

Anterior Insula Functional Connectivity Correlates with Subjective Interoceptive Awareness



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Background

- Emotional Intelligence is key component of military operational performance and navigating stressors of civilian life.
- Interoception, the perception of physiological states, underlies emotional and motivational processes with greater **interoceptive awareness** linked to stress resilience, while deficits are common across psychiatric disorders.
- The **right anterior insula** is heavily involved with integration of interoceptive signals; thus, we hypothesized that there would be functional connectivity (FC) differences in this region between individuals.
- We aim to further elucidate individual differences in IA for potential targets of neuroanatomical intervention.

Materials and Methods

Participants:

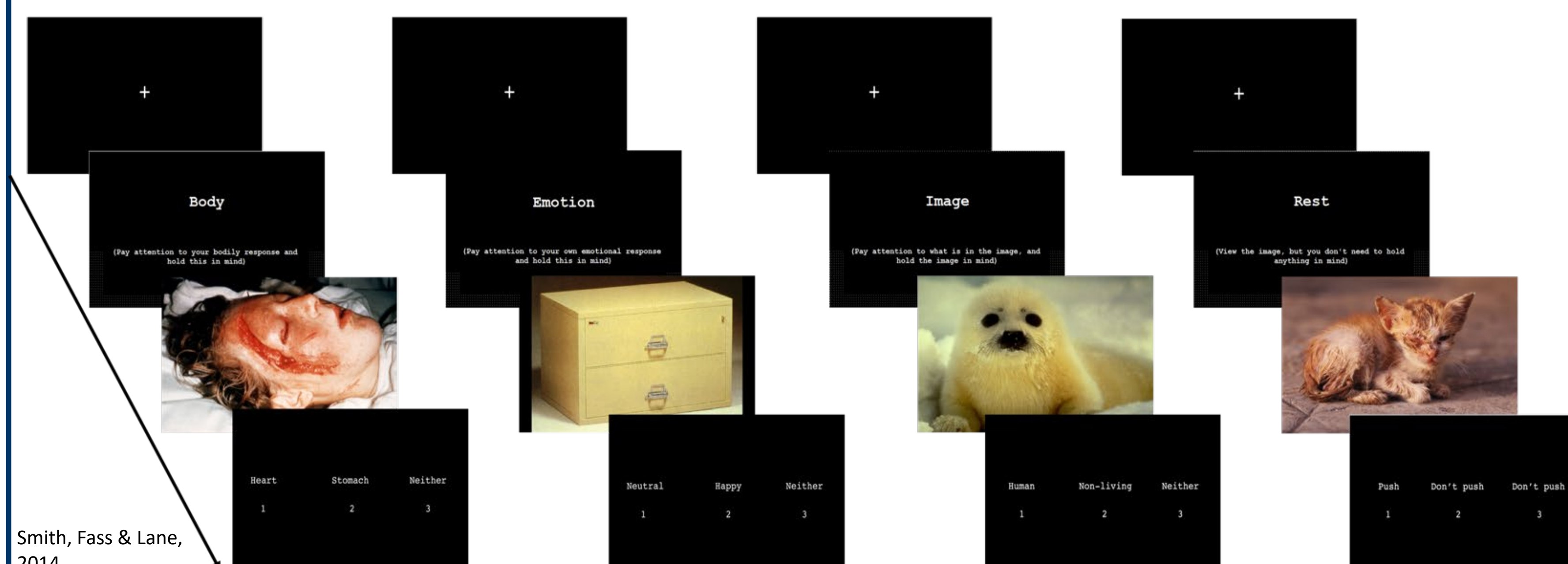
- 64 healthy participants (41 female, age: 26.72 ± 7.01)

Methods:

- Participants completed the **Multidimensional Assessment of Interoceptive Awareness** (MAIA) before undergoing an fMRI imaging task.
- Participants completed the **Attention to Internal Emotion** (A2IE) task where they were shown images of varying valence accompanied by prompts instructing them to focus on their bodily response (interoception) or nothing in particular (rest).

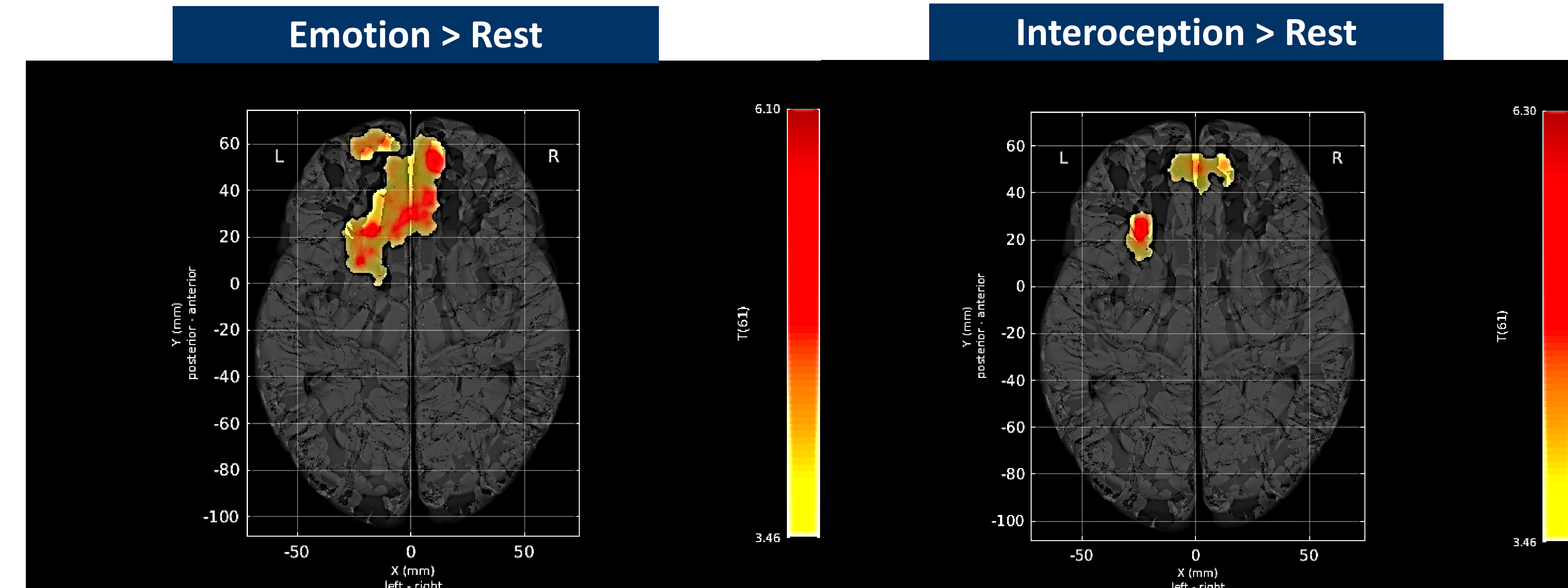
Analysis:

- Analysis was performed in CONN with a seed placed in the right anterior insula and seed-to-voxel approach was used.
- The **Interoception** and **Rest** conditions were contrasted to evaluate FC differences.

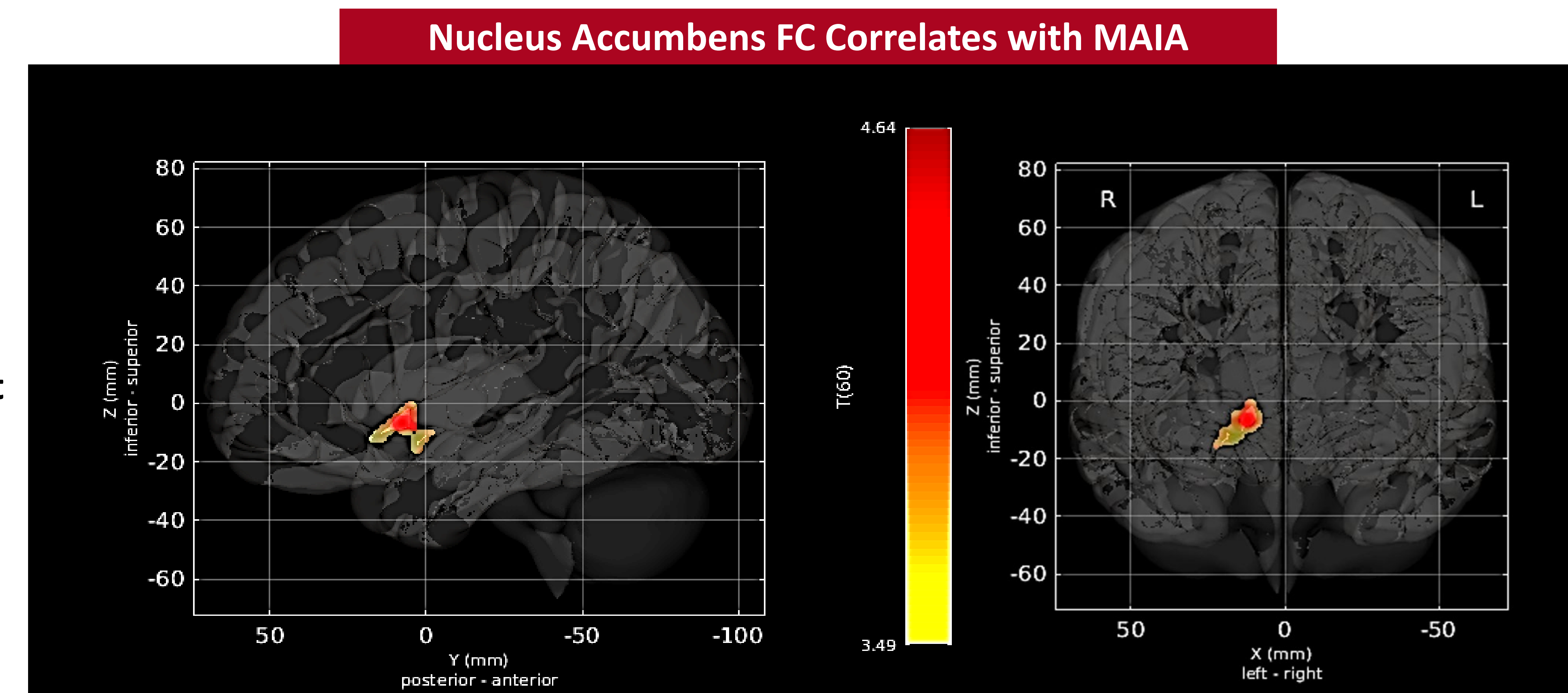


Results

- Controlling for age and sex, the contrast between **Interoception** and **Rest** revealed significant FC between the frontal orbital cortex, paracingulate gyrus and supramarginal gyrus and the seed region of the r. anterior insula (all p-FDR < .001). Similar patterns were noted when contrasting the **Emotion** and **Rest** conditions.



- Following the inclusion of MAIA scores, only connectivity between the right Nucleus Accumbens (NAcc) and right insula were significant (p-FDR < .001, see right). This was only found for the **Interoception Rest** contrast. Individuals with increased FC between the r. anterior insula and NAcc scored higher on the MAIA (i.e. improved interoceptive awareness).



Conclusion

- Overlapping connectivity patterns of both interoceptive and emotion conditions suggest shared neural mechanisms linking these related processes.
- Yet connectivity between the anterior insula and NAcc uniquely tracks IA, implicating this circuit as a potential neural substrate of interoceptive awareness.
- Given known links between this pathway and impulsivity, greater connectivity may support improved awareness and behavior regulation.
- This research provides insight into specific neural circuits and connectivity patterns that might be modified and targeted to improve interoceptive awareness and contribute more generally to emotional intelligence.