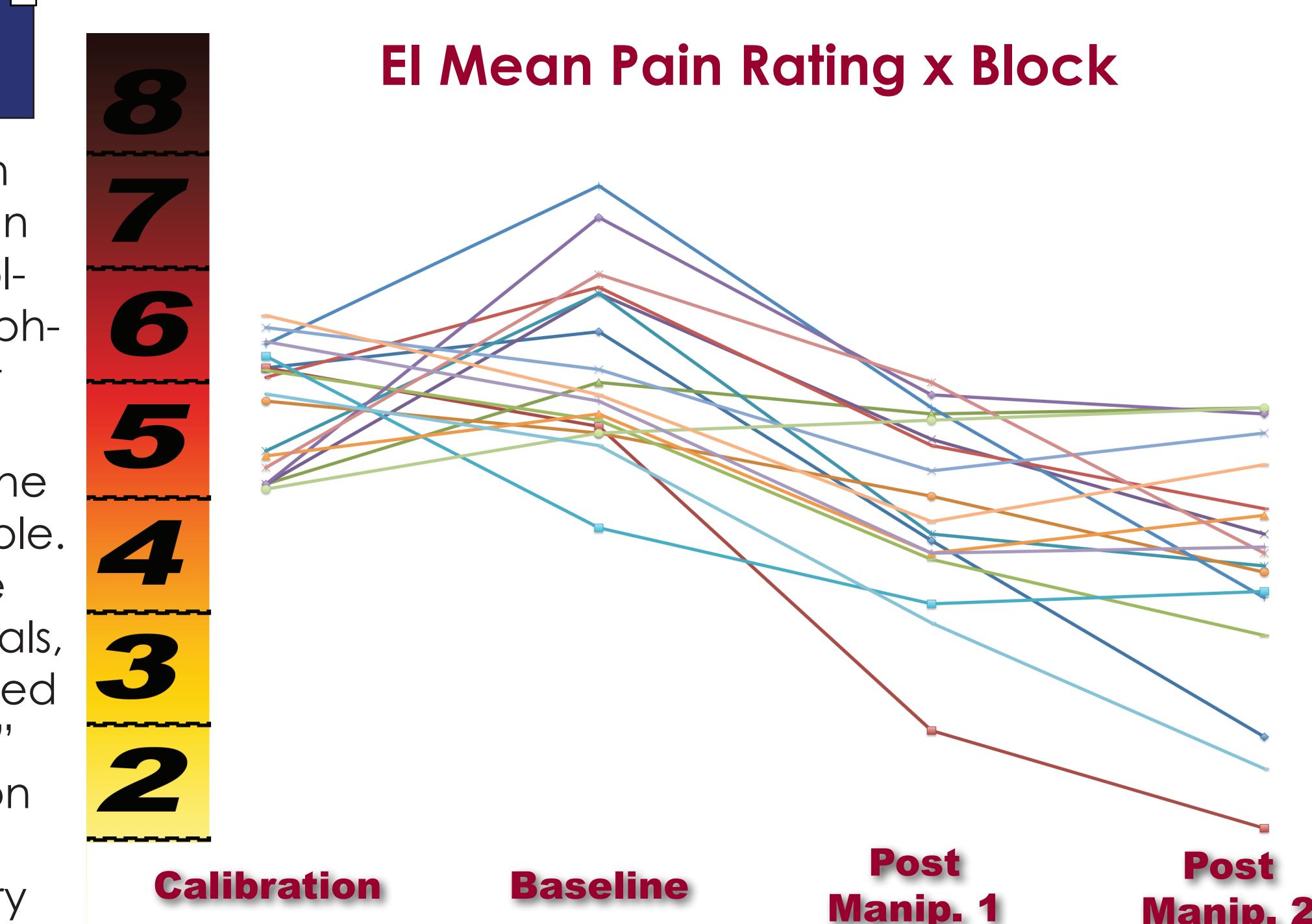
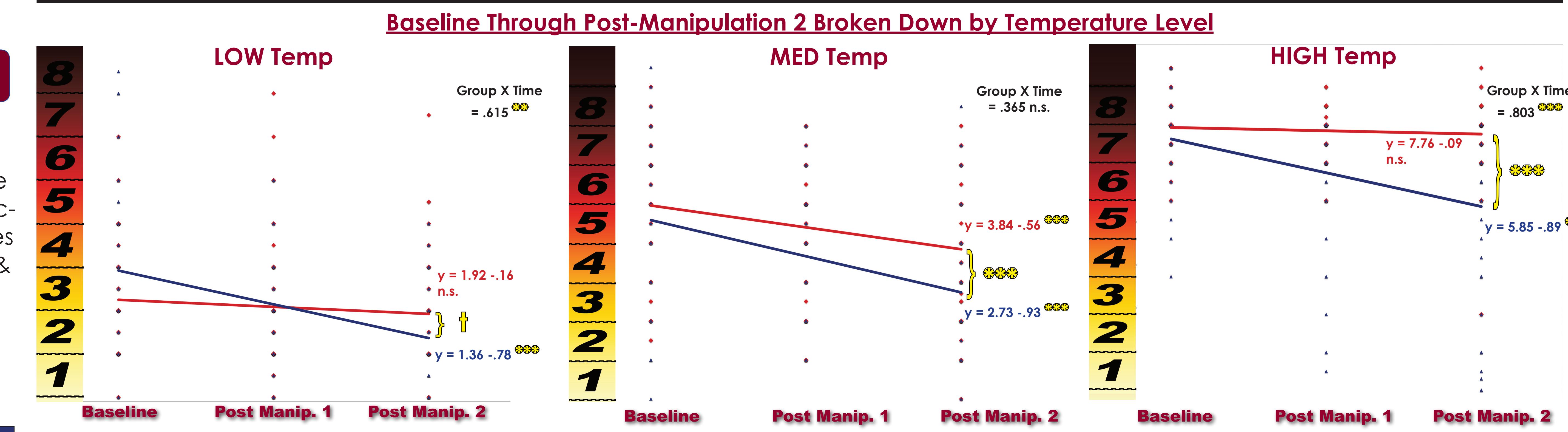
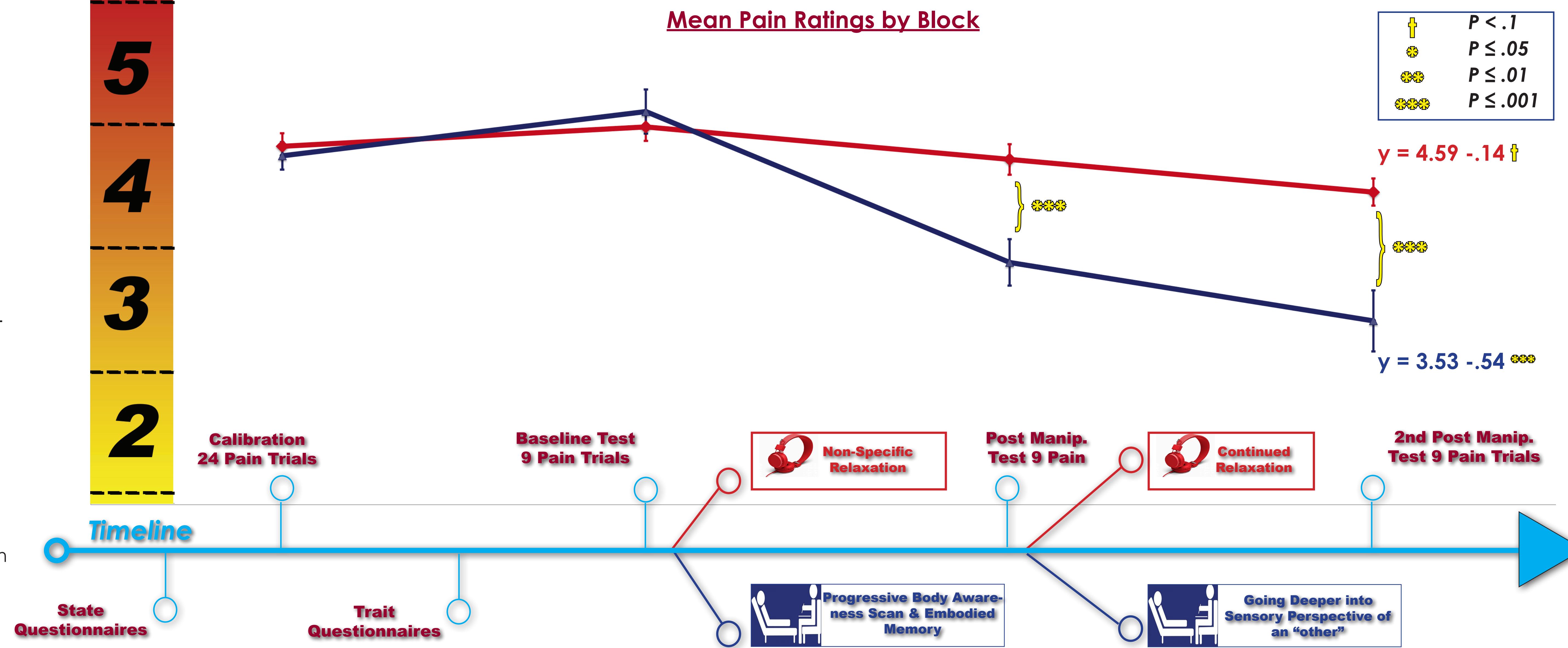
Manipulations



Participants were seated in a reclined position and fitted with headphones playing brown noise. They were given non-specific passive relaxation instructions and asked to keep their eyes closed for the duration of the experiment. Pain trials were administered during relaxation at approximately 10min and 25min following the start of relaxation (see timeline).

Participants were guided through a progressive body awareness scan and a 1st-person embodied recollection of a pleasant autobiographical memory from a time they felt "safe and secure". Participants were asked where in their body the feeling of safety was most palpable. A deeper immersion followed the first post-manipulation block of trials, wherein the participant was guided into the perspective of an "other" in the memory (i.e. another person or object). The therapist helped to maintain the imagined memory during pain stimulation.

RESULTS



Mechanisms of Embodied Imagination

EI led to sizable drops in reported pain overall. Individuals did vary in the amount and rate of reduction (see graph on left). To explore this individual variability and the components of EI that were most critical for pain relief, three independent raters coded the therapist's detailed session notes, which outlines the individual memories. We also coded the notes using the Linguistic Inquiry and Word Count software [4]. Results shown on the right.

Correlations with individual slopes (Baseline - Post Manipulation 2)

Coded Therapist Session Notes	Linguistic Inquiry and Word Count (LIWC)
Sensory Vividness of the Memory	-0.44
Emotional Valence (high = positive)	0.32
Embodiment (1st person sensory details)	-0.27
Physical Arousal	-0.22
Perceived Emotional Support in the Memory	0.14
Emotional Affinity with the Imagined Physical Environment	-0.08
Emotional Valence (high = positive)	-0.01
Body - references to somatics	-0.25
Negative Emotional Words	0.19
Words Related to Perception	0.15
Words Related to Home	0.12

Annotations: P < .05 (uncorrected), P < .1, RED = correlation in opposite of predicted direction.

- Relative to passive relaxation, EI had a robust effect on subjective pain reports thus confirming our hypothesis. In both post-manipulation blocks, average pain ratings were significantly lower in the EI condition.
- This effect was observed across all temperature levels.
- Our second hypothesis was also confirmed as these effects increased over time for the EI group only.
- We attempted to tease apart potential factors contributing to the EI effects by analyzing the therapist's session notes. While some factors showed promise, these analyses were inconclusive. Notably, we did not record the actual therapist interactions.
- Moreover, there may have been too little variability across the memories to detect meaningful differences as they were specifically selected to load on certain dimensions (e.g., positive affect etc.,).

Future Directions

- EI is multifaceted and may be underpinned by several potentially cooperating elements including (e.g., cognitive distraction, dissociation, positive valence, etc.). In order to understand the underlying mechanisms of EI, future replications should attempt to isolate and manipulate these factors separately.
- While this study focused exclusively on physical pain, in clinical practice EI is employed to treat a variety of ongoing negative stressors. Hence, future empirical work should test the generalizability of EI across other domains.
- Finally, longitudinal studies might assess EI as a trainable technique for managing negative affect.

Acknowledgments

We are grateful to Olivia Strauser, Brian Bowen, and Daniel Garcia at the University of Denver, who coded the therapist session notes. We also wish to acknowledge our collaborators, Robert Bosnak who developed the EI method, and especially Jill Fischer, who conducted the EI sessions.

References

- Schafer, S. M., Colloca, L., & Wager, T. D. (2015). Conditioned Placebo Analgesia Persists When Subjects Know They're Receiving a Placebo. *The Journal of Pain : Official Journal of the American Pain Society*, 16(5), 412–420.
- Sola, M. L., & Wager, T. D. (2016, March 12). Holding hands alleviates pain reducing pain-specific and emotional brain responses. *American Psychosomatic Society*, Denver.
- Bosnak, R. (2003). Embodied Imagination. *Contemporary Psychoanalysis*.
- Pennebaker, J.W., Booth, R.J., Boyd, R.L., & Francis, M.E. (2015). Linguistic Inquiry and Word Count: LIWC2015. Austin, TX: Pennebaker Conglomerates (www.liwc.net).

