

# Dimensions of Physical Fitness Evaluation Procedures among Police Personnel: Systematic Literature Review

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## Abstract

Being a police officer is a physically tasking occupation that requires much fortitude. The importance of having physically fit police officers cannot be emphasized. The research assessed the existing state of knowledge on the dimensions of physical fitness evaluation procedures among police personnel by conducting a complete literature review. The PRISMA principles were followed throughout the paper search and analysis. After examining electronic databases (Sport Discus, PubMed, Science Direct, and Scopus), 664 studies were retrieved. The chosen studies must include both male and female active police officers, be published in English between January and October 2022, and evaluate the participants' fitness levels. The quantitative synthesis comprised 9 studies with a total of 3275 male and female participants. The methodology of the physical fitness evaluations in all the studies was of high quality, less emphasis was placed on the health measures. The 2,400meter run is the most prevalent cardiovascular health test, followed by the sit-up, leg press, and push-up test, the vertical jump, the Illinois test, and body mass index. The amount number of push-ups an officer could accomplish, their handgrip strength, and their agility were found to correspond with their work performance. Due to the vast variety of fitness test dimensions and test selection procedures, standardization of fitness test protocols is required for accurate and meaningful comparability of findings. For future research on police fitness evaluation to be really unique, there is a need to further create a norm standard for various test batteries, primarily for the police population.

**Keywords:** Physical Fitness, Test Batteries, Police

## **Introduction**

In any Society, the maintenance of social order requires the existence of the rule of law as well as physically and psychologically healthy law enforcement agents. The enforcement duties that come with being a police officer make for a profession that requires a significant amount of physical stamina. Both before and during their shifts, the physical health of officers is vitally crucial, since it has a direct bearing on both their effectiveness and the protection of the general public. They might be needed to begin a pursuit, jump and traverse between covers, overcome the resistance of a belligerent, make a split-second decision that includes a high level of risk, or see horrifying events and circumstances. Police personnel is required to maintain high levels of physical fitness and overall health in order for them to be able to do their jobs efficiently (Filip et al., 2020). As a result of the strenuous nature of their work, police officers need to make sure they are physically healthy. However, only a few nations mandate that actively serving police officers achieve any sort of fitness standards (Dawes et al., 2017); Cocke et al., 2016). The vast majority of those who work in law enforcement agencies are not forced to participate in annual physical tests or be otherwise compelled to meet certain levels of physical fitness (Bissett et al., 2012). Many police officers have developed unhealthy eating habits and abandoned exercise since they are not compelled to maintain a minimum level of physical condition (Taylor et al., 2016; Dawes et al., 2017). Working shifts and coping with the stressors of police work can make it difficult for officers to maintain healthy habits such as regular exercise and the preparation of nutritional meals. This can increase the officers' risk of obesity, cardiovascular disease, and substance abuse. Working shifts and coping with the stressors of police work can make it difficult for officers to maintain healthy habits (DeNysschen et al., 2018 Williams & Ramsey, 2017).

There aren't many studies out there that examine the factors that go into determining police officers' physical fitness levels. As a result, the objectives of this research are to discover and evaluate the physical fitness assessments that are most frequently utilized for police officers, and (ii) to get an understanding of the physical fitness standards that are included in police officer job descriptions.

## **Materials and Methods**

### **Protocol Procedures**

A systematic evaluation was conducted to determine the dimensions of physical fitness tests performed to police officers and to describe the fitness levels of this population. Throughout this systematic review, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed to. Due to the fact that the authors gathered and evaluated data from previous studies for which the study investigators had previously gained informed consent, this inquiry does not require ethical approval. Consequently, an institutional review board did not provide clearance for this study.

### **Search Strategy**

Topic-specific keywords were used to search significant literature databases for pertinent original research. Sciondirect, Scopus, PubMed, and SportDiscus were utilized to find relevant materials. The databases reflect journals that produce high-quality papers and are extensively searched by scholars. Table 1 summarizes the databases, search phrases, and

filters utilized. Two writers individually import EndNote references. After finding papers, duplicates were eliminated and the remaining articles were examined using the study's title and abstract. The three analytical articles originated external sources. After an initial screening, the remaining papers underwent a stricter screening based on inclusion and exclusion criteria (Table 2). From January 1, 2022, through October of this year, these investigations were conducted. Inclusion criteria to ensure research were as current as feasible and pertinent to law enforcement today. Only studies reporting at least one fitness test measure were included in this study. PRISMA shows search techniques (see Figure 1). A third author was called in if the two reviewers couldn't agree.

Table 1

*Database and keywords*

Database	Search terms*	Filter	Total extracted
PubMed	Police+AND+Fitness+test+AND+health&filter=years.2022-2022	Relevance	28
Science Direct	Police%20AND%20Fitness%20test%20AND%20health&years=2022	Best match	240
Scopus	Police AND Fitness tests AND health	Best match	179
SportDiscus	Police AND Fitness tests AND health	Best match	197

**Eligibility Criteria**

This systematic review follows PRISMA guidelines. Table 2 summarizes the population, intervention, and comparison, outcome, and study design.

Table 2

*Inclusion and Exclusion criteria*

PICOS	Screening criteria
Participants	Police officers in active service, Aged>25 years old (except for exercise contraindications and other diseases)
Intervention	IT must include a physical fitness test, norms standards for physical and various, fitness police fitness evaluations and interventions.
Comparison	No need for pre and post
Outcomes	Norm's standards and evaluation on Strength, endurance, balance, flexibility, body composition, cardiorespiratory fitness, and balance.
Study Design	Randomized control trial

Studies were included if they (1) satisfied the inclusion criteria, (2) comprised healthy participants (those without exercise contraindications or who were too weak to participate), and (3) measured health and fitness objectively. Physical fitness parameters include body composition, flexibility, muscular strength, aerobic capacity, power, speed, agility, balance, coordination, and response time. They include fitness testing and assessments. We imported pertinent papers into Mendeley to prevent duplicating work. An experimental librarian led the initial search. Two reviewers individually analyzed titles and abstracts. Then, relevant full-text articles were analyzed. A third reviewer was utilized to settle reviewer disagreements.

### Study Selection

The author eliminated duplicate articles. Two writers chose papers using titles and abstracts. An expert librarian helped with our study's retrieval. Two independent reviewers evaluated titles and abstracts of full-text papers that satisfied the requirements. Then, they reviewed the whole text of the papers based on inclusion and exclusion criteria and judged the research standard. Two reviewers worked independently throughout the procedure. When disagreements arose, a third reviewer was consulted. The whole procedure for selecting candidates is depicted in Figure 1.

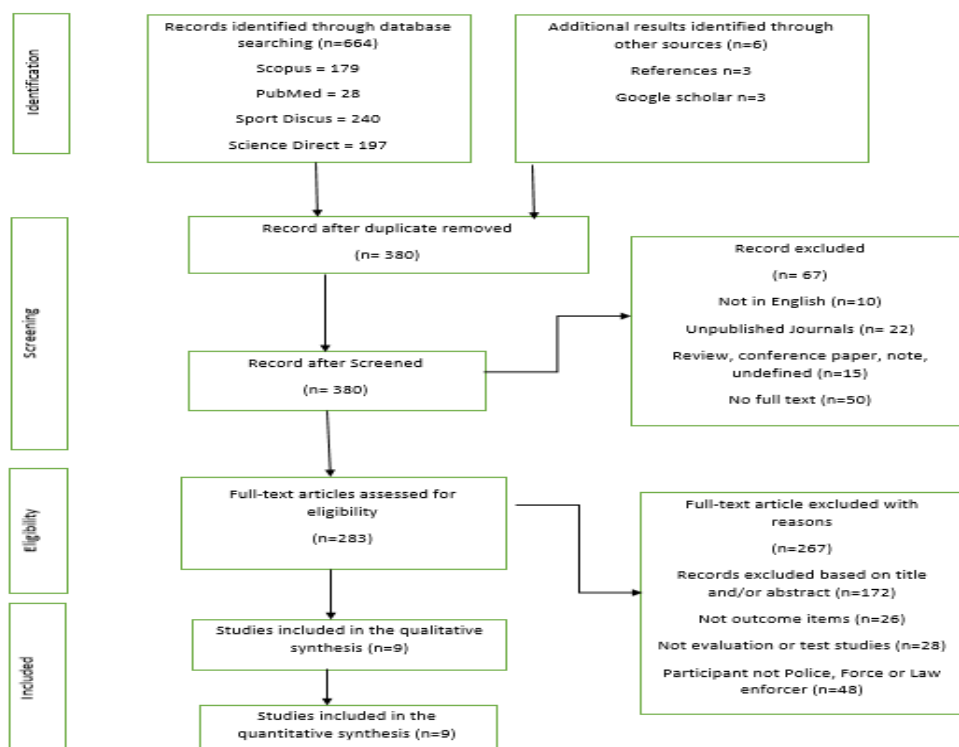


Figure 1. PRISMA a schematic of the search strategy

## Data Extraction and Quality Assessment

After the research was selected, two independent reviewers gathered pertinent data from each included study and examined the full texts of each publication. The database revealed: (1) author/year; (2) Population features; (3) measures of Physical fitness; (4) Measures of Health parameters or questionnaires (5) major findings and conclusion. Authors/publication year	Population	Measures Physical fitness test	Measures health parameters or questionnaires	Main results/general conclusion
<i>Ardiana et al., 2022</i>	n=978 age= 26yrs upward Male and female Indonesia Police Officers	BMI(body composition)	CS anthropometrics TG LDL-C HDL-C Total cholesterol Fasting blood sugar Blood pressure AIP	blood pressure, triglycerides, LDL-C, total cholesterol, fasting glucose, and AIP*  Both groups had CVD. Police officers had a greater AIP and CVD risk than civilians, necessitating strong CVD preventive methods.
<i>Koropanovski et al., 2022</i>	n=50 Age= 39.52 ± 8.09 yrs Serbia Police Students	SR300y (300-yard shuttle run) (agility) Test Illinois (Agility) Cooper 2.4-km (Aerobic capacity)	CS anthropometrics	IATmax speed and IATmax speed after doing the SR300y at 95, 90, 85, and 80% of maximum speed ↑ SR300y > CT2.4km at 95% and 90% . Sex made no difference. Anaerobic running at 90% intensity affects CODS

<i>Lockie et al., 2022</i>	n=383 USA Law enforcement officers	Vertical jump (lower body power) Sit and reach (flexibility) 2.4 cooper test(aerobic capacity) Push up/sit- up(muscle endurance)	CS anthropometrics	performance more than aerobic running. 40–49 and 50–59-year-old men scored worse on the VJ, sit-up test, and 2.4-km run than 20–29- year-old men (p 0.001–0.045). 20–29-year-old females did better in the push-up test than 30–39- year-olds (p = 0.013) and 40–49- year-olds (p = 0.025). Lower-body power, abdominal strength, and aerobic conditioning help older officers execute job-specific activities. Female police should maintain upper-body strength.
<i>(Dawes et al., 2022)</i>	n=1085 New Zealand Police Training	BMI(Body composition )	CS anthropometrics	Younger male and female recruits fared better than older recruits, with "under 20" and 20–24-year- old groups doing considerably better than 35–39-year-old groups in both sexes and the 25– 29-year-old group performing significantly better than 35–39- year-old female officers. Strengthen New Zealand's police.
<i>Tomczak et al., 2022</i>	n=543 Poland Air force	NP	International Physical Activity Questionnaire	M&SD for MET = 4173 ± 5306 ; 2371 ± 2725; 2455 ± 4843; 2421 ± 802. BMI was 25.98±3.38 kg/m <sup>2</sup> . Troops were typically active.
<i>Heinrich et al., 2022</i>	n=123 USA Army training	2 min push- ups, 2 min sit- ups, 2-mile run(APFT) 1-repetition maximum deadlift pull-up repetitions or timed flexed arm hang, horizontal jump, dummy drag (ACFT)	Online Survey	Muscle-strengthening predicted improved ACFT performance. Command directives should promote the new Holistic Health and Fitness initiative, which emphasizes cardiovascular and muscle-strengthening exercise for soldiers.
<i>Talaber et al., 2022</i>	n=47 Australia	1RM squat 1RM deadlift	CS anthropometrics	The bench press (+7%: initial mean=1.240.20%), deadlift (+6%:

	Special operational police officers	1RM Pull-up 1RM benchpress		initial mean=1.710.25%), and pull-up (+4%: initial mean=1.370.15%) also increased. Only bench press (+1.7%), squat (+1.1%), and relative bench press (+1.6%) increased (p0.05). Specialist policeman may maintain or enhance their strength with a coach and time to workout.
Post et al., 2022	N=43 Law enforcement officers (LEOs).	75 PR, (5- and 20-m sprint intervals), lower-body power standing wide jump greatest lateral leap (Illinois test [IAT]), and strength (isometric mid-thigh pull: peak force, normalized peak force [NPF]) tests.	CS Anthropometrics	Significant correlations were found between the 75 PR and jump tests, 20-m sprint interval, IAT, and 505 in males and 75 PR and jump tests, NPF, sprint intervals, IAT, and 505 in females.
Perroni et al., 2022	n=23 Italy Firefighters	handgrip, upper and lower body strength VO <sub>2max</sub>	CS Anthropometrics	The anthropometric fitness measure and MQI parameters varied across genders (p 0.05). MQI values were associated positively with the Handgrip test and negatively with the Bench press test and female status.

CS (Classical anthropometric), TG (Triglycerides), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), cardiovascular disease (CVD), Change-of-direction speed (CODS) metabolic equivalent (MET) \* significant AIP Atherogenic Index of Plasma ↑ increased

**Results**

**Study Selection**

FIGURE 1: Record selection. The initial search yielded 664 publications, and manual searching added 6. 380 studies were examined after duplication. 67 of 380 study titles were rejected. We excluded 267 more studies from the remaining 283. PRISMA flow graphic (Moher et al., 2009) summarizes the screening and selection procedure and literature search outcomes (Figure 1). The examined research involved police, recruits/cadets, and law enforcement officers. Two were undertaken in the USA (Lockie et al., 2022; Heinrich, 2022) and one in Indonesia, Serbia, New Zealand, Poland, Australia, and Italy (Adriana et al., 2022;

Koropanovski et al., 2022; Dawes et al., 2022; Tamczak et al., 2022; Talaber et al., 2022; Perroni et al., 2022).

### **Physical Fitness Parameters**

The most used aspects of physical fitness dimensions were aerobic and anaerobic capacity, agility, body composition, muscular fitness tests, and power, and flexibility. Aerobic capacity was examined in three investigations, while the anaerobic capacity was investigated in one (Koropanovski et al., 2022; Lockie et al., 2022; Perroni et al., 2022; Koropanovski et al., 2022). Muscular strength was evaluated in four articles (Heinrich et al., 2022; Talaber et al., 2022; Post et al., 2022; Perroni et al., 2022), muscular endurance was evaluated in one paper (Lockie et al., 2022), and muscular power was evaluated in three publications (Lockie et al., 2022; Post et al., 2022; Heinrich et al., 2022). Other aspects of physical fitness such as agility and flexibility were evaluated with just one test (Koropanovski et al., 2022; Post et al., 2022; Lockie et al., 2022), respectively. In three separate investigations, participants were subjected to a variety of tests to determine their maximum physical strength. These included the bench press Talaber et al (2022), the deadlift Talaver et al (2022), and the handgrip strength (Perroni et al., 2022). Squats Talaber et al (2022), push-ups Lockie et al (2022); Talaber et al 2022 and Heinrich et al 2022), and sit-ups (Talaber et al, 2022) were the activities that were utilized the most often in order to evaluate a subject's level of muscular endurance. The vertical jump was employed to evaluate muscle power (Lockie et al., 2022; Post et al., 2022) and a range of aerobic capacity tests was done, including a 2.4 kilometer run (Koropanovski et al., 2022; Lockie et al., 2022). In addition, a variety of other tests were done. (Lockie et al., 2022; Post et al., 2022). Tests of anaerobic ability were conducted utilizing intervals of 5 and 20 meters of sprinting. The sit-and-reach test (Lockie et al., 2022) and the Illinois run test Koropanovski et al (2022); Post et al (2022) were used to measure flexibility, while the shuttle run test Koropanovski et al (2022) and the Illinois run test Koropanovski et al (2022) were used to assess agility.

### **Measures of Health Features**

Anthropometric measurement, also called a classical measurement, was utilized in seven out of nine research included in this review [Ardiana et al., 2022; Koropanovski et al., 2022; Lockie, Dawes et al., 2022; Talaber et al., 2022; Post et al., 2022; Perroni et al., 2022). In their study designs, they did not include many tests or questionnaires assessing health parameters. Some vital measures such as blood pressure and high/low-density lipoprotein are some of the other health indicators studied (Heinrich et al., 2022). There is just one published study (Tomczak et al., 2022) that makes use of the IPAQ.

### **Discussion**

Due to the significant variation in fitness test dimensions and test selection techniques, Streamlining fitness test methodologies ensure comparability and precision. Each study showed a good level of methodological quality when evaluating physical fitness, however, health considerations were not given enough attention. Bench press (Talaber et al., 2022), deadlifts (Talaber et al., 2022), and handgrip strengths (Perroni et al., 2022) were the most frequently employed test batteries in the publications analyzed. The 2.4 kilometer run, (Koropanovski et al., 2022; Lockie et al., 2022), 200 push-ups (Lockie et al., 2022; Talaber et al., 2022), 100 sit-ups (Lockie et al., 2022; Heinrich et al., 2022), 100 squats (Talaber et al.,



2022), and 200 push-ups (Lockie et al., 2022; Talaber et al., 2022). Many studies have found that officers' fitness levels decline with age (Ardiana et al., 2022; Dawes et al., 2022; Lockie et al., 2022). In the police community, heart disease is a real concern (Ardiana et al., 2022; Lockie et al., 2022; Dawes et al., 2022; Perroni et al., 2022). Despite the lack of a consistent difference in trunk size between the sexes, studies show that male police officers are typically heavier and taller than their female counterparts and that they also improve lower limb power, hand grip strength, upper limb endurance, and metabolic fitness (Koropanovski et al., 2022; Lockie et al., 2022; Dawes et al., 2022; Perroni et al., 2022).

A number of studies have shown that female police officers, specifically, need to work on their fitness, and more specifically, their upper-body strength (Dawes et al., 2022; Lockie et al., 2022; Koporanovski et al., 2022). As was also shown, conditioning should aim to enhance metabolic fitness and muscular endurance to boost both sit-up performance and running times (Lockie et al., 2022; Heinrich et al., 2022). Physical fitness (including anthropometric parameters) and health measures should be utilized together as a guiding concept for police conditioning programs in order to improve performance (Koropanovski et al., 2022; Lockie et al., 2022; Ardiana et al., 2022; Perroni et al., 2022; Tomczak, et al., 2022). However, health promotion strategies must be used to reduce cardiovascular and metabolic risk factors (Ardiana et al., 2022; Dawes et al., 2022; Perroni et al., 2022). Standardizing the criteria for a fitness test was challenging because of the large number of tests considered. This was reflected, for example, in the fact that there were no generally accepted standards developed specifically for the police force. As a result, it was difficult to draw meaningful comparisons between the various measures of fitness, and this was considered as a weakness of the study. During this evaluation, a variety of criteria for measuring fitness were studied and ranked. Another disadvantage of this study was that it included studies involving non-police officials in law enforcement.

### **Conclusion**

The results showed that the 2.4-kilometer run was the most used fitness assessment, followed by the push-up and sit-up test (both measures of muscular endurance) and body mass index (measures of body composition). Lower body strength was often evaluated using the vertical leap test, whereas upper body strength was typically evaluated using grip strength. The number of push-ups and the 2.4-kilometer run were strong indicators of future performance at the police. There was a correlation found between how well an officer did on fitness tests, including the number of push-ups, handgrip, muscle strength, aerobic capacity, and agility, and how well they did on the job. Most countries does not place importance to on-the-job fitness management of police personnel. There are scarce fitness norms for police population as most studies' findings were compared with the norm standards for the general or sedentary population.

### **Recommendations**

Based on the above conclusions, the following are recommended

1. Annual or bi-annual aerobic fitness examinations (such as the 2.4 km run) may be especially helpful for testing fitness in the police community due to the high prevalence of cardiovascular disease among officers.

2. For future research on police fitness evaluation to be really unique, there is a need to further create a norm standard for various test batteries, primarily for the police population.
3. There is a need for more theoretical intervention studies to examine the health behaviour of police and how physical and psychological interventions can be used to improve overall health of the police population.

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