# Strong Arm (and Legs) of the Law: Relationships between Isometric Strength and the Body Drag in Incoming Deputy Sheriff Recruits

Robert G. Lockie[1] ◆ Matthew R. Moreno[1] ◆ Megan B. McGuire[1] ◆ Tomas J. Ruvalcaba[1] ◆ Ashley M. Bloodgood[1] ◆ Joseph M. Dulla[2,3] ◆ Robin M. Orr[3] ◆ J. Jay Dawes[4]

[1]Center for Sport Performance, Department of Kinesiology, California State University, Fullerton, Fullerton, CA, USA. [2]Recruit Training Unit, Training Bureau, Los Angeles County Sheriff's Department, Los Angeles, CA, USA. [3]Tactical Research Unit, Bond University, Robina, Qld, Australia. [4]School of Kinesiology, Applied Health and Recreation, Oklahoma State University, Stillwater, OK, USA.

## ABSTRACT

**INTRODUCTION:** An essential job task for law enforcement officers is a body drag, where officers must rescue a civilian or colleague from a hazardous environment and move them to a safe location. Law enforcement recruits in California must drag a 75-kg dummy 9.75 m in under 28 s to attain points in their exit examination. However, the average adult male in the USA weighs ~89 kg, while the average female weighs ~77 kg. This would suggest that the dummy mass should be increased to follow population trends. There is anecdotal resistance to changing the dummy mass because of the physical demands associated with a body drag. There could be less resistance to change if: 1) incoming recruits can complete the 75-kg body drag without specific training; 2) relationships between the body drag and practical strength measures can be established to assist with training recommendations; and 3) a strength baseline needed to complete the 75-kg body drag can be established. **PURPOSE:** To determine the relationships between isometric strength measured by a grip and leg/back dynamometer with the 75-kg body drag in incoming deputy sheriff recruits. **METHODS:** Retrospective analysis on data from an incoming recruit class from one agency was conducted. The class included 72 males (age = 27.78 ± 6.64 years; height = 1.73 ± 0.08 m; body mass = 84.50 ± 13.55 kg) and 21 females (age = 26.86 ± 3.99 years; height = 1.61 ± 0.06 m; body mass = 64.63 ± 9.43 kg). In the week before academy, recruits completed the body drag, and had strength assessed by grip (both hands combined) and leg/back dynamometers. The body drag required the recruit to lift the dummy to a standing position and drag it 9.75 m as quickly as possible. Timing commenced once the dummy began to move during the drag, with time recorded via a stopwatch. Pearson's correlations ($p < 0.05$) determined relationships between grip and leg/back strength with the body drag. A stepwise linear regression ($p < 0.05$) was used to determine whether isometric strength predicted the body drag for those recruits who could complete the task, and recruits were ranked according to body drag time to describe the strength of recruits that could not. **RESULTS:** All males and 19 females completed the body drag to state standards. Grip ($r$ = -0.60) and leg/back ($r$ = -0.67) strength related to the body drag. Only leg/back isometric strength predicted the body drag, with 44% explained variance (Figure 1). For the two females who could not complete the drag, they had a combined grip strength below 50 kg (41 kg and 47 kg) and leg/back strength below 100 kg (82 kg and 90 kg). One female had a combined grip strength of 40 kg, although her leg/back strength score was 100 kg and she could perform the body drag. **CONCLUSIONS:** Strength measured by isometric grip and leg/back dynamometers related to the body drag. Improving these strength qualities could enhance the job-specific task of dragging. Notably, this pilot data also suggested that a minimum leg/back isometric strength of 100 kg may be needed to perform a 75-kg body drag. **PRACTICAL APPLICATIONS:** Grip and leg/back isometric strength related to the ability to perform the 75-kg body drag. Further improving strength would be essential for officers to perform the body drag with heavier masses encountered when they are on-duty interacting with the general population and their colleagues. Although this requires further investigation, the leg/back dynamometer could be used as a method to measure strength specific to the body drag during entry fitness testing for law enforcement agencies.

## INTRODUCTION

- An essential job task for law enforcement officers is a body drag, where officers must rescue a civilian or officer from a hazardous environment and move them to a safe location. Many law enforcement recruits will need to effectively complete a body drag as part of occupational physical ability testing. For example, recruits in California must drag a 75-kg (165-lb) dummy 9.75 m in under 28 s to attain points in their exit examination.[4]
- However, the average adult male in the USA weighs ~89 kg, while the average female weighs ~77 kg.[2] This would suggest that the dummy mass should be increased to follow population trends. It could be theorized that the potential to perform a body drag could relate to an individual's strength. For example, Lockie et al.[3] found that greater strength measured by a one-repetition maximum hexagonal bar deadlift related to a faster 75-kg body drag in male and female civilians.
- There is anecdotal resistance to changing the dummy mass because of the physical demands associated with a body drag. There could be less resistance to change if: 1) incoming recruits can complete the 75-kg body drag without specific training; 2) relationships between the body drag and practical strength measures can be established to assist with training recommendations; and 3) a strength baseline needed to complete the 75-kg body drag can be established.
- Therefore, this study investigated the relationships between isometric strength as measured by a grip and leg/back dynamometer with the 75-kg body drag in incoming deputy sheriff recruits.

## METHODS

- Retrospective analysis on data from one incoming recruit class from one law enforcement agency was conducted. The class included 72 males (age = 27.78 ± 6.64 years; height = 1.73 ± 0.08 m; body mass = 84.50 ± 13.55 kg) and 21 females (age = 26.86 ± 3.99 years; height = 1.61 ± 0.06 m; body mass = 64.63 ± 9.43 kg).
- In the week before academy, recruits had isometric strength assessed by grip and leg/back dynamometers and completed the body drag. To measure grip strength, recruits kept their testing arm by their side and squeezed the dynamometer handle as hard as possible for ~2 s.[5] The best score for each hand was summed together to provide the combined grip strength score.
- For the leg/back dynamometer, the recruit was positioned so their arms were extended and both hands were on the handle positioned at the mid-thigh.[1] From here, recruits pulled the handle upward as hard as possible by attempting to extend the hips and knees.[1]
- The body drag required the recruit to lift the dummy to a standing position (Figure 1) and drag it 9.75 m as quickly as possible.[3,4] Timing commenced once the dummy began to move, and finished when the feet of the dummy passed the finish line. Time was measured via a stopwatch by a qualified instructor.[3,4]
- Pearson's correlations ($p < 0.05$) were used to calculate relationships between grip and leg/back strength with the 75-kg body drag. A stepwise linear regression ($p < 0.05$) was used to determine whether isometric strength predicted the body drag for those recruits who could complete the task. Recruits were ranked according to body drag time to describe the strength of recruits that could not complete the body drag.

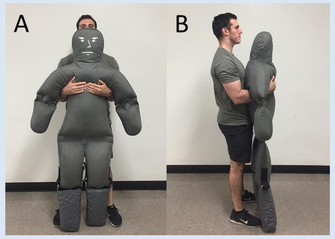


**Figure 1.** Anterior (A) and lateral (B) view of the starting position for the body drag.

## RESULTS

- All males and 19 females completed the body drag to state standards. Grip ($r$ = -0.60) and leg/back ($r$ = -0.67) isometric strength related to the body drag. Only leg/back isometric strength predicted the body drag, with 44% explained variance (Figure 2).
- For the two females who could not complete the drag, they had a combined grip strength below 50 kg (41 kg and 47 kg) and leg/back strength below 100 kg (82 kg and 90 kg). One female had a combined grip strength of 40 kg. However, this recruit had a leg/back strength score of 100 kg and she could successfully perform the body drag.

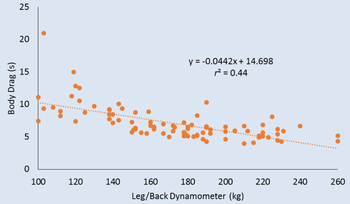


**Figure 2.** Scatter plot and regression equation for the relationships between leg/back isometric strength relative to the 75-kg body drag in law enforcement recruits.

## CONCLUSION

- Greater isometric strength measured by grip and leg/back dynamometers related to a faster body drag in law enforcement recruits. This supported previous research that detailed greater lower-body strength measured by the hexagonal bar deadlift related to a faster 75-kg body drag in civilians.[3] Grip strength would relate to the body drag as the dummy must be held throughout the drag. Leg and back strength is important for lifting the dummy to a standing position, and maintaining this position throughout the drag.
- This pilot data also suggested that a minimum leg/back isometric strength of 100 kg may be needed to perform a 75-kg body drag. More research is needed to provide a strong predictive relationship between leg/back isometric strength and the ability to perform a 75-kg body drag. Nonetheless, the current data indicates potential for use of the leg/back dynamometer in law enforcement fitness testing.

## PRACTICAL APPLICATIONS

- Grip and leg/back isometric strength related to the ability to perform the 75-kg body drag. Improving these strength qualities could enhance the job-specific task of dragging. Developing these qualities may be even more important for officers to be able to perform the body drag with heavier masses encountered when they are on-duty interacting with the general population and their colleagues.
- Although this requires further investigation, the leg/back dynamometer could be used as a method to measure strength specific to the body drag during entry fitness testing for law enforcement agencies.

**References**

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