

MOVEMENT CHARACTERISTICS OF FIREFIGHTERS: INJURY RISK CORRELATIONS & DESCRIPTIVE DATA

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ABSTRACT

PURPOSE: Firefighters require a high level of fitness to operate safely, effectively, and efficiently. Due to the physical job demands, firefighters are classified as tactical athletes, and have an injury prevalence seven times higher than the general population. Poor movement quality has been associated with musculoskeletal injury risk among firefighters and the need to improve movement competency is emphasized in the literature. Given the link between movement quality and musculoskeletal injury, this study sought to evaluate movement quality characteristics, joint pain, and age among firefighters in a public fire department. **METHODS:** A total of 110 full-time firefighters (100 men), mean age 39 (standard deviation (SD) =) 9.9 years, completed the Functional Movement System (FMS)TM assessment during a single session. Age, FMS scores (composite and individual tests), presence of asymmetry, and joint pain were entered into data collection software for analysis. Descriptive data including mean, SD, percentage, and ranges were determined. Spearman Rho correlational analysis was used to determine relationships between scores, pain, asymmetry, and age. **RESULTS:** Mean composite FMSTM scores were 16.8/21 with a SD of 1.7. Composite scores < 14 were present in 13.6% of firefighters. Screening tests for pain provocation identified pain during impingement testing in 12 shoulders with lumbar extension producing pain in 6 participants.

Asymmetry was present for the in-line lunge, hurdle step, rotary stability, active straight leg raise, ankle mobility, and shoulder mobility tests. Overhead squat was associated with a higher composite score ($r \geq .521$) and asymmetry of the active straight leg raise was most closely associated with a lower score, $r = -.310$. Age inversely correlated to FMSTM composite scores ($r = -.297$), shoulder mobility ($\leq -.424$), left hurdle ($-.232$), and right ankle mobility ($-.290$). **CONCLUSIONS:** Both age and asymmetry of the active straight leg raise were most closely correlated with lower FMSTM scores. Asymmetry was present in 35% of the firefighters on at least one movement test, which has been shown in the literature to increase injury risk by 2.7 times.

PRACTICAL APPLICATIONS: Programming considerations designed to meet the job demands of firefighters and mitigate injury should recognize movement asymmetry in addition to composite scores. Moreover, recommendations to closely monitor shoulder mobility are indicated given age-related impairments and prevalence of shoulder pain among firefighters.



Figure: Functional Movement SystemTM

INTRODUCTION AND PURPOSE

Firefighters require a high level of fitness to operate safely, effectively, and efficiently. Due to the physical job demands, firefighters are classified as tactical athletes, and have an injury prevalence seven times higher than the general population.¹ Poor movement quality has been associated with musculoskeletal injury risk among firefighters and the need to improve movement competency is emphasized in the literature.² Given the link between movement quality and musculoskeletal injury, this study sought to evaluate movement quality characteristics, joint pain, and age among firefighters in a public fire department.

METHODS

A total of 110 full-time firefighters (100 men), mean age 39 (standard deviation (SD) =) 9.9 years, completed the Functional Movement System (FMS)TM assessment during a single session (Figure). Age, FMSTM scores (composite and individual tests), presence of asymmetry, and joint pain were entered into data collection software for analysis. Descriptive data including mean, SD, percentage, and ranges were determined. Spearman Rho correlational analysis was used to determine relationships between scores, pain, asymmetry, and age.

REFERENCES

1. Campbell R, Hall S. Firefighter Injuries in the United States. National Fire Protection Association. December 2022.
2. Bonazza NA, Smuin D, Onks CA, Silvis ML, Dhawan A. Reliability, Validity, and Injury Predictive Value of the Functional Movement Screen: A Systematic Review and Meta-analysis. *Am J Sports Med.* 2017;45(3):725-732.

RESULTS

Mean composite FMS scores were 16.8/21 with a SD of 1.7. Composite scores < 14 were present in 13.6% of firefighters. Screening tests for pain provocation identified pain during shoulder impingement testing in 12 shoulders with lumbar extension producing pain in 6 participants. Asymmetry was present for the in-line lunge, hurdle step, rotary stability, active straight leg raise, ankle mobility, and shoulder mobility tests. Overhead squat was associated with a higher composite score ($r \geq .521$) & asymmetry of the active straight leg raise was most closely associated with a lower score, $r = -.310$. Age inversely correlated to FMS composite scores ($r = -.297$), shoulder mobility ($\leq -.424$), left hurdle ($-.232$), & right ankle mobility ($-.290$).

CONCLUSION

Both age and asymmetry of the active straight leg raise were most closely correlated with lower FMS scores. Asymmetry was present in 35% of the firefighters on at least one movement test, which has been shown in the literature to increase injury risk by 2.7 times

PRACTICAL APPLICATIONS

Programming considerations designed to meet job demands of firefighters & mitigate injury should recognize movement asymmetry in addition to composite scores. Moreover, recommendations to closely monitor shoulder mobility are indicated given age-related impairments & prevalence of shoulder pain among firefighters.