Introduction

Startle and nociceptive reactions are both believed to emanate from an evolutionarily old system that promotes survival (i.e., the aversive/defensive system). Further, similar neural substrates are involved with the modulation of startle and nociception (e.g., anterior cingulate, amygdala, periaqueductal gray). Together, this suggests that startle responding could provide important insights into nociceptive processing. For example, individual differences in startle modulation could be related to individual differences in pain/nociceptive sensitivity.

Objective

To determine the relationship between affective startle modulation and measures of basal pain and nociceptive sensitivity (NFR threshold, pain threshold, pain tolerance).

Participants

- 54 Participants
  - Characteristics: 65% Female; 70% White, Non-Hispanic; 76% single; 82% employed; average age = 27 yrs (SD=10.23); average yrs education = 15 yrs (SD=2.53)
- Exclusion Criteria:
  - < 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 (due to picture-viewing)
  - Chronic pain condition

Procedure

- Recording Electrodes
  - 2 EMG sensors placed over left orbicularis oculi muscle
- Acoustic Startle Probes
  - Presented during 50% of pictures (H2D1 and H2D7)
- 50 ms in duration
- 105 dB(A)

ASR Eyeblink Magnitude

- Used as a physiological measure of startle response size
- ASR Eyeblink Magnitude = peak of orbicularis oculi EMG minus mean of 40 ms pre-stimulus interval

Measurement of Pain Threshold / Tolerance

- Single ascending series of stimulations with 65 mA steps
- Pain Threshold: first stimulus (in mA) rated ≥50 on rating scale
- Pain Tolerance: stimulation intensity (in mA) associated with rating of 100 (or 40 mA max intensity, if reached)

Results:

Correlations between Emotional Modulation of Startle and Pain Outcomes

<table>
<thead>
<tr>
<th>Emotional Modulation Change Scores</th>
<th>NFR Threshold</th>
<th>Pain Threshold</th>
<th>Pain Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mutilation Modulation (mutilation - neutral)</td>
<td>0.30</td>
<td>0.27</td>
<td>0.11</td>
</tr>
<tr>
<td>Attack Modulation (attack - neutral)</td>
<td>-0.11</td>
<td>-0.18</td>
<td>-0.26</td>
</tr>
<tr>
<td>Erotic Modulation (erotic - neutral)</td>
<td>0.14</td>
<td>0.23</td>
<td>0.36</td>
</tr>
</tbody>
</table>

Note: Bolded correlations are significant at p<.05

Conclusions

- Relatively greater facilitation of startle by pictures of mutilation was associated with higher NFR thresholds.
- Relatively greater inhibition of startle by pictures of eroticism was associated with lower pain tolerance.
- While preliminary, these data suggest that startle modulation may be related to basal pain and nociceptive sensitivity.
- Future studies are needed to replicate these findings and to determine potential underlying mechanisms.

Does Affective Modulation of Startle Correlate with Pain Sensitivity and Spinal Nociceptive Processes?

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