



Measures of Central Sensitisation and their Measurement Properties in Musculoskeletal Trauma: a Systematic Review

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Introduction

- Following a traumatic musculoskeletal injury, pain and disability are common and expected. It is unknown why some transition from acute to chronic pain
- Central sensitisation (CS), characterised by clinical features such as secondary hyperalgesia, tactile allodynia and widespread pain, offers a potential explanation for the development of chronic pain¹
- Multiple outcome measures are suggested to evaluate CS, with no gold standard proposed
- Established measurement properties are imperative to avoid bias in findings and to have confidence in results²
- No systematic review exists evaluating the measurement properties of CS within musculoskeletal trauma

Aim

- Identify what outcome measures are used in musculoskeletal trauma to evaluate CS
- Investigate whether current CS measures within musculoskeletal trauma have established measurement properties

Methods

- PROSPERO registered systematic review (CRD42018091531) with a pre-defined published protocol³. Reported in line with PRISMA guidelines
- 2 stage systematic review:
 - **Stage 1:** identified all CS outcome measures within musculoskeletal trauma
 - **Stage 2:** evaluated the measurement properties of identified CS measures.
- Inclusion Criteria
 - Adults (≥ 16 years), who had experienced any type of musculoskeletal trauma and were evaluating CS. Any domain or measurement property as defined by COSMIN²
- Exclusion criteria
 - Studies investigating traumatic brain injury, burns or neurological injury
 - Studies not written in English
- Multiple databases (MEDLINE, CINAHL, EMBASE, PUBMED, ZETOC), Google Scholar, grey literature and hand searching of key journals were completed
- 2 independent reviewers conducted searches, title and abstract and full text screening, with a third reviewer available for any disagreement. Data extraction, risk of bias and overall quality was completed independently.
- Risk of bias was evaluated using the COSMIN risk of bias tool, with overall quality evaluated using a modified GRADE recommended by COSMIN²

Results

- **Stage 1:** 86 studies were included, with 30 different CS measures identified. Majority of studies evaluated whiplash associated disorders (WAD) n=76
- Majority of measures were quantitative sensory testing (QST) focused (figure 1)

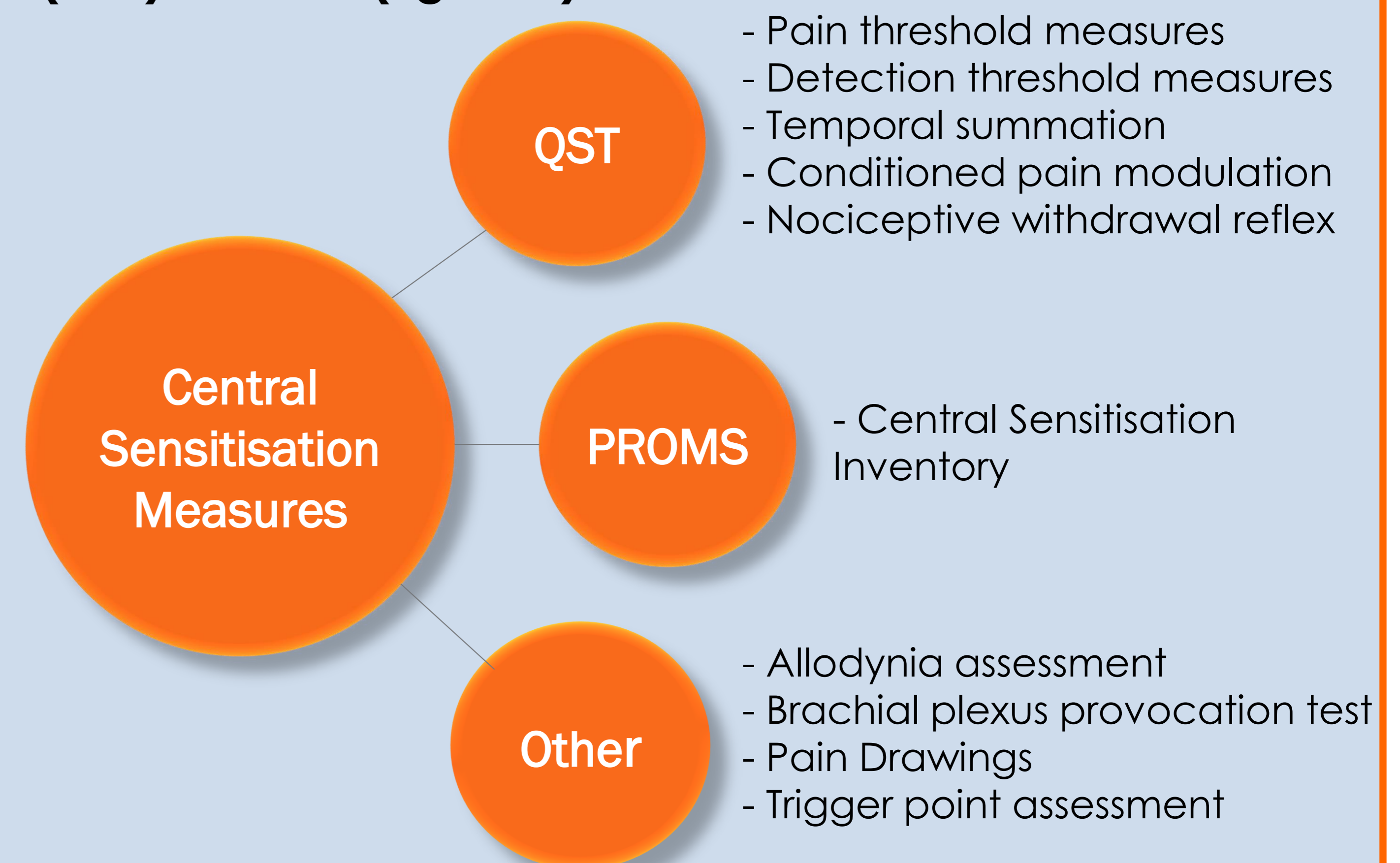


Figure 1. Summary of the measures found in stage 1 to evaluate CS

- **Stage 2:** 9 studies were included. Over 50% of the studies investigated WAD,
- 8 studies evaluated reliability and 1 evaluated construct validity
- CS measures evaluated included multiple QST measures, pain drawings and a pinwheel
- Risk of bias was rated as doubtful or inadequate for all reliability studies, with one study evaluating construct validity rated as very good.
- Overall quality was rated very low for all measures apart from the pinwheel which was rated as low
- Variable results in terms of adequate reliability demonstrated in all studies

Discussion

- Further high quality studies are required to evaluate measurement properties within musculoskeletal trauma
- Reporting of measurement properties and appropriate statistical methods was variable and consistency in reporting is required
- Non-English studies were excluded in this review

Conclusion & Implications

- A wide range of measures are used to evaluate CS, with the majority of research in the WAD population. Results were varied with high risk risk of bias in all but one study, with overall quality low or very low.
- Further high quality research is now required to establish measurement properties in this population to be confident in using these measures in clinical practice.

References

1. Woolf, C.J. (2011) Central sensitization: implications for the diagnosis and treatment of pain. PAIN 152, S2-S15.
2. Mokkink et al (2018) COSMIN methodology for systematic reviews of Patient-Reported outcome measures: User manual
3. Middlebrook et al (2019) Measures of central sensitisation and their measurement properties in the adult musculoskeletal trauma population: a protocol for a systematic review and data synthesis. BMJ OPEN 9 e023204

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