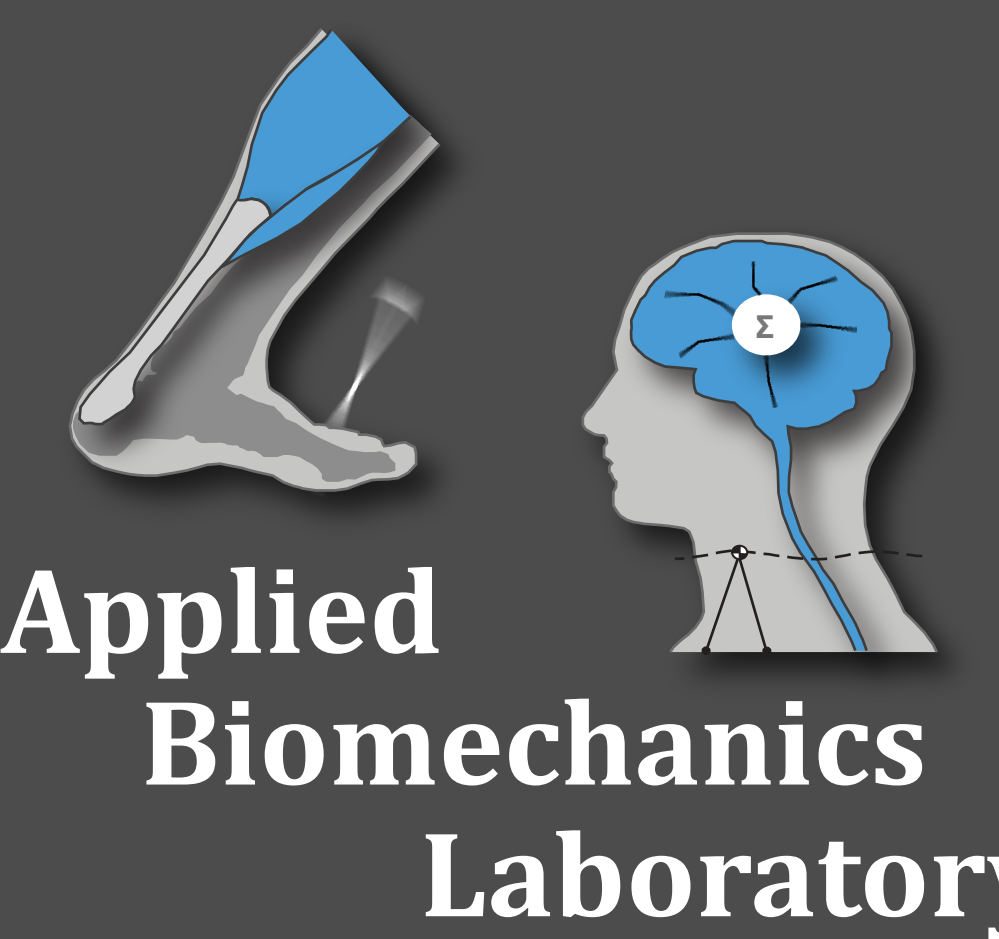


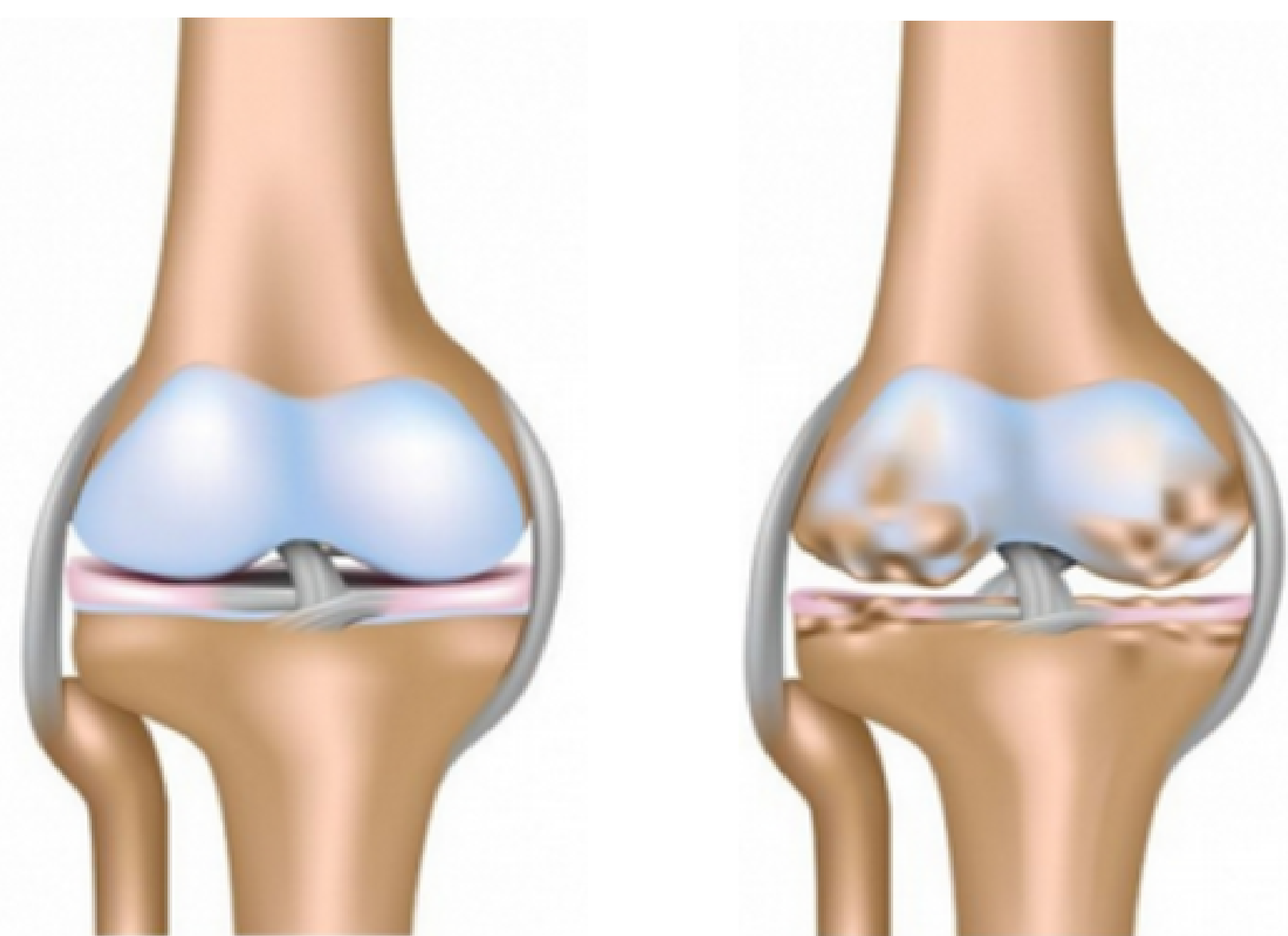
Knee Kinematics During Walking Associate with Symptomatic Pain in Individuals with Knee Osteoarthritis

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PAIN EXPERIENCED FROM KNEE OSTEOARTHRITIS IS A MAJOR FACTOR IN THE INDIVIDUALS' COMPENSATION BEHAVIOR IN WALKING.



Knee osteoarthritis is one of the leading causes of pain worldwide and is the most prevalent joint disease [1]. Understanding the phenotypic effects of knee osteoarthritis on gait in individuals is an extremely important step in developing methods for precision rehabilitation. Symptomatic knee osteoarthritis in particular can yield aberrant compensations and avoidance behaviors that may be further detrimental to knee joint health.

Purpose

Quantify preliminary associations between self-reported pain/function and three potential kinematic biomarkers during walking - knee flexion angle, knee angular acceleration, and knee angular jerk.

Hypothesis

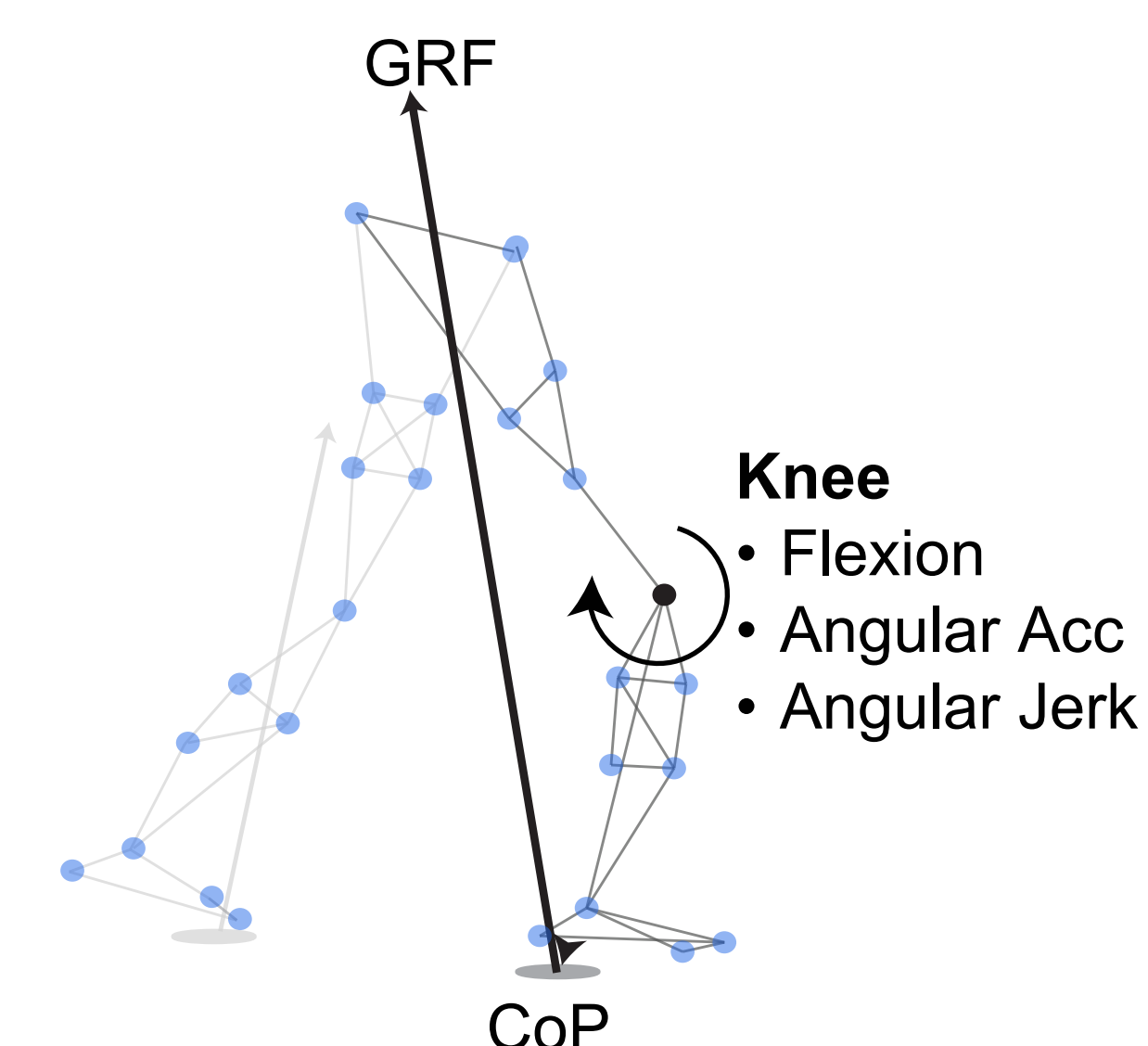
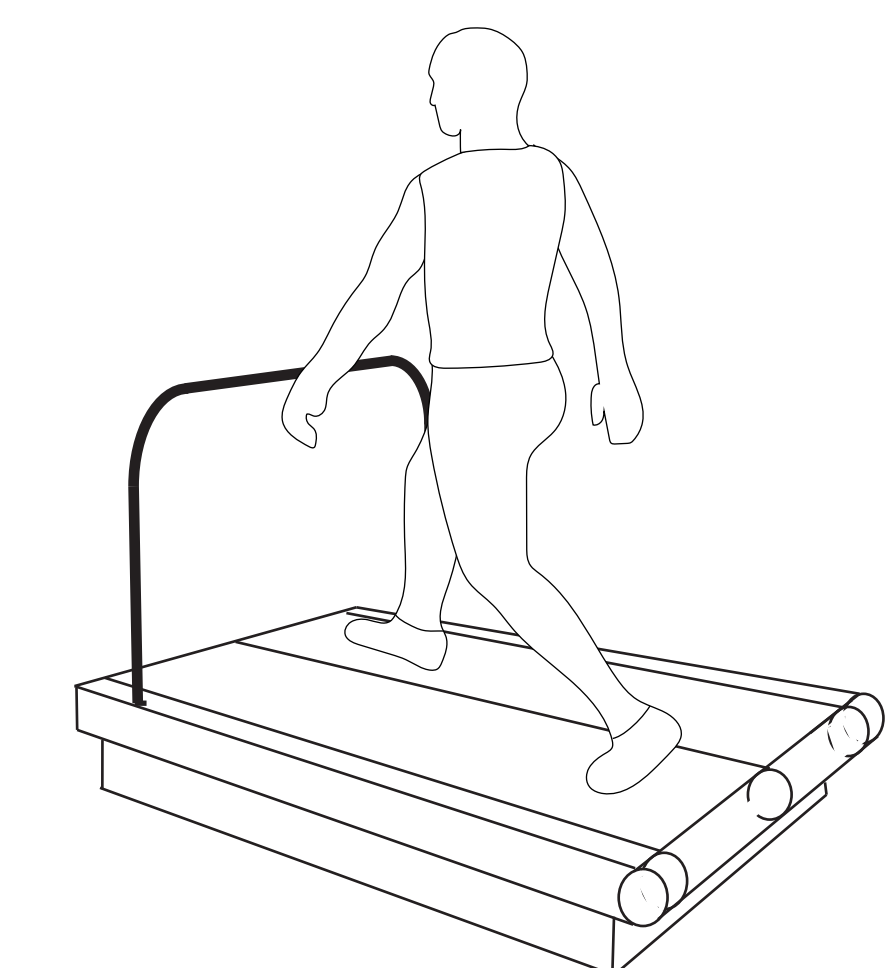
Higher self-reported pain would associate with lesser peak knee flexion, knee angular acceleration, and knee angular jerk.

Findings from this study will generate a better understanding of the effects that the change in walking due to pain in individuals with knee osteoarthritis have.

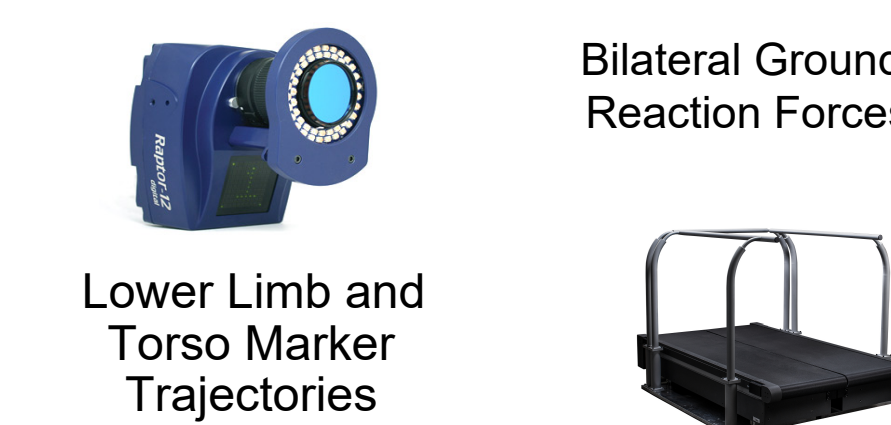
PARTICIPANTS DIAGNOSED WITH OA AND INDICATED VARIOUS LEVELS OF PAIN

15 Participants with OA

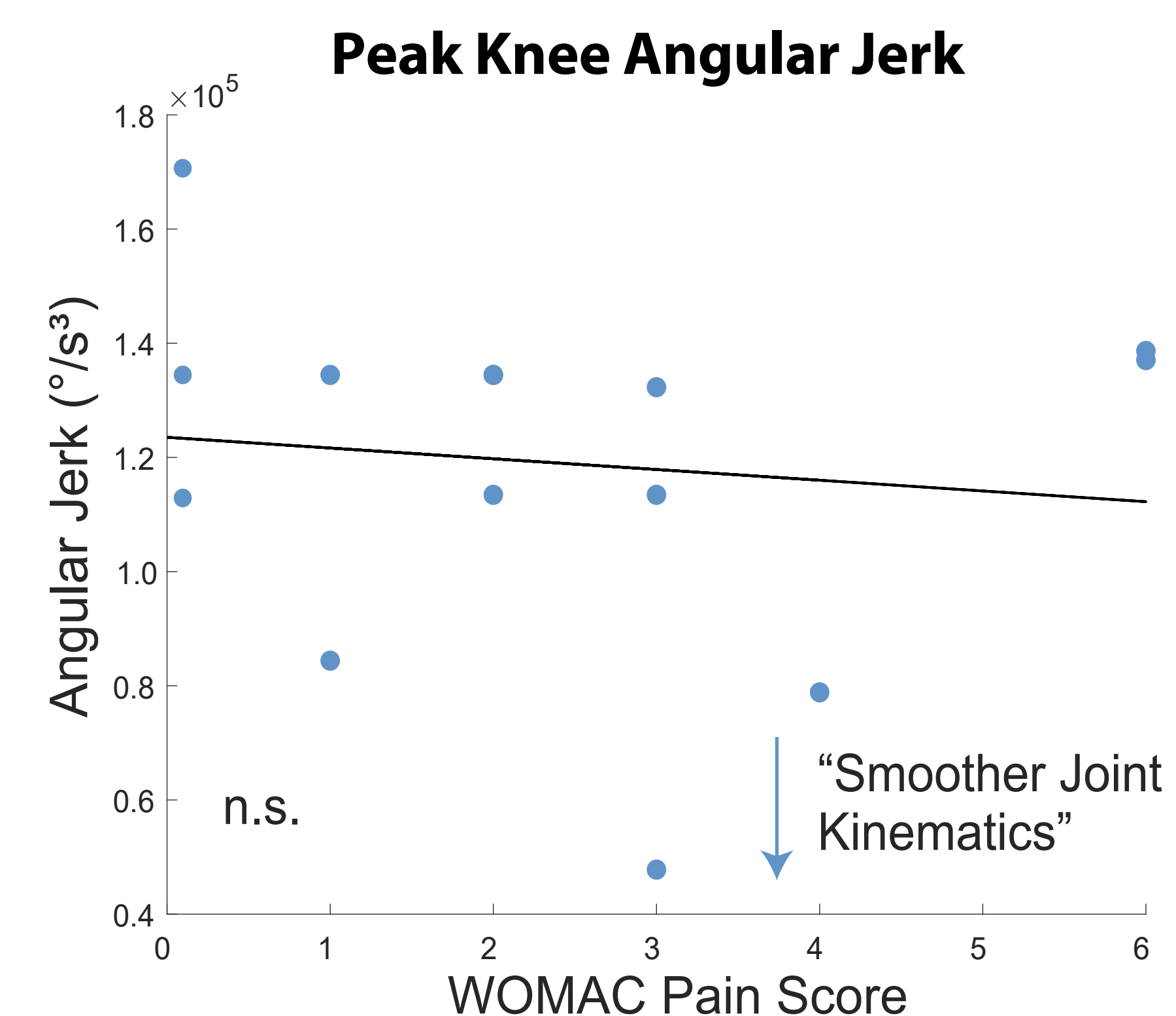
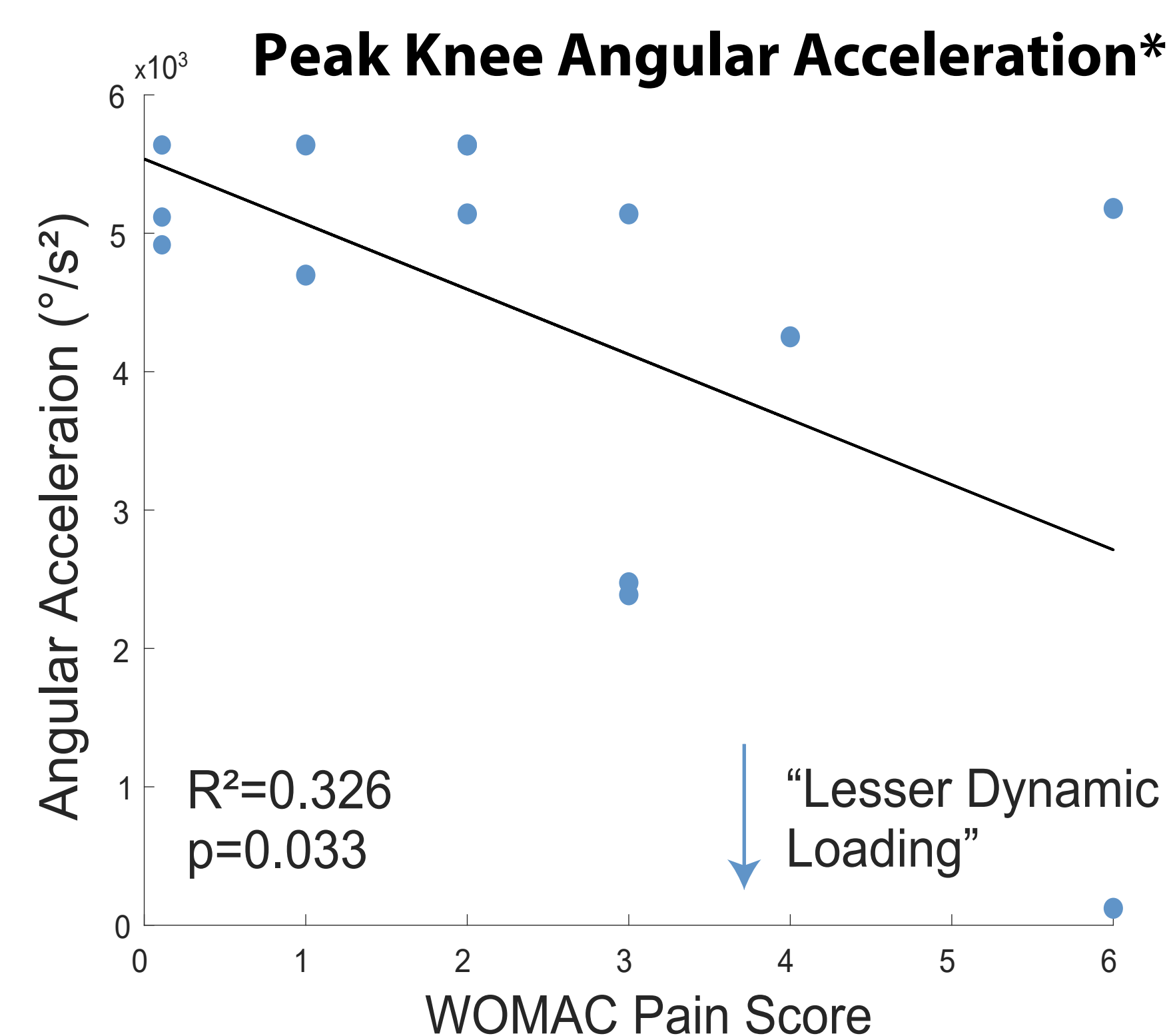
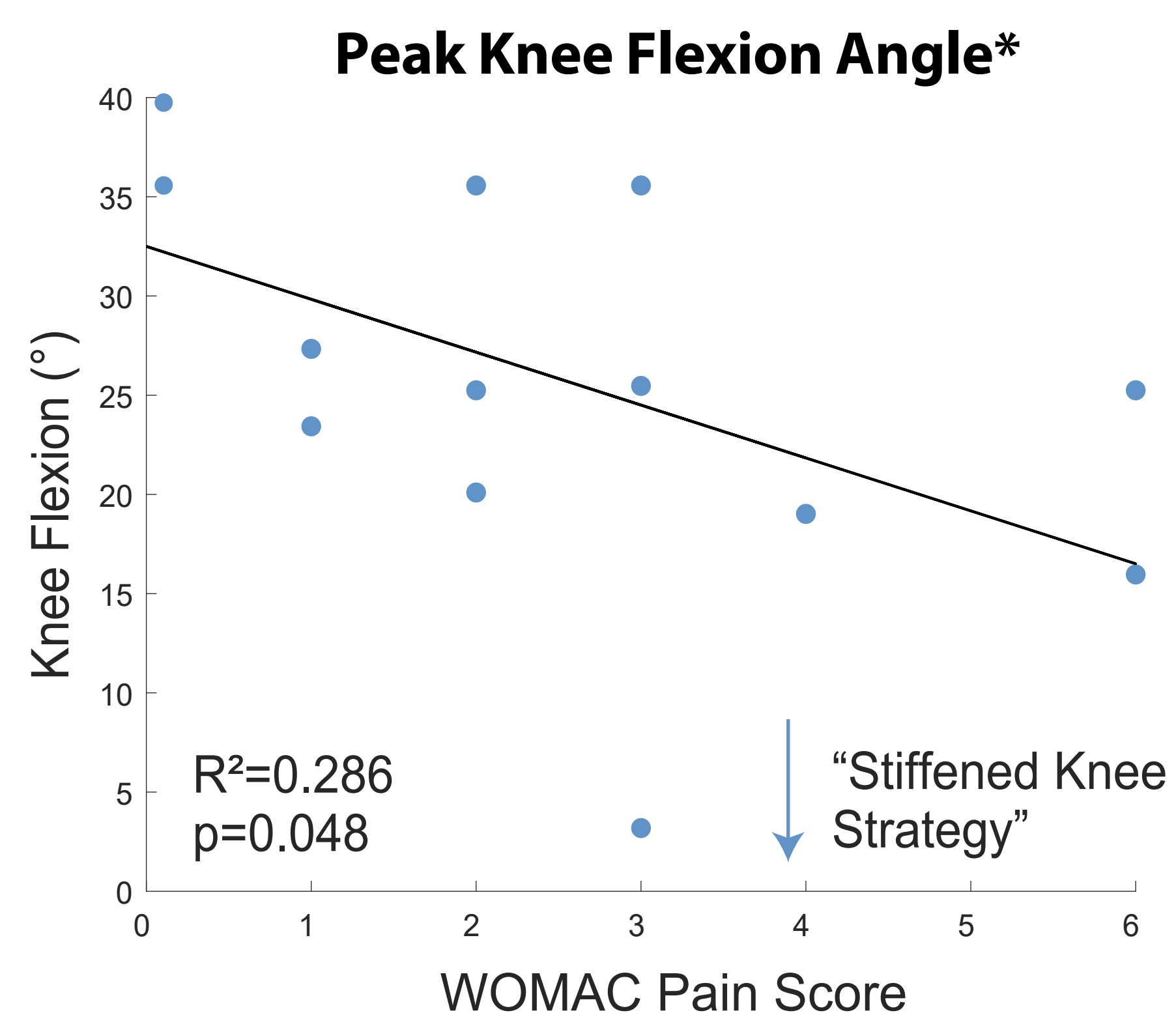
Age 66.57 ± 7.46 years
Sex 7M / 8F
BMI 26.66 ± 3.26



Data Collected



SELF REPORTED PAIN SCORES CORRELATED WITH A LESSER KNEE FLEXION AND LESSER KNEE ANGULAR ACCELERATION



WOMAC Survey

- Scores range from 0 to 20
- Higher scores indicate greater pain
- Questions revolved around pain within the past 48 hours during daily activities:

- Walking on a flat surface
- Managing stairs
- Disturbed Sleep
- Sitting or lying down
- Standing Upright

Higher WOMAC pain scores were significantly correlated with:

- lesser midstance knee flexion
- lesser early stance phase knee angular acceleration

DISCUSSION AND FUTURE DIRECTIONS

We have found knee-specific markers that may be: (1) linked to avoidance strategies in symptomatic knee osteoarthritis and (2) opportunistic for wearable sensing and remote monitoring of knee osteoarthritis symptom mechanisms.

Our next steps are to look at neuromechanical phenotypes associated with symptomatic pain in the same patients derived from measured compressive joint forces and muscle function (activation and ultrasound simultaneously measured).



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Joint Department of Biomedical Engineering at UNC and
NCSU Johnson Scholarship

- [1] Murray et al. 2013
- [2] Murphy et al. 2008
- [3] Losina et al. 2013
- [4] Tani et al. 2018

Image Sources

