

## Differences Between Novice And Expert Performance In Defensive Tactics Employed By Police Officers

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Method: We recruited 44 healthy and 56 knee-osteoarthritis participants matched for age (>50 years) and gender. Each participant's knee CT scan was registered to fluoroscopy of kneeling using a bespoke 3D-2D registration algorithm—producing knee motion in 3D. Kinematic features including 3 translations and 3 rotations were analysed, for position, displacement and rate-of change, using MANCOVA controlled for BMI.

Results: Groups were matched for age and gender, but the OA group had higher body mass index. Moving into flexion: osteoarthritic knees had  $-12.8^\circ$  (95% CI:  $-17.0^\circ$  to  $-8.6^\circ$ ) less maximum flexion, tibias internally rotated earlier and were  $-4.6^\circ$  ( $-7.7^\circ$  to  $-1.4^\circ$ ) more rotated at  $120^\circ$  flexion. Femurs rolled back less, at maximum flexion were 8.3 (5.0, 11.5) mm more anterior and 4.0 (1.6 to 6.2) mm more medial. Over flexion range  $120^\circ$ -maximum flexion, osteoarthritic femurs translated 5.8 (2.8 to 8.9) mm less posteriorly and 1.3 (0.6 to 2.1) mm more superiorly.

Conclusion: Knees with osteoarthritis have reduced flexion, reduced femoral roll back and internally rotate earlier. These kinematics are related, since femoral rollback and rotation is integral to allowing flexion.

Key Practice Points:

- Knees with osteoarthritis have reduced flexion and less femur roll-back.
- Since femur roll-back and rotation are integral to knee flexion, there may be an opportunity to intervene by improving roll back.

Proposed impact, if any, on the health outcomes of Aboriginal and Torres Strait Islander peoples: There is no specific impact.

## DIFFERENCES BETWEEN NOVICE AND EXPERT PERFORMANCE IN DEFENSIVE TACTICS EMPLOYED BY POLICE OFFICERS

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Aim: To compare experts and novice law enforcement officers in defensive skill execution, using the Defensive Tactics and Arrest Control (DEFTAC) gauntlet.

Design: A retrospective cohort study.

Method: Data for 15 police DEFTAC instructors (age =  $31.93 \pm 6.98$  yrs; height =  $194.02 \pm 17.03$  cm; mass =  $87.55 \pm 12.25$  kg) and 36 general duties officers (age =  $39.67 \pm 8.32$  yrs; height =  $186.40 \pm 14.59$  cm; mass =  $89.62 \pm 13.90$  kg) completed DEFTAC training. Four DEFTAC subject matter experts evaluated police officers' ability to execute the techniques as trained, and their physical ability to perform each defensive skill. Defensive skills included edged weapon disarm (EWD), holstered gun retention (HGR), blunt object defence (BOD), gun disarm (GD) and prone handcuffing (PH).

Results: Instructors outperformed ( $p < .001$ ) general officers in 'techniques-as-trained' in all five techniques and in 'physical-ability-to-perform' for EWD ( $p < .001$ ), HGR ( $p < .001$ ) and GD ( $p < .05$ ).

Conclusion: Police training and physical assault are leading cause of police officer injuries. Police officers with higher levels of skill can perform DEFTAC skills more effectively and typically more physically efficiently, thus reducing their risk for movement error, and injury to themselves, other officers undergoing training and offenders.

#### Key Practice Points:

- Investment in the development and maintenance of instructor-level DEFTAC skill, especially where physical capability is required, may lead to an increase in general duties officer effectiveness in DEFTAC performance and decrease their risk of physical injury when restraining an offender.
- After periods of prolonged recovery (e.g. following serious injury), DEFTAC skills may have degraded and need to be retrained prior to full return-to-duty

Proposed impact, if any, on the health outcomes of Aboriginal and Torres Strait Islander people: The results of this research are likely to have no greater impact on the Aboriginal and Torres Strait Islander population above that of the non-Indigenous population

### RISK FACTORS FOR DEVELOPMENT OF LOWER LIMB OSTEOARTHRITIS IN PHYSICALLY-DEMANDING OCCUPATIONS LIKE THE MILITARY: A NARRATIVE UMBRELLA REVIEW

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**Aim:** To identify and synthesise key findings from previous literature reviews that have examined risk factors for development of lower limb OA in physically-demanding occupations.

**Design:** A narrative umbrella review

**Method:** A systematic search was conducted to identify literature reviews examining associations between lower limb OA and occupational tasks. Methodological quality was rated with a Measurement Tool to Assess Systematic Reviews (AMSTAR) 2 before key data were extracted and synthesised.

**Results:** Sixteen reviews were found (knee = seven, hip = four, hip and knee = three, various joints = two) and based on AMSTAR 2, one review was of high methodological quality, one of critically low methodological quality and the others of moderate methodological quality. The selected reviews found moderate to good evidence that heavy occupational lifting (range 10-50kg) was associated with an increased risk of OA at the knee and the hip. Other occupational tasks that may increase the risk of lower limb OA included kneeling, squatting and climbing with previous injuries to joints and overweight and obesity also predictive of lower limb OA.

**Conclusion:** These tasks and joint injuries are common in military personnel; therefore, it is not surprising that they experience greater rates of OA than the general population. Efforts to reduce exposure to these tasks, reducing joint injuries, ensuring optimal bodyweight and full rehabilitation of injuries may reduce risks of lower limb OA. Further research is needed to test these interventions.

#### Key Practice Points:

- This study highlights the potential of the development of lower limb OA in physically demanding jobs.

Proposed impact, if any, on the health outcomes of Aboriginal and Torres Strait Islander people: Aboriginal and Torres Strait Islander people who work in occupations which require heavy lifting, kneeling, squatting or climbing may be at an increased risk of lower limb OA.