THE NEED FOR STANDARDIZED PAIN MEASUREMENTS IN ORTHOPAEDIC BIOMECHANICS RESEARCH: A Systematic Review of the Hand Osteoarthritis Literature

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Musculoskeletal research is multidisciplinary, with biomechanists and pain scientists comprising the majority.

**Biomechanics studies:**
- Focus on understanding movement adaptations
- X Fail to acknowledge and address the key role pain plays in modulating movement

**Pain studies:**
- ✔ Assess and monitor somatosensory neuropathies and other pain disorders
- X Do not routinely include movement and force analyses

**OBJECTIVE:** This review aims to provide background on current quantitative pain methods, describe the need for standardization within and across the biomechanics and pain fields, and provide suggestions for using pain research methods to elucidate the complex mechanisms behind diseases such as hand OA.

**Merging biomechanics and pain measurements can provide insight into:**
- (a) effect of pain sensitization on treatment responses
- (b) mechanisms of postoperative pain
- (c) differences between pain at rest and movement-evoked pain

Osteoarthritis (OA) is a widely studied musculoskeletal disease in both fields with an overarching consensus that structural changes in musculoskeletal system do not correlate directly with pain or function.

Hand OA was selected as a representative field of study as methodology to characterize pain and biomechanics is similar across joints; hand OA also presented a feasible scope for capturing relevant articles.

**Objective:**
- To identify the presence of peripheral and/or central pain
- To test the effectiveness of certain pain therapies

**Results and Interpretation:**

**Biomechanical outcomes of hand OA:**
- Studies showed:
  - Kinematic changes (e.g., decreased range of motion) at the affected and surrounding joints
  - Decreased grip and pinch strength
  - Variable muscle activity across studies

**Literature varied substantially in their discussion and measure of the influence of pain on movement**

**Pain outcomes of hand OA:**
- The primary goal of studies was to either:
  - Test the effectiveness of certain pain therapies
  - Identify the presence of peripheral and/or central sensitization

**Overall Importance:**
- Measuring pain in biomechanics studies using quantitative methods followed by analytical discussion will close the gap between fields and advance our understanding of the relation, both negative and positive, between movement and pain.

**References:**