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PHYSICAL TRAINING CONSIDERATIONS FOR POLICE ACADEMY RECRUITS

INTRODUCTION

Police academies often rely on historical methods of physical training (PT), such as calisthenics and running, which do not best optimize physical development for the occupational requirements of law enforcement officers (LEOs). PT instructors are typically LEOs who may emphasize physical training approaches experienced during their own time in the academy, but who often lack formal strength and conditioning expertise and fail to implement evidence-based strength and conditioning practices. The assumption also may exist that recruits are not "tough enough," so PT methods are often used with the intent to build psychological resilience (20). Thus, PT programs often consist of extensive hours of training and lack evidence-based approaches or formal progression for new recruits to follow (4,17). However, research has shown that periodized training programs are favorable when compared to non-periodized physical training for improving muscular strength, muscular endurance, anaerobic power, and cardiovascular fitness (20). Specific adaptations to anaerobic training, such as increased muscular strength and endurance, hypertrophy, power, and motor skill development, are specific to the stimulus applied in the training program (4). It is important for police academies to better prepare recruits for their job as an LEO, which requires stepping away from past PT methods and utilizing evidence-based training approaches supported by current strength and conditioning research. In so doing, recruits may become physically stronger, faster, more resilient to injury, better prepared for the possible situations they may encounter while on the job, and better able to sustain health over the duration of a law enforcement career.

NEEDS ASSESSMENT OF THE LEO

The job of a LEO is both physically and psychologically demanding (33,36). The physical demands of a LEO may include driving a vehicle at high speeds, foot pursuits, clearing obstacles, discharging firearms, exerting force to apprehend offenders, grappling, handcuffing, crowd control, restraining, lifting, self-defense, and frequent confrontational interactions (4,17,28,30,33). The physiological capabilities that underlie all LEO job tasks include muscular strength and endurance, anaerobic power, aerobic capacity, flexibility, agility, speed, coordination, balance, and accuracy (4,12,19,20,30). An important consideration is also the unique balance between sedentary and active occupational requirements among LEOs (5,37). LEOs are often required to quickly adapt to dynamic occupational tasks from a sedentary position without a warm-up (4,20,30,35,37). For instance, an LEO may engage in a vigorous foot pursuit after sitting in their patrol vehicle for several hours, which requires a substantial change in physiological state (30,37). Other occupational stressors common to the LEO include shift work and frequent overtime, while also recognizing that psychological stressors inherent to the LEO profession represent an additional impact on officer health and wellbeing (17,33,36).

External loads in the form of a duty belt and protective vest also affect how LEOs maneuver, affecting posture, ground reaction forces, and gait (12,13,16,29,33,38). The weight of a general duty belt and protective vest, ranging from 15 – 22 lb, can cause a substantial degree of strain on the lumbar spine when the LEO rotates the body to exit a vehicle (12,37,38). Common musculoskeletal injuries (MSKI) among LEOs are sprains and strains of the back, ankle, hamstring, and rotator cuff (18,30). The lower back is among the leading sites of injury and there is a relatively high incidence of low back pain associated with sitting (e.g., while in a patrol vehicle) (1,2,10,18). Long periods of sitting that are an everyday occurrence for LEOs are not beneficial, especially as sitting with the addition of external load such as protective body armor has been shown to result in adverse changes in lumbar spine posture and decreased ability to tolerate occupational demands (2,10,37). Extended sitting time is associated with increased lumbar spine stiffness and inactivation of the posterior chain musculature, in addition to greater perceived discomfort (2,10,37). This has been demonstrated among military helicopter pilots during four hours of restricted sitting and in United States Marines sitting with an 11.3-kg body armor load (2,10). It is therefore beneficial to have a strong trunk that stabilizes the lower back to help prevent injuries, especially those associated with weight-bearing of a duty belt and protective vest (13,31).

IDENTIFYING THE PHYSICAL FITNESS GAP AMONG LEO RECRUITS

Research evidence demonstrates a clear gap in police recruit physical preparedness and PT outcomes within the police academy setting (4). A common theme in the research literature is the lack of physical preparation among those who fail to graduate from the police academy (17,33). Importantly, as others suggest in their examination of physical fitness performance across 11 academy classes, there is a "low bar" set for passing the entry standards for the academy (21). This results in many recruits arriving ill-prepared for the physical rigors of the academy, which subsequently negatively affects academy performance (20). A six-year retrospective analysis of Massachusetts (MA) police academy recruits examined the relationship between physical fitness and the likelihood of failing or not completing a 20-week police academy (33). According to the Massachusetts Municipal Police Training Committee, 70% of academy failures to graduate were due to recruits dropping out due to insufficient preparation and 20% of that 70% failed due to not meeting physical fitness

preparation criteria (33). A subsequent study sought to validate these findings and fitness recommendations using prospective data (2015 – 2016) from MA police academy recruits (17). Entry-level data for push-ups and 1.5-mile run, as well as subsequent graduation status, were used to test the validity of these measures as predictors of academy graduation rates (17). Results showed that unsuccessful academy graduates were on average heavier and had significantly higher body mass index (BMI: 25.39±7.00) and fat mass compared to successful graduates (BMI: 20.57±7.46), while performance on entry-level fitness measures, minus the sit-and-reach, was significantly lower as compared to successful graduates (17). Among male and female recruits alike, those who completed 20 or fewer push-ups and had 1.5-mile run times greater than 15 min and 20 s had very high academy failure rates of 38 – 45% (17). On average, recruits who were successful in completing the academy weighed less at the start of the academy, had lower body fat, performed more push-ups and sit-ups, and had faster 1.5-mile run times than those who failed to graduate (33). Push-ups and maximal oxygen consumption (VO_2max) were significant predictors of successful graduation, such that push-up capacity and higher VO_2max increased the probability of successful graduation (33). Meanwhile, a seven-year retrospective analysis also showed that injury incidence among US law enforcement academy recruits was highest among those in the lowest physical fitness quintiles (20th percentile) (24). In addition, a 2014 systematic review suggests that prior injury predisposes to future injury risk through multiple mechanisms, such as altered biomechanics and neuronal firing (9). Thus, research evidence supports the notion that higher physical fitness at the time of entry into a police academy is not only strongly associated with likelihood of successful academy graduation, but also may contribute to improved injury risk profiles later in the policing career (9,17,24,33).

PHYSICAL FITNESS IMPLICATIONS AFTER THE ACADEMY

Successful academy graduation is an important factor for police recruits; however, the predictors of physical performance during academy training are further significant for physical fitness after academy graduation. Among four law enforcement academy classes in California (CA), higher scores on a physical fitness test battery (maximal push-ups, sit-ups, and mountain climbers completed in 120 s; maximal number of pull-ups; 201-meter run; and 2.4-kilometer run) were linked to better performance in the Work Sample Test Battery (WSTB), a mandatory physical fitness assessment for academy recruits in CA (19). Similarly, a 2017 retrospective analysis of U.S. patrol officers demonstrated a significant relationship between physical fitness characteristics and performance on an occupationally relevant Physical Ability Test (PAT), such that performance on select physical fitness tests (vertical jump, one-minute push-up, one-minute sit-up, 20-meter multistage fitness test [MSFT], handgrip dynamometer, and leg/back chain dynamometer) explained 69% of the variance in PAT scores (7). More fit officers who scored higher on the 20-meter MSFT, one-minute push-up and sit-up tests, and vertical jump had a significantly higher PAT performance (7). BMI was also significantly higher (30.37±3.96) in less fit officers as compared to more fit officers (26.15 ±2.89), with officers at a lower BMI having a faster PAT time (182.79±19.06 s versus 217.16±18.33 s) (7). In another retrospective analysis by the same authors, increased fat mass was similarly found to be negatively correlated ($p \leq 0.01$) with vertical jump, 1.5 mile run and estimated VO_2max among male police officers (6).

Physical fitness is not only linked to improved job performance, but also has a positive effect on health and wellness outcomes among LEOs. To contextualize, research suggests obesity rates among U.S. police officers are as high as 40%, statistics that reflect obesity rates seen among the civilian adult population (3,37). Meanwhile, MSKI rates are well-documented among LEOs due to the physical demands and unique stressors of the occupation, with MSKI incidence rates ranging from 7.3% in one study of North Carolina probation officers, to 25 – 48% among Canadian police over three-year period (17,18,26,34). Importantly, research has demonstrated 2.5 times higher MSKI prevalence rates among obese probation officers as compared to officers at normal bodyweight (26). However, probation officers at a normal bodyweight not only had lower injury rates, but also had the highest physical activity participation rates as compared to obese officers, suggesting a protective effect of improved physical fitness (26). Although beyond the scope of this paper, mental health concerns such as post-traumatic stress disorder (PTSD), depression, generalized anxiety, and suicidal ideation are closely linked to the occupational hazards of the policing profession, with prevalence rates of 14.2%, 14.6%, 9.6%, and 8.5%, respectively, across 26 countries included in a 2020 systematic review (36). Physical fitness may also confer protective benefits for mental health, although research on the extent of the stress-buffering effect is inconclusive, also suggesting the protective effect of sleep (11,32). Health issues may lead to early retirement, as heart disease accounts for 2 – 50% of early retirements, while back problems account for 15 – 35% (34). Almost 50% of LEOs have at least three of the five major risk factors for coronary heart disease, which include high cholesterol, smoking, obesity, inactivity, poor cardiovascular fitness, and high blood pressure (34). However, higher cardiorespiratory fitness has been shown to be protective in reducing cardiometabolic risk among police officers, with more fit officers having more favorable BMI, waist circumference, body fat, high-density lipoprotein, triglyceride, and blood glucose profiles as compared to less fit officers (32). Lastly, officers who were at a healthy body weight missed almost half as many days of work after an injury compared to those who were overweight and almost four fewer days than those who were obese (12). Aside from the personal cost to the officer, these statistics are significant because the average total cost of injury based on the hours missed by an injured officer over the span of a year accounts for

approximately $160,000 in expenditures (12). A greater emphasis on physical fitness can positively affect these different health and wellness concerns and can potentially lead to reductions in injuries, medical claims, early retirement, overtime expenditures, and sick leave reimbursements.

PRACTICAL PROGRAMMING CONSIDERATIONS

Periodized programming has been shown to produce favorable results in muscular strength and endurance, anaerobic power, cardiovascular fitness, and other important physical fitness attributes (e.g., flexibility, agility, speed, coordination, and balance) needed by the LEO (4,12,20,30). For improved physical fitness, the PT program must provide enough stimulus to elicit the desired training adaptations, while avoiding overtraining, injury, and illness (12). While traditional physical training programs have been shown to benefit recruit fitness, results are limited (4,23). For example, a 2016 study examined the effects of a traditional PT program administered by academy instructors during a 16-week police academy (4). While the training program improved fitness parameters (e.g., agility, upper and lower body peak power output) across the first eight-week block of training, continued improvements were not seen across the second eight-week block, suggesting a potential lack of adequate training stimulus in the second half of the academy (4). These results were mirrored in a 2021 retrospective analysis of another 23-week police academy PT program, in which performance improvements were seen primarily during the first half of the academy (23). Meanwhile, another study examined fitness development of LEO recruits over the course of a 27-week PT program that incorporated formal strength and conditioning (20). Improvements were seen in push-ups, sit-ups, and 20-meter multistage shuttle run performance from the beginning to midpoint of the training, with further improvements in vertical jump and posterior chain strength seen from the midpoint to post-training timepoint (20). One might suggest that the initial improvements in the first 6 – 8 weeks of training in these studies likely occurred due to increased neural recruitment and rate of firing rather than changes in muscular structure and function (4,20,23). These findings demonstrate the limitations of traditional academy PT programs and support the need for proper periodization to elicit muscular development and realize maximal training adaptations.

It is recommended that a daily undulating periodization approach be used so that each training session can focus on a different fitness component, while allowing for modification of physical training sessions due to competing academy training demands (30). Importantly, and easily overlooked if operating under the assumption that each recruit has the requisite physical preparation for academy physical training, each academy class should be brought through a foundational phase where recruits learn the proper movements for the main exercises that will be utilized (16,35). Starting with unloaded movements and progressing to weighted movements will enable the understanding of proper movement mechanics that are foundational in learning correct movement patterns and avoiding injury (15). Lower intensities and volumes are recommended for the beginning of training with a gradual increase of training load over time, as recruit fitness and exercise capacity improve (30). Reduced stressor weeks where the movement pattern and energy system emphasis are varied are vital to the continued development of recruits and allow for recovery from the training done in the prior weeks (15,35). Other considerations for the daily PT session include appropriate testing, a practical warm-up, mobility, and a cooldown as beneficial components of physical fitness development (31).

In addition to PT, it is imperative to consider the cumulative fatigue of learning policing skills and the cognitive demands of classroom instruction (20). Developing a general strength and conditioning base is critical, but job-specific movements must also be trained (i.e., mimicking what an LEO does while on shift) (16,30). For example, subduing a subject for arrest requires 75 – 90% of maximal work intensity lasting upwards of 2 min (30). Other policing tasks such as sprinting, pushing, dragging, or clearing an obstacle have been shown to require near maximal effort lasting anywhere from 30 s to 2 min (25,30). Interval training utilizing different work-to-rest ratios can be a beneficial way to target these work capacities while maximizing training efficiency (16,30). These PT sessions should include working between 30 – 120 s with an intensity of 75 – 100% of maximal work capacity, and then resting between 1 – 5 min depending on the developmental goal of the session (30). Incorporating shorter rest periods can more closely mimic stressors encountered in the field; however, care must be taken in the programming approach to carefully balance competing training priorities (e.g., strength and power development) and to avoid overtraining (30). Longer intervals of 5 – 10 min at 75 – 85% of maximal work capacity can be performed occasionally to develop maximal aerobic capacity and aid in recovery (30). Lastly, running mechanics may require additional coaching emphasis, as improved mechanics result in greater running efficiency and may potentially mitigate lower extremity injuries commonly associated with poor running technique (15).

RECRUIT PHYSICAL FITNESS BENEFITS AND RECOMMENDATIONS

PT in the academy is meant to prepare recruits physically and mentally for their job demands, as superior fitness has been associated with increased performance on law enforcement-specific occupational tests such as the PAT and WSTB (7,17,19,20). By increasing the percentage of physically fit recruits from which law enforcement agencies can select to hire, police academies enhance recruitment opportunities and improve retention (17,27). This is achieved by lower risk of injury and illness and optimized tactical athleticism among police academy graduates, thus contributing to longer and healthier LEO careers (17,24). Furthermore, there is a strong financial incentive to minimize the

number of unsuccessful academy recruits (33). In MA for example, each recruit's training costs $5,000 on average, and the hiring jurisdiction loses tens of thousands of dollars invested during the hiring process if a recruit does not successfully graduate from the academy (33). It can be equally financially detrimental when academy recruits do not graduate due to injury or LEOs sustain an injury while on-duty (post academy graduation). It costs more than $60,000 to identify a new trainee to replace an injured recruit, while the estimated cost for an injured LEO varies from $2,500 – $12,000 depending on the area injured (12,22).

Most police recruits begin their fitness development during the academy (20). However, it is advantageous for recruits to begin a physical training program ahead of arriving at the academy so that they are prepared for academy PT requirements (4,17). Incoming recruits who are physically fit prior to entering the academy are better equipped to handle the rigors of academy training, resulting in lower injury and attrition rates (4,17,20,33). For example, among US Federal Bureau of Investigation (FBI) agent trainees, injury incidence was lower among those trainees with the fastest 300-meter and 1.5-meter run times (14). Physical preparation is best implemented following a pre-academy strength and conditioning program (Table 1), ideally guided by a certified instructor with expertize specific to the tactical population (e.g., TSAC Facilitator® [TSAC-F®]) (4,16). Tactical organizations have begun to recognize the positive impact of having of qualified instructors on staff at their organizations (8). As an example, the Los Angeles County Fire Department (CA) realized positive health and wellness outcomes in its wildland fire program by bringing an experienced exercise physiologist on board to assist in physical training instructor development, managing recovery and rehabilitation efforts, and conducting research (8). Strength and conditioning instructors with tactical expertize are best equipped to address the unique physical training needs of academy recruits, while factoring in LEO-specific occupational requirements, the individual's fitness level, training age, mobility restrictions, and any preexisting injuries (16). Thus, evidence-based strength and conditioning programs led by qualified instructors are key in transforming physical training programs into valuable opportunities to help law enforcement agencies and academies (8,27).

Importantly, it is recommended that recruits train to surpass minimum police entry fitness standards (33). Based on retrospective analysis of successful academy graduates in MA (2006 – 2012), it is suggested that recruits who meet minimum entry fitness criteria (Table 2) would have more than a 95% likelihood of graduating from the academy (33). Meanwhile, recruits who meet target entry fitness criteria (Table 2) would have about a 98% likelihood of graduating (33). It has also been shown that candidates, regardless of sex, who complete more than 20 push-ups and have a 1.5-mile run time faster than 12 min and 33 s had graduation rates of greater than or equal to 98% (17). The results of such studies demonstrate the importance of being physically prepared prior to beginning the police academy, such that it substantially increases the recruit's likelihood of successfully completing the academy.

CONCLUSION

Periodized programming for the police academy has sizeable value for the physical development of LEO recruits in preparation for their subsequent careers. LEO recruits are required to be physically fit to not only successfully graduate from the academy but also to meet the everyday requirements of the profession while sustaining health over the duration of a law enforcement career. As such, the following strategies are recommended:

1. A pre-academy physical training program (available upon request by contacting this article's first author) is an integral first component of the police recruit's preparation that must be emphasized during police academy recruitment and onboarding.
2. Use programming approaches rooted in evidence-based strength and conditioning principles to enhance recruit physical performance during and after the academy.
3. Leverage relationships with and employ certified physical training instructors with LEO-specific expertize to develop and implement appropriate strength and conditioning programs.

TABLE 1A. SAMPLE PRE-ACADEMY PHASE I TRAINING SEQUENCE (DAY 1)

DAY 1				
		TEMPO	SETS	REPS
Athletic Development	Vertical Jump Stick and Reset		2	3
	Bird Dog	1:3:1	2	4e
	Straight-Leg Sit Up	3:1:1	2	8
Speed	5-Yard Build-Up to 10-Yard Sprint		3	

		WEEK 1			WEEK 2			WEEK 3		
		Tempo	Sets	Reps	Tempo	Sets	Reps	Tempo	Sets	Reps
Tier 1	Push-Up	3:1:x	2	5	3:1:x	2	6	3:1:x	3	6
	Goblet Squat	3:1:x	2	10	3:1:x	2	10	3:1:x	3	10
Tier 2	2DB High Row	3:1:x	2	8	3:1:x	2	8	3:1:x	3	8
	Supine Hamstring Curl	3:1:x	2	6	3:1:x	2	6	3:1:x	3	6
Tier 3	Alternating Step Up		2	10e		2	10e		3	10e
	Bear Position Hold		2	:25		2	:30		3	:30
	SL ¼ Squat Stance Hold		2	:10e		2	:15e		2	:20e

Table legend: Rep = repetitions, DB = dumbbell, SL = single leg. Tempo (x:x:x format) refers to the speed of movement for each phase of a given exercise: eccentric, isometric, and concentric, respectively. For tempo, where denoted, "x" means that phase of movement should be performed explosively (e.g., "3:1:x" means 3 s eccentric, 1 s isometric, explosive concentric). For repetitions, where denoted, "e" refers to "each" (e.g., 8e = 8 each side).

TABLE 1B. SAMPLE PRE-ACADEMY PHASE I TRAINING SEQUENCE (DAY 2)

DAY 2				
		TEMPO	SETS	REPS
Speed	Shuffle 5 Yards		2	
	Crossover to Sprint 5 Yards		2	

	WEEK 1			WEEK 2			WEEK 3		
	Tempo	Sets	Reps	Tempo	Sets	Reps	Tempo	Sets	Reps
Alt Forward Lunge	Circuit:			Circuit:			Circuit:		
Jump Squat	:30 work/:30 rest (3-5 rounds)			:30 work/:30 rest (5-7 rounds)			:30 work/:15 rest (4-6 rounds)		
Mountain Climbers	• Complete each exercise in the far left-hand column for 30 s then rest 30 s before moving on to the next exercise.			• Complete each exercise in the far left-hand column for 30 s, then rest 30 s before moving on to the next exercise.			• Complete each exercise in the left-hand column for 30 s, then rest 15 s before moving on to the next exercise.		
Hollow Hold									
Alt Lateral Lunge									
High Plank Shoulder Taps	• Complete exercises in the order listed.			• Complete exercises in the order listed.			• Complete exercises in the order listed.		

Table legend: Reps = repetitions, Alt = alternating. Where denoted, :30 work/:30 rest means 30 s of work, followed by 30 s of rest. For example, 30 s of alternating forward lunges, followed by 30 s of rest, then 30 s of jump squat, followed by 30 s of rest.

TABLE 1C. SAMPLE PRE-ACADEMY PHASE I TRAINING SEQUENCE (DAY 3).

DAY 3										
					TEMPO		SETS		REPS	
Athletic Development		M/L Hop with Stick and Reset					2		3	
		High Plank Hold					2		:20	
Speed		Lean Fall Run 5 Yard					2e			
		Sprint 10 Yard					2			
		WEEK 1			WEEK 2			WEEK 3		
		Tempo	Sets	Reps	Tempo	Sets	Reps	Tempo	Sets	Reps
Tier 1	Split Squat	3:1:x	2	8e	3:1:x	2	8e	3:1:x	3	8e
	Chin Up	3:1:j	2	5	3:1:j	2	6	3:1:j	3	7
Tier 2	Single-Leg Hip Bridge Hold		2	:15e	3:1:x	2	:20e	3:1:x	3	:25e
	½ Kneeling Single-Arm DB OH Press		2	8e		2	8e		3	8e
Tier 3	Alternating Leg Lowers		2	6e		3	6e		3	6e
	Tibialis Raise		2	10		2	10		2	12
	Front and Lateral DB Raise		2	10e		2	10e		2	10e

Table legend: M/L = medial/lateral, Reps = repetitions, DB = dumbbell, OH = overhead. Tempo (x:x:x format) refers to the speed of movement for each phase of a given exercise: eccentric, isometric, and concentric, respectively. For tempo, where denoted, "x" means that phase of movement should be performed explosively (e.g., "3:1:x" means 3 s eccentric, 1 s isometric, explosive concentric). For tempo, where denoted, "j" means "jump." For repetitions, where denoted, "e" refers to "each" (e.g., 8e = 8 each side).

TABLE 2. POLICE ACADEMY CANDIDATE PHYSICAL FITNESS CRITERIA.

	MINIMUM ENTRY FITNESS CRITERIA	TARGET ENTRY FITNESS CRITERIA
Push-Ups	Women: >10 Men: >20	Women: >20 Men: >40
1.5-Mile Run	Women: <15 min, 20 s Men: <15 min, 20 s	Women: <14 min Men: <12 min, 30 s

Physical fitness criteria based on retrospective analysis of successful MA police academy graduates (33).

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