

# 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

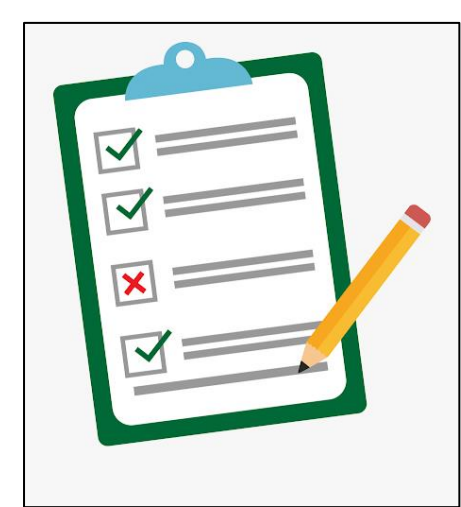
## Research Aims

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%

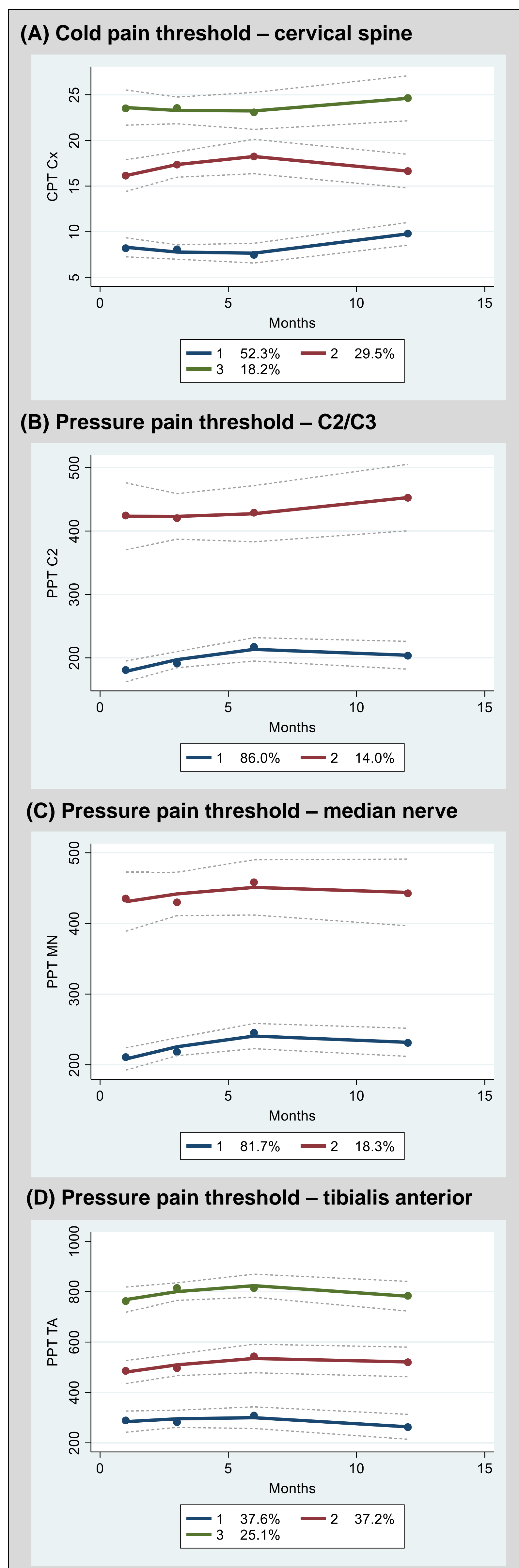


Figure 1 Discrete trajectory groups for (A) cold pain threshold (cervical spine) and PPTs at (B) C2/C3, (C) median nerve and (D) tibialis anterior sites at 1, 3, 6 and 12 months following a whiplash injury

## 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

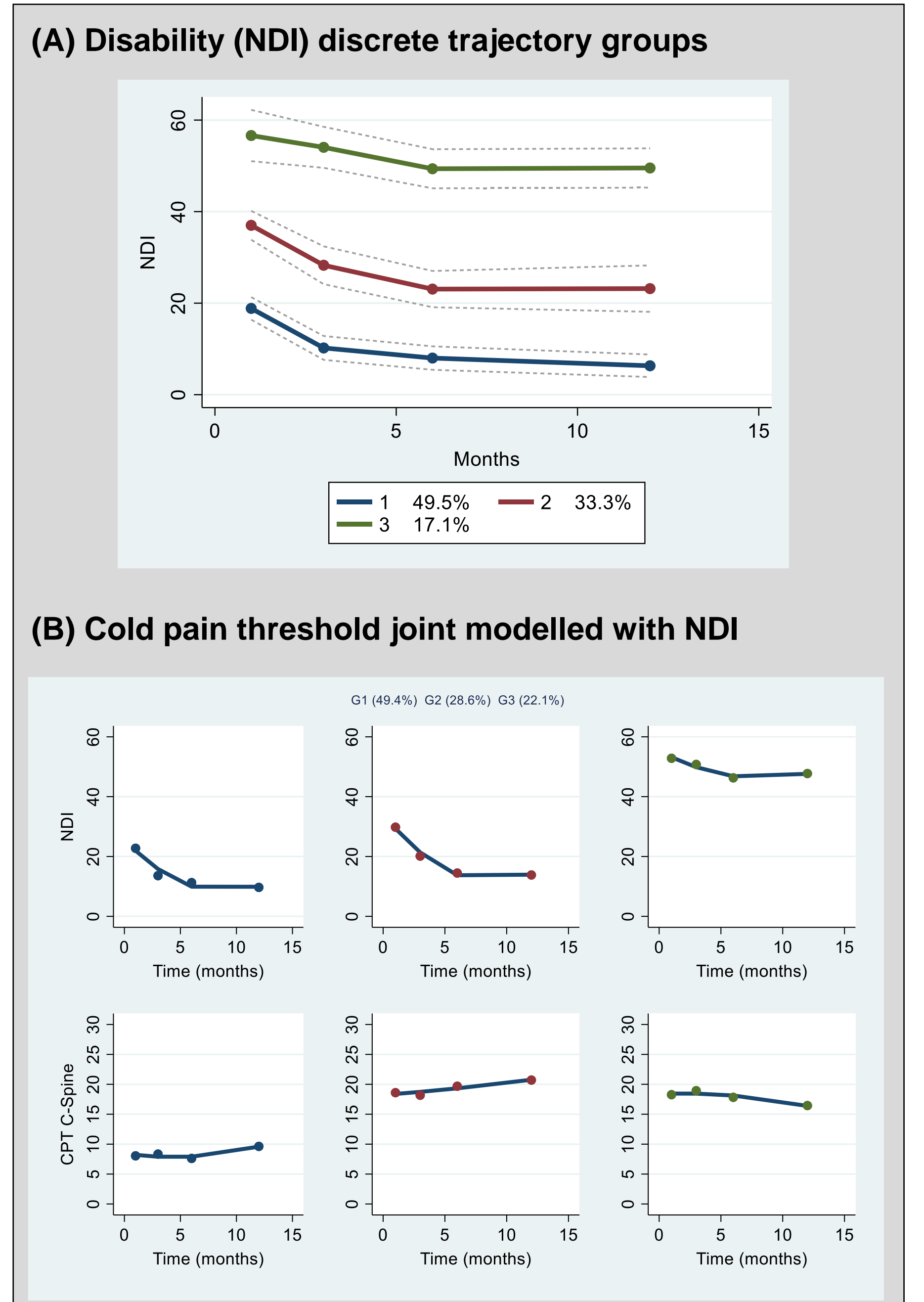


Figure 2 (A) Discrete trajectory groups for Neck Disability Index (NDI) at 1, 3, 6 and 12 months following a whiplash injury. (B) Joint-trajectory modelling of cold pain threshold (CPT) and NDI following a whiplash injury

## 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

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