The effect of acute pain on risky and intertemporal choice

Lina Koppel1, David Andersson1, India Morrison1, Daniel Västfjäll1,2 and Gustav Tinghög1
1Linköping University, Sweden and 2Decision Research, Eugene, OR
Contact: lina.koppel@liu.se

Introduction

Pain is a salient and attention-demanding experience. Therefore, it should result in more intuitive (system 1) decisions, including more impatient behavior and greater reliance on automatic biases such as the reflection effect of prospect theory, i.e. less risk-seeking for gains and more risk-seeking for losses.1,2

On the other hand, patients with chronic pain make riskier decisions than control participants, especially when high potential gains are at stake.3,4

Here we investigate the effect of acute pain on decisions in three standard economic tasks: risky gains, risky losses, and intertemporal choice.

Method

Participants (N = 109, 35% women, M age = 23 years) performed three tasks twice: once in the pain condition and the control condition (in counterbalanced order).

Pain condition: Painful heat stimulation was delivered for 60s during each task. The stimulation was calibrated to each participant’s subjective pain threshold (M = 48°C).

Control condition: No pain.

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References


Risk aversion and discounting parameters

Constant relative risk aversion: \( u(x) = x^{2 - \gamma} / (1 - \gamma) \)

Exponential discounting: \( u(x) = 0.9\gamma x \)

<table>
<thead>
<tr>
<th>Risk aversion for gains</th>
<th>Discount Factor (( \gamma ))</th>
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<tbody>
<tr>
<td>(1)</td>
<td>(1)</td>
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<tr>
<td>Pain</td>
<td>1.1</td>
</tr>
<tr>
<td>Control</td>
<td>0.9</td>
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<tr>
<td>Round</td>
<td>1.1</td>
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<tr>
<td>Pain ( \times ) Round</td>
<td>1.1</td>
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<tr>
<td>Constant</td>
<td>1.1</td>
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Note: Robust standard errors corrected for clustering on the individual level in parentheses.

* \( p < .10 \), ** \( p < .05 \), *** \( p < .01 \)

Conclusions

Acute pain increased risk-seeking for gains but not for losses, in line with research on chronic pain.3,4

Acute pain led to greater preferences for immediate (smaller) over future (larger) monetary rewards, i.e. made participants more impatien, in line with dual-process theories.1,2

We interpret these results in terms of a motivation to offset the negative, pain-induced state. Receiving money feels rewarding, and the act of winning can reduce the subjective intensity and aversiveness of a painful stimulus.3 Thus, increased risk-seeking and impatience could be viewed as an attempt to relieve pain and repair one’s mood.

The proportion of risky choices was greater in the pain condition than in the control condition (105 = 3.84, p = .0002, d = .16).

The proportion of impatient choices was greater in the pain condition than in the control condition (105 = 3.84, p = .0002, d = .16).

The overall proportion of risky choices in the first round was greater in the pain condition than in the control condition (105 = 3.47, p < .001, d = .69).

The overall proportion of risky choices in the first round was greater in the pain condition than in the control condition (105 = 1.09, p > .250, d = .23).

No significant difference in overall proportion of risky choices in the first round (105 = 1.46, p = 1.17, d = .27).