

Training Strategies to Enhance the Health and Performance of Police Officers

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Overview

I'm Mark Abel, director of the First Responder Research Laboratory, and today I'm presenting the webinar on training strategies to enhance the health and performance of police officers.

So, by way of a brief overview, today I'm going to talk about three primary threats to law enforcement officers' health and present some practical countermeasures to address those threats.

Specifically, we'll talk about the threats of cardiovascular disease and the implications for physical activity to help reduce cardiovascular disease risk. I'll talk about the occupational demands of law enforcement and specifically across the lifespan of an officer and what are some practical exercise training strategies that can utilize to reduce these demands and their impact.

And then, finally, we'll talk about the impact of shift work and the effect that that has on officers' health, and we'll discuss some respective sleep and exercise strategies to reduce the negative impact of shift work.

Primary threats to law enforcement officers' health

Let's dive right in, starting with cardiovascular disease. It's no secret that cardiovascular disease is prevalent in law enforcement officers. In fact, some of the research that we have conducted indicates that officers tend to come into the occupation with superior cardiovascular health compared to similar age-matched counterparts from the general population. However, they end up retiring with inferior or worse cardiovascular health, again, indicating that the occupation itself has negative impacts, has a negative impact on cardiovascular disease.

And if we look at risk factors for cardiovascular disease that are associated with law enforcement or policing, stress levels certainly are high, they're related to cardiovascular disease, shift work in and of itself is known to increase risk of chronic disease, also dietary intake and the fact that officers are typically sedentary, spending a lot of time in patrol cars. They're probably not making the healthiest dietary choices while they're spending their shift in a car.

Those are associated with risk. Indirectly, they impact cardiovascular disease risk through deleterious body composition. They increase fat mass and that, of course, is linked to risk of cardiovascular disease. But the good news is we can do something about cardiovascular disease. And I think a lot of times officers may think that they have to exercise a lot to get some health benefits, to reduce their risk of cardiovascular disease.

But if we look at the general relationship between physical activity levels and the derived health benefits from it, as you can see here, there's a curvilinear response, which means that if a sedentary officer is able to just increase their activity level by a little bit due to the nature of this relationship, they derive a lot of health benefits from it. Compared to someone who is say, highly active, if they increase their activity by the same amount, they're not going to get as much of an increase in health benefit, but they're already getting your maximum benefits. I think when officers look at this and educate officers on this relationship, you can see that a little bit goes a long way in terms of physical activity and the associated health benefits. And of course, your actual objective data demonstrating that the most fit individuals have the lowest risk of cardiovascular disease.

Now when we look at the physical activity levels of law enforcement officers, at least in the United States, they first of all, what should they be getting, right? Well, they should be getting 150 minutes of modern, vigorous physical activity per week, and they should be resistance training twice a day. Unfortunately, officers, at least in the United States, are typically only getting achieving 35% of this 150 minute per week recommendation. 35%, so they're getting about 50 minutes of modern, vigorous physical activity.

We need to do more to engage officers in regular exercise or physical activity. How do we do that? Well, we can do that specifically at multiple levels, at the departmental or the agency level. It's important that we offer incentives to officers.

Those incentives may include decreases in health insurance premiums or paid off time or paid holiday time, additional holiday time if they're meeting certain kind of criteria in terms of are they participating in a wellness program, inclusive of physical activity, stress reduction, things like that. We need to reward them and incentivize officers. Also do we provide them with access to trainers and equipment, resources to be active and especially active in a safe manner, we don't want them getting hurt when they're engaging in an exercise program. So, we need to provide the education and credentialed strength and conditioning practitioners to implement the training.

At the interpersonal level, between officers essentially, we need to create an active culture so that officers are exercising together, creating kind of a team-based atmosphere. I think working collectively towards a goal in this case of wellness and physical fitness is really important and can be really beneficial in a law enforcement agency.

And then finally, there are interpersonal factors that we need to utilize to increase physical activity levels of officers. And that can start with kind of what I've mentioned previously, educating officers about the importance of physical activity. Those are some things that we can do.

Moving on down to the second threat, that is occupational demands and in addition, the impact of aging. It provides some training strategies to overcome these here. In terms of occupational demands of law enforcement, if you look at the research literature, most physical fitness attributes have been found to be correlated to law enforcement officer performance. If we time their completion performing a set of occupational tasks, maybe it's rescuing a victim, performing a foot pursuit, performing defensive tactics, it turns out that almost all fitness attributes are related to their ability to perform those tasks in a timely manner.

Everything from strength and power on one end of the fitness continuum through anaerobic and aerobic appearance on the other end of the continuum. In addition, part of what makes law enforcement tasks more challenging is the fact that officers are wearing personal protective equipment in the form of a duty belt or a tactical vest. And that weighs about 7 to 10 kilos. And wearing a tactical vest or a duty belt has been shown to increase officers' time of completion of occupational tasks. It slows them down. And in fact, when we look at their ability to accelerate, which can be very important in taking cover potentially in an active shooter situation, they're slower. They can't accelerate as quickly.

These are some things; these are some fitness attributes that you see here that we need to target through a comprehensive exercise program to help them perform occupational tasks easier.

When we look at age, unfortunately, all of these fitness attributes, strength, muscle endurance, power, agility, anaerobic, all tend to get worse with age.

And, certainly, research that's been conducted recently has indicated that officers tend to slow down across the career spanner. At least if you look at different age, different ages of officers, they tend to slow down among older officers tend to perform tasks more slowly. And we do have to concentrate our training efforts, not just in the young, you know, cadets in an academy, but we need to focus on incumbent officers throughout the career span to keep them safe.

And here are some encouraging data that demonstrate the ability of humans to improve fitness across the age span. These are aerobic capacity data among two groups of individuals, sedentary individuals shown in the red line and endurance trained individuals in the blue line. And you can see at any given age, take, for example, 40 years old here. A 40-year-old sedentary officer or sedentary individual is going to have an aerobic capacity of roughly 40 MLs per kg per minute, whereas a 40-year-old endurance training runner actually has an aerobic capacity of about 55 MLs per kg per minute. That means their aerobic capacity is about 32% higher just due to training.

And officers can improve their aerobic endurance as demonstrated here at any point across the career span, but they can also improve strength, power, and other fitness attributes in a similar manner. And so, although all, you know, fitness attributes are really important for officers. I really think that there is a slight kind of delineation and point to making that. I think strength and power tend to be more important for occupational demands like defensive tactics, running up a flight of stairs, sprinting to catch someone.

But, you know, I think there's not as many instances of long foot pursuits anymore just because if there are adequate resources, another officer is typically going to kind of come around the block in a patrol car and be able to intercept the perpetrator. And there certainly are some instances where, you know, longer foot pursuits do occur. But in general, strength and power seem to be really important for officers' occupational demands where I think aerobic endurance is really probably as much if not more important for health outcomes like reducing the risk of cardiovascular disease. So, all fitness attributes are important but potentially for different reasons.

How can we train officers right? I want to just highlight three different kind of periodization strategies that can be used to achieve these fitness outcomes, because we need to try to improve almost all fitness outcomes as we just talked about and by way of definition periodization is a training strategy to perform long-term improvements in performance and it helps us to manage fatigue by systematically manipulating the training intensity specificity and volume.

You can take a look at these three strategies within that context of those training parameters of intensity and volume. The first one is linear periodization. Linear periodization is really characterized by a progressive increase in intensity and a decrease in training volume over time, such that you might focus on muscle endurance initially in a training program.

The second cycle may focus on hypertrophy or building muscle size and then finally focusing more on neurological adaptations that increase strength levels.

We use the terms saturation and variation to describe the primary characteristics of periodization strategies. And with linear periodization, the focus is much more on saturating or targeting and focusing on a given biomotor ability before we move on to the next. And, so, it has a large degree of saturation but pretty minimal training variation. Because of the high degree of saturation and minimal variation, it's very appropriate for lesser trained individuals. This would be very appropriate to utilize in the beginning of an academy where you have a diverse set of fitness levels or profiles across the dense and you kind of want to develop physiological foundation before you get into higher intensity training. It could also be used for an untrained incumbent officer.

In contrast to linear periodization, undulating periodization is really just the opposite. It's characterized by a large degree of training variation with minimal saturation on any given biomotor ability or fitness attribute.

And if you plot intensity and volume over time, you tend to see a very kind of jagged sawtooth design in the training intensity and volume, such that you really tend to focus on targeting or stimulating multiple biomotor abilities within a given week, and you have very minimal saturation on any one of them. Because of the high degree of variation, it's much more appropriate for more highly trained individuals.

And this could be something you utilize towards the end of an academy when a physiological foundation has already been developed potentially through linear periodization or through more highly trained incumbent officers. And here's undulating nonlinear periodization among incumbent officers, and in this case here you can see that the officer is working for 10-hour days, for instance Monday through Thursday, with three subsequent days on Friday, Saturday, and Sunday, and it's important to understand what biomotor abilities we might target on the shift days versus off-duty days.

Power and aerobic endurance are probably more appropriate to train after shifts and of course mobility work before and after the shifts would be ideal but power and aerobic endurance tend to not induce as much or accumulate as much fatigue in individuals and so it would be good to do those after a shift might not be ideal to do them before a shift, but if that's the only time for the officer to do it, that's probably going to work out fine, and that's probably appropriate for them.

But strength, hypertrophy training, anaerobic endurance, muscle endurance, so circuit work, HIIT style work, Tabata workouts, anything with moderate resistance training loads with short recovery periods, which is going to create a high training volume, it's going to accumulate a lot of fatigue and it's going to take a couple of days to truly recover. Last thing we would want to do is to do some those types of workouts before an officer's shift and have them be fatigued during the course of that shift and not be able to perform adequately if it an emergency called for.

Block periodization is the final type that I'm going to talk about and Watt periodization was really developed for Olympic athletes that, A, had sporadic competition schedules. Olympic athletes tend to compete, at least elite Olympic athletes, every couple of months. And the idea is that we need to, the challenge in that case, is to try to keep their performance in multiple biomotor abilities multiple times throughout the year. And that sporadic competition schedule is probably somewhat similar to a law enforcement officer's competition schedule. That is, they never know when an emergency is going to arise and they have to be physically prepared for the job.

In addition, like Olympic athletes that require the development of multiple biomotor abilities, so too do officers, as we just discussed. And I think block periodization because of the schedule and the need to develop multiple biomotor abilities probably has a place for training law enforcement officers. Block periodization utilizes training residuals as a way to sequence the targeting of various biomotor abilities. That is, certain biomotor abilities like Strengthener of Endurance have longer residuals, and so we're going to train those or sequence those first. A training residual is the amount of time that an individual maintains a biological adaptation for that attribute of their biomotor ability before you start to lose it. endurance adaptations.

Glycolytic endurance is about 15 to 18 days and then speed is about five to seven days. The idea is to sequence the biomotor abilities that last the longest first and then move on to the second shortest glycolytic endurance and then finally at a speed and power last.

Block periodization uses three training cycles, each of these that focus on different biomotor ability starting with accumulation and transmutation and finally realization. It takes about five to twelve weeks to get through all three of those training blocks. And the idea is that when we sequence them from longest to shortest, the idea is that we're maintaining adaptations while we move on to focusing on the next biomotor ability, so that we never really lose adaptations that are important for performance.

In short, we tend to cycle through multiple biomotor abilities in a shorter period of time so that we never really reach detraining levels for a given biomotor ability. But yet, unlike nonlinear periodization that also focuses on multiple biomotor abilities, here we really focus on one or two in a training block and then we move on. Nonlinear, you might train three, four, five biomotor abilities within a period, within in a weak cycle in Microsoft.

For these reasons, I think block periodization really has potential for law enforcement officer readiness. The accumulation block, again, generally focuses on aerobic endurance, muscular strength, and the training resistance is about 30 volts. The intensity is relatively high because of the focus on strength development. Thus, volume is low. Whenever intensity is high, volume is low and vice versa. There's an inverse relationship between those two training parameters and the duration here again for the accumulation blocks about two to six weeks. Transmutation block focuses on glycolytic or anaerobic endurance, again, 15-to-18-day training residual. The intensity is moderate, but the volume is high. Most people would describe the transmutation block or cycle phase, I should say, as the most exhausting training cycle. There's a large accumulation of fatigue.

The duration of the transmutation block is two to four weeks. And then finally we have a realization block. This was really meant as a taper for Olympic athletes, but the training frequency and volume is dramatically reduced here. The focus is more on speed or power and really on occupational, occupationally relevant tasks.

An exercise session during this phase would look much more like a circle, hit style training, but the workout, although it would be intense, it would be very short. And we can put it all together here in this five-month figure, and we'll just focus on the first two or two and a half months. You can see the blocks listed at the top here, accumulation, transmutation, utilization, and then the training targets. In the accumulation block, in the wave room, the focus is on strength, so you can see we're stimulating or training the phosphagen system, the immediate energy system, high intensity but short duration energy system. At the same time, we can focus on training relatively high, even we could go higher here than the figure shows, we can, we can, high intensity days could be more like, would train the glycolytic energy system, and that would be more like doing interval work, for instance on a row or a bicycle or a track, whereas the low intensity days would be below anaerobic threshold and would be a training oxidative system.

And these are considered to be complementary training stimuli where we're avoiding the interference effect. The interference effect is where we try to develop strength and aerobic endurance simultaneously. And research shows that typically that endurance training comes at a cost, it decreases strength development. And we want to use compatible stimuli. And we can train, if we're training heavy in the weight room, either with strength under a power stimuli, we can utilize either high or low endurance stimuli. The transmutation phase here, we're focusing more on circuit work to stimulate lipolytic endurance in the weight room. This is more of kind of our circuit training stimuli or stimulus. And the compatible stimulus here for endurance training is below anaerobic threshold. You see a reduction in the endurance training intensity.

And, finally, the realization phase. The focus here is on tactically relevant movement patterns and energy systems. We said all three are important so we're going to train them up. This is our circuit training here where we're a mannequin or a sled, climbing stairs, all of this with a weighted vest on to simulate the load carriage. So very occupationally relevant movement patterns and tasks. Some grappling defensive tactics would be great during this as well.

And then we evaluate. We see what is working in terms of we could evaluate them on their fitness outcomes, relevant fitness outcomes. We also could use our circuit and time that circuit to see are they improving in terms of their speed of completion, if not, what tasks are they struggling with? Are they more strength, aerobic endurance, more glycolytic endurance related? And then we would focus on those deficiencies in the subsequent training cycle.

Finally, I want to talk about the threat of shift work and how we can address some of those threats through sleep and exercise. It's no secret that shift work takes a toll on sleep, especially officers that are working second and third shifts where they're really fighting against disrupted circadian rhythms. Humans biologically are meant to sleep at night. When we disrupt that structure, it can affect our sleep quantity and quality. And so real briefly, a little bit of information about sleep. There are two phases of sleep. There's non-REM and REM, non-REM stands for rapid eye movement, non-REM sleep really tends to focus physiologically on physical health and recuperation. We see increases in anabolic hormones and protein synthesis, energy mobilization, and those initial levels of sleep that you see here.

REM, shown in the darker blue bars here, is a phase of sleep that we get into it later in our sleep cycles and spend more time in it the longer the sleep about goes on. REM sleep in general tends to be more for mental health and recuperation, emotional regulation, motor learning, reorganization of neuronal activity. Both are important, but potentially for different reasons. And incidentally, when we consume caffeine or alcohol, it may affect our ability to fall asleep. The sleep onset can be delayed. sleep, it can also affect the quality of the sleep, especially REM sleep.

Alcohol tends to decrease REM sleep and so even though you may still get seven or eight hours of sleep, after consuming some alcohol, you still might feel groggy the next day and it's because the REM sleep was negatively impacted.

In terms of the ideal amount of sleep the World Health Organization recommends for health benefits to accumulate or obtain about seven to nine hours of sleep. Unfortunately, 30 percent of officers are reported to obtain less than six hours of sleep. And, of course, short sleep duration and porcelain quality are also associated with symptoms of burnout, depression, and stress among individuals.

When we look at the impact of shift schedule and exercise and fitness, it turns out that individuals who have greater aerobate fitness levels are

actually able to cope with the transition of swing shifts going from day to night shifts a little bit better. Individuals that work night shift tend to be less motivated to exercise.

Again, fitness can help to kind of moderate the negative impact of working swing shifts or specifically working night shifts. But it can, you know, chronically working a night shift can increase your motivation to exercise. And agencies need to be aware of this and consider some potential interventions there.

Sleep's also important for performance. We know that sleep loss or sleep deficits are associated with increased error rates, slower reaction and response times. You can't recall information quite as well with regard to working memory. General performance deteriorates. And when we look at officers, you know, there's potential for officers that are sleep deprived to make more errors in time critical situations, not react as quickly, might not make decisions, sound decisions, and cognitive errors.

Research on sleep loss and performance metrics indicates that if you actually have more than 24 hours of sleep deprivation, it actually doesn't negatively affect anaerobic capacity and maximal strength. High intensity efforts are generally not effective. However, you start to get about 36 hours or more of sleep deprivation, it definitely decreases endurance performance, primarily through a decreased motivation to perform longer bouts of exertion. So, what can we do to enhance our sleep, right? Certainly, exercise, regular exercise helps decrease the sleep onset. We can get to sleep more quickly. Cutting out caffeine intake about 6 hours prior to a sleep out. It is generally good. That's about the half-life of sleep.

Scheduling in some napping, if at all possible, can help keep it about 30 minutes or less or 90 minutes or more so you don't get filled or brought. But from a napping perspective, generally 30 minutes or less. In the environment, sleep hygiene is really important. To be able to fall asleep in an efficient manner requires kind of a cave-like atmosphere. The environment should be cool, it should be quiet, dark, and really avoid screen time that can delay sleep onset as well.

And to briefly summarize, we talked about a number of different threats to officers' health and performance. And we talked about some practical countermeasures that can be implemented by the officer themselves and with, in some cases, the assistance of the law enforcement agency to support the office here.