RAPID RESEARCH

@physicaltherapyresearch

April 2021

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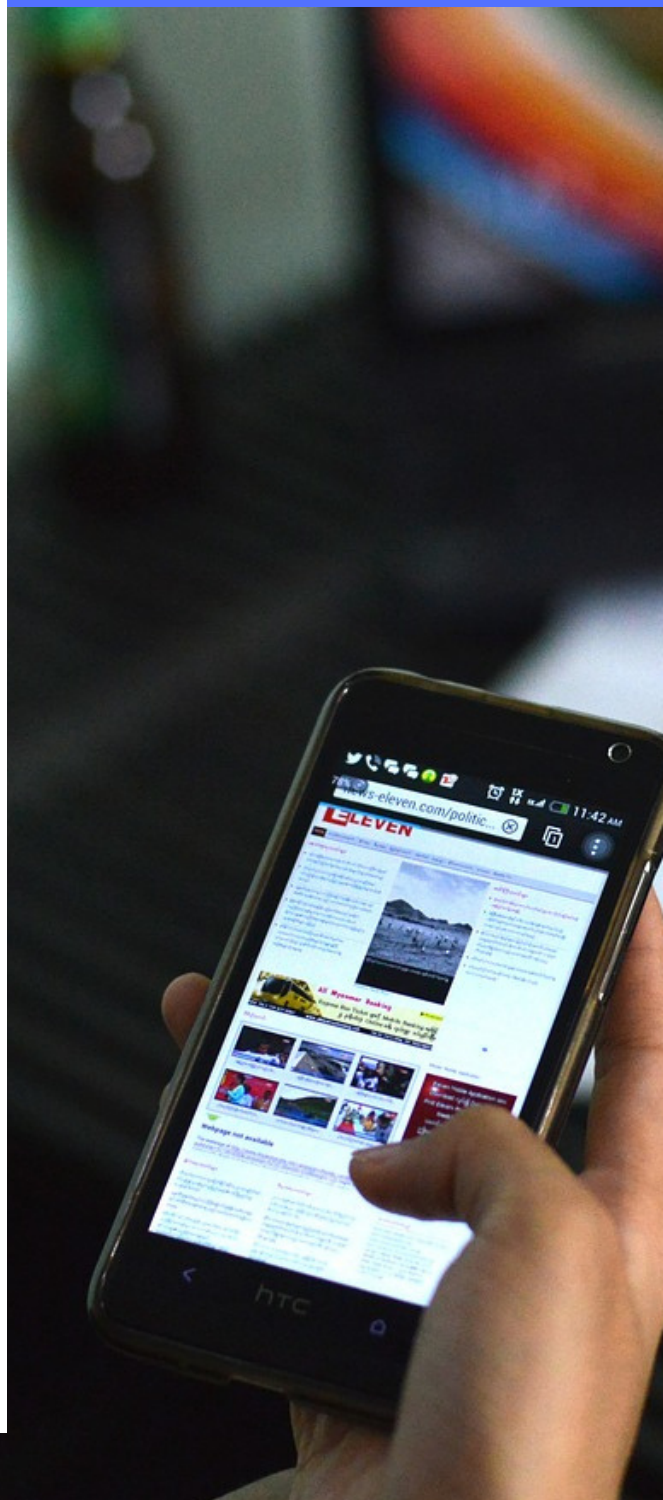
Low Back Strength & Movement

- Low Back Strength: Flexed vs. Straight
- How Much Do We Bend/Extend our Low Back Over 24 Hours?
- Brace Yourself: How Abdominal Bracing Affects the Spine



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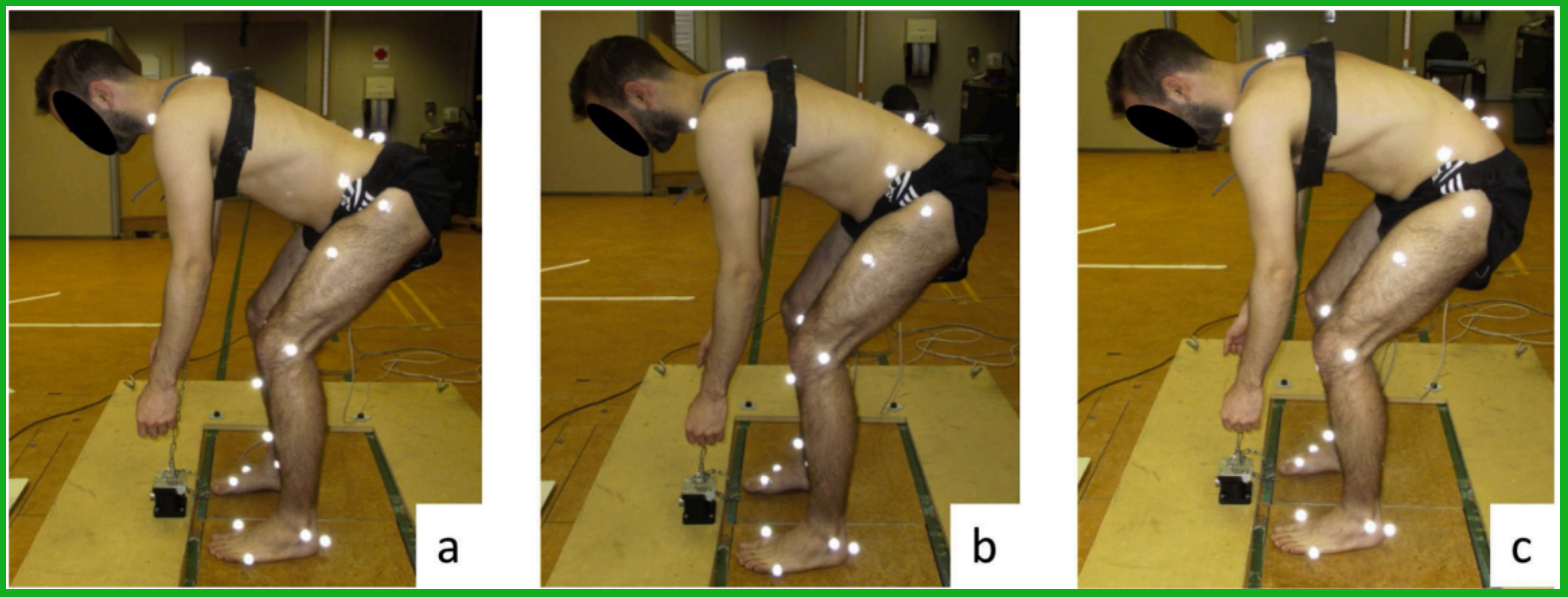
LOW BACK STRENGTH: FLEXED VS. STRAIGHT

Inspite of common lifting advice to maintain a lordotic posture, there is debate regarding optimal lumbar spine posture during lifting. This research looked at differences in lumbar posture & the influence on trunk extensor strength, muscle activity, and neuromuscular efficiency during maximal lifting.



KEY FINDINGS

Lumbar curvature:
In lifting position, average peak flexion was 56.2 ◦ .
In upright standing position, average peak flexion was 57.2 ◦ .
In the extended position, an average of 22.7 ◦ lumbar flexion still remained.

Back extensor strength:
Males exerted significantly higher peak strength than females across all postures.
Back extensor moments were significantly different between:
Flexed & mid-range.
Mid-range & extended posture.
Flexed & extended posture.

Hip and knee moment:
When normalized to body weight, there was no difference between males and females.
Lumbar posture had no effect on hip or knee moments.

Muscle activity:
Positioning affected neuromuscular efficiency, the average increasing by:
Moving from the extended to mid-range [25%].
Moving from midrange to full flexion [300%].

MAIN TAKEAWAYS

Flexed lumbar spine lifting postures increased the body's ability to generate a trunk extensor moment and significantly improved neuromuscular efficiency.

Conversely, the lordotic / straight lumbar spine postures resulted in the lowest extensor moment and poorest Neuromuscular efficiency.

A flexed-back posture is associated with increased strength and efficiency of the back muscles compared to a lordotic posture.

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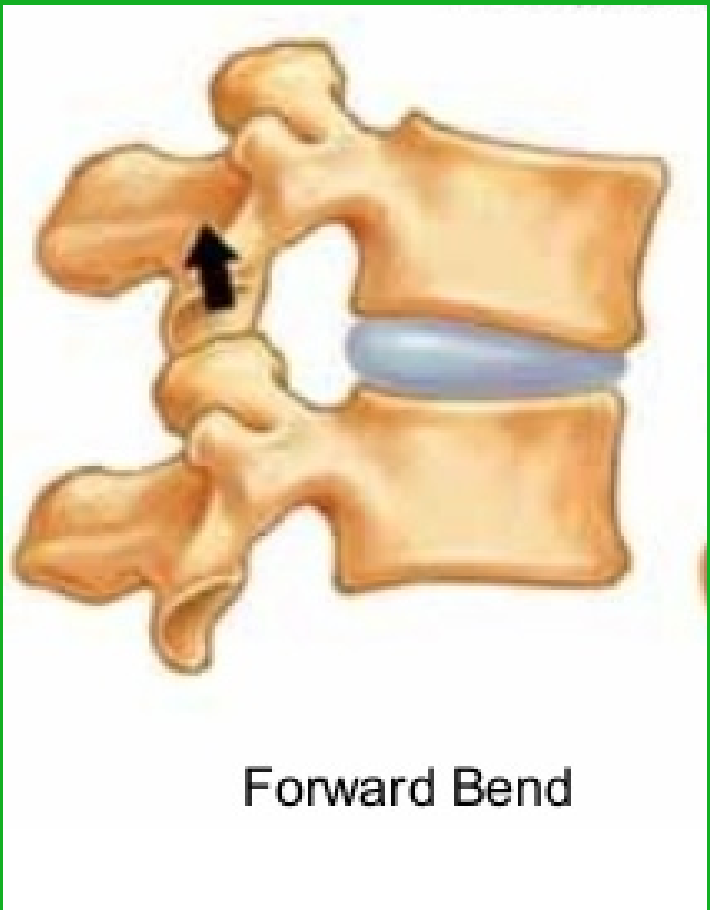
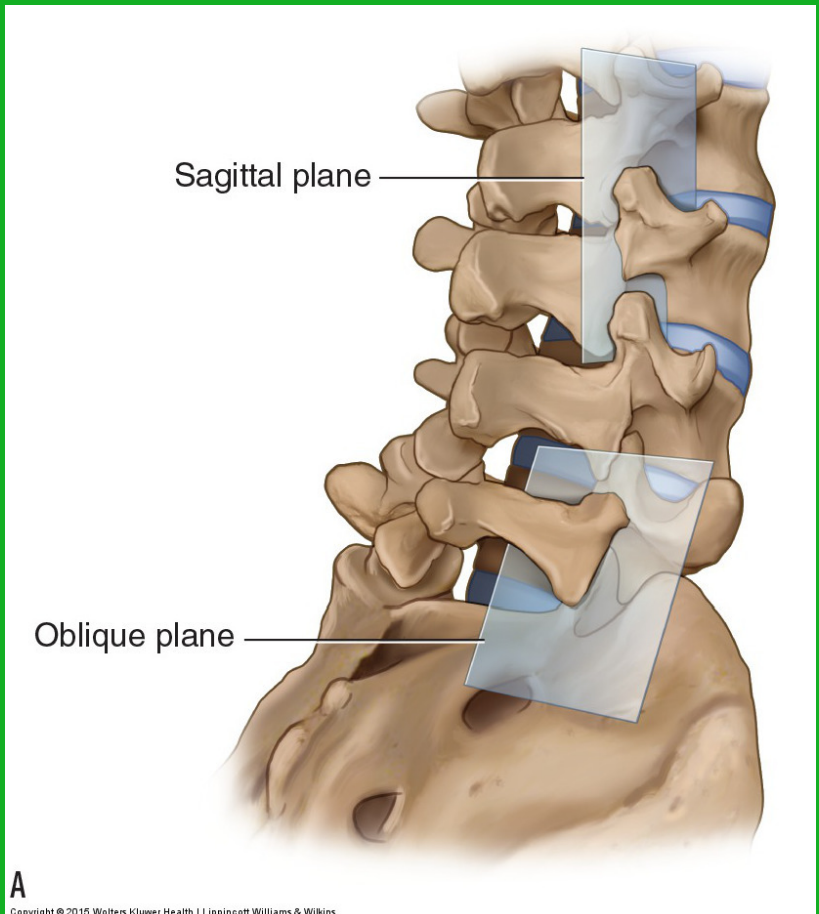
HOW MUCH DO WE BEND/EXTEND OUR LOW BACK OVER 24 HOURS?

This study aimed to measure people's spine movements in typical day-to-day life, as ongoing debate around the general health and/or injury risk of repeated flexion of the spine.



Forward Bend



KEY FINDINGS

The median total number of movements with a Lordosis Angle (LA) change **greater than 5 degrees was ~4,400 (Range 1,248–13,029)** within 24 h.

66 % (~2,915) had **LA changes of 5–10 degrees**, (range 741–9,897).
17% of LA changes were between **10 and 15 degrees.**
6% of LA changes between were between **15 and 20 degrees.**

Median number of LA changes of greater than **45 degrees was 21.**

Average full flexion was 25.1 degrees.
Average full extension was 3-62 degrees.

LA of full flexion was reached or exceeded an average of 50 times.
Full extension was 0 times.

MAIN TAKEAWAYS

Predominantly, a small range of movement of the spine is used during daily activities.

Only a small amount of time, if any was spent in extension.

These unique data strongly contribute to the understanding of patients' everyday behavior, which might affect the development and testing of spinal implants and the evaluation of surgical and nonsurgical treatments.

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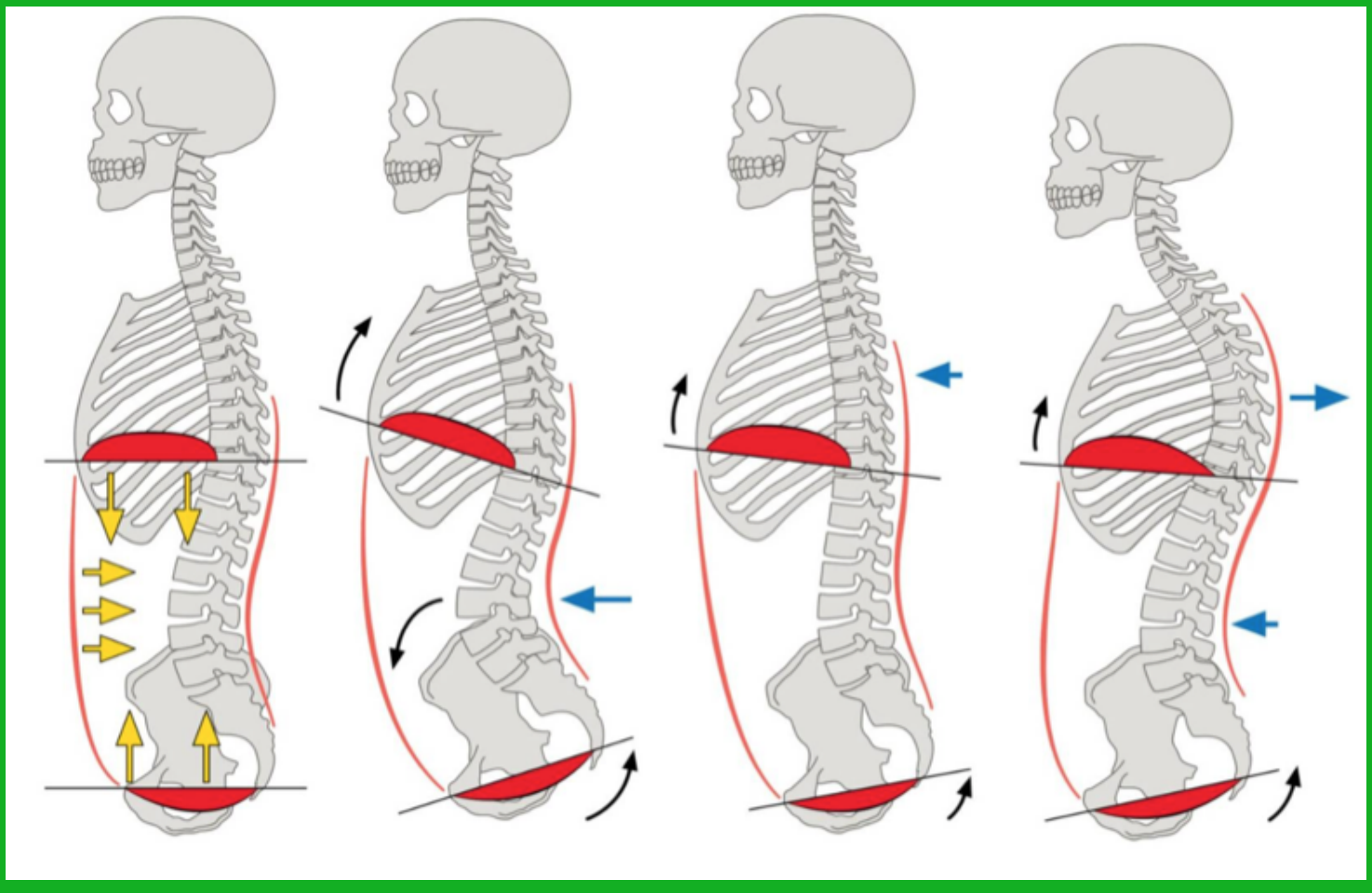
BRACE YOURSELF: HOW ABDOMINAL BRACING AFFECTS THE SPINE

This study investigated the effects of abdominal bracing on spine intersegmental kinematic and neuromuscular responses to sudden trunk loads applied via the hands.



KEY FINDINGS

Abdominal bracing significantly reduced sagittal plane motion (Bending/Extending):
T12/L1 to L4/L5, by **45%.**
L4/L5 by **94%.**

L5/S1 experienced a **50% reduction**, but this was not statistically significant.

Abdominal bracing resulted in greater baseline activation of all abdominal and back muscles.

However **did not affect** onset times or response magnitudes of any of the back muscles acting counter to the perturbation

MAIN TAKEAWAYS

Abdominal bracing reduces the lumbar spine's movement deviation to a sudden loading perturbation.

More specifically, abdominal bracing resulted in significantly reduced flexion at all lumbar intersegmental levels except L5/S1.

The reduction in kinematic disturbance is likely due to increased baseline muscle activation and corresponding stiffness.

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We would greatly appreciate any feedback you have, as it helps us continually improve!

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