

REDUCED RANGE OF MOTION AND HIGHER MOVEMENT-EVOKED PAIN IN INDIVIDUALS WITH CARPOMETACARPAL OSTEOARTHRITIS

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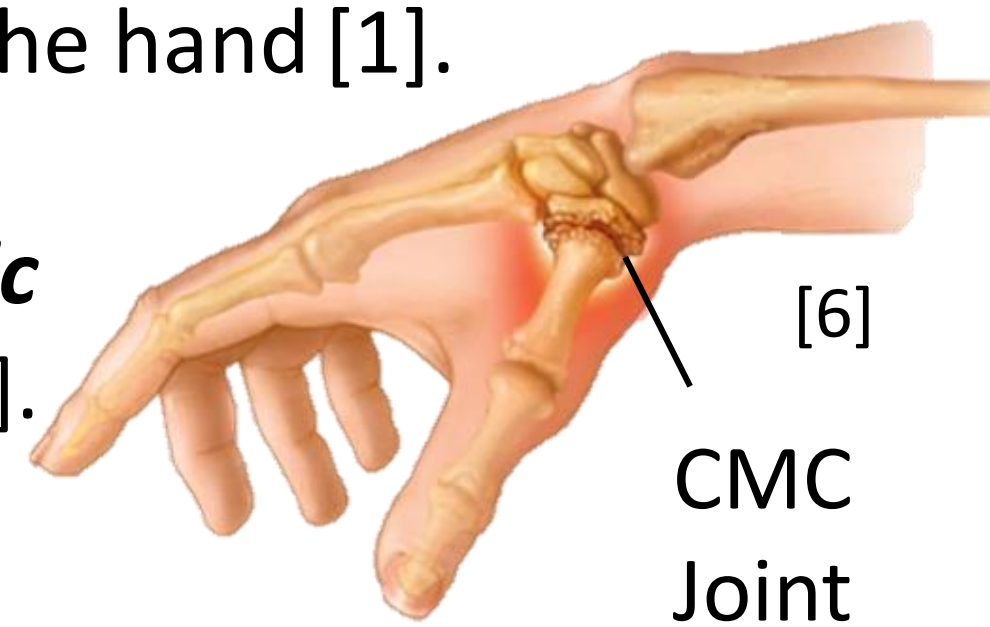
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INTRODUCTION

The carpometacarpal (CMC) joint is the most mobile joint of the hand [1].

Osteoarthritis (OA) at the CMC joint can lead to **severe chronic pain, joint damage**, and **up to 50% loss of hand function** [2-4].



Pain ≠ Disease Severity

Movement-evoked pain (MEP) can highlight the bi-directional association between pain and movement [5].

AIM

Examine **movement** and **pain** differences during CMC joint range of motion tasks.

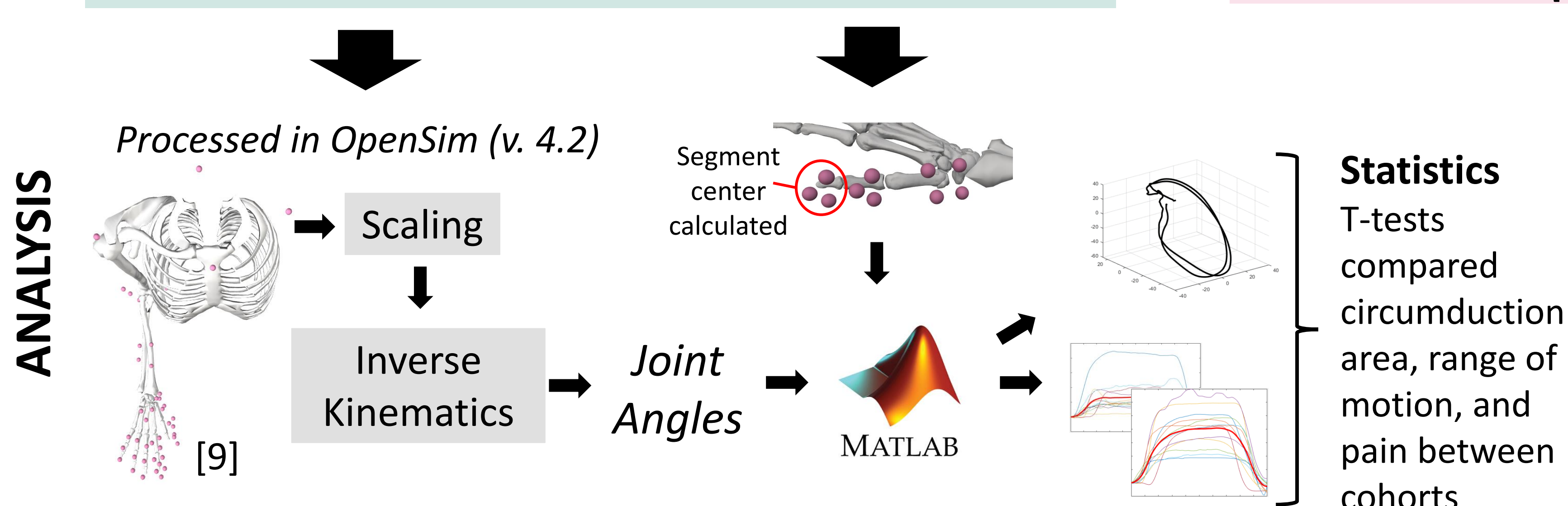
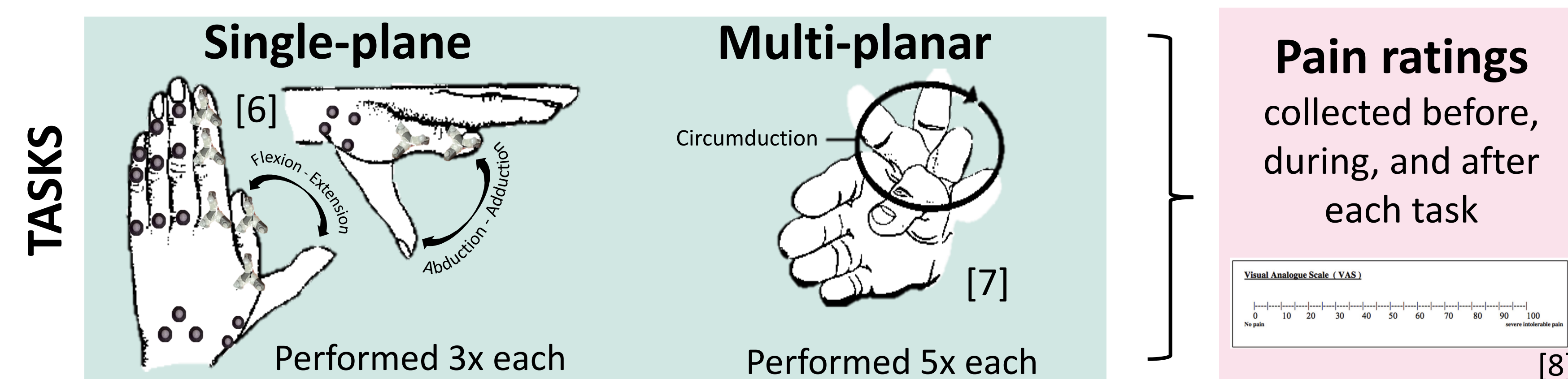
Hypothesis: Individuals with CMC OA will have significantly decreased range of motion and higher pain ratings than healthy controls.

METHODS

Data was collected from 13 female participants for each cohort:

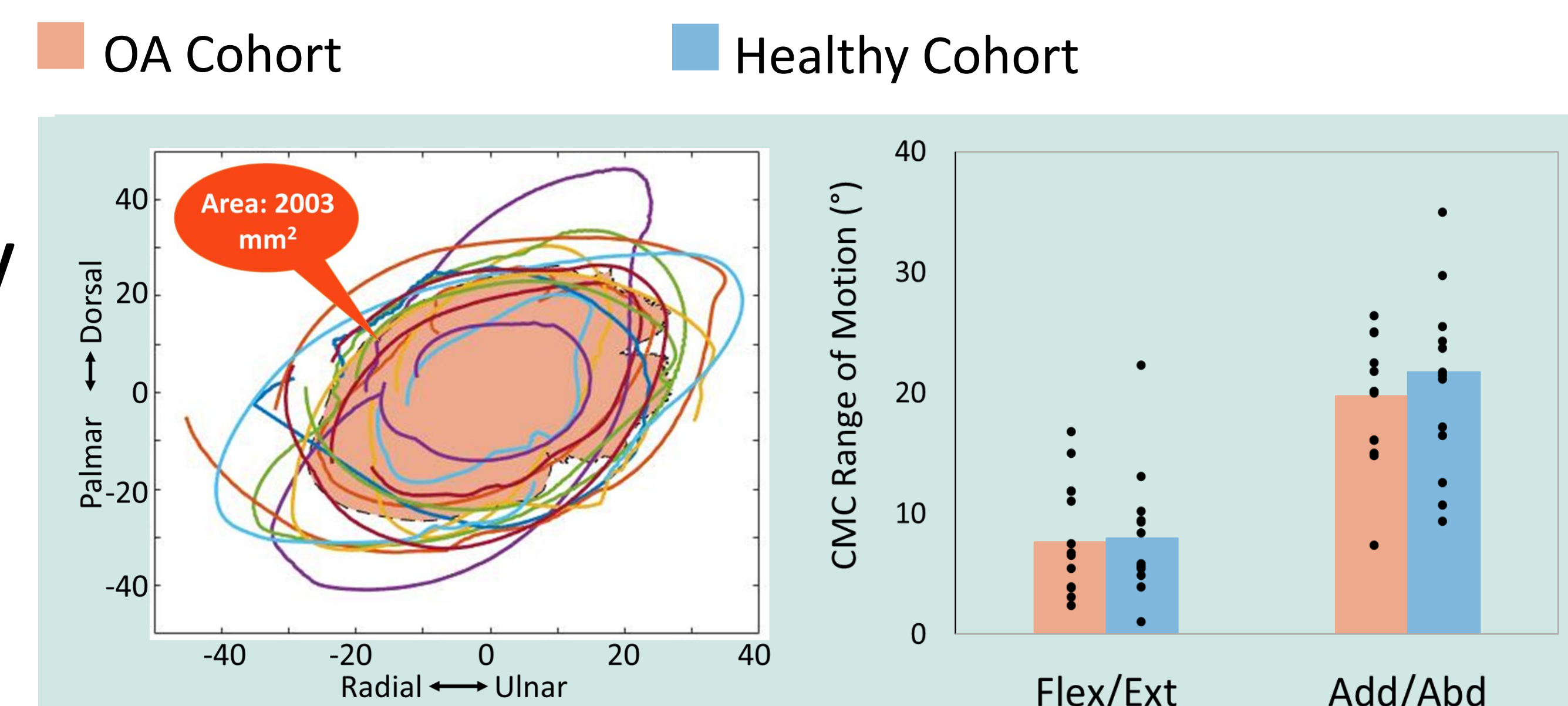
	OA (mean ± SD)	Healthy (mean ± SD)	P-values
Age	66.9 ± 11.2	62.2 ± 12.9	0.3
Eaton-Litter	2.9 ± 0.8	2 ± 1.2	0.03
AUSCAN			
Pain	3.9 ± 2.1	0.6 ± 2.0	<0.001
Function	4.6 ± 2.3	0.8 ± 2.1	<0.001
DASH	32.9 ± 19.9	6.7 ± 10.6	<0.001

Motion data was collected during 3 tasks at 100 Hz using a 12-camera Vicon system:

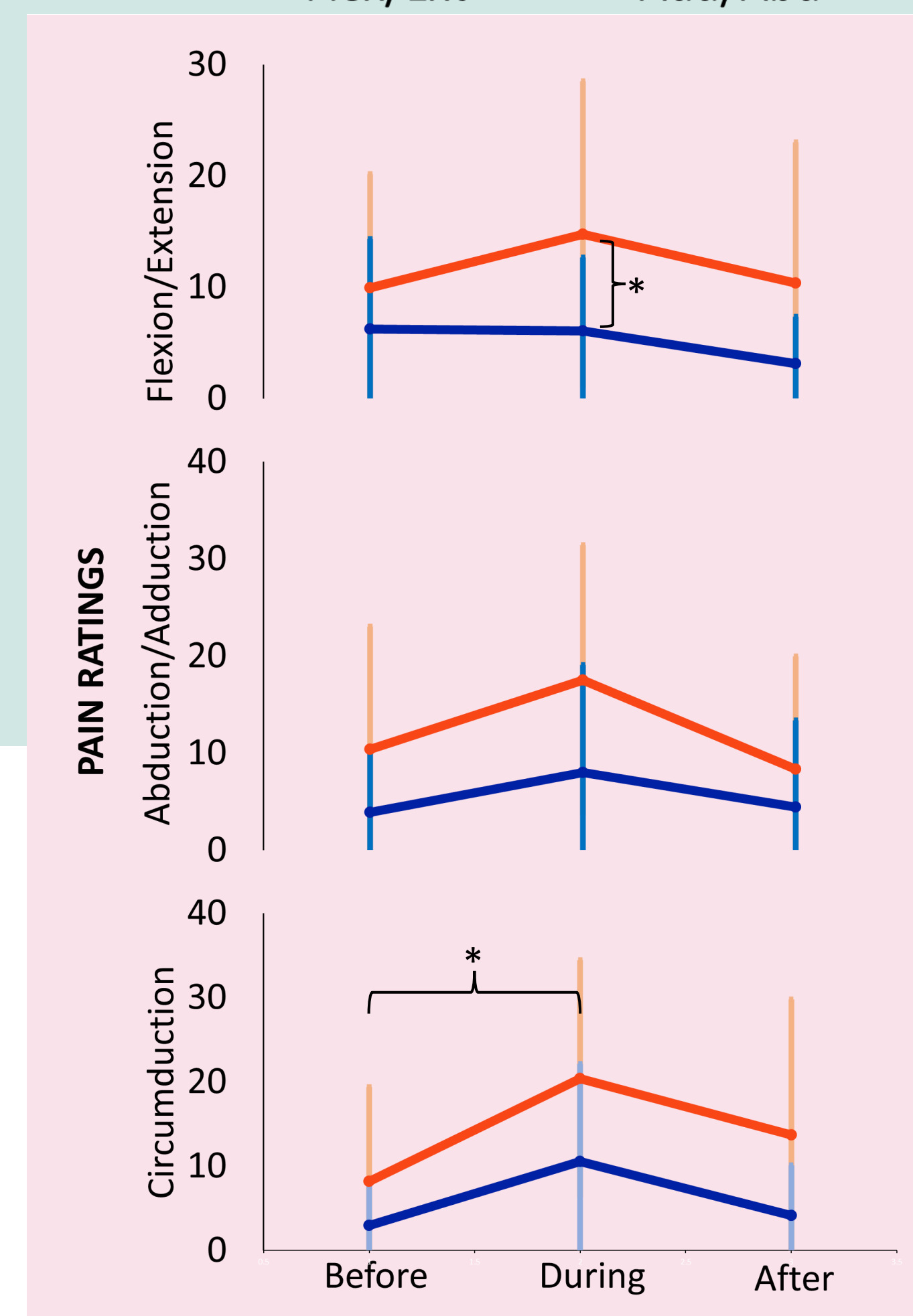


RESULTS

Range of motion was not significantly different between cohorts based on self-reported pain and functional disability.



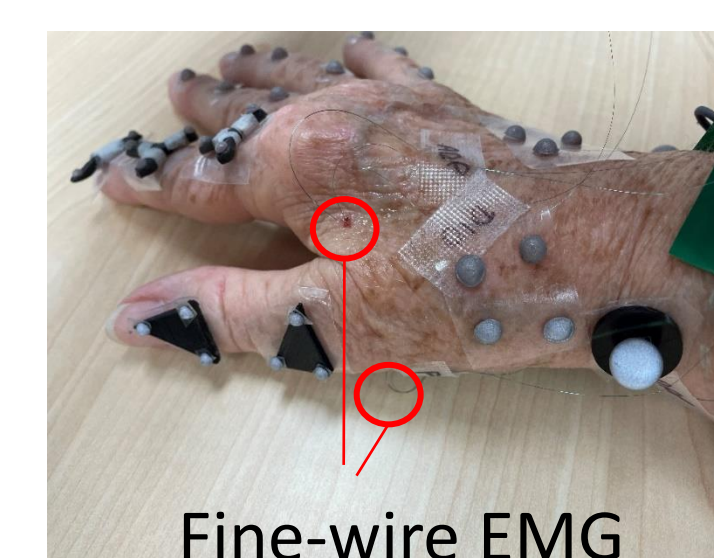
Pain ratings were consistently higher in the OA cohort compared to controls. Pain was highest during tasks for both cohorts.



DISCUSSION

Although no significant differences were found during single- or multi-planar tasks, our results highlight the heterogeneity and multifaceted nature of OA:

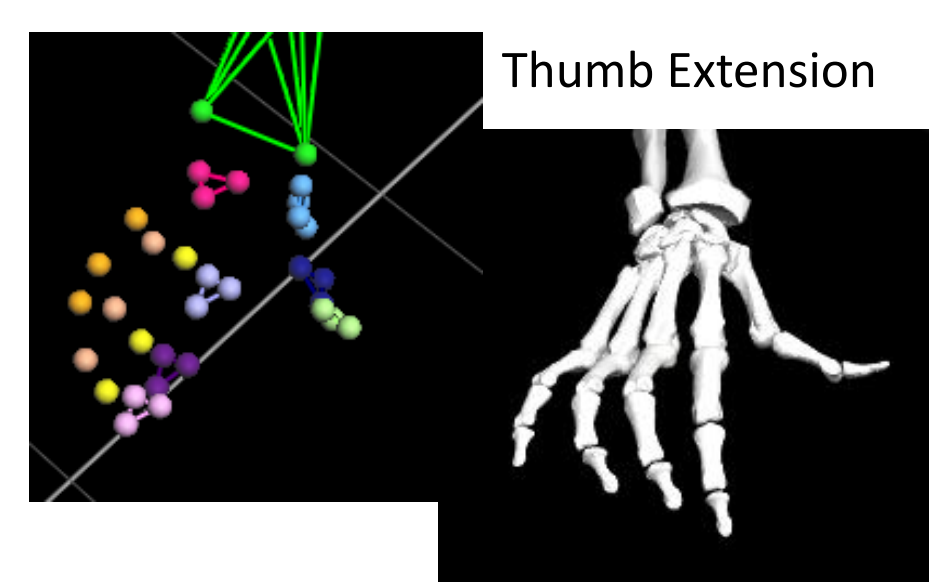
- The **range of motion** data suggests identifying cohorts based on pain alone may not fully capture movement deficits in CMC OA.
- The **pain** results demonstrate the need to better understand and measure the pain experienced due to movement.



Fine-wire EMG

Limitations: Small number of participants, induced pain due to fine-wire electromyography, and unconstrained movement during circumduction.

Future work: Increase the number of participants, normalize the circumduction plots based on thumb length, analyze movement compensation at the surrounding joints, and identify different clustering methods to define cohorts.



References

- [1] Mansfield, P., et. al., *Essentials of Kinesiology for the Physical Therapist Assistant*, 2019 [2] March L., et. al., *Oarsi* 2016:1-103 [3] Hunter DJ., et. al., *Nat Rev Rheumatol* 2014;10(7):437-441 [4] Kjeen L., et. al., *Ann Rheum Dis*. 2005;64(11):1633-1638 [5] Corbett DB., et al., *Pain* 160(4):757-761 [6] Wright, W., et. al., <https://www.melbournehandtherapy.com.au> (Aug. 15, 2022) [7] *Musculoskeletal Key*, <https://musculoskeletalkey.com> (Aug. 15, 2022) [8] Aggarwal K., et al., *J Dent Anesth Pain Med* 18(6):367 [9] Saul KR., et al., *Comput Methods Biomech Biomed Engin* 18:1445-58 [10] Boulder Centre for Orthopedics & Spine, <https://www.bouldercentre.com/> (Aug. 15, 2022)