Examining the Association of Trait-like vs. In-Vivo Catastrophizing and Experimental Pain Sensitivity

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INTRODUCTION
• Catastrophizing cognitions, consisting of rumination, helplessness, and magnification, are associated with increased pain intensity and pain behaviors in individuals with chronic pain.
• Trait-like catastrophizing refers to levels of catastrophizing related to general past pain experiences.
• In-vivo catastrophizing refers to levels of catastrophizing related to a specific pain event, usually one that has just occurred.
• The current study examined the extent to which trait-like and in-vivo pain catastrophizing are differentially related to experimental pain tolerance.
• We hypothesized that:
  1) In-vivo catastrophizing would have a stronger relationship with pain tolerance than trait-like catastrophizing.
  2) Different components of catastrophizing (i.e., rumination, helplessness, and magnification) would be differentially related to pain tolerance.

METHODS
Participants
• 131 participants: Indiana University-Purdue University Indianapolis undergraduate students.
• Age: Mean = 22.56 years (SD = 6.98).
• Sex: 74% Female; 26% Male.
• Race/Ethnicity: 60% Caucasian; 35% African American; 3% Asian; 2% Hispanic; 2% Other.

Procedure
• Participants completed the Pain Catastrophizing Scale (PCS) to measure trait-like catastrophizing prior to completing a cold pressor pain task.
• Participants were asked to submerge their non-dominant hand into a circulating water bath maintained at 1-3 degrees Celsius and rate their pain every 10 seconds.
• Pain tolerance was measured by the amount of time participants kept their hand submerged in the water.
• Participants completed the PCS again after the pain task to measure in-vivo catastrophizing (i.e., how much they engaged in catastrophizing during the pain task).
• Participants were compensated with class credit or a $10 Amazon gift card.
• The study was approved by the IUPUI IRB and all participants provided informed consent.

RESULTS
Correlations between Catastrophizing and Pain Tolerance

<table>
<thead>
<tr>
<th>Variables</th>
<th>R</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trait-Like Catastrophizing</td>
<td>-0.21</td>
<td>0.02</td>
</tr>
<tr>
<td>Trait-Like Ruminination</td>
<td>-0.16</td>
<td>0.07</td>
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<tr>
<td>Trait-Like Magnification</td>
<td>-0.15</td>
<td>0.08</td>
</tr>
<tr>
<td>Trait-Like Helplessness</td>
<td>-0.22</td>
<td>0.01</td>
</tr>
<tr>
<td>In-Vivo Catastrophizing</td>
<td>-0.40</td>
<td>0.00</td>
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<tr>
<td>In-Vivo Rumination</td>
<td>-0.45</td>
<td>0.00</td>
</tr>
<tr>
<td>In-Vivo Magnification</td>
<td>-0.25</td>
<td>0.00</td>
</tr>
<tr>
<td>In-Vivo Helplessness</td>
<td>-0.35</td>
<td>0.00</td>
</tr>
</tbody>
</table>

• There is a trend suggesting that in-vivo catastrophizing ($r = -0.40, p < 0.001$) is more strongly related to pain tolerance than is trait-like catastrophizing ($r = -0.21, p = 0.02; z = 1.69, p = 0.09$).
• Among the components of catastrophizing, in-vivo rumination ($r = -0.45, p < 0.001$) was most strongly related to pain tolerance, followed by helplessness ($r = -0.35, p < 0.001$), and magnification ($r = -0.25, p < 0.01$).

CONCLUSIONS
• These data suggest that:
  1) Catastrophizing, particularly situation-specific catastrophizing, is related to pain sensitivity.
  2) In-vivo rumination is more strongly related to pain tolerance than in-vivo helplessness and magnification.
• These results may be used to inform the development of psychosocial interventions for chronic pain.
• Study limitations include the lack of diversity amongst subjects in the study sample which consisted only of IUPUI students.
• Further research should experimentally manipulate in-vivo catastrophizing to confirm its causal relationship to pain sensitivity.

This study was supported by the Department of Psychology Research Award.