The natural consequences of aging negatively impact physical performance. Naval Special Warfare (NSW) requires Operators maintain peak physical condition throughout the tactical lifecycle. Over time, musculoskeletal strength and physiological performance. Further analysis is needed to investigate if these deficiencies are purely the result of aging or amplified by factors of military service.

The purpose of the current study was to compare physiological and musculoskeletal characteristics between age cohorts of SEAL Operators as they age, particularly approaching 35 years or older, in order to lessen the negative impact of aging on performance. These findings suggest the need for Operators to undergo periodic testing to evaluate performance levels as they age. Further research should evaluate if these deficiencies are purely the result of aging or amplified by factors of military service.

### PROCEDURES

**Body Composition**

- Body composition was measured using air displacement plethysmography (BodPod, Cosmed, Chicago, IL)
- Body mass index (BMI) was calculated
- Waist circumference was measured

**Aerobic Power/Capacity**

- Anaerobic power and capacity were assessed with a 30-s Wingate cycle protocol using an electronically braked cycle ergometer (VeloTron, RacerMate, Inc, Seattle, WA)
- Wingate cycle protocol was executed at 60°/sec

**Strength**

- Knee flexion/extension, shoulder internal/external rotation, torso flexion/extension, and torso rotation were measured
- Knee flexion (22.2±6.9, 11.3±2.7 kg, p=0.024), shoulder flexion (19.1±10.9 kg, 22.5±47.0 kg, p=0.027), and trunk rotation (29.7±6.9 kg, 30.7±14.7 kg, p=0.002). NSW≥35 had a lesser trunk rotation (29.7±6.9 kg, 30.7±14.7 kg, p=0.002).

**Shoulder Flexibility**

- Shoulder flexion (63.7±15.4 %BW, 74.3±14.9 %BW, p=0.004)
- Shoulder internal rotation (64.6±15.6 %BW, 74.6±13.9 %BW, p=0.003)

**Knee Flexion Strength (%BW)**

- Knee flexion strength was measured
- Knee flexion strength (%BW) was 121.0±26.8 %BW, 130.7±21.3 %BW, 122.0±26.8 %BW

**Shoulder Flexibility**

- Shoulder internal rotation was measured
- Shoulder internal rotation was measured

### RESULTS

- **Body Fat (%):** Operators ≥35 had significantly less muscular strength and poorer physiological performance, including a higher percentage of body fat than younger cohorts:
  - NSW≥35 (16.3 ± 5.6 %BW, 15.5 ± 5.6 %BW, p=0.012)
  - NSW29-34 (17.0 ± 6.7 %BW, 15.5 ± 4.7 %BW, p=0.011)
  - NSW23-28 (15.5 ± 4.7 %BW, 131 ± 25.4 %BW, p=0.013)

- **Aerobic Capacity (mL/kg/min):**
  - NSW≥35 had lesser VO₂ max (5.7 ml/kg/min, 38.4 %BW, p=0.02), and NSW29-34 (8.3 ± 16.3 W/kg, p=0.001), NSW23-28 (15.5 ± 4.7 %BW, 131 ± 25.4 %BW, p=0.012).

- **Knee Flexion Strength (%BW):**
  - Knee flexion strength (%BW) was 121.0±26.8 %BW, 130.7±21.3 %BW, 122.0±26.8 %BW

### SUMMARY AND CONCLUSIONS

- These findings suggest the need for Operators to undergo periodic testing to evaluate performance levels as they age.
- Alterations in training programs for older Operators may be advisable for maintenance of physical conditioning requirements and prevention of decrements associated with age and other confounding variables such as deployments, stress, prior injuries, etc.
- Future research should evaluate if these deficiencies are purely the result of aging or related/amplified by factors of military service.

**Heading**

- **ABSTRACT**
- **INTRODUCTION**
- **SUBJECTS**
- **RESULTS**
- **DISCUSSION**
- **CONCLUSION**

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