

**T. J. Kraemer, PhD, PT, ATC**  
 A.T. Still University, Physical Therapy Department

## INTRODUCTION

- Back pain is one of the most common musculoskeletal problems, accounting for 25% of all disabling injuries in the United States.
- Previous research on lumbopelvic dysfunction has focused on a variety of physiological and anatomical parameters and found that lumbopelvic imbalances produce increased anterior tilt of the pelvis and exaggerated lumbar lordosis.
- The exact relationship of decreased pelvic mobility, hamstring length, and spinal active range of motion (flexion) remains unclear.

## PURPOSE

- The purpose of this study was to investigate the relationship of various physical factors (hamstring length, spinal AROM, pelvic tilt, and pelvic mobility) that result in self-reported low back pain in racially diverse employees in a physically demanding job within a university setting.
- It was hypothesized that decreased hamstring flexibility and pelvic mobility are contributing factors to low back pain.

## METHODS

DESIGN: This was a quasi-experimental, correlational design.

### PARTICIPANTS:

- A convenience sample consisting of 30 racially diverse employees
- Employed by a major research University physical plant (maintenance, grounds, vehicle repair, custodial)

### PROCEDURES:

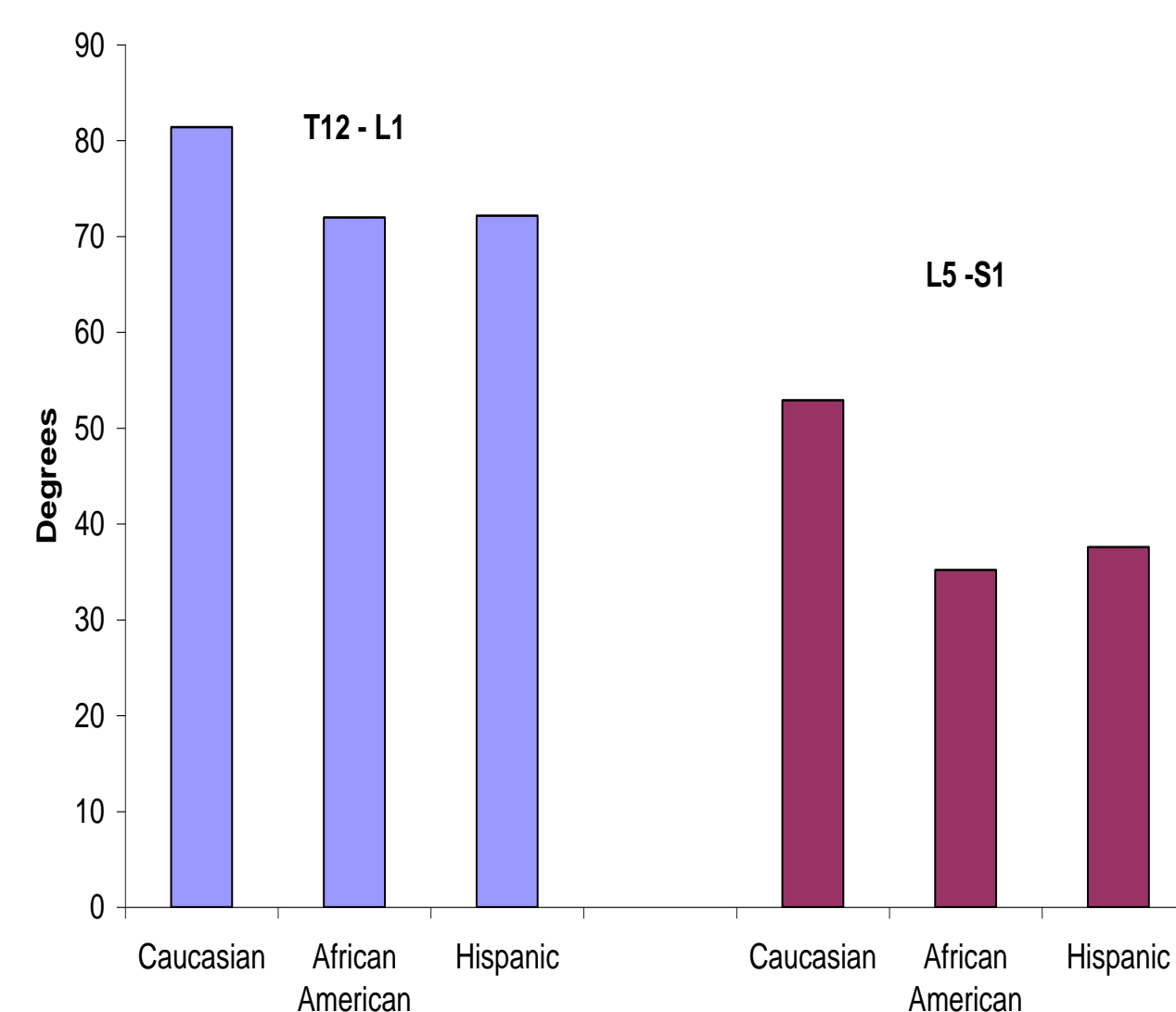
- Completed informed consent and a general demographic/screening questionnaire
- Physical measurements including
  - Anthropometrics (height, weight, BMI, girth)
  - Straight leg raise (avg. of 3 bilaterally)
  - Lumbar spine AROM (Saunders Digital inclinometer)
  - Pelvic tilt position (flexicurve)
  - Pelvic mobility utilizing osteopathic spring techniques
  - All measurements were obtained via blinded testers at each station

## RESULTS

**Table 1. Patient Characteristics**

| Measure                     | Count (%)        |
|-----------------------------|------------------|
| Sex (male)                  | 21 (75)          |
| Race/ethnicity              |                  |
| Caucasian                   | 10 (35.7)        |
| African American            | 10 (35.7)        |
| Hispanic                    | 8 (28.6)         |
| Age                         |                  |
| 21-30                       | 7 (25)           |
| 31 -40                      | 6 (21)           |
| 41-50                       | 12 (43)          |
| 51+                         | 3 (11)           |
| Previous Back Injury        | 10 (36)          |
|                             | <b>Mean ± SD</b> |
| Straight leg raise-right    | 64.1 ± 14.3      |
| Straight leg raise-left     | 67.6 ± 17.1      |
| T12 – L1 spinal inclination | 75.4 ± 14.5      |
| L5 – S2 spinal inclination  | 42.2 ± 14.0      |
| Pelvic tilt inclination     | 0.07 ± 0.027     |

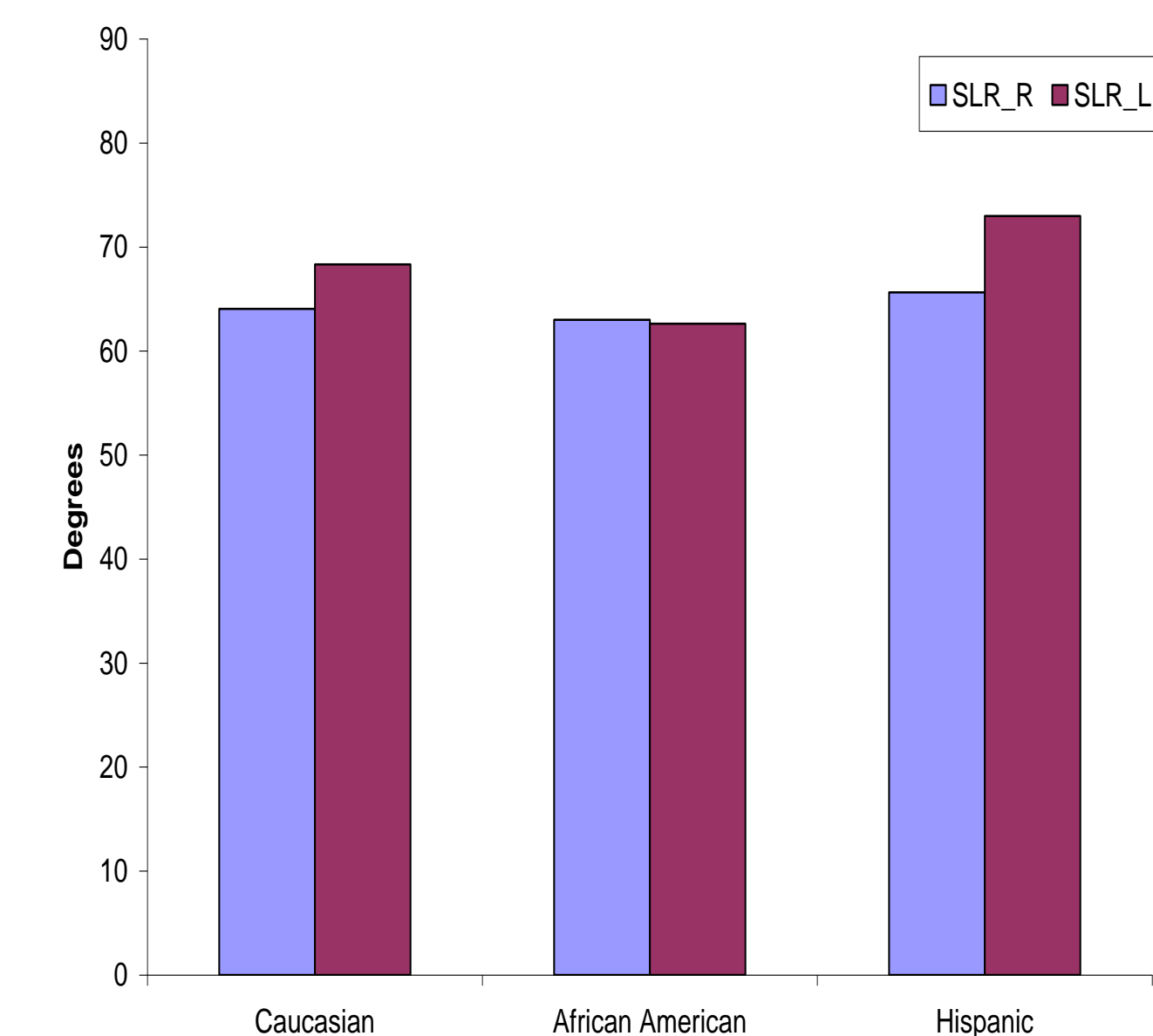
**Figure 1. Lumbar Spine ROM**



**Table 2. Osteopathic Pelvic Spring**

| Hesch Spring Mobility Test                       | Count (%) |
|--|-----------|
| Hypomobile posterior rotation anterior ilium     | 16 (57%)  |
| Hypomobile inferior stress anterior ilium        | 18 (64%)  |
| Hypomobile superior stress to ischial tuberosity | 17 (60%)  |
| Hypomobile inferior stress to posterior ilium    | 16 (57%)  |

**Figure 2. Straight Leg Raise**



## CONCLUSIONS

- Although the findings indicate that each variable contributes to lumbopelvic dysfunction and the resulting report of low back pain, the exact role of each remains unclear.
- Reliable interpretation on the source and role of lumbar lordosis, hamstring tightness, and pelvic immobility is only possible if additional information on lumbar ROM, pelvic tilt, abdominal strength, and pelvic mobility (rotation, slide (slip), side bending, and spring) is available.

### FUTURE RESEARCH:

- should focus on the role and contribution of pelvic mobility combined with neurophysiological recruitment in completing lumbopelvic movements, lengthening the hamstrings, and recruiting the abdominal muscles to reduce low back pain.

### CLINICAL IMPLICATIONS:

- In the US alone, a 1% reduction in the overall prevalence of low back pain and lumbopelvic dysfunction could considerably reduce worker morbidity and save billions of dollars.
- By correctly identifying the contributing factors to lumbopelvic dysfunction, physical therapists can:
  - Screen, detect, and potentially prevent lumbopelvic dysfunction
  - determine an accurate differential diagnosis
  - establish a clinically sound and logical plan of care
  - utilize effective treatment intervention strategies
  - provide cost effective quality care thereby enhancing a client's quality of life
  - reducing worker compensation costs and societal medical expenditures.