

A replicable and generalizable neuroimaging-based indicator of pain sensitivity across individuals

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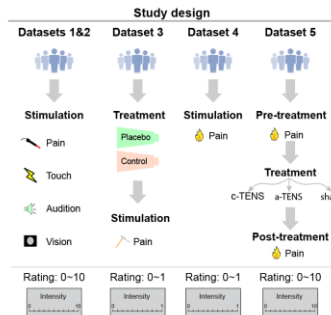
Introduction

- Neural indicators of pain sensitivity helps measure pain sensitivity objectively, and improve the diagnosis and individualized treatment of chronic pain.
- It is controversial whether pain-evoked BOLD responses can serve as neural indicators of pain sensitivity.
- It remains unclear whether pain-evoked BOLD responses can selectively encode inter-individual pain sensitivity.
- It has rarely been evaluated whether neural indicators of pain can be transferred to predict analgesic effects, even though predicting medication responses is an oft-mentioned purpose of such neural indicators.

Methods

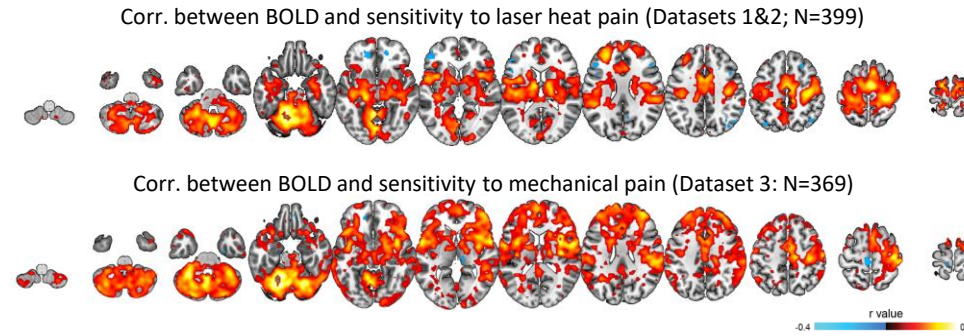
- **Participants:** total N = 1010 (from five large fMRI datasets)
- **Sensory stimulation:** painful and nonpainful stimuli
- **Pain treatment:** placebo (Dataset 3), transcutaneous electrical nerve stimulation (TENS; Dataset 5)

Questions	Answers
Q1: Do pain-evoked brain responses reflect pain sensitivity?	Yes, across all datasets.
Q2: Is the correlation between brain responses and sensitivity pain selective?	Yes, across all datasets.
Q3: Can a machine learning model be built to accurately predict pain sensitivity and pain relief?	Yes, across all datasets.
Q4: How many samples do we need to reliably decode pain sensitivity from BOLD responses?	See Figure 4 for univariate and multivariate modeling results.

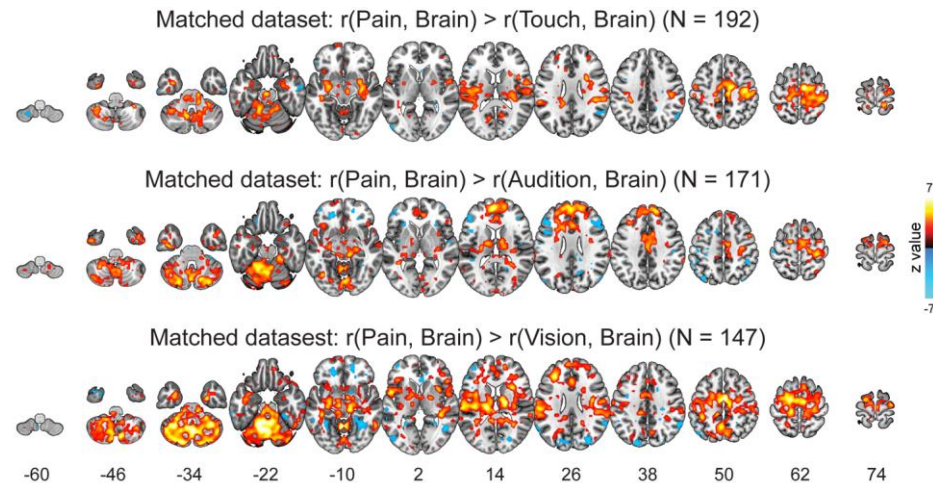


Results (part 1)

1. Pain-evoked BOLD responses correlated with pain sensitivity in large datasets.

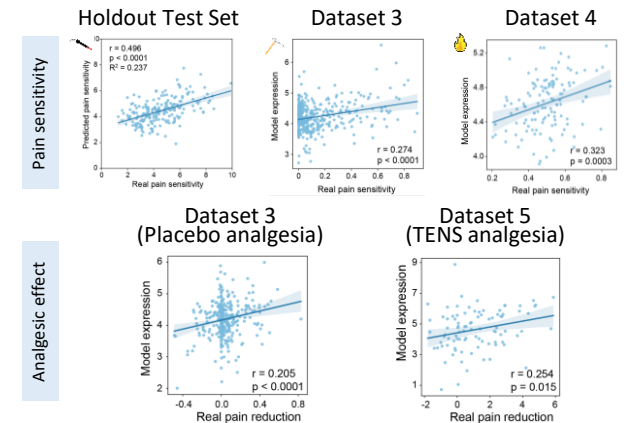


2. Pain-brain correlations were larger than nonpain-brain correlations, even when sensory sensitivities were matched between modalities.

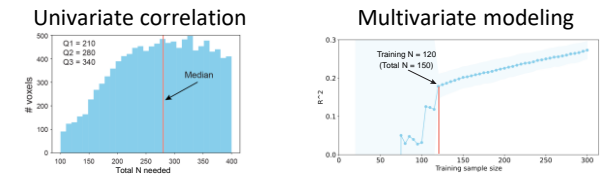


Results (part 2)

3. The machine learning model built with Datasets 1&2 predicted pain sensitivity and analgesic effects



4. Large sample sizes were needed to reveal the BOLD-pain association.



Conclusion

Pain-evoked BOLD responses can serve as replicable, generalizable, and transferable neural indicators of pain sensitivity.