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A Retrospective and Comparative Analysis of the Physical Fitness of Custody Assistant Classes Prior to Academy Training

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ABSTRACT

Background
Within a law enforcement agency (LEA), custody assistants (CAs) are responsible for upholding proper safety and security inside correctional facilities. However, unlike other law enforcement positions, CAs may not be subjected to fitness testing prior to matriculation. If there are differences in fitness between recruits across different classes, this could influence training adaptations following academy.

Purpose
The purpose of this study was to investigate the physical fitness of CAs across three different academy classes.

Methods
A retrospective examination of performance data was conducted on 108 CAs from three classes (Class 1: males=29, females=11; Class 2: males=22, females=16; Class 3: males=18, females=12). The fitness tests encompassed: number of push-ups and sit-ups in 60 seconds; 201-meter (m) and 2.4-kilometer (km) run times; and estimated maximal aerobic capacity (VO2max) derived from the 2.4-km run. To compare males and females from the classes (the sexes were analyzed separately), a one-way analysis of variancewith Bonferroni post hoc was utilized ($p<0.05$). Effect sizes (d) were also calculated.

Results
Class 2 males executed significantly more sit-ups than those from Class 3. There were moderate effects for the greater number of push-ups completed by Class 2 compared to Class 3, and the faster 201-m run for Class 3 compared to Class 2 (d=0.60-1.00). There were no significant between-class differences for the females, but moderate effects for the greater sit-ups and estimated VO_{2max} for Class 1 compared to Class 3 (d=0.64-0.76).

Conclusion
Even without physical testing prior to academy, the CA classes from this LEA seemed to be relatively similar in fitness. However, physical training instructors should acknowledge that there may be select variances between certain classes (e.g. abdominal strength measured by sit-ups; anaerobic endurance measured by the 201-m run). Instructors should utilize appropriate assessments to characterize fitness of their recruits, and where possible, tailor training accordingly.

Keywords
Aerobic capacity; Anaerobic endurance; Correctional officers; Police; Strength endurance; Tactical.

INTRODUCTION

Custody assistants (CAs) are law enforcement personnel that assist law enforcement officers (LEOs) and deputies with maintaining safety and security in custody detention, station jails, or court lockup facilities. Although CAs tend to support the work of LEOs at the detention facilities, they still may be required to perform extraordinary physical activity during a work shift.[1] Some of the more important tasks for CAs include the searching of cells, responding to alarms to assist colleagues, physical confrontations which could involve control and restraint of an inmate, or the need to pursue and corral an inmate attempting to evade restraint.[2,3] Tasks such as emergency response and inmate confrontations could potentially be very physically taxing for a CA, and could endanger the safety and well-being of the CA, their colleagues, and other inmates. Accordingly, it has been recognized that correctional populations should have an acceptable level of strength, endurance, flexibility, and general fitness to complete the tasks demanded of them.[2,3]

Despite the importance of physical health and fitness for a CA, depending on the agency, applicants for a CA position may not need to complete any physical fitness testing prior to matriculation.[4] Fitness testing is typically used by a law enforcement agency (LEA) to ensure that they find candidates that have the requisite physical abilities to complete job-specific training and the tasks required in the occupation. Not incorporating any physical testing prior to matriculation, in addition to the non-discriminatory hiring practices adopted by most LEAs,[5] could mean that the pool of potential qualified CA recruits is greater. This increase in pool size may be of benefit to the LEA in terms of increasing their ability to select the most viable recruits and as a means to fill any vacant positions. However, a possible by-product of this approach is that the number of potential qualified individuals, and the resulting accepted recruits, may have very different fitness levels prior to commencing the academy training period.

Academy is where LEA instructors will train recruits so that they can tolerate the physical rigors of the profession, while also teaching the necessary procedures required for the job.[6-8] Specific to CAs, some examples would be completing physical training (PT) to develop base aerobic and anaerobic fitness for job-related tasks, defensive tactics training to learn specific inmate restraint techniques and self-defense, and learning the proper procedures for processing and supervising inmates, conducting cell searches, and other CA-specific responsibilities. These teaching units are commonly taught in a standardized manner, in order to meet the requirements of the LEA and state in which the LEA is based. In accordance with this, and with specific reference to PT, many agencies will adopt a one-size-fits-all approach.[8-10] What this means is that all recruits within a class will complete a standard set of exercises and activities, regardless of any pre-existing fitness or ability levels. This approach is often adopted due to the time constraints associated with academy, the number of recruits within a class relative to the number of PT instructors, and the fact that job tasks will remain the same regardless of the age, sex, and fitness of the CA. Nevertheless, this approach could be problematic if the recruits in a class vary greatly in their levels of fitness. For example, in law enforcement officers, numerous studies have shown inherent differences in fitness between males and females as shown by performance in assessments such as the maximum number of push-up in 60 seconds (sec), vertical jump, and 2.4 kilometer (km; 1.5 mile) run.[5,11-13] This could potentially lead to a higher rate of injury in females if they are required to complete the same level of training as males, which has been shown to occur in recruits from the military.[14] Further, age may also have an impact on the physical fitness of law enforcement populations.[11,12] From a training perspective, even though there may be set curriculum and expectations for PT, the same training stimulus may not be optimal for all recruits to meet the same required end of course performance standard. This could be especially true if the fitness levels of CA recruits vary considerably.

The intensities of specific training units within a PT session (e.g. circuit training, calisthenics, formation runs) is generally dependent on the overall fitness of the class.[9,10] For example, it can be observed that during a PT session, such as a formation run (a long, slow distance run where the class stays in an organized formation along a set route),[9] the intensity is generally set towards those recruits of lesser fitness. This is done in attempt to ensure that the class stays in formation for the duration of the run. Nonetheless, modifying training intensity towards the bottom end of a class is an issue, because if an inappropriate load is applied, this can result in under-training for more fit recruits.[15] It should also be noted, however, that adjusting training intensity towards more fit recruits can also be problematic, as too great an intensity-for less fit individuals could lead to over-training and an increased risk of injury.[15-17] Orr and Moorby[18] demonstrated the limitations of group training in Australian Army recruits where heart rates for a given group endurance marching session had some recruits working above 180 beats per minute, and others at approximately 150 beats per minute. In an investigation of a standardized formation run where individual fitness can be reflected in the heart rate response in CA recruits, Cesario et al.[9] noted that the heart rate responses varied between high, moderate, and low fitness recruits. Collectively, these results suggest that different training stimuli are being applied to individuals within the one group session.

There is currently no research that has demonstrated the pre-existing fitness levels of CA recruits in typical tests for law enforcement populations prior to academy training. This is important information to document, as it could help dictate program design for practitioners and PT instructors who work with CAs and custody populations. Given the previous research has recommended individualized[19] and ability-based training[8-10] for law enforcement populations to enhance fitness and prevent injury, information such as this could dictate whether this approach is relevant in CA recruits. Therefore, the purpose of this study was to investigate the characteristics of CAs from three different classes prior to academy training. It was hypothesized that there would be significant differences between these assessments (number of push-ups and sit-ups, 201-meter [m] and 2.4-km run times) across the different CA classes. This would be true when considering the overall means for the classes, and for both males and females.

METHODS

Participants

Data were collected by the training staff of one LEA from the USA and were released with consent from that organization. A sample of convenience comprised of 108 CA recruits (age: 27.91±6.87 years; body mass: 75.59±15.73 kg), which encompassed all recruits from three academy classes. The academy training period for each of the three classes was conducted separately over the time period from December 2016 until May 2017, but all occurred at the same facility. The sample included 69 males (age: 27.54±6.74 years; body mass: 81.27±15.22 kg) and 39 females (age: 28.56±7.13 years; body mass: 65.68±11.11 kg). Similar to previous research on tactical populations,12,20,21 only age and body mass data were available for the description of the participants. Based on the archival nature of this analysis, the institutional ethics committee approved the use of pre-existing data (HSR-17-18-370). Regardless, the study still conformed to the recommendations of the Declaration of Helsinki.

Procedures

The data utilized in this study were collected by the CA training staff of one LEA using the procedures that are detailed. Instructors who held a Tactical Strength and Conditioning Facilitator (TSAC-F) certification from the National Strength and Conditioning Association in the USA verified the proficiency of the staff. All testing was conducted in the first week of academy training for each CA class in the order presented here. This typically occurred between the times of 0600-0700. The push-up and sit-up tests were conducted outdoors at the start of one physical training session at the LEA's training facility. The 201-m and 2.4-km run were performed on an athletics track at the LEA's facility.

Push-up Test

Upper-body strength endurance was assessed via a maximal push-up test where recruits completed as many repetitions as possible in 60-sec. The protocol for this assessment followed that of established research.6,11,12,20-22 The recruits started in the 'up' position, with their body taut and straight, their hands positioned shoulder width apart, and their fingers pointed forwards. A partner placed a fist on the floor directly under the recruit's chest, which ensured that the recruits descended to an appropriate depth. On the start command, the tester began the stopwatch and the recruit lowered themselves until their chests contacted their partner's fists, before returning to the start position. The recruits performed as many push-ups as possible using this technique in the allotted time period. Recruits could rest in the up position with straight arms, but only full repetitions were recorded.

Sit-up Test

Strength endurance of the abdominal muscles was assessed via the sit-up test, where the recruits completed as many repetitions as possible in 60-sec.[6,11,12,21,22] The recruits laid on their backs with their knees flexed to 90°, heels flat on the ground, and hands cupped behind their ears. The feet were held to the ground by a partner during the test. On the start command, recruits raised their shoulders from the ground while keeping their hands cupped at their ears and touched their elbows to their knees. The recruit then descended back down until their shoulder blades contacted the ground, and completed as many repetitions as possible in the allocated time period. Recruits could rest in the up position, but only full repetitions were counted.

201-m (220-yard) Run

The 201-m run has been used previously in physical assessment batteries of firefighters,[23] and was adopted by the PT instructors in this study. A running test over this distance provided a measure of anaerobic capacity.[24] The 201-m distance was marked on the athletics track, and the recruits were instructed to run the distance as quickly as possible. The recruits completed the runs in their platoons (groups of between 8-12 recruits). Time for each recruit was recorded to the nearest 0.10 sec by a handheld stopwatch, a common practice in law enforcement testing.[6,11,12,21] Test administrators trained in the use of stopwatch timing procedures, which the PT instructors were, can record reliable data.[25]

2.4-km (1.5-mile) Run

The 2.4-km run was used to assess aerobic capacity and is commonly used for this purpose in tactical populations.[6,11,12,21,22] The test was performed on an athletics track where the recruits were required to complete six laps of the 400-m track as quickly as possible. The 2.4-km run time was recorded for each recruit on a handheld stopwatch to the nearest 0.10 sec, and the final run time was recorded in minutes: seconds (min: sec). Maximal aerobic capacity (VO_{2max}) was estimated for male and female recruits via the following equations,26 and expressed in milliliters of oxygen consumed per kg body mass per min ($ml.kg^{-1}.min^{-1}$):

Male VO_{2max} ($ml.kg^{-1}.min^{-1}$)=91.736-(0.1656 x body mass)-(2.767 x 2.-km run time in min).

Female VO_{2max} ($ml.kg^{-1}.min^{-1}$)=88.020-(0.1656 x body mass)-(2.767 x 2.4-km run time in min).

These equations were used as the sample population in this study had a mean age that fell within the range detailed by George et al.[26]

Statistical Analysis

All statistical analyses were computed using the Statistics Package for Social Sciences (Version 24.0; IBM Corporation, New York, USA). Descriptive statistics (mean±standard deviation [SD]; 95% confidence intervals [CI]) were calculated for each test parameter. A one-way analysis of variance (ANOVA), with Bonferroni post hoc adjustment for multiple pairwise comparisons, was used to calculate any differences between the different classes, with males and females analyzed separately. Statistical significance was set at $p<0.05$ a priori. Effect sizes (d) were also calculated for the between group comparisons, where the difference between the means was divided by the pooled SD.[27] In accordance with Hopkins,[28] a d less than 0.2 was considered 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. As described by Lockie et al[29] effect sizes were included in this research to provide useful and practical information. Furthermore, scatter plots were also produced for each fitness test to derive the spread of scores relative to the individual CA recruit from each class.

RESULTS

The descriptive data for the overall class means is shown in Table 1, and there were no significant differences between the classes when male and female data was combined for any of the assessments (p=0.093-0.998). All between-class effect sizes for the comparisons were trivial-to-small (Table 2). Descriptive data for the male and female CA recruits from the three classes is shown in Table 3, while the pairwise effect size data for the males and females is displayed in Tables 4 and 5, respectively. With regards to the males, there were no significant differences between the three classes in age, body mass, number of push-ups, 2.4-km run time, or estimated VO_{2max} (p=0.154-0.946). There was a moderate effect size for the greater number of push-ups completed by Class 3 compared to Class 2, although the difference was not significant (p=0.366). The initial one-way ANOVA suggested that there were significant differences in the number of sit-ups (p=0.035) and 201-m run time (p=0.047). The post hoc analysis revealed that the males from Class 2 completed significantly more sit-ups compared to the Class 3 males (24%; p=0.042), which had a moderate effect size. Regarding the 201-m run, the post hoc revealed that there were no significant between-group differences, although the faster time for Class 3 approached significance when compared to Classes 1 (18%; p=0.086) and 2 (19%; p=0.079). There was also a moderate effect size for the difference between Classes 2 and 3.

Table 1. *Descriptive Data (mean±SD; 95% CI) for all Custody Assistant Recruits from Three Classes Prior to Academy Training*

	Class 1 (n=40)	Class 2 (n=38)	Class 3 (n=30)
Age (years)	27.30±6.17 (25.33-29.27)	27.34±6.47 (25.22-29.47)	29.43±8.14 (26.39-32.47)
Body mass (kg)	76.87±18.13 (71.08-82.67)	74.92±14.43 (70.11-79.74)	76.82±14.70 (71.33-82.31)
Push-ups (no.)	31.08±16.09 (25.93-36.22)	29.34±14.16 (24.69-34.00)	33.27±15.30 (27.55-38.98)
Sit-ups (no.)	37.70±8.83 (34.88-40.52)	39.82±16.25 (34.47-45.16)	33.30±9.98 (29.57-37.03)
201 m run (sec)	36.40±10.87 (32.92-39.88)	37.84±8.29 (35.12-40.57)	33.30±8.96 (29.96-36.64)
2.4 km run (min:sec)	14:29±3:39 (13:19-15:39)	14:29±2:29 (13:40-15:19)	14:27±2:53 (13:21-15:33)
VO_{2max} (ml•kg^{-1}•min^{-1})	38.57±11.49 (34.89-42.24)	37.50±9.40 (35.48-40.71)	37.50±9.40 (34.00-41.01)

Table 2. *Pairwise Effect Size Data for all Custody Assistant Recruits from Three Classes Prior to Academy Training*

	Class 1 – Class 2	Class 1 – Class 3	Class 2 – Class 3
Age (years)	0.01	0.29	0.28
Body mass (kg)	0.12	0.00	0.13
Push-ups (no.)	0.11	0.14	0.27
Sit-ups (no.)	0.16	0.47	0.48
201 m run (sec)	0.17	0.31	0.53
2.4 km run (min:sec)	0.00	0.01	0.01
VO_{2max} (ml•kg^{-1}•min^{-1})	0.01	0.10	0.00

Table 3. *Descriptive Data (mean±SD; 95% CI) for Male and Female Custody Assistant Recruits from Three Classes Prior to Academy Training*

	Males			Females		
	Class 1 (n=29)	Class 2 (n=22)	Class 3 (n=18)	Class 1 (n=11)	Class 2 (n=16)	Class 3 (n=12)
Age (years)	26.90±5.77 (24.70-29.09)	27.77±5.65 (25.27-30.28)	28.28±9.29 (23.66-32.90)	28.36±7.31 (23.45-33.28)	26.75±7.60 (22.70-30.80)	31.17±5.98 (27.37-34.37)
Body mass (kg)	82.60±17.68 (75.87-89.33)	81.68±13.37 (75.59-87.76)	81.10±14.18 (74.05-88.15)	61.77±7.75 (56.56-66.98)	66.06±10.68 (60.37-71.75)	70.40±13.55 (61.79-79.01)
Push-ups (no.)	36.14±14.46 (30.64-41.64)	36.91±10.35 (32.32-41.50)	42.94±9.71 (38.12-47.77)	17.73±12.41 (9.39-26.06)	18.94±12.05 (12.52-25.36)	18.75±9.41 (12.77-24.73)
Sit-ups (no.)	38.00±9.22 (34.49-41.51)	43.91±13.94 (37.73-50.09)	35.50±6.91* (32.07-38.93)	36.91±8.08 (31.48-42.34)	34.19±17.93 (24.63-43.74)	30.00±13.00 (21.74-38.26)
201 m run (sec)	35.51±12.35 (30.82-40.22)	36.00±4.13 (34.17-37.83)	29.17±8.71 (24.84-33.50)	38.73±5.04 (35.34-42.11)	40.38±11.57 (34.22-46.54)	39.50±4.95 (36.36-42.64)
2.4 km run (min:sec)	14:21±4:04 (12:49-15:54)	13:46±2:19 (12:44-14:48)	13:15±2:04 (11:44-14:45)	14:50±2:18 (13:17-16:22)	15:29±2:26 (14:11-16:47)	16:09±1:48 (15:00-17:18)
VO_{2max} (ml•kg^{-1}•min^{-1})	39.22±12.84 (34.34-44.10)	40.85±7.56 (37.50-44.20)	41.32±9.26 (36.71-45.92)	36.85±7.02 (32.13-41.56)	34.31±7.02 (30.56-38.05)	31.78±6.38 (27.73-35.84)

*Significantly (p<0.05) less than Class 2.

Table 4. *Pairwise Effect Size Data for Male Custody Assistant Recruits from Three Classes Prior to Academy Training*

	Class 1 – Class 2	Class 1 – Class 3	Class 2 – Class 3
Age	0.15	0.18	0.07
Body mass	0.06	0.09	0.04
Push-ups	0.06	0.55	0.60*
Sit-ups	0.50	0.31	0.76*
201 m run	0.05	0.59	1.00*
2.4 km run	0.18	0.31	0.19
VO_{2max}	0.15	0.19	0.06

*Moderate effect for the pairwise comparison.

Table 5. *Pairwise Effect Size Data for Male Custody Assistant Recruits from Three Classes Prior to Academy Training*

	Class 1 – Class 2	Class 1 – Class 3	Class 2 – Class 3
Age	0.22	0.42	0.65*
Body mass	0.46	0.78*	0.36
Push-ups	0.10	0.09	0.02
Sit-ups	0.20	0.64*	0.27
201 m run	0.18	0.15	0.10
2.4 km run	0.28	0.64	0.31
VO_{2max}	0.36	0.76*	0.38

*Moderate effect for the pairwise comparison.

There were no significant differences between classes for the female CA recruits in age, body mass, or any of the fitness assessments (p=0.184-0.961). There were moderate effect sizes for the greater age for Class 3 compared to Class 2, and body mass for Class 3 compared to Class 1, but both were non-significant (p=0.331 and 0.203, respectively). There were also moderate effect sizes for the 23% greater number of sit-ups and 16% higher estimated VO_{2max} for Class 1 compared to Class 3, but again, these were non-significant (p=0.761 and 0.253, respectively).

Figure 1. *Individual Scores for the Push-Up (A) And Sit-Up (B) Tests in Male and Female Custody Assistant Recruits from Three Classes Prior to Academy Training*

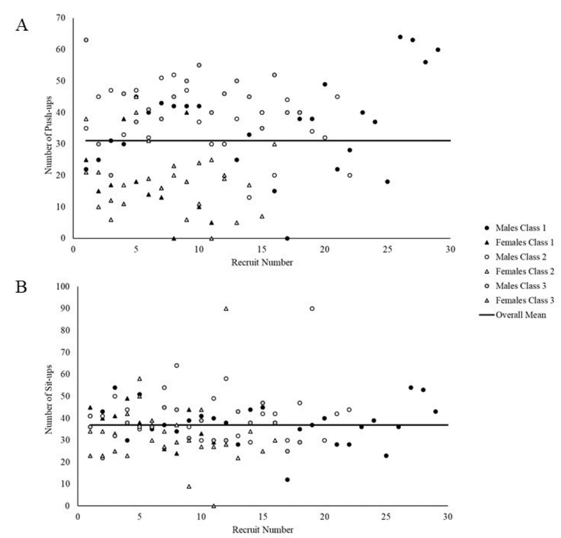
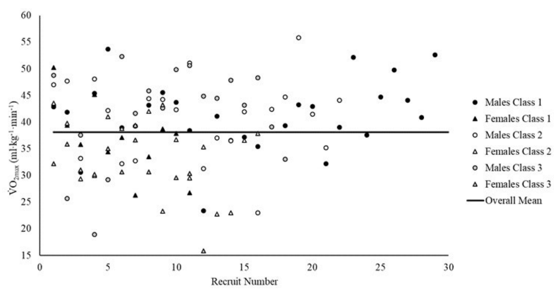
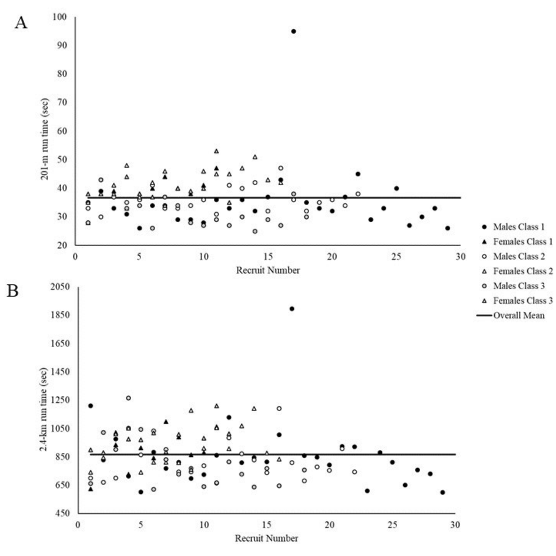


Figure 2. *Individual Times for the 201 M (A) and 2.4 Km (B) Runs in Male and Female Custody Assistant Recruits from Three Classes Prior to Academy Training*



Figures 1 through 3 display the individual scores for each CA recruit from the three classes in the push-up and sit-up test, 201 m and 2.4 km run, and estimated VO_{2max} from the 2.4 km run, respectively. The scores in the push-up test ranged from a low of 0 repetitions to a high of 64 repetitions across the three classes. The sit-up test also had a low of 0 repetitions, and a high of 90 repetitions. The 201 m run time had a slowest time of 95 sec, and a fastest time of 25 sec. The 2.4 km run time had a slowest time of 31:35 min:sec (1895 sec), and a fastest time of 9:59 min:sec (599 sec). Finally, the lowest estimated VO_{2max} from the three classes was 15.84 $ml \cdot kg^{-1} \cdot min^{-1}$, and the highest was 55.81 $ml \cdot kg^{-1} \cdot min^{-1}$.

Figure 3. *Individual Estimated VO_{2max} from the 2.4 Km Run in Male and Female Custody Assistant Recruits from Three Classes Prior to Academy Training*



DISCUSSION

This study investigated the physical fitness characteristics of CA recruit classes prior to academy training. Physical testing may not be required prior to matriculation into academy for certain LEAs,[1] which could result in classes that are different in their physical fitness levels prior to training. The results from this study suggested that even without pre-employment testing, the fitness characteristics of CA recruits across three classes were relatively similar for both males and females when considering overall mean data (both select differences for males (strength endurance as measured by push-ups and sit-ups, and anaerobic capacity as measured by 201-m run time) and females (abdominal strength as measured by sit-ups and estimated VO_{2max} derived from the 2.4-km run) between the classes. Any differences in fitness between recruit classes suggests that a 'one-size-fits-all' approach to academy training may be less than optimal, and ability-based training could be explored in this population.[8-10]

Physical fitness testing is often used by LEAs to in an attempt to find recruits that are capable of completing training and tasks specific to the occupation, while also not discriminating against individuals on the basis of age, sex, and ethnicity.5 The non-inclusion of physical testing could expand the potential candidate pool, but may mean that a great range of fitness levels would be present in recruit classes. Specific to CAs, the results from this study suggested that when considering the overall mean data for male and female recruits, there were relatively few differences between the three classes. These results further suggest that the hiring practices adopted by this LEA, which include an initial application, written test, background checks, and medical and psychological evaluations,[1] can result in classes with relatively similar fitness characteristics, as measured by maximal push-ups and sit-ups, and 201-m and 2.4-km runs. However, when considering individual results, it was evident there was a great spread of fitness across the recruits from each of the classes as measured by each test. Further to this, the spread of individual scores resulted in select differences between the classes for both the males and females.

Recognizing potential fitness differences for individual recruits in CA academy classes is important for practitioners and PT instructors, as individualized training programs have been recommended for law enforcement populations.[19] Indeed, if there is variation in fitness for individuals within a class, adopting a 'one-size-fits-all' model of training may not be optimal. As an example, this is an issue with formation runs in CA recruits[9] and endurance marching in army recruits,[18] as the same relative workload results in different intensities amongst individuals. With regards to the females, there was a moderate effect size for the higher estimated VO_{2max} from the 2.4-km run for Class 1 compared to Class 3. Further, for both the male and female recruits, there was a spread of scores for both the 2.4-km run time and estimated VO_{2max} when considered specific to each individual across the three classes. This is a particular issue as the male and female recruits train together, and this could increase the risk of injury for the females.[14]

Orr et al[8] analyzed ability-based training for running in Australian police recruits, and found that this could be a more timeefficient way to develop aerobic conditioning when compared to a more traditional interval running model, as measured by the 30-15 intermittent fitness test. Furthermore, Orr et al[8] found a reduced rate of injury in ability-based training groups when compared to police recruits who completed interval running not based on ability (4-6% *vs*. 10-14% of the respective groups). While the previous examples involve police recruits, in military recruit training sudden increases in training loads have been is associated with an increased risk of injury.[30] Similarly, inappropriate application of training load can further contribute to an increased risk of injury,[15] which could occur in interval training that is not based on the fitness level of individuals or smaller ability-based groups. Given the potential variations in aerobic fitness that could exist between individual CA recruits, ability-based running training could be incorporated into academy training with the dual goals of increasing fitness while also reducing the probability of injury. The effects of this type of training approach requires further investigation in tactical populations.

If ability-based training is appropriate for aerobic conditioning in law enforcement recruits,[8] it could also be appropriate for anaerobic-based training as well. Select differences were seen in tests that emphasized anaerobic capacity for the CA recruits in this study. The males in Class 2 completed significantly more situps compared to Class 3, and there were moderate effect sizes for the greater number of push-ups completed by Class 2 compared to Class 3, and the faster 201-m run time for Class 3 compared to Class 2. With regards to the females, there was a moderate effect size for the greater number of sit-ups for Class 1 compared to Class 3. Further to this, the spread of individual scores in the push-up test, sit-up test, and 201-m run highlights discrepancies between individual CA recruits, which is some cases was very marked. For example, there were CA recruits who could not complete a pushup or sit-up prior to academy, and there was one recruit who took more than 90-seconds to complete the 201-m run. This could be a major issue for these recruits, as a lack of strength and anaerobic capacity could negatively affect their ability to complete essential job tasks (e.g. response to emergencies, inmate pursuit and restraint).[2,3] Furthermore, given these differences in initial fitness levels, ability-based anaerobic training should be a consideration for TSAC-F and training instructors.

Some of the challenges for implementing ability-based strength and anaerobic training is the absence of equipment and appropriate training space at LEA facilities. The use of alternative implement training (e.g. sand bags, kegs, tires, battle ropes) could be utilized if there is a lack of traditional resistance training equipment and gym space.[31,32] This would allow for ability-based strength and anaerobic-focused training to occur outdoors if required, and resistance could still be manipulated (e.g. via degree of resistance, volume, sets, repetitions, and rest periods) depending on the ability level of recruits. Circuit training could be adopted where factors such as these could be manipulated by instructors relative to the ability of the CA recruits.[10] Practitioners should attempt to individualize their training programs targeting strength, power, and anaerobic endurance as much as possible, within the confines of their equipment and location. This could lead to more optimal adaptations in fitness measures such as strength and anaerobic endurance in CA recruits. This should also be investigated further in law enforcement and tactical populations.

There are several study limitations that should be noted. The class sizes investigated in this study were not the same size, nor were the numbers of males and females in each class the same. However, class sizes are often dictated by the human resources division of a LEA, and by how many applicants can successfully complete the hiring process by class start dates. There was no data available on the pre-academy training habits of the CA recruits in this study, although potential recruits have no legal obligation to provide this information to LEA hiring or training staff. Further, the data analyzed in this study has practical relevance because these were actual CA classes from a LEA. This study did not detail whether fitness changed over the course of academy for each CA class specific to the training model used. Future studies should investigate whether fitness measures such as strength endurance, and anaerobic and aerobic capacity, improve over the course of academy in CA recruits. Furthermore, the implementation of traditional and ability-based training methods for CAs and correctional populations should be analyzed.

In conclusion, although the hiring practices of LEAs should result in CA academy classes of relatively similar characteristics of male and female recruits when considering mean data, there will be differences in fitness between individual recruits. This would suggest that a 'one-size-fits-all' model of training may not be the most optimal approach. In order to note any strengths and weaknesses of CA recruits, practitioners should use appropriate assessments to gauge the fitness characteristics of their classes. Following this, it is suggested that PT programs be individualized as much as possible, and based on the ability levels of the recruits. This could lead to PT being more time-efficient with more optimal changes in fitness for all recruits, while also reducing the risk of any injury that can occur via the inappropriate application of training load. Even though the job tasks of male and female CAs are the same following academy training, the prescription of ability based training should better prepare each individual recruit so they will be able to all meet the same demands of the profession.

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CONFLICT OF INTEREST

None of the authors have any conflict of interest.

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