

Development of the Tactical Human Optimization, Rapid Rehabilitation, and Reconditioning Program Military Operator Readiness Assessment for the Special Forces Operator

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ABSTRACT

THE AIM OF THIS ARTICLE IS TO DESCRIBE A NOVEL MILITARY UNIQUE OPERATOR READINESS ASSESSMENT (ORA). THE ORA WAS DESIGNED BY TACTICAL HUMAN OPTIMIZATION, RAPID REHABILITATION, AND RECONDITIONING PROFESSIONALS AS PART OF A RETURN-TO-DUTY PROTOCOL TO

SPECIFICALLY EVALUATE THE MUSCULOSKELETAL READINESS AND PHYSIOLOGICAL PREPAREDNESS OF PREVIOUSLY INJURED OPERATORS. THE ORA COMPRISES 11 TACTICALLY RELEVANT AND PHYSICALLY TAXING EVENTS COMPLETED IN ORDER WITH A 2-MINUTE REST BETWEEN EVENTS. DEVELOPMENT OF A COMPREHENSIVE RETURN-TO-DUTY PROTOCOL OF THIS NATURE IS A NECESSARY FIRST STEP FOR TACTICAL

STRENGTH COACHES TO REDUCE RISK OF REINJURY TO PREVIOUSLY INJURED PERSONNEL.

INTRODUCTION

High prevalence of musculoskeletal injuries continues to be a major concern for military personnel, from the basic training

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soldier to the seasoned Special Forces operator (1,7,9–11,20). Furthermore, reinjury events are commonly observed but investigations into their occurrence are infrequent in the literature (6). One of the highest risk factors for suffering a future musculoskeletal injury is a history of previous injury (6,12,17,21,23). Schneider et al. (21) conducted a retrospective study of 1,214 US Army Airborne personnel and reported an operator's risk for suffering a future injury was approximately 7 times greater if they had sustained a previous injury. In addition, a 71.6% higher risk of subsequent injury was observed if operators sought medical advice from solely a medic, and did not pursue further evaluation from a physician (21). Although medics play a crucial role in military medicine, they specialize in combat casualty care and field medicine and do not have authority to order restriction on an individual's activity (3,4). It is important to note, however, that it is ultimately the operator's responsibility to follow up with a medical professional and seek treatment if there are continuing medical concerns, which may not have been occurring in this population.

Another possible explanation for high risk of reinjury is ineffective restoration of an operator's fitness to preinjury levels. In the Schneider et al.(21) study, diminished performance in a 2-minute timed push-up test after sustaining an injury was associated with a 24.9% increased risk of subsequent injury. Decreased aerobic fitness is another major risk factor for injury (12); injury-related training constraints, coupled with the austere conditions of deployment, could limit an operator's ability to maintain the high levels of fitness necessary to be an effective Special Forces soldier (5,14–16,22). An additional study investigated the deployment readiness of 158 soldiers who had rehabilitated recent orthopedic injuries and reported that 62% were unable to deploy with their respective unit, despite compliance with prescribed rehabilitation activities over a 6-month period (4). Of the 99 soldiers

unable to deploy, 44.4% became part of the Physical Disability Evaluation System, 20.2% continued treatment of their respective injuries with temporary restrictions, whereas the rest fell under behavioral health care, developed other medical conditions, or were transitioning off their unit (4). Those individuals who were being evaluated for disability or continuing treatment will likely have difficulty maintaining preinjury fitness levels over the rehabilitative period and may be at an increased risk for future injuries as a result.

Defining "return-to-duty" criteria in previously injured operators is a critical area of future research to help limit subsequent injury risk and evaluate preparedness for combat readiness. Quantifying criteria for various injuries remains a difficult task; a decision to allow an athlete to return to full participation is often a combination of poorly defined objective criteria and subjective opinion of a medical professional (2,6). Previous research on injuries in athletics has noticed the need for a return-to-play protocol that is both simple and objective (6). This concept could be adapted and applied to the military, where a pressing need is evident for a simple yet comprehensive evaluation of an operator's physical preparedness for combat (8,13,18).

The United States Special Operations Command (USSOCOM) has placed an emphasis on human performance through the Preservation of the Force and Family (POTFF) initiative. This program entails a holistic approach to supporting our Special Operations Forces, and it addresses human, physical, psychological, spiritual, and social performance. The Tactical Human Optimization, Rapid Rehabilitation, and Reconditioning (THOR3) Program was formed to address the POTFF priorities related to human performance; enhancing Special Operations Forces readiness, building force resiliency, and optimizing Special Operations Forces performance. THOR3 consists of a comprehensive human performance team that includes strength and conditioning coaches, physical therapists, and

a performance dietitian. This team provides customized, periodized, and personalized strength and conditioning, rehabilitation, and performance nutrition programs for Special Operations soldiers to optimize their human performance goals. The THOR3 team recognized that decisions on returning recently injured operators to duty were made arbitrarily and on a case-by-case basis, either by a commander or a medic. This resulted in situations in which not fully functional operators were prematurely returned to duty, potentially endangering the unit, or an operator was removed from duty based on an injury when they could potentially still physically perform to the standard of an uninjured operator. Thus, the need for a return-to-duty protocol that evaluates both musculoskeletal integrity and physiological readiness was deemed to be necessary by the THOR3 team.

DESIGN OF THE OPERATOR READINESS ASSESSMENT

The test was designed to tax a combination of musculoskeletal and physiological systems while functionally assessing an operator's tactical readiness after an injury. To develop the Operator Readiness Assessment (ORA), a focus group comprising 25 experienced operators advised the THOR3 strength and conditioning staff on common military tasks from their deployment experience. Three main principles were applied to inclusion of the events: safety, specificity, and logistical sense based on space/equipment constraints. Events were then chosen based on their ability to test aerobic, anaerobic, and/or musculoskeletal systems along with their specificity to operational skills and deployment demands. The sequence of events was chosen based on safety and specificity principles; caving ladder and X-agility drill, for example were placed earlier in the order to test agility and coordination appropriately, whereas also limiting chance of injury from fatigue. Minimum pass/fail times were based on pilot testing of healthy US Army personnel from third Special Forces Group. Pass times for each event were then based on the pilot group's average performance plus 1

SD. The overall time to complete the ORA is not evaluated; rather, the operator must complete each event, except for the pass/fail events, within the minimum pass time.

Operators were required to wear a weighted vest during testing to simulate the wearing of body armor, which has been highly correlated with musculoskeletal injuries during deployment (19,23). The additional weight consisted of standard interceptor body armor and ammunition, totaling 50 pounds. A 2-minute rest was allowed between events. The soldier could stop events if pain, inadequate function, or the inability to continue were experienced; voluntarily stopping the test also resulted in a failure. Failing 1 event constituted a failure of the ORA. The test was supervised and scored by a certified strength and conditioning specialist who was also certified for first aid and CPR. Passing the test required successful completion of these 11 events in order:

EVENT 1: CAVING LADDER

To assess the ability to complete a practical scaling task, operators were required to ascend and descend a 20' caving ladder while using a hand-over-hand, heel-to-toe technique. Complete ascent and descent was required to pass this event.

EVENT 2: 5' WALL TRAVERSE

To test the ability to ascend/descend obstacles while wearing body armor, operators were required to traverse a series of five 5' high walls spaced 10 feet apart. Completion of this event in a maximum of 29.5 seconds was required to pass.

EVENT 3: X AGILITY DRILL

This drill tests the ability to change direction and accelerate/decelerate while wearing body armor, demonstrate the ability for the cardiovascular system to recover from stress, and generate power while completing repetitive sprints that require change of direction. Two repetitions were required in each direction, and each repetition must be completed in a maximum of 13.5 seconds to pass (Figure 1).

2-Reps Each Direction

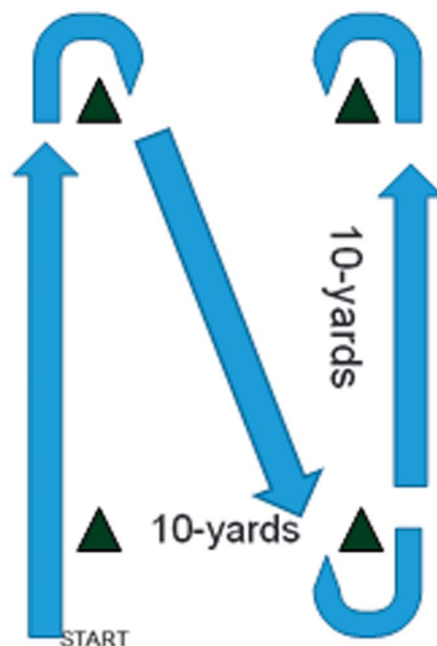


Figure 1. X agility drill.

EVENT 4: COVER AGILITY DRILL

This event was included to assess muscular endurance, ability to transition between various tactical positions, and both lateral and linear acceleration/deceleration along with change of direction while carrying a rifle. Operators were required to complete this event within 79 seconds to pass (Figure 2).

EVENT 5: 48" BOX DEPTH DROP

This event was included because of its realistic operational jump height, using a dismount from a Humvee bed as a comparison. It tests the ability to absorb impact while wearing body armor, lower-body strength by adequate control of landing, and joint and core integrity due to repetitive jump completion. Eight repetitions of a successful ascent and descent from a 48" box were required to pass.

EVENT 6: 24" BOX STEP-UP

To test single leg strength and stability while wearing body armor, lower-body muscular endurance,

and an ability to scale uneven terrain, operators were required to step completely on and off of a 24" box while alternating legs. Ten repetitions were required per leg, and the event must be completed within 93.5 seconds to pass.

EVENT 7: HIGH AND LOW HURDLE OVER/UNDER

To test lateral movement ability and knee, hip, and back mobility while wearing body armor, operators were required to navigate over ten 30-inch hurdles and under 42-inch hurdles. Navigating these hurdles in both directions without touching the hurdles was required to pass.

EVENT 8: SLED PUSH AND SLED DRAG

To test lower-body strength and endurance while wearing body armor and efficient linear movement of a weight object, operators were required to push and drag a 125-pound sled.

Pushing the sled 25 yards and then dragging the sled 25 yards within 47.5 seconds was required to pass.

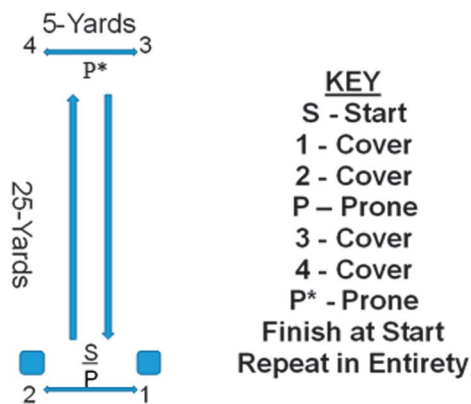


Figure 2. Cover agility drill.

EVENT 9: “RESCUE RANDY”

To test total body strength, power, and endurance while evaluating the ability to move a wounded soldier under load, operators were required to drag a 165-pound dummy. Dragging the dummy 25 yards within 22.5 seconds was required to pass.

EVENT 10: “FARMER’S CARRY”

To test grip strength and endurance, core and lower-body stability, and tactical ability to carry objects like ammo cans or a litter, operators were required to carry one 80 pound kettlebell in each hand over a 50 yard distance. Completion of the test within 29.5 seconds was required to pass.

EVENT 11: TREADMILL WALK

To test the ability to sustain a walking pace while fatigued with body armor, and over a gradually increasing gradation, operators were required to walk on a treadmill at 2.5 miles per hour over 6 stages. Stages 1–5 lasted 2 minutes except stage 6, which lasted 5 minutes. Stage 1 was completed at a 5% grade. The grade was increased 5% each stage until stage 5, for a maximum of 25% incline. Stage 6 was completed at 0% incline. Completion of the event was required to pass.

IMPLICATIONS OF OPERATOR READINESS ASSESSMENT TESTS ON RETURNING TO DUTY

The goal of this article was to describe the return-to-duty assessment that identifies US Army Special Forces

soldiers who have not fully recovered from their respective injuries and should not be cleared to return to full duty. The ORA was designed to evaluate preparedness of the musculoskeletal and physiological systems through a combination of tactically relevant activities. Thus, those who are unable to pass may need more recovery time, further rehabilitation on their specific injury, or additional training time to regain diminished physiological capabilities.

The X-agility drill, cover prone drill, step-ups, sled push/pull, “Rescue Randy,” and “Farmer’s Carry” events likely place a greater strain on the physiological systems, specifically anaerobic energy system mechanisms, and require muscular strength and endurance to complete successfully. Passing these events would suggest an adequate return to anaerobic performance levels. Those who did fail likely need more time to rebuild their anaerobic capacity, muscular strength, and lower-body muscular endurance.

Failing the 5-foot wall traverse is likely not attributed to physiological fatigue, because of the low demand of the caving ladder, which is the only event preceding the traverse. Failures observed during that event are likely related to suboptimal mobility and strength/power of the lower body, or inadequate upper-body strength/power to elevate the body above the wall. The treadmill event failures could be

related to injury-related pain exacerbations from walking up steep inclines, or the cumulative effects of a physiologically taxing protocol resulting in the inability to finish. Future research is necessary to confirm the expected energy system and musculoskeletal demands of these events.

PRACTICAL APPLICATIONS

The Army Medical Department considers musculoskeletal injury prevention a top priority, and the POTFF initiative places emphasis on SOF readiness and human performance (23). Development of an assessment that evaluates an operator’s physical readiness to return to combat aids these priorities for the Army and USSOCOM. The THOR3 team uses a failure of a specific event as an opportunity to solidify an operator’s physical fitness profile by improving the characteristics that particular event is expected to stress. For example, if an individual failed the X-agility drill, the team may work on their linear acceleration/deceleration or change of direction. In another example, a failure of the treadmill protocol, the most commonly failed test, may signal that more training time is needed on aerobic and/or work capacity. Reducing the risk of reinjury by ensuring complete function of an operator’s musculoskeletal system and full preparation of the physiological systems for operational-type stressors is a critical step to lowering secondary injury rates.

Future research is necessary to validate the ORA. The events were chosen based on operational applicability and subjective opinion of a clinical and human performance team that works intimately with this population. This laboratory is developing future studies to validate that each event is taxing the physiological system expected. Furthermore, longitudinal studies are indicated to evaluate the potential effect of passing the ORA before returning to duty on future injury rates.

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