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Original Research

An Analysis of the Body Drag Test in Law Enforcement Recruits with Consideration to Current Population Demographics

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ABSTRACT

International Journal of Exercise Science 15(7): 276-288, 2022. An essential job task for law enforcement officers is a body drag, where they must drag a person from a hazardous environment. In California, a 9.75-m body drag with a 74.84-kg dummy must be completed within 28 s to graduate academy. This mass is less than the average US adult, which may suggest it should be increased. This has not happened due to concerns regarding a potential increase in recruit injuries and failure rates. However, if recruits can complete the drag without formal training, this could leave scope for increasing the mass. This study analyzed the body drag in incoming recruits, compared their results to graduated recruits, and detailed how many achieved current standards without training. A retrospective analysis of two incoming (n = 191) and nine graduated (n = 643) recruit classes from one agency was conducted. Incoming recruits completed the drag in the week prior to their 22-week academy; the graduated recruits in their final weeks. The drag required the recruit to lift the dummy and drag them 9.75 m. Independent samples t-tests compared the groups, and recruits were compared to the 28-s standard. Graduated recruits performed the drag faster than incoming recruits (~5.11 vs. ~7.28 s; $p < 0.01$). All but one incoming recruit completed the drag within 28 s. Incoming recruits had sufficient strength and technical ability to drag a 74.84-kg dummy fast enough to achieve state standards before training. Further analysis should determine whether the current California body drag is appropriate for policing job demands.

KEY WORDS: Casualty drag, job standards, police, tactical, victim drag

INTRODUCTION

An essential job task for law enforcement officers is a body drag, which requires an officer to rapidly drag an incapacitated civilian or officer from a hazardous environment. Law enforcement recruits are trained and tested in their ability to complete this task during their academy training (28, 31, 32, 38). In the state of California in the USA, a drag with a 74.84-kg dummy over a distance of 9.75 m is a task within the Work Sample Test Battery (WSTB) (44).

The WSTB is administered by the Commission on Peace Officer Standards and Training (POST). As described on their website, POST "sets minimum selection and training standards for California law enforcement officers, and fosters professionalism in agencies and officers" (43). The WSTB, where the recruit completes job-specific tasks (e.g. in addition to the body drag, recruits complete an obstacle course, fence climbs, and a 457-m run) to accrue points, is completed prior to academy graduation (28, 31). The body drag must be completed within 28 s to attain points towards the WSBT (44).

What is notable is that the current dummy mass used in the WSTB may not be representative of the US population (27, 31). Indeed, the current mass of the dummy is closer to what an average adult US male weighed in the 1960s (51). Current data indicates that the average US adult male weighs 88.90 kg, and the average adult female weighs 76.66 kg (19). When considering incumbent officers, male officers have been found to have a body mass of 91-96 kg, while female officers weighed 67-77 kg (13, 16, 32). This does not consider additional load carried by a law enforcement officer, who can wear 8-22 kg of equipment depending on their job responsibilities (1, 24). The difference in mass between the current US population (19) and the dummy in the WSTB body drag (44) would imply that the dummy mass should be increased from 74.84 kg. It could be suggested that the body drag load should be more commensurate with either the general population (~90 kg) (19) or fellow officers with their duty load (~100 kg) (1) to better prepare recruits for this task.

However, there has been anecdotal opposition to increasing the dummy mass by law enforcement training staff in California for several reasons (31). These include a potential increase in injury risks associated with dragging a heavier load, and increased failure rate in the WSTB. A factor that influences this opposition is that absolute strength should be a contributing factor to the body drag, regardless of dummy mass (27, 31, 34). For example, lower-body strength measured by a back squat correlated (r = -0.57) with the time to drag a 79.5-kg dummy 10 m in Army Reserve Officer Training Corps and civilian university students (34). With regards to the 74.84-kg body drag, Lockie et al. (27) found that greater absolute (r = -0.666) and relative (r = -0.619) strength measured by a one-repetition maximum hexagonal bar deadlift related to faster drag performance in male and female civilians. Lockie et al. (31) measured isometric strength via grip and leg/back dynamometers in male and female law enforcement recruits and analyzed the relationships between these variables and the 74.84-kg body drag. The data indicated both absolute (r = -0.599 to -0.677) and relative (r = -0.261 to -0.322) isometric strength related to the body drag.

It is notable that strength and power development is not often a focus of academy, with a greater emphasis placed on endurance and aerobic conditioning (9, 26, 28, 37). This despite previous research indicating strength and power underpin many law enforcement-specific job tasks (14, 31, 42, 48). The physical training typically performed in law enforcement academies may be part of the reason why there is some opposition to any discussion about adjusting the dummy mass in the WSTB (31). However, if incoming recruits enter academy with enough strength and technical ability to complete the body drag with a 74.84-kg dummy according to state standards, this could provide some impetus to changing the mass to be more reflective of the population and the setting of this heavier standard as the new WSBT graduation requirement. If recruits can already complete this job-specific task with no specific training, this could raise questions as to the validity of the body drag in its current form.

As stated, if incoming recruits enter academy with enough strength and technical ability to complete the body drag with a 74.84-kg dummy according to established standards in California, this could provide some impetus to changing the mass to be reflective of the population. The purpose of this study was to measure the body drag in incoming recruits, compare their data to recruits who graduated academy, and detail how many incoming recruits achieved the state standard prior to receiving specific training. There has been very little research that has specifically analyzed the body drag (27, 31, 38), even though it is a common job-related task performed by police officers (14, 28, 32), firefighters (25, 46, 49, 54), and military personnel (8, 18, 30, 34). It was hypothesized that graduated recruits would perform better than incoming recruits in the body drag. It was further hypothesized that all recruits (both graduated and incoming) would complete the body drag within the 28-s time limit.

METHODS

Participants

Data were collected by staff from one law enforcement agency that was based in southern California and released with consent from that organization. The sample consisted of 834 recruits (age: 26.75 ± 5.36 years; height: 1.73 ± 0.09 m; body mass: 79.95 ± 14.00 kg), including 687 males (age: 26.79 ± 5.52 years; height: 1.76 ± 0.07 m; body mass: 83.21 ± 12.31 kg) and 147 females (age: 26.59 ± 4.59 years; height: 1.62 ± 0.07 m; body mass: 64.69 ± 11.02 kg). The sample contained two classes of incoming recruits, and nine classes of graduated recruits. The characteristics of the subjects in this study, in addition to the ratio between males and females, was typical of law enforcement populations from the literature (5, 10, 28, 29, 31, 41). Based on the archival nature of this analysis, the institutional ethics committee approved the use of pre-existing data (HSR-17-18-370). This research was conducted in accordance to the ethical standards of the International Journal of Exercise Science (40), and the recommendations of the Declaration of Helsinki (55).

Protocol

The data were collected by agency staff through 2017-2018. Each recruit's age, height, and body mass were recorded at the start of academy. Height was measured barefoot using a portable stadiometer (Seca, Hamburg, Germany), while body mass was recorded by electronic digital scales (Health o Meter, Neosho, Missouri). Incoming recruits completed the body drag in the week prior to their academy; graduated recruits completed the body drag in the final weeks of their 22-week academy (28, 32). This is very typical for this agency, and any variations in when the body drag was performed as part of exit examinations for graduated recruits were due to variations in the timetable across classes. The body drag for the incoming and graduated recruits were completed outdoors on a concrete surface (31, 32, 38, 44), and weather conditions were typical of the climate of southern California during a calendar year (6). Depending on the class schedule, testing occurred between 0500-1200. All recruits wore their physical training attire during testing, with no additional external equipment or load (28).

The body drag was conducted according to established procedures (28, 31, 32, 38, 44). Adhesive tape marked the start and finish lines for the 9.75-m dragging distance. The 74.84-kg dummy (Dummies Unlimited, Pomona, California) was made of heavy duty Cordura® fabric, which encased a siliconized pellet, sand, foam and rubber composite within the dummy to provide the weight (17). For the body drag, the dummy was positioned started face side up, with the head orientated towards the finish line. The feet were positioned 0.3 m behind the starting line. Timing was conducted via stopwatch (Accusplit, Pleasanton, California) by trained staff. Recruits picked up the dummy by wrapping their arms underneath the arms of the dummy and lifted it to standing by extending the hips and knees (28, 31, 32, 38, 44). Once the recruit was standing with the dummy and they informed the tester they were ready, timing was initiated when the feet of the dummy passed the start line. The recruit dragged the dummy as quickly as possible by walking backwards over the required distance. Timing stopped when the dummy's feet crossed the finish line, and was recorded to the nearest 0.10 s (44). Timing via stopwatches is standard practice in law enforcement testing, in addition to the use of multiple testers trained in stopwatch procedures, which were used across all sessions due to the high volume of recruits (3, 11, 26, 28, 32, 45). Testers trained in the use of stopwatch timing procedures for exercise tests can record reliable data (21, 35). Internal documentation provided by the law enforcement agency indicated that the body drag testing procedures had a trial-to-trial intra-class correlation coefficient (ICC) that equaled 0.74 (20), which was acceptable (ICC > 0.70) (2, 23, 33). The graduated recruits completed 1-2 trials; the second trial was only completed if required (i.e. the recruit wanted to attempt to improve their time), and the fastest time was recorded (44). According to official procedures (44), recruits were allowed to rest for a minimum of 2 minutes between attempts if they completed a second attempt. Specific to the graduated recruits, only the trial with the fastest time was used for this study; the difference in time between attempts if 2 trials were completed by a recruit were not reported. This was because the fastest trial was the trial that was used for record. A single trial was completed by incoming recruits. This was due to time constraints, but also followed WSTB procedures (44).

Statistical Analysis

Statistical analyses were processed using the Statistics Package for Social Sciences (SPSS) Version 25.0 (IBM Corporation, New York, USA), and Microsoft Excel (Microsoft Corporation™, Redmond, Washington, USA). SPSS was used for the statistical analysis, and Excel was utilized to produce the figure. Independent samples *t*-tests calculated any differences in body drag time between the incoming and graduated recruit groups (all combined, males, and females). Levene's test for equality of variances ascertained the homogeneity of variance for the data, with significance set as $p < 0.05$. Demographic information was included in the comparisons between incoming and graduated recruits as there can be variations in age, height, and body mass between different academy classes (29). The combined data was included as there are no separate graduating standards for males and females from this agency or across the state (28, 31, 44). Further to this, previous law enforcement research has combined sexes in data analysis (10, 28, 31). Nonetheless, male and female data were included separately, as numerous studies have documented sex differences in the physical performance of law enforcement populations (4, 16, 28, 31). Effect sizes (Cohen's *d*) were also calculated for the between-group comparisons for incoming and graduated recruits (all combined, males, and females), which was the difference between the means divided by the pooled standard deviations (12). A *d* less than 0.2 was a trivial effect; 0.2 to 0.6 a small effect; 0.6 to 1.2 a moderate effect; 1.2 to 2.0 a large effect; 2.0 to 4.0 a very large effect; and 4.0 and above an extremely large effect (22). Lastly, individual incoming and graduated recruits were compared to the state standard of 28 s.

RESULTS

Demographic data for the incoming and graduated recruits, as well as the number of recruits in each group and *p*-values for the between-group comparisons, is shown in Table 1. For the *t*-test analysis, equal variances were not assumed for age for all (F = 4.336, p = 0.038) and male (F = 7.027, p = 0.008) recruit data, but they were for the female (F = 0.055, p = 0.815) data. Equal variances were assumed for all between-group height (all recruits: F = 1.809, p = 0.179; males: F = 1.048, p = 0.306; females: F = 1.096, p = 0.297) and body mass (all recruits: F = 1.766, p = 0.184; males: F = 0.111, p = 0.739; females: F = 1.602, p = 0.208) data. Graduated recruits were significantly taller than incoming recruits when considering all recruits combined, although the effect was small. When separated by sex, graduated female recruits were significantly taller than the incoming recruits, which had a moderate effect. There were no significant differences in height between the incoming and graduated male recruits (trivial effect). There were also no significant differences between the groups in age or body mass (trivial-to-small effects).

Body drag data for the incoming and graduated recruits is shown in Figure 1. Equal variances were not assumed for the between-group *t*-test analysis for all recruits (F = 95.019, p < 0.001), male (F = 15.773, p < 0.001), and female (F = 15.279, p < 0.001) data. The graduated recruits performed the body drag significantly (p < 0.001) faster than the incoming recruits when considering all recruits combined (d = 0.89; moderate effect), males (d = 0.87; moderate effect), and females (d = 1.30; large effect). Individual body drag times are displayed in Figure 3. Graduated and incoming recruits were arbitrarily numbered to profile their performance relative to the 28-s benchmark. All graduated recruits completed the drag in less than 28 s, which would have earned them WSTB points. Only one incoming recruit (a male) out of 191 recruits recorded a time above 28 s. All incoming female recruits were able to complete the task according to end-of-academy state exit standards.

Table 1. Descriptive statistics (mean ± standard deviation) for age, height, and body mass for all, male, and female incoming and graduated law enforcement recruits. Statistical significance (*p* value), and effect size data (*d* and *d* strength) for the between-group comparisons are also shown.

	Age (years)	Height (m)	Body Mass (kg)
All Recruits			
Incoming (*n* = 191)	26.89 ± 6.35	1.71 ± 0.08*	78.49 ± 14.23
Graduated (*n* = 643)	26.72 ± 5.05	1.74 ± 0.09	80.38 ± 13.91
p-value	0.730	<0.001	0.100
d	0.03	0.35	0.13
d strength	Trivial	Small	Trivial
Males			
Incoming (*n* = 145)	27.06 ± 6.86	1.75 ± 0.07*	83.69 ± 11.70
Graduated (*n* = 542)	26.72 ± 5.13	1.76 ± 0.07	83.09 ± 12.47
p-value	0.591	0.013	0.601
d	0.06	0.14	0.05
d strength	Trivial	Trivial	Trivial
Females			
Incoming (*n* = 46)	26.39 ± 4.50	1.59 ± 0.05*	62.09 ± 7.39
Graduated (*n* = 101)	26.68 ± 4.65	1.63 ± 0.07	65.87 ± 12.17
p-value	0.722	0.002	0.051
d	0.06	0.66	0.38
d strength	Trivial	Moderate	Small

Note: m = meters; kg = kilograms. *d* = Cohen's d. * Significantly ($p < 0.05$) different from the graduated recruit group.

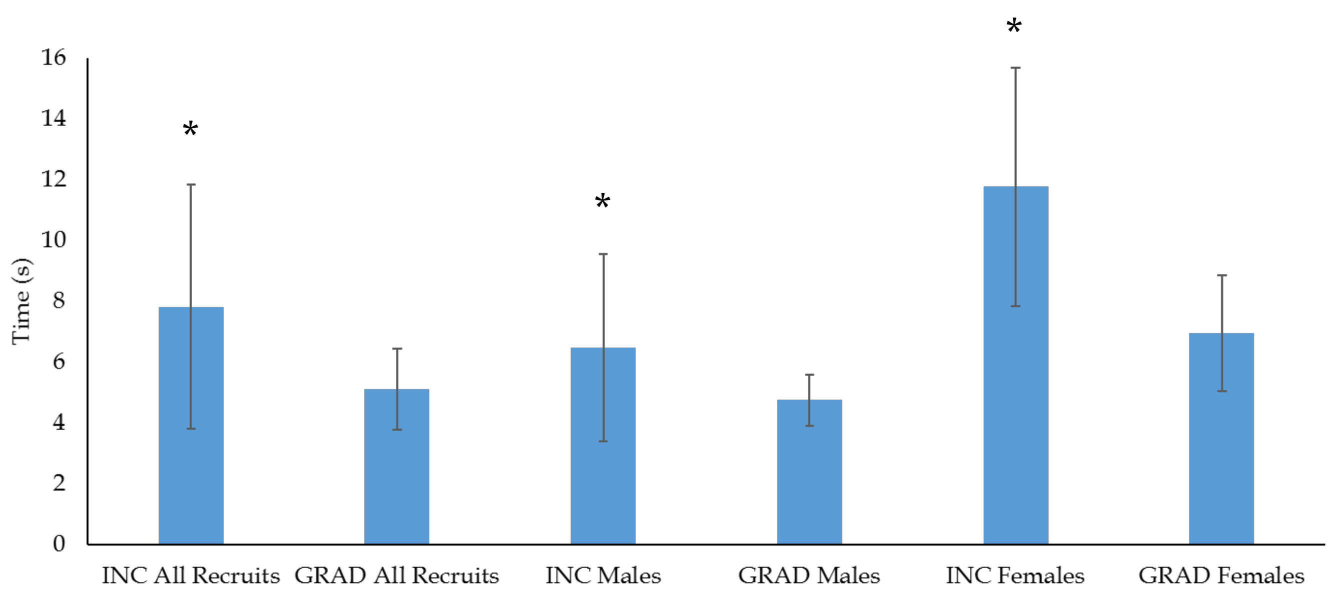

Figure 1. Descriptive statistics for body drag time for all, male, and female incoming (INC) and graduated (GRAD) law enforcement recruits. *Significantly ($p < 0.05$) different from the graduated recruit group.

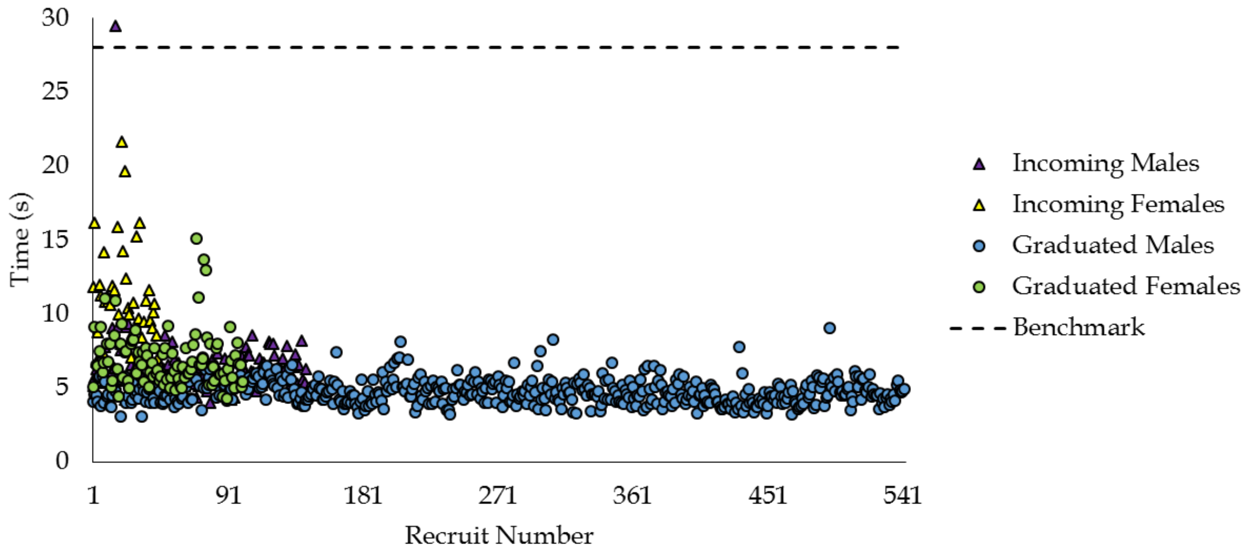

Figure 2. Scatter plot for body times for all incoming (*n* = 191) and graduated (*n* = 643) law enforcement recruits. The 28-s benchmark is also indicated in the scatter plot.

DISCUSSION

This study investigated the body drag to ascertain whether incoming recruits from one law enforcement agency in California could perform a drag according to state standards prior to undergoing specific training. This is important, as the current dummy mass for Californian law enforcement recruits is below that of the general population (19). The results indicated that incoming recruits could perform the body drag effectively relative to current standards. It should be noted that the graduated recruits when considering the all recruits combined and female groups tended to be taller than the incoming recruits in this study. Body size could influence performance of tactical tasks. For example, a greater body height could be advantageous in certain firefighting tasks such as hose and dummy drags (49), and greater body mass could contribute to a faster military casualty drag with a 123-kg dummy (30). Future research could investigate relationships between body height and mass in law enforcement recruits relative to the body drag. Nevertheless, previous research has shown mean data for law enforcement recruit classes can significantly vary in descriptive data such as height (29). Further to this, all recruits fell within ranges for recruit and incumbent officers (5, 10, 28, 29, 31, 32, 41). Thus, the data could be extrapolated to other police recruit populations.

The graduated recruits completed the body drag significantly faster than the incoming recruits. There were moderate effects for the between-group comparisons considering all recruits combined and the males, and large effects for the females. They may have had more familiarity with the task, and potentially greater physical conditioning. In military populations, active-duty soldiers were able to perform a 15-m casualty drag with a 123-kg dummy faster than trainee soldiers (8). The graduated recruits were coming to the conclusion of a 22-week training academy, and recruit fitness tends to improve over this period (11). Any improvements to dynamic (27, 34) and isometric (31) strength could contribute to a faster drag.

Notably, even though the incoming recruits tended to perform the body drag slower than graduated recruits, they were still able to perform this task to a level that would have attained WSTB points and state-mandated academy exit standards. Only one incoming recruit out of 191 did not complete the BD in 28 s, and all 46 incoming female recruits completed the body drag within this time. This is noteworthy considering female recruit and incumbent officers tend to demonstrate lower strength when compared to males (4, 7, 10, 16), and strength relates to a faster 74.84-kg drag (27, 31). This would suggest the great majority of incoming recruits had sufficient strength and technical ability to drag a 74.84-kg dummy fast enough to achieve state standards prior to specific training, in a time well under that required by POST.

These results raise some questions as to whether the body drag in its current form is an appropriate part of an exit examination for US-based law enforcement recruits, especially as they can 'pass' this examination before completing any training. As stated, the mass of the dummy is close to that of an average male from the 1960s (51), and well below that of male US civilians (19) or law enforcement officers with their duty loads (1). If recruits are being trained to pass a body drag with a 74.84-kg dummy, they may be ill-prepared to drag heavier civilians, or their colleagues, from hazardous environments when on-duty. Law enforcement agency staff from California, or from any agency that uses an exit examination body drag with a mass below that of individuals they may encounter when on-duty, should consider updating their test. Although much further research is needed to determine the effects of changing the dummy mass in a body drag such as that featured in the WSTB, not being able to drag heavier people could have serious implications for officers if they need to perform this task in the field. As will be discussed, an increase in body drag dummy mass would need to be concurrently supported by improved strength and technical training of recruits to any new standards established for the body drag.

Several studies have associated the body drag from this study to lower-body strength, which would imply that improving this quality should positively influence performance of this task (27, 31). However, absolute strength is not often a focus of law enforcement academy training programs (9, 26, 28, 37). There are reasons for this (e.g. large class sizes, limited space and equipment), but this is not ideal given the potential importance of the body drag to officers. Similar to recommendations for military (34) and law enforcement (27, 31) populations, absolute strength training could be a greater focus of future academies, especially if the dummy mass increases to match current population data. Although this requires much further research to confirm, this also has application for law enforcement academies all over the USA, particularly those that have a body drag in their exit examination. Technical training with regards to different body drag methods could also be important, especially considering how the drag may be performed in the field. Army Emergency Responders have been assessed in their ability to perform different types of drags that could be encountered in a rescue situation, which included dragging a casualty across different surfaces and with different masses (53). Although it may be impractical to assess different forms of body drags within an examination such as the WSTB, law enforcement recruits could be introduced to different drag techniques relative to their strength and technical ability, and the size of the person they are trying to save.

As noted, anecdotally there is resistance to increasing the dummy mass in the body drag due in part to the potential for injury in recruits, and concerns over failure rates (31). However, without specific training, most of the incoming recruit group met the current standards. It should be reemphasized that specific analysis of a drag with a heavier dummy would need to be conducted before any changes are made. Furthermore, if law enforcement staff are hesitant about using a heavier dummy for a body drag, strength assessments could be performed as part of entry fitness testing for recruits. Fitness testing is often performed as part of the hiring process to determine whether law enforcement recruits have the physical attributes to safely and effectively perform job-related task training (10), and complete academy training (26, 47). Although the relationship between strength tests and the body drag requires further investigation to ensure legal defensibility (and is outside the scope of this study), surrogate tests have been used to predict occupational performance (50, 52). The US Army recently included a hexagonal bar deadlift as part of their Occupational Physical Assessment Test to measure a recruit's strength specific to tasks such as casualty evacuation from a vehicle (36). Further, maximal strength measured by a one-repetition maximum hexagonal bar deadlift was used to investigate strength relationships to 74.84-kg and 90.72-kg body drags in civilians (27). The leg/back isometric strength dynamometer has been used previously in law enforcement populations (15, 16, 31), and greater strength measured by this device has related to the 74.84-kg body drag (31). Accordingly, should the dummy mass increase, LEA staff could investigate the use of a deadlift (27, 36), back squat (34), or isometric leg/back strength device (15, 16, 31) to indicate a potential recruit's strength relative to the body drag.

There are study limitations that should be detailed. This study only involved recruits from one agency, and fitness characteristics of recruits can vary across agencies (39). As a result, the body drag, and performance in other job tasks, should also be analyzed specific to each agency. There was a large discrepancy between the graduated and incoming recruit groups (643 recruits vs. 191 recruits). This was the only data provided by the agency to the researchers. Furthermore, this data is still practically relevant to law enforcement agencies and practitioners. Although this study has suggested the dummy mass in the WSTB (and potentially other exit examinations for law enforcement recruits) may need to increase commensurate with the mass of the general populations, this requires much further analysis. Impact on training time, potential injuries, graduation rates, costs (i.e. replacing existing dummies), and agency-specific impacts need to factor in this decision. Future research should also investigate relationships between body height and mass of law enforcement recruits with body drag performance. Nonetheless, this study provides an important step in this process for considering the relevancy of the current dummy mass for the body drag in the WSTB.

In conclusion, most incoming recruits from one law enforcement agency in California completed the body drag with a 74.84-kg dummy to state standards prior to academy. This may suggest that the body drag in its current form may not be the optimal test of a recruits capacity to perform this task when on-duty, as all but one incoming recruit out of 191 could not perform this task the POST's minimum standard. Additionally, it could be speculated that the strength and technical ability of incoming recruits, prior to academy training, may not be an impediment to increasing the dummy mass to be reflective of the general population. If changes are made to the dummy mass due to population increases in body mass, absolute strength and technical training for body drags should be a greater focus of academy. The use of a strength test (e.g. hexagonal bar deadlift, back squat, leg/back isometric strength dynamometer) could be considered for inclusion in fitness testing to indicate a recruit's strength relative to the body drag if the dummy mass increases.

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