

USING COMPLEXES TO HELP IMPROVE TACTICAL JOB PERFORMANCE

Tactical personnel, whether they serve in fire and rescue, law enforcement, or the military, regularly encounter physically demanding tasks. Firefighters often encounter close spaces that also require them to push, pull, carry, and lift objects or people in those close quarters (3). While law enforcement and military personnel may occasionally find themselves in small confined spaces, they are more likely to be in open spaces that require the same physical demands. Specific physical requirements, such as grip strength (for pulling hoses, opening fire hydrants, dragging a victim to safety, and firing a weapon) and to more general muscular and cardiovascular endurance (for pursuing suspects on foot and climbing steps) is crucial for reducing fatigue after repeated bouts of effort (3,4). Therefore, in order to physically prepare tactical personnel to perform these tasks, specific muscle qualities, such as muscular strength and muscular endurance, anaerobic endurance and aerobic fitness should be targeted in a comprehensive strength and conditioning program for the tactical professional. One way to improve these qualities is through the use of complexes.

Complexes are a series of exercises that are performed consecutively (without recovery) and without putting down the chosen implement (1). Complexes are typically performed with a barbell, dumbbell (DB), kettlebell, or other implement. Performing exercises under these parameters challenges both muscular strength and muscular endurance. Based on the physical demands required to perform a complex and the occupational needs of the tactical professional, this form of conditioning provides a specific and unique training stimulus that not only can improve fitness, but occupational performance as well.

Made popular by Istvan Javorek, complexes were originally designed as conditioning programs for Olympic weightlifters, which is why Javorek's traditional complexes typically use Olympic weightlifting movements and their derivatives (1,2). An example of a Javorek Dumbbell Complex can be found in Table 1 (2).

TABLE 1. EXAMPLE OF JAVOREK DUMBBELL COMPLEX

| EXERCISE | REPETITIONS |
|---------------------|-------------|
| DB upright row | 6 |
| DB high pull snatch | 6 |
| DB squat push press | 6 |
| DB bent-over row | 6 |

DEVELOPING COMPLEXES

When developing complexes, there are several factors that should be considered. To start, complexes typically consist of 3 – 6 exercises and 3 – 6 repetitions per exercise; however, they can be used with a higher repetition scheme of up to 12 repetitions if the training load is reduced. They can be performed using 1 – 6 sets with 3 – 5-min rest periods between rounds (1). For example, a lower repetition scheme may place a greater emphasis on power-endurance or strength-endurance (e.g., 6 – 8 repetitions), whereas a higher repetition scheme may have a greater emphasis on developing muscular endurance and conditioning (e.g., 8 – 12 repetitions). However, it is important to understand that the main purpose of complexes is to develop muscular endurance and exercise capacity. While some strength and power may be developed from this form of training, more traditional strength programs may be better suited to achieving these goals.

As mentioned, complexes can be implemented using a variety of implements such as barbells, DB, kettlebells, sandbags, weight plates, etc. The implement selected will often depend on the individuals being trained, as some implements are more specific to the tactical professional's occupation. Sandbags are commonly used with tactical professionals due to their odd shape and weight distribution. Fat grip DB, hoses, and other tactical equipment may also be an appropriate choice for firefighters due to the wide diameter of the hoses that are used. Sandbags are a possible option for police officers to potentially simulate a victim drag (3). These exercises may potentially have a better transfer of training effect to situations and tasks that tactical professionals encounter in the line of duty (3).

Next, the exercises selected within the complex should be chosen so that there is minimal adjustment between exercises. For example, when using a barbell it is best to select exercises that utilize the same grip (i.e., supinated, pronated, neutral) so the lifter can transition into the next movement without changing hand position or putting the barbell down. With DBs, it is easier to use different grips, because the lifter simply needs to rotate the arms or wrists. In contrast, if using a barbell, exercises that all require the same type of grip (i.e., pronated or supinated) should be used to improve efficiency and alleviate the need to change grips.

Once the exercises to be used and repetitions have been determined, it is important to recognize which exercise(s) is going to be “load limiting.” The limiting factor to how much weight can be used in a complex is generally the exercise or muscle group that is the weakest (e.g., performance of a DB biceps curl is

USING COMPLEXES TO HELP IMPROVE TACTICAL JOB PERFORMANCE

generally weaker than a DB snatch). This exercise or muscle group will determine the weight that will be used.

Finally, be aware that since these exercises are being performed non-stop, the tactical professional will not be able to use as much weight as a traditional set and repetition format (e.g., three sets of 10 repetitions at 75% one repetition maximum [1RM] with 90 s recovery). Complexes have the potential to produce a large anaerobic stimulus and thus, lead to significant fatigue as the duration of the complex continues. This will generally lead to performance decrements throughout the complex and potentially affect proper technique. As such, selecting a weight that is challenging, but can still be performed with good form and technique for each of the exercises throughout the complex is essential.

As mentioned, when progressing tactical professionals, it is critical to make certain proper form is maintained throughout the entire complex. Once proper form is demonstrated, the complexes can be intensified by decreasing the recovery time between subsequent rounds, increasing implement load, increasing the number of repetitions per exercise, and/or increasing the number of exercises within the complex.

TABLE 2. EXAMPLE OF SANDBAG COMPLEX

| EXERCISE | REPETITIONS |
|---------------|-------------|
| Goblet squat | 10 |
| Front raise | 10 |
| Bent-over row | 10 |
| Toss and grab | 10 |

**Perform each of the following exercises for the prescribed number of repetitions. All of these repetitions should be completed consecutively, with no rest between reps or between exercises.*

**Rest 1 – 3 minutes after completing complex, then repeat for 2 – 3 more rounds*

TABLE 3. EXAMPLE OF BARBELL COMPLEX

| EXERCISE | REPETITIONS |
|-------------------|-------------|
| Romanian deadlift | 8 |
| High pull | 8 |
| Overhead press | 8 |
| Overhead lunge | 8 |

**Perform each of the following exercises for the prescribed number of repetitions. All of these repetitions should be completed consecutively, with no rest between reps or between exercises.*

**Rest 1 – 3 minutes, then repeat for 2 – 3 more rounds*

TABLE 4. EXAMPLE OF KETTLEBELL COMPLEX

| EXERCISE | REPETITIONS |
|------------------|-------------|
| Lunge | 6 |
| Kettlebell swing | 6 |
| Bent-over row | 6 |
| Goblet squat | 6 |

**Perform each of the following exercises for the prescribed number of repetitions. All of these repetitions should be completed consecutively, with no rest between reps or between exercises.*

**Rest 1 – 3 minutes, then repeat for 2 – 3 more rounds*

EXAMPLES OF COMPLEXES WITH DIFFERENT IMPLEMENTS CONCLUSION

There are many attributes that play a role in the success of tactical professionals. Just as any athletic team can benefit from sport-specific training, tactical professionals can benefit from occupational task-specific training as well. Combining pushing, pulling, pressing, and total body movements into complexes may help mimic the demands and movements of job tasks that tactical personnel may encounter. Complexes may provide a unique method of developing grip strength, muscular endurance, anaerobic endurance and overall performance for individuals in this population, replicating many movements seen on the job.

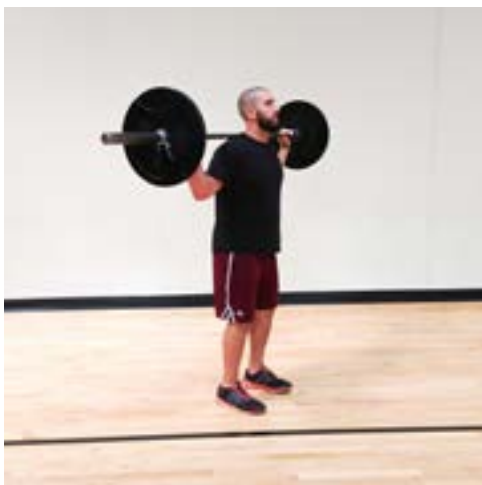


FIGURE 1. OVERHEAD PRESS

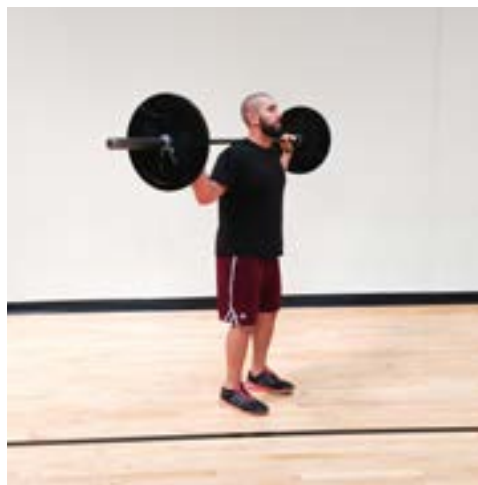


FIGURE 4. BARBELL LUNGE



FIGURE 2. OVERHEAD PRESS

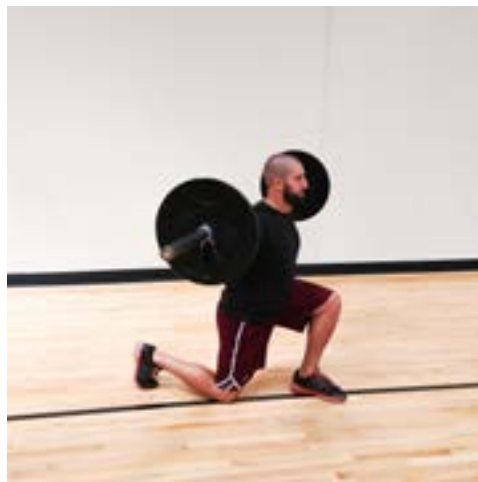


FIGURE 5. BARBELL LUNGE

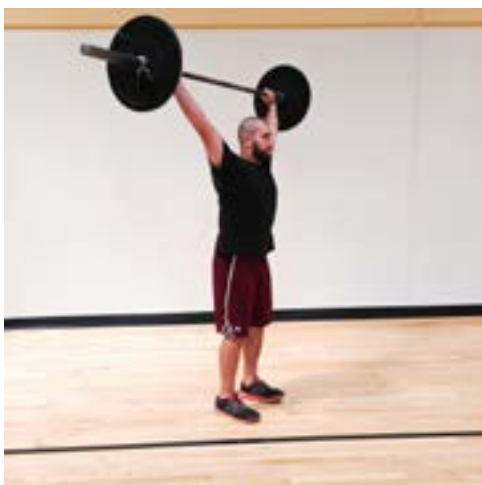


FIGURE 3. OVERHEAD PRESS



FIGURE 6. BARBELL ROMANIAN DEADLIFT

USING COMPLEXES TO HELP IMPROVE TACTICAL JOB PERFORMANCE



FIGURE 7. BARBELL ROMANIAN DEADLIFT



FIGURE 10. SANDBAG BENT-OVER ROW



FIGURE 8. BARBELL HIGH PULL

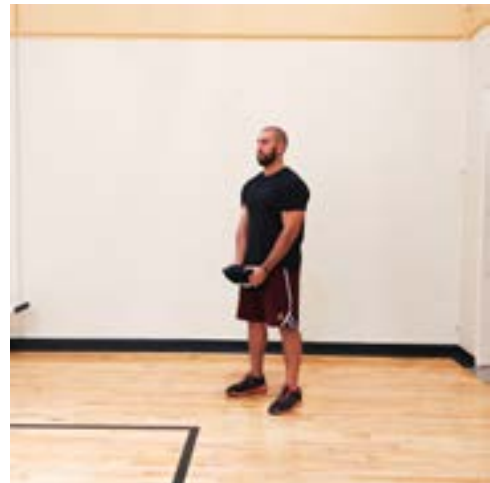


FIGURE 11. SANDBAG FRONT RAISE



FIGURE 9. BARBELL HIGH PULL



FIGURE 12. SANDBAG FRONT RAISE



FIGURE 13. SANDBAG GOBLET SQUAT



FIGURE 15. SANDBAG TOSS AND GRAB



FIGURE 14. SANDBAG GOBLET SQUAT



FIGURE 16. SANDBAG TOSS AND GRAB

REFERENCES

1. Javorek, I. The benefits of combination lifts. *Strength and Conditioning Journal* 20(3): 53-56, 1998.
2. Javorek, I. Sample exercises. *Istvanjavorek.com*. Retrieved July 2017 from <http://www.istvanjavorek.com/sample-exercises>.
3. Schmidt, C, Mckune, A. Associations between physical fitness and job performance in firefighters. *Ergonomics SA* 24(2): 44-57, 2012.
4. Sell, K, and Hofman, J. The importance of grip strength for firefighters. *TSAC Report* 30: 8-10, 2013.
5. Sell, K, Taveras, K, and Ghigiarelli, J. Sandbag training: A sample 4-week training program. *Strength and Conditioning Journal* 33(4): 88-96, 2011.

ABOUT THE AUTHORS

Tim Lentine earned his undergraduate degree from Central Michigan University and is pursuing his Master's degree in Strength and Conditioning at the University of Colorado Colorado Springs. His area of focus is the performance of tactical athletes and combative sports.

*Jay Dawes is an Associate Professor of Strength and Conditioning and the Coordinator for Athletic Performance at the University of Colorado Colorado Springs. He has worked as a strength/performance coach, personal trainer, educator, and post-rehabilitation specialist for over 15 years, and continues to act as a performance consultant for the Colorado State Patrol. Dawes earned his PhD in the School of Applied Health and Psychology Department at Oklahoma State University. He is certified by the National Strength and Conditioning Association (NSCA) as a Certified Strength and Conditioning Specialist® with Distinction (CSCS,*D®), NSCA-Certified Personal Trainer® with Distinction (NSCA-CPT,*D®), and Tactical Strength and Conditioning Facilitator® (TSAC-F®). He is also certified with the American College of Sports Medicine (ACSM) as a Health Fitness Specialist, United States of America Weightlifting (USAW) as a Club Coach, and the Australian Strength and Conditioning Association (ASCA) as a Level 2 Strength and Conditioning Coach. Additionally, Dawes is recognized as a Fellow of the NSCA since 2009. He is currently the Secretary-Treasurer for the NSCA Board of Directors and is the NSCA Board Liaison for the TSAC Program.*

CONFLICT OF INTEREST STATEMENT

Conflicts of Interest and Source of Funding: The authors report no conflicts of interest and no source of funding.