Pain and affective working memory: results of a novel facial n-back task

Nina Attridge\textsuperscript{a}, Edmund Keogh\textsuperscript{\textsuperscript{b}}, Christopher Eccleston\textsuperscript{a}

\textsuperscript{a} Centre for Pain Research, University of Bath, UK
\textsuperscript{b} Department of Psychology, University of Bath, UK

Background

Pain disrupts attention, and in particular, the ability to update the contents of working memory\textsuperscript{1, 2}. Working memory is essential for completing tasks in everyday life, such as cooking, handling money and using transport. Here we examined the effect of pain on the updating of emotional information in working memory using an n-back task with face stimuli. We also examined the contribution of individual differences in self-perceived susceptibility to distraction from pain.

Method

Thirty-eight healthy participants (half female, aged 18-45) performed 1-back and 2-back tasks with faces showing pain, anger, happiness or a neutral expression. Participants viewed a series of faces and indicated whether each face was the same or different to the one presented two faces back (Figure 1).

Each task was completed twice, once while pain free and once while painful heat pulses were applied to the forearm with a Medoc Pathway Advanced Thermal Stimulator.

Participants reported their susceptibility to cognitive intrusion from pain using the Cognitive Intrusion and Pain Dominance (CIPD) scale.

Ethical approval was granted from the University of Bath Psychology and Health ethics committees.

Results

Reaction times to targets were entered into a 2 (Load: 1-back, 2-back) x 2 (Condition: pain, no pain) x 4 (Emotion: angry, happy, pain, neutral) ANOVA with one between-subjects factor: high/low cognitive intrusion (CIPD) scores.

There was no main effect of Pain Condition but there was a significant interaction between Load, Pain Condition and CIPD, $F(1,33)=6.30, p=.017, \eta^2_p=.160$ (Figure 2). This was due to an interaction between Load and Condition in the low CIPD participants, $F(1,14)=7.24, p=.018, \eta^2_p=.341$, but not in the high CIPD participants, $F(1,19)<1, \eta^2_p=.026$.

In the low CIPD participants, pain increased RTs in the 1-back task (no pain $M=549.74, SD=109.07$, pain $M=568.89, SD=105.57$), and decreased RTs in the 2-back task (no pain $M=773.90, SD=159.05$, pain $M=735.83, SD=103.66$).

Conclusion

Overall, pain did not affect performance on the n-back task, contradicting previous research. The emotional content of our stimuli may have made them salient and protected against the effects of pain.

However, participants who reported low susceptibility to cognitive intrusion from pain in fact showed greater effects of pain than those who reported high cognitive intrusion. While counterintuitive, this may reflect individual differences in strategy choice for completing a task while in pain. Participants who perceive themselves as easily distracted by pain may have strategies to buffer themselves against its effects.

References