

An Exploratory Investigation of Bilateral Movement Patterns within Law Enforcement Recruits

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INTRODUCTION

During training recruits undergo extensive physical training to prepare them for job demands. Law enforcement training academies within the United States typically last an average of 833 hours.¹ Injuries resulting from job requirements and the associated financial burden are two concerns. Annual injury incident rates have been reported between 240 and 2500 per 1000 personnel for law enforcement officers, with operational training alone accounting for 64% of recorded injuries.² There is a high cost associated with an injury to law enforcement personnel.³ Given the cost and frequency of injury, understanding risk factors is important. Previous work has demonstrated that asymmetry in movement is associated with increased injury risk.⁴ Therefore, investigating movement patterns of recruits is necessary. This preliminary data is a part of a larger investigation to determine injury risk and exploration of a potential injury prevention program for law enforcement recruits.

AIM

To analyze asymmetries in movement patterns of law enforcement recruits at the start of a training program.

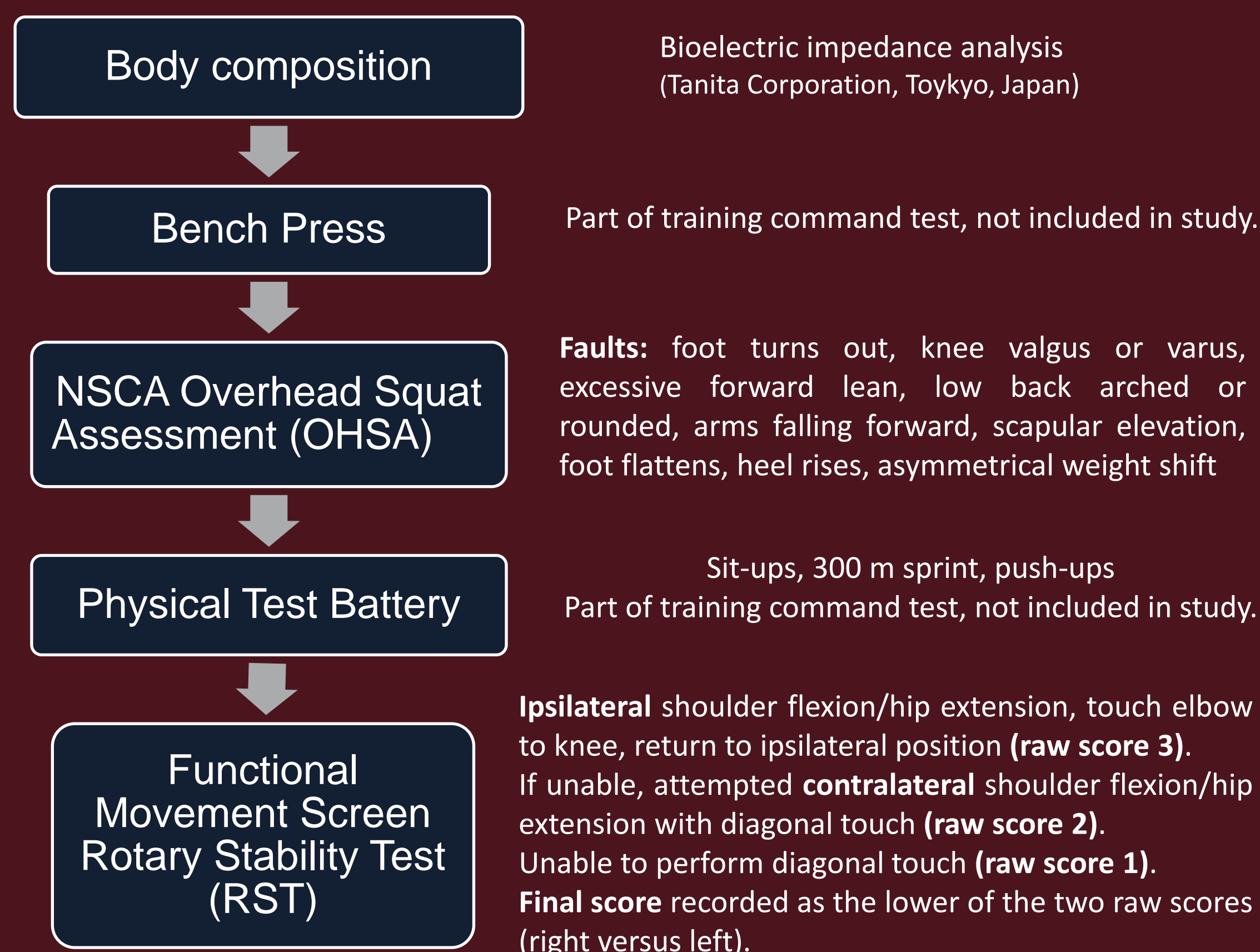
METHODS

121 law enforcement recruits (108 males, 13 females)

Table 1. Recruit Descriptive Characteristics

	HEIGHT (m) mean±SD	WEIGHT (kg) mean±SD	AGE (yrs) mean±SD
MALES	1.79±.07	87.92±15.27	27.97±6.86
FEMALES	1.63±.08	64.68±11.78	24.08±2.75

- Assessed during training command's entrance physical test.
- Data analyzed for presence of bilateral asymmetries during two movement patterns. Movement assessments were completed by three researchers with either the CSCS or BOC, Inc. athletic trainer credential.



RESULTS

Body fat percentages for males and females were $15.91 \pm 5.71\%$ and $23.4 \pm 7.95\%$, respectively. Nearly all recruits (97.5%) demonstrated a fault with OHSA (Table 2), with average total faults at 3.45 ± 1.60 faults. Approximately 7.5% of recruits (n=9) demonstrated an asymmetry in the lower body during OHSA.

Table 2. Overhead Squat Errors expressed as a Percentage of Recruits

VIEW	ANTERIOR VIEW			LATERAL VIEW				POSTERIOR VIEW				
ERROR	FOOT TURNS OUT	KNEE VALGUS	KNEE VARUS	FORWARD LEAN	LOW BACK ARCHES	LOW BACK ROUNDS	ARMS FALL FORWARD	FORWARD HEAD	SCAPULAR ELEVATION	FOOT FLATTENS	HEEL RISES	WEIGHT SHIFT
% OF RECRUITS	58.68	27.27	11.57	42.98	26.45	18.18	36.36	10.74	7.44	56.20	30.58	7.44

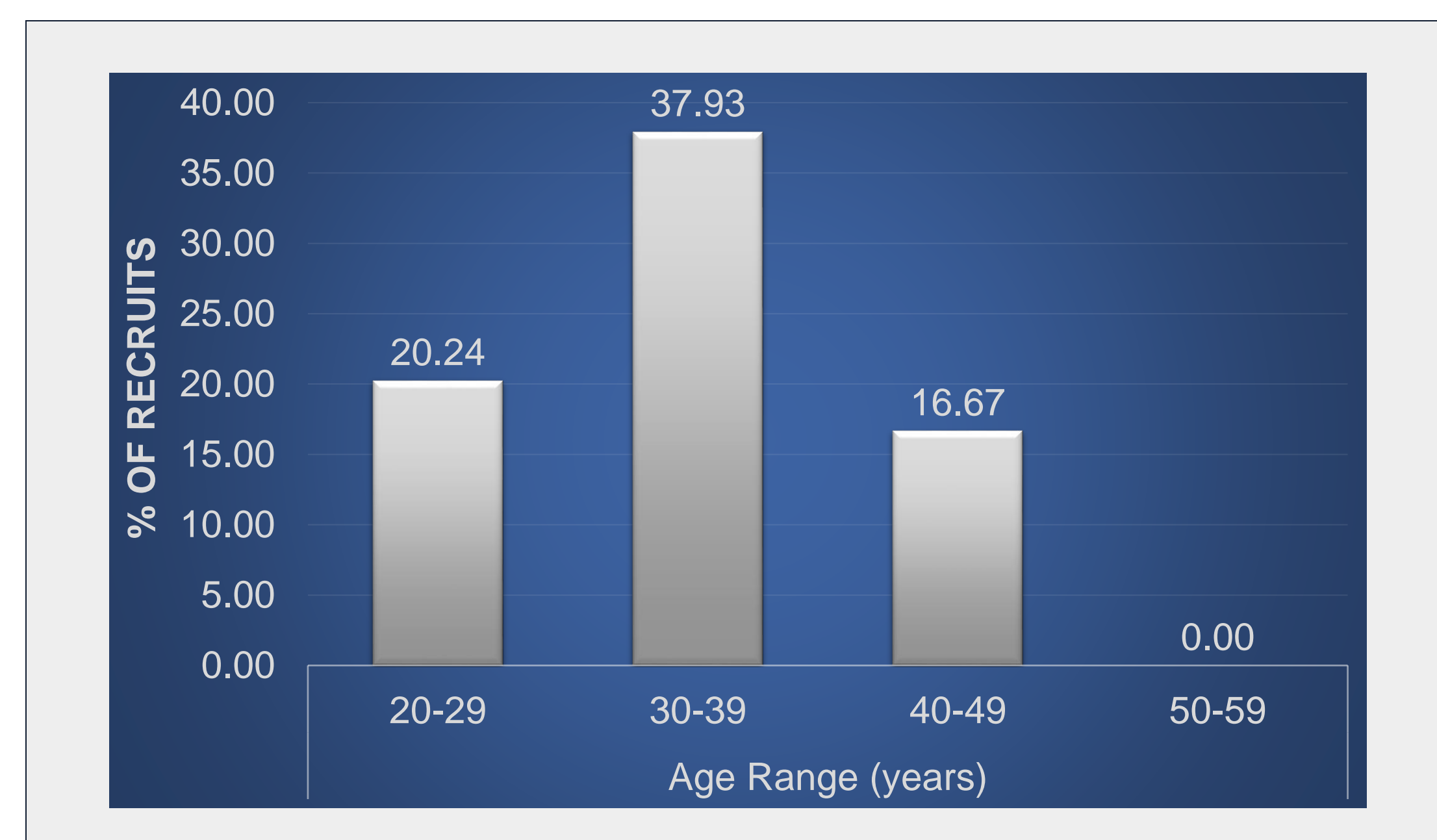
Within the RST movement pattern, 17.36% (n=21; 20 males, 1 female) of recruits demonstrated an asymmetry between limbs. Of the recruits with asymmetrical movement, dominance (as indicated by a higher raw score) appeared with the right arm-left leg movement pattern versus the left arm-right leg movement pattern for nearly 67% of cases. Approximately half of the cases of asymmetry (n=10, 47.62%) were found to have a final score of 1. This represented 62.5% of all cases of final score of 1 (Table 3). RST final score was a 2 for 86.78% of recruits and a 1 for 13.22% of recruits. No recruits scored a final score of 3, however 11 recruits (9.09%) were able to achieve a raw score of 3 on either the right or left side.

Table 3. Rotary Stability Test Final Scores

FINAL SCORE	COUNT	ASYMMETRY PRESENT
3	0	0
2	105	11
1	16	10

Collectively, nearly one-quarter of all recruits (n=28) presented with an asymmetry in either the OHSA or RST. Asymmetries were found to be highest in the 30-39 years age range (Figure 1). There was not a statistically significant correlation between asymmetry in OHSA and RST using Spearman's correlation ($r(119) = -.047, p = .611$). There was no relationship between total faults in the OHSA and RST final score or presence of asymmetry.

Figure 1. Percentage of Recruits by Age Range with an Asymmetry



CONCLUSIONS

Approximately one quarter of law enforcement recruits demonstrated an asymmetry between left and right sides in either the overhead squat or rotary stability movement patterns. When assessed across age, recruits within the 30-39 year range demonstrated the highest percentage of asymmetry, followed by the 20-29 year range. Speculations could be made from the findings of this pilot study, which would include the decline in muscle mass as age progresses, and as a result loss of neuromuscular coordination, or possibly differences in exercise/training patterns across age groups leading up to the command entrance physical test.

A higher percentage of recruits presented with an asymmetry in RST (17.36%) compared to OHSA (7.44%). The difference is likely explained by the additional demand of stability needed in the transverse plane as well as the sagittal plane in RST compared to OHSA, where only the sagittal plane is involved. The RST requires a coordinated neuromuscular firing pattern to allow for energy transfer through the trunk as the arm and leg move simultaneously.

PRACTICAL APPLICATIONS

Tactical strength and conditioning instructors should work to address movement quality during recruit training across multiple planes of movement and through various movement patterns.

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