The Mind-Body Problem: Exploring the Relationship between Affective Reactivity and Interoceptive Sensitivity
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Abstract
In this study, we examine the relationship between affective reactivity (individual differences in physiological and subjective responses to emotional stimuli) and interoceptive sensitivity (the ability to detect changes in the body). To measure interoceptive sensitivity, participants completed a heartbeat detection task in which they reported whether their heartbeat was in-sync or out-of-sync with a series of audio tones. We then examined individual differences in affective reactivity by measuring participants’ physiological activity and subjective experiences of valence and arousal while they were presented with emotionally evocative sounds and images. We included measures of peripheral physiological activity associated with changes in valence, like activity in the corrugator supercilii muscle and the zygomaticus major muscle using facial electromyography (EMG). Changes in body arousal were also assessed with physiological measures, including electrodermal activity (EDA) and cardiac impedance-derived measures. As predicted, results revealed a significant relationship between affective reactivity and interoceptive sensitivity. Individual differences in interoceptive sensitivity moderated the relationship between physiological activity and self-reported valence. Individuals with higher levels of interoceptive sensitivity showed a tighter coupling between their subjective and physiological responses to emotional stimuli, but only for the physiological measures relevant to each rating. Results suggest that more interoceptively sensitive individuals may have more enhanced emotion regulation capabilities, which in turn would enable them to successfully learn and execute components of clinical treatments in which emotion regulation plays a critical role in recovery and success.

Methods
Participants (N=113) peripheral physiological activity was recorded while they completed the experimental tasks, including measures of electrodermal activity (EDA), respiration, heart rate (via ECG), blood pressure, cardiac output (via impedance cardiography), and muscle activity of the Corrugator supercilii and Zygomaticus Major muscles (via iEMG).

Heart Beat Detection (HBD)
- 100 trials of 10 audio tones, where each tone was triggered by participant’s own heartbeat.
- Participants determined whether the tones were in sync (200ms after r-spike) or out of sync (500ms after r-spike) with their heartbeats (See Figure 1).

Picture and Sound Rating Task
- Participants viewed pictures from the International Affective Pictures System (IAPS; See Figure 2) and listened to sounds from the International Affective Digitzed sound system (IADS) that varied in terms of their normed valence and arousal.
- Four Subtasks:
  - Single images in random order
  - Single sounds in random order
  - Blocks of 10 images sharing same valence/arousal
  - Blocks of 10 sounds sharing same valence/arousal

Results

<table>
<thead>
<tr>
<th>Corrugator Supercrii Activity</th>
<th>Zygomaticus Major Activity</th>
<th>Cardiac Output</th>
<th>Discussion</th>
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<tbody>
<tr>
<td>Arousal Rating</td>
<td>Arousal Rating</td>
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<tr>
<td>Poor HBD (-1 SD)</td>
<td>Poor HBD (-1 SD)</td>
<td>Mean HBD</td>
<td>There is a significant relationship between affective reactivity and interoceptive sensitivity. More interoceptively sensitive individuals had a tighter coupling between self-reported valence and arousal and physiological activity but only for physiology measures relevant to each rating. Moreover, self-reported body vigilance did not moderate any of the relationships between physiological activity and subjective ratings, which suggests our findings are related to participants’ actual ability to sense changes in their body and not simply differences in how much participants report attending to their body. Results imply that less interoceptively sensitive individuals may not be able to control their emotional responses to evocative stimuli as well as more interoceptively sensitive individuals because they can not as accurately sense relevant peripheral physiological changes. If a more interoceptively sensitive individual can, in fact, more successfully regulate their emotions, this would enable them to more successfully learn and execute components of many treatments, such as dialectical behavioral therapy, in which emotion regulation plays a critical role in recovery and success.</td>
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<td>Mean HBD</td>
<td>Good HBD</td>
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References

Questionnaires
- Participants completed the Body Vigilance Scale along with several other questionnaires measuring trait-level constructs related to affective reactivity.