CHARACTERIZING IN-VIVO EXPOSURES OF THE LUMBAR SPINE DURING SIMULATED LOW-SPEED REAR IMPACT COLLISIONS

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INTRODUCTION

- Up to 50% of people involved in **low-speed collisions** report **low back pain.**[1]
- Few studies involving human volunteers address the risk of low back injury.

Bracing for Impact:

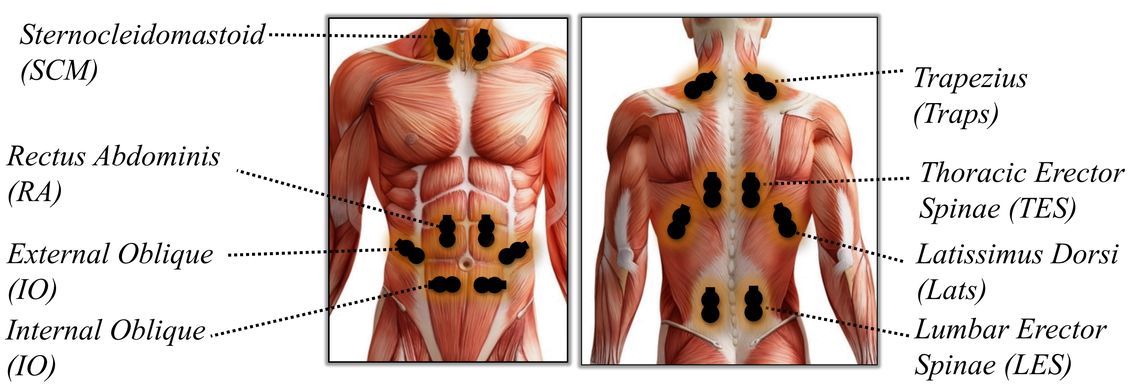
- ↓ Forward Excursion: knees, hips, elbows and head[2]
- Changes initial posture → Influences Joint Kinematics & Biomechanical Response[3,4]

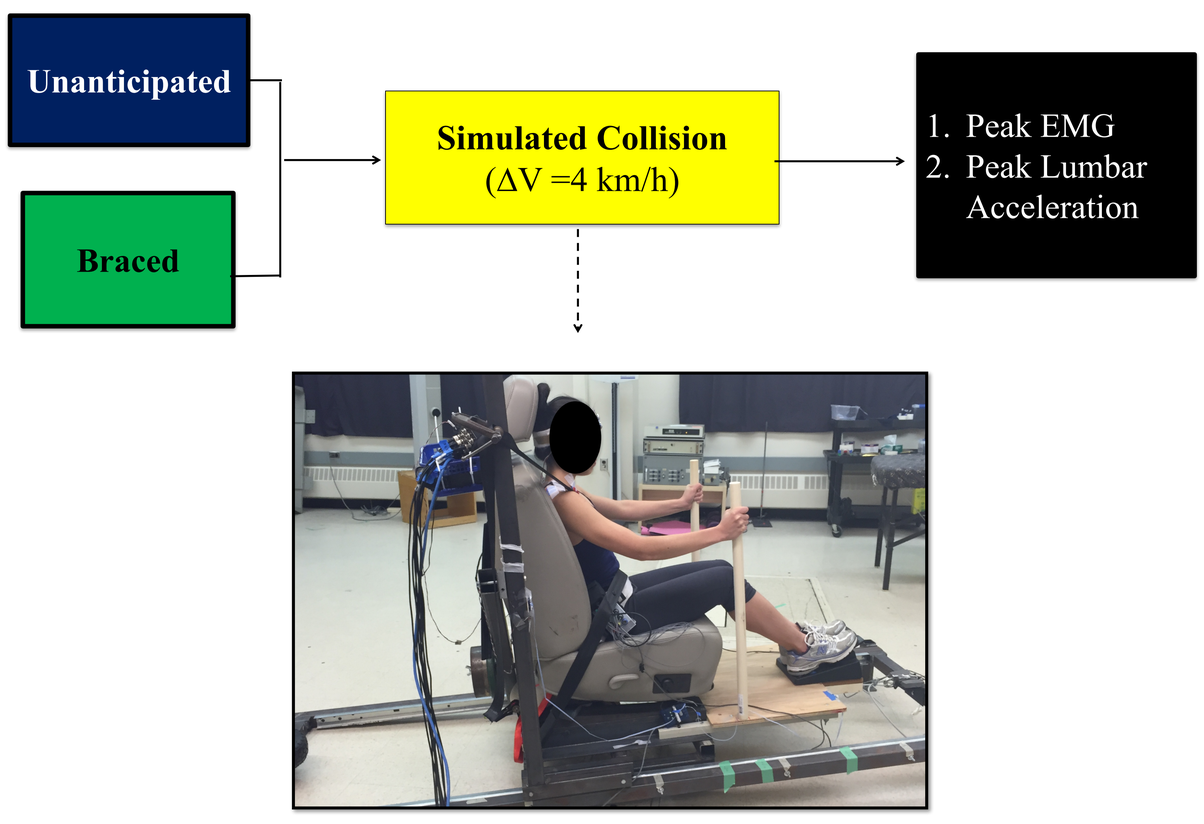
Purpose: Investigate muscle activations and lumbar accelerations in response to **Unanticipated** and **Braced** simulated rear end collisions.

METHODS

11 Participants (7 male, 4 female)

- Accelerometers → Sled & L4L5

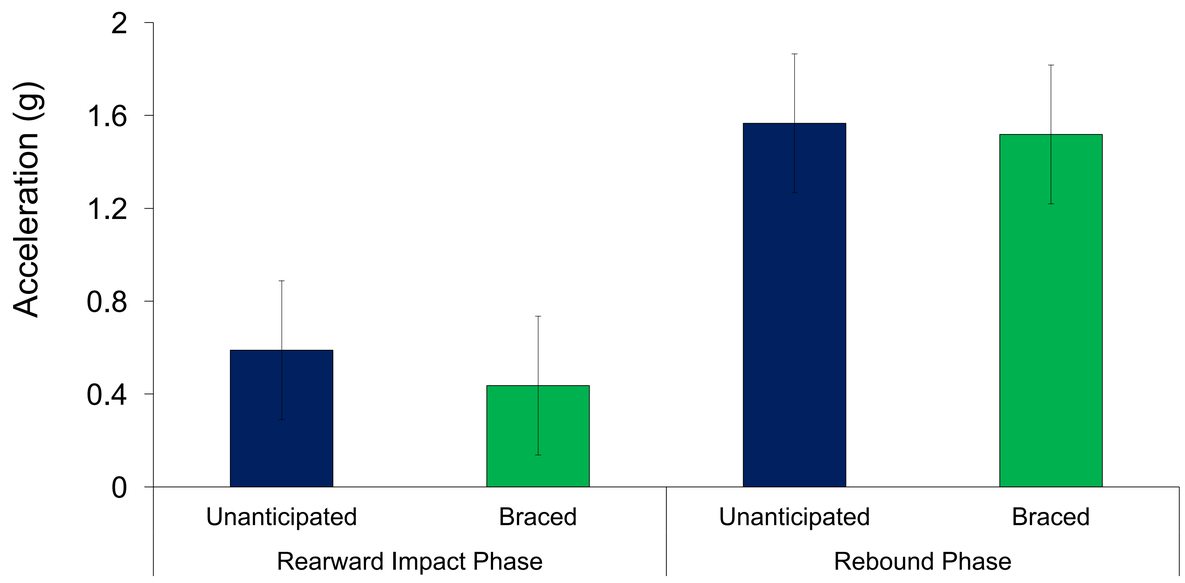




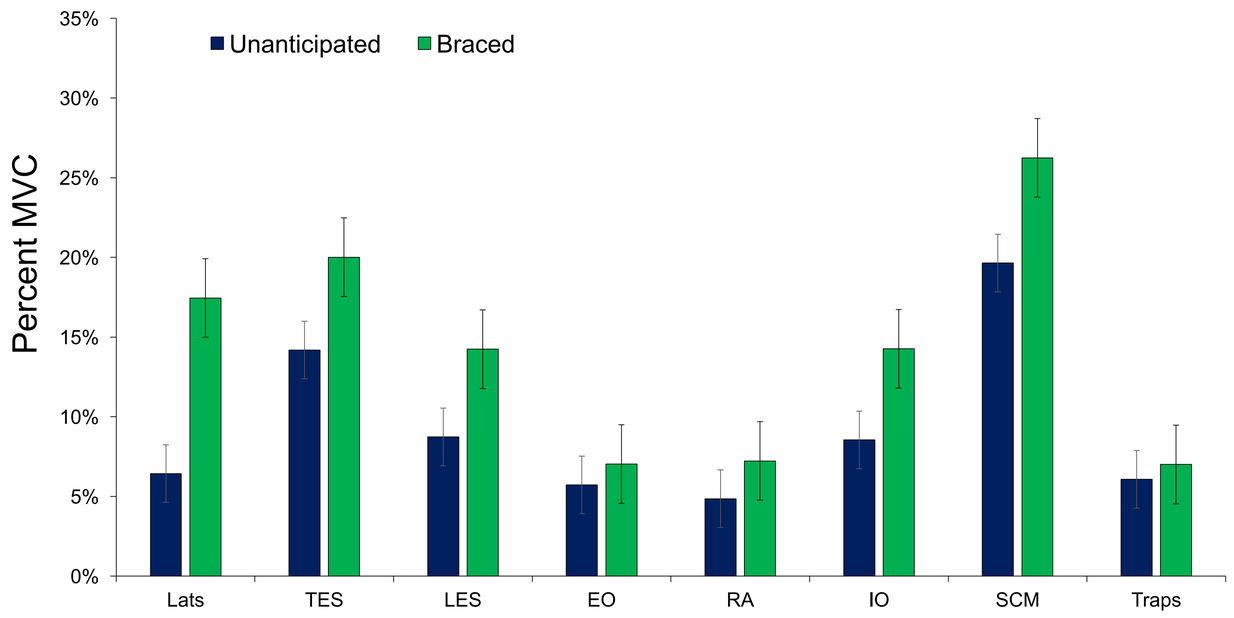
Custom rear-impact crash sled.

RESULTS

Peak Lumbar Accelerations: ↓ Braced



Muscle Activations



IMPLICATIONS

- Unanticipated Collision: ↓ Muscle Activations
- Muscle activation likely has minimal contribution to the bone-on-bone forces experienced in intervertebral joints in the lumbar spine during rear impact collisions

1. Simplified Joint Models
2. Cadaveric
3. ATD Testing

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