

Developmental trajectories of pain sensitivity and disability following whiplash injury

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Background

- Early after whiplash injury, cold hyperalgesia predicts transition to chronic pain-related disability, while blunt pressure hyperalgesia is associated with more severe symptoms at acute and chronic times post-injury
- It is unclear how these measures of pain sensitivity behave over time after a whiplash injury

Research Aims

To explore trajectories of quantitative sensory testing (QST) measures over 12 months following a whiplash injury

To examine co-development of QST and pain-related disability trajectories over 12 months following a whiplash injury

Method

- **Design:** Longitudinal study assessing patients at 1, 3, 6 and 12 months after whiplash injury
- **Population:** 191 patients with acute whiplash injury (Grades I-III) (mean [SD] age 35.0 [12.6] yrs; 169 [88%] females)
- **Outcomes:**
 - Neck Disability Index (NDI)
 - Cold pain threshold (CPT, cervical spine)
 - Pressure pain threshold (PPT, C2/C3, median nerve, tibialis anterior)



NDI



CPT



PPT

- **Analysis:** Group-based trajectory modelling:
 - Modelled discrete trajectory groups (DTGs) of QST measures and NDI individually
 - Jointly-modelled QST measures and NDI to explore whether they co-develop
 - Models selected using model fit statistics, non-overlapping DTG confidence intervals, and probability of DTG membership $\geq 10\%$
 - We report number of DTGs and probabilities of DTG membership

Results

- All QST measures followed linear trajectories (Fig. 1). DTGs were:
 - CPT - 3 groups: low 52.3%, moderate 29.5%, high 18.2%
 - PPT C2/C3 - 2 groups: low 86.0%, high 14.0%
 - PPT median nerve - 2 groups: low 81.7%; high 18.3%
 - PPT tibialis anterior - 3 groups: low 37.6%, moderate 37.2%, high 25.1%

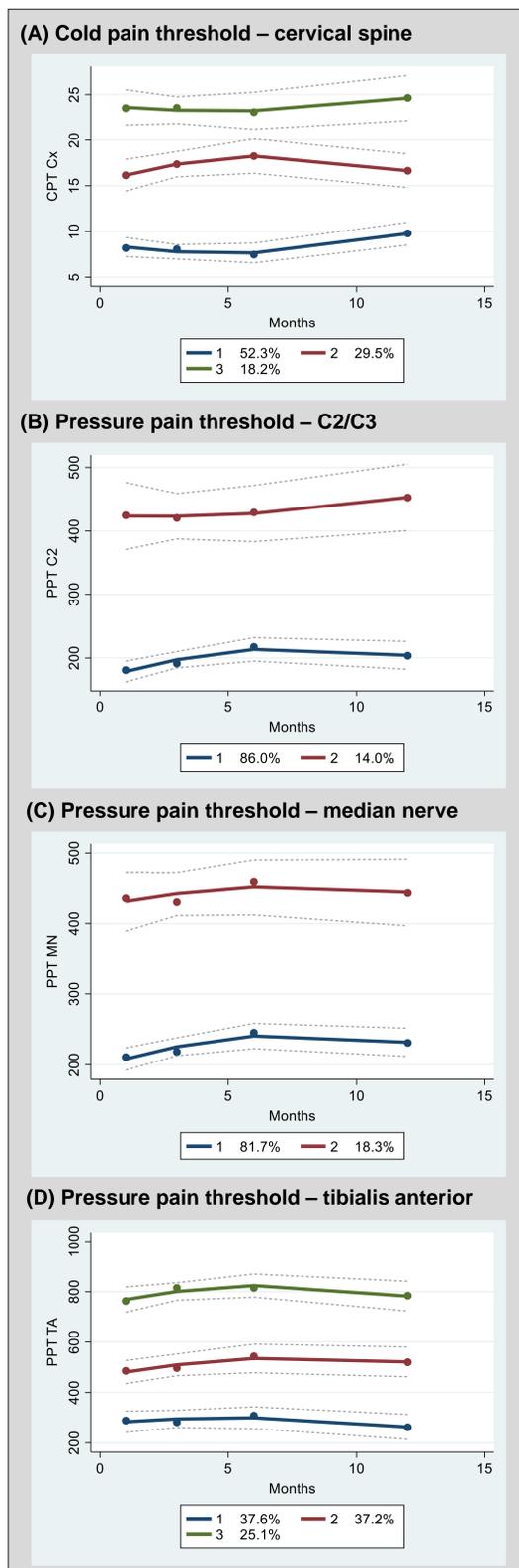


Figure 1 Discrete trajectory groups for (A) cold pain threshold (cervical spine) and PPTs at (B) C2/C3, (C) median nerve and (D) tibialis anterior sites at 1, 3, 6 and 12 months following a whiplash injury

Results cont.

- **Disability (NDI) DTGs** were comparable with those previously reported (mild 49.5%, moderate, 33.3%, chronic-severe 17.1%) (Fig. 2A) (Sterling et al 2010 PAIN 150: 22-28)
- **Joint-trajectory** modelling of CPT and NDI identified three DTGs (Fig. 2B):
 - Low CPT with mild disability (49.4%)
 - Cold hyperalgesia with recovering moderate disability (28.6%)
 - Cold hyperalgesia with chronic-severe disability (22.1%)
- No joint DTGs were identified for NDI and PPT at any site

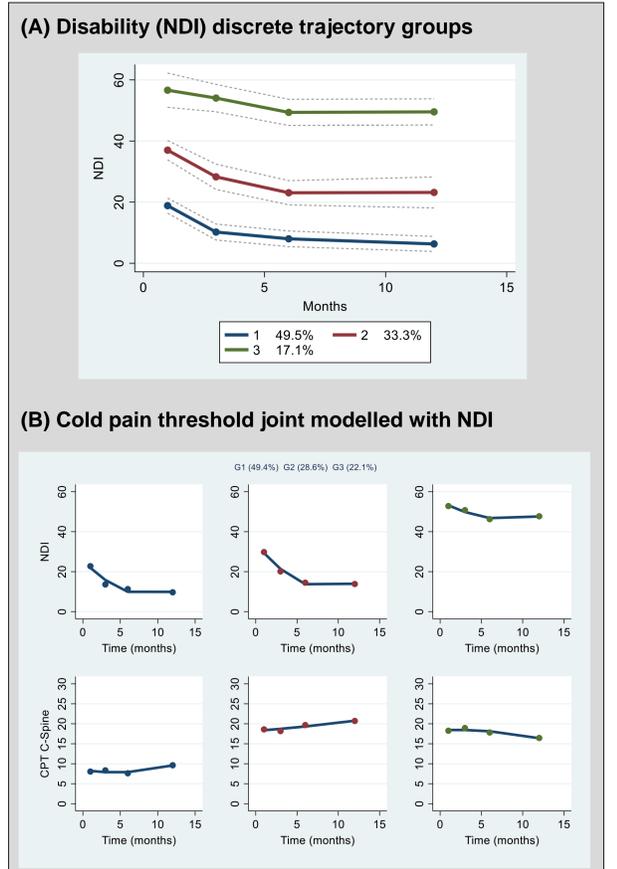


Figure 2 (A) Discrete trajectory groups for Neck Disability Index (NDI) at 1, 3, 6 and 12 months following a whiplash injury. (B) Joint-trajectory modelling of cold pain threshold (CPT) and NDI following a whiplash injury

Conclusions

- QST measures follow linear trajectories, remaining consistent in the 12 months following a whiplash injury
- Number of DTGs and probability of DTG membership for CPT and disability (NDI) were similar
- Joint modelling of CPT and NDI confirms cold hyperalgesia as a risk factor for fair and poor recovery

Acknowledgements

Funding for this study was received from the Australian Research Council (ARC), Motor Accidents Insurance Commission, Qld and Suncorp Metway General Insurance. The work of the authors was independent of the funders.

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