Self-Reported Muscle-Strengthening Exercise Behaviors Are Not Different Between Weaker and Stronger Firefighters

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Introduction

Fire suppression activities can be physically demanding and require an element of strength. Some of the critical job tasks include forcible entries and victim drags. Insufficient muscular strength can lead to decrements in job performance resulting in injury or death. A better understanding of firefighter resistance training habits may help to provide insight into the necessity for monitored exercise regimens.

Purpose

This study aimed to explore the difference in Muscle-Strengthening Exercise Questionnaire (MSEQ) Concordance Scores between weaker and stronger firefighters.

Methods

The study was a retrospective analysis of archived data from a local fire department's annual fitness assessment. The data included male career firefighters (n=96) along with demographic information (e.g., age, height, and weight). As part of their fitness assessment, firefighters completed a MSEQ short form, and the isometric mid-thigh pull (IMTP). The MSEQ asked about muscle strengthening behaviors such as time spent per week exercising, the intensity of each session, the types of muscle strengthening exercises performed, and what muscle groups were targeted in these exercises. Responses were scored using the MSEQ Concordance Scoring criteria, which categorized behaviors into four levels: Full, Modest, Minimal, and Not Met. The IMTP required participants to complete three trials of a 5-sec isometric contraction using a custom strength testing device with an integrated load cell. The peak IMTP value was used to calculate relative strength (RS): peak IMTP/bodyweight. Firefighters with an RS <1.99x(n=39) were assigned to the weaker group, while firefighters with an RS≥2.0x (n=57) were assigned to the stronger group. The inclusion criteria for each group were established based on the findings and recommendations of previous research. Descriptive statistics were run to find the frequency of participants falling within the four concordance score levels. A Mann-Whitney U test was used to analyze the difference between groups. The adjusted alpha level was set at 0.05.

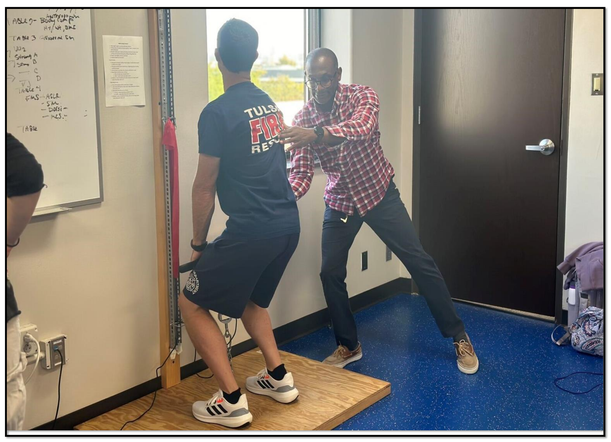


Figure 1. IMTP▲

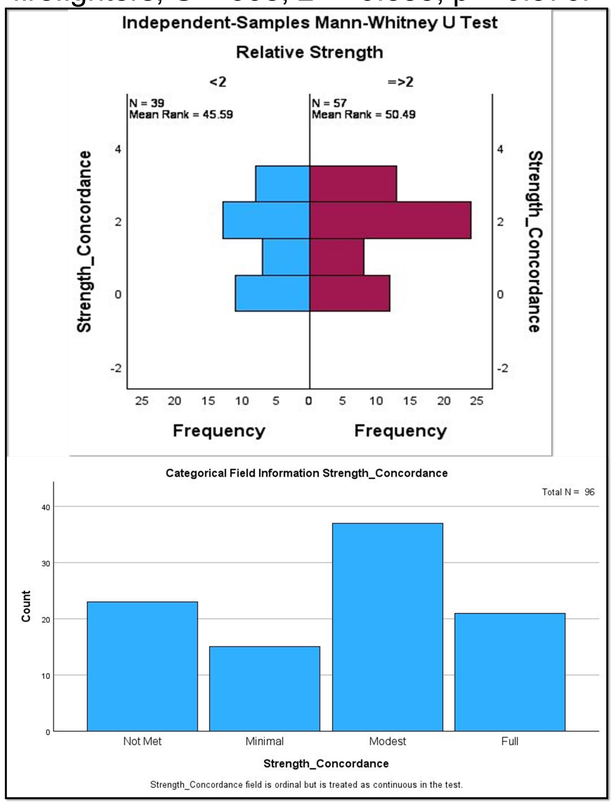
Table 1. Mann-Whitney U►

Guideline concordance	Not Met (0/3)	Minimal (1/3)	Modest (2/3)	Full (3/3)
Frequency	<2 days/week	≥ 2 days/week	≥ 2 days/week	≥ 2 days/week
Intensity	<RPE 6		≥ RPE 6 OR all muscle groups	≥ RPE 6
Muscle Groups	<7 muscle groups			all muscle groups

Figure 2. Concordance Scoring Criteria▲

Results

Concordance Score behavior categories were distributed as follows: 24% as Not Met, 15.6% as Minimal, 38.5% as Modest, and 21.9% as Full. The percentage of participants who received a Modest or Full score was 60.4%, meaning muscle-strengthening exercises were performed ≥2 days/week, at a rating of perceived effort (RPE) ≥6, and/or performing exercises that target all specified muscle groups. The results of the Mann-Whitney U test indicated that the distribution of the concordance scores between stronger and weaker firefighters were similar, as assessed visually. The median concordance scores were not significantly different between stronger and weaker firefighters, U = 998, z = -0.885, p = 0.376.



Conclusions

The results suggest that MSEQ short-form concordance scores are not an indicator of relative strength in career firefighters.

Practical Applications

While firefighters indicate they work out ≥2 days/week, they may or may not be doing the most appropriate exercise regimens to increase muscle strength. Fire Department administration should consult with strength and conditioning professionals to create exercise programs specific to the needs and demands of career firefighters.

Acknowledgements

TULSA FIRE DEPARTMENT
PROTECTING LIFE, HEALTH, PROPERTY & ENVIRONMENT
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References

1. Shakespear-Druery, J., De Cocker, K., Biddle, S. J. H., & Bennie, J. (2022). Muscle-Strengthening Exercise Questionnaire (MSEQ): an assessment of concurrent validity and test-retest reliability. *BMJ open sport & exercise medicine*, *8*(1), e001225.

2. Shakespear-Durery, J. (2022). Scoring protocol for the Muscle-Strengthening Exercise Questionnaire (MSEQ). Toowoomba; University of Southern Queensland.