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Physical Ability, Fitness and Police Work

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NOTE: Further information about this report can be obtained by calling the CPRC information number (613) 998-6343

EXECUTIVE SUMMARY

The objective of this article is to provide an overview of physical ability, fitness and police work. The literature is reviewed and the method used to develop a tool that measures the physical abilities required for police work is presented. The importance of linking this standard with a program for health promotion is stressed. The reasons why this standard is occupation specific and non-discriminatory is explained.

The Canadian Police Research Centre would like to thank Dr. Brown for permission to publish this report.

SOMMAIRE

Cet article a pour but de donner un aperçu des capacites physiques, de la condition physique et du travail policier. On y examine la documentation pertinente et on y presente la methode utilisee pour élaborer un instrument qui permettra de mesurer les capacites physiques necessaires au travail policier. Le present document met également l'accent sur I'importance de rattacher cette normeq a un programme de promotion de la santé et explique pourquoi une telle norme est propre au travail policier et non discriminatoire.

Le Centre canadien de recherches policieres tient à remercier le Dr Brown de nour avoir donné la permission de publier ce rapport.

INTRODUCTION

Police departments, historically, have required that recruits be healthy. Indeed, one of the early recruiting posters, for what was then the Northwest Mounted Police required:

> "... applicants between the ages of twenty two and forty, active, able-bodied men of thoroughly sound constitution...".
>
> (1893)

In many police forces, including the London Metropolitan, standards of height and weight were set. Applicants not meeting these standards need not apply. The arbitrary nature of such standards was realized by the middle of the twentieth century and they were eliminated by most police departments. Arbitrary though they may have been, however, these standards were set for a reason.

In the early part of this century police work was physically demanding. Policemen in cities walked their beat, in all kinds of weather, up and down hills and stairways, checking locks, and peering into dark places. Physical confrontation happened regularly and the constable had to be able to defend himself and to apprehend the wrongdoer. Frequently he had to chase the suspect and then take him into custody. In countries like Canada the situation was similar, except that the policeman patrolled a less urban environment, often on horseback, and often in appalling weather conditions.

It was presumed that big men were better able to do this sort of work and the concept of 'soundness' was closely analogous to what we now call occupational fitness. With time it was realised that neither large size nor male gender guaranteed occupational fitness. To deny employment opportunities to men that were under the height requirement, or to women, was discriminatory. Not only were would-be police officers denied opportunities, but police forces needlessly denied themselves the chance to recruit talented people who were well able to do the job. So it was that height requirements were eliminated, and the bias against women was slowly whittled away.

The difficulty was that, in many police forces, nothing was provided to ensure the need for some degree of occupational fitness. Height and gender had, at least, provided a rough guide to physical ability. It wasn't a very good guide, and it was unnecessarily discriminatory, but there was some sort of association with the physical abilities needed to do police work. Now there was nothing, and police forces were faced with situations where people who clearly lacked the physical abilities required to do the work were expected to do it anyway. It became necessary to define and measure the physical abilities needed to do police work in a manner that was objective, realistic and non discriminatory.

The term ‘occupational fitness’ has appeared only recently and the attempt to objectively define occupational fitness in measurable terms is less then ten years old.

THE EVOLUTION OF POLICE WORK

The last 25 years has seen change in police work. Police departments are adopting the ideals of community policing and police officers work in partnership with the community. Links are made between individuals and the officers working in the area. Members of the public are encouraged to articulate their concerns and to work with the police to find solutions. Most police training academies also teach gradation in the use of force. Alternative methods of dispute resolution are encouraged. With the advent of computers, new skills such as keyboard operation are required. The question that must be asked is whether physical abilities are still required in modern policing.

Recent research clearly demonstrates that police work is largely sedentary and that 80 to 90% of the job is devoted to tasks that require limited physical abilities (1,2,3). This information could result in a temptation to downplay or even dismiss the importance of the need for police officers to maintain a level of physical readiness or fitness. It is important to recognize, however, that while the activities which demand physical abilities may be infrequent, they are often critical.

Consider, for instance, the case of a motor vehicle accident with injuries. The officer is often the first on the scene. He or she must assess the situation and act accordingly. Injuries must first be evaluated and proper first aid provided. The accident scene must be made secure and all precautions taken to avoid further injuries or accidents. These activities require that the officer jog or run for short distances, move around and over obstacles lifting and carrying objects such as flares from one area to the other, bend and squat. In some cases a victim must be pulled from the vehicle to a safety. Motor vehicle accidents happen most often when the weather is bad. This adds to the difficulty and energy demands of these tasks. Whether the police officer is small or large, young or old, male or female, the tasks remain the same. If the police officer fails, then the fundamental task of protecting the public safety has not been achieved.

Trottier and Brown (4) have compared the role of the police officer to that of a lifeguard at a swimming pool. The majority of the time, the task is very sedentary, sitting and watching. A quadriplegic could do it; until someone needs rescuing. Then the quadriplegic could not perform the required functions. It doesn’t happen often, that someone needs rescuing, perhaps one tenth of one percent of the time. But the ability to jump into the water and save the drowning victim is critical to the job. This is the reason why there has been someone sitting and watching for the other 99.9 percent of the time.

It is the authors' position that, because the disabled lifeguard is unable to perform the critical and essential part of the job, he is incapable of doing the job of lifeguard. Even if he can do 99.9 percent of the job, he should not be employed as a lifeguard.

The same applies to police work. For the majority of the time a police officer does not require a great deal of physical ability. Nevertheless, where functional job analysis, or formal task analysis, have been published (4) physical tasks are invariably present. These include tasks such as pursuing fleeing suspects, controlling those resisting arrest or tackling, grappling and handcuffing. Crowd control is often very physically demanding. Inability to perform such tasks as these clearly endangers the public safety.

There are numerous less confrontational tasks which require a high degree of physical ability. If someone falls in a river the police officer is expected to pull him out. Officers are often asked to perform search and rescue activities in support of larger operations.

Adverse weather conditions often increase energy demands. In a task analysis performed on dog handlers, Bonneau (5) showed that the energy demands of the task varied greatly depending on the terrain and that a 0.5 km run in a city environment could become a gruelling experience if it was done in a field when the terrain was wet or covered with snow. The energy requirement could easily increase five fold.

Tasks analyses recently completed by police departments in North America, Europe, and Australia (4,6,7,8,9,10,11,12) demonstrate a marked similarity in the type and intensity of physical activities reported. It appears that police work demands the ability to perform core of physical tasks and that these core activities are similar whether in Canada, the USA, Europe or Australia. Moreover, these job analyses also demonstrate that, at a given rank, the job does not change substantially with years of service (7,11,13).

Having determined that some level of physical ability is required to safely do police work, it is interesting to examine the effect of police work on fitness. It turns out that the job has a deleterious effect on the health and fitness levels of police officers. Collingwood compared the fitness levels of police officers and prison inmates(14). He found that the inmates were more physically fit specially in the area of cardiovascular fitness and adiposity. The same conclusions have been reached by other authors (15,16,17,18). Simply stated, the average police officer does not have the fitness capacity to face the average criminal.

These authors have also examined the change in fitness levels with time and have consistently found that fitness levels of most police officers declined as years of service increased (18,19). In a survey of RCMP personnel done between 1991 and 1992, we observed the same phenomenon (20). Only 17% of police officers questioned engaged

in regular physical activity at least three times a week. The greatest decline in fitness levels occurred among males between the age of 20 and 30.

In summary, it would appear that a level of physical ability is necessary to safely and effectively do police work and that the occupation, in itself, does not provide sufficient training to maintain that level. Inability to perform the physical aspects of police work may endanger the public safety. This circumstance raises the important issue of vicarious liability. If there is legal action, the police department may be found negligent on the grounds of negligent retention, negligent assignment, failure to supervise, or, failure to train (21). In the USA, several agencies have been sued using these sorts of arguments (22).

Accordingly, it has become imperative for police departments to develop tests to evaluate the level of occupation specific physical readiness, to determine a standard for occupational fitness and to put in place programs that will assist officers to attain and maintain the level of occupational fitness necessary for policing.

It is important, in this context, to remember that fitness may be measured according to a variety of physiological parameters. These range from oxygen consumption per unit of work to, simply, the number of push-ups a person can do, or how fast a person can run. These physiological parameters generally provide a measure of cardiovascular or health related fitness. This is distinctly different from occupational fitness. Some police forces require members to run a certain distance within a given time, or to lift a predetermined weight or perhaps to do a certain number of push-ups. There is no good reason, however, to believe that the number of push-ups one can do is in any way related to ability to do police work.

An important debate rages as to the virtue of health related or physiological testing versus occupational fitness testing. It is our opinion that both types of tests have an important role to play in the maintenance of a healthy work force.

Fitness tests are notoriously inexact when they attempt to compare individuals to population norms. In the area of cardiovascular fitness, for example, in order to obtain a true measure of oxygen consumption one must use direct invasive tests during maximal exercise.

Indirect tests and field measures present important error margins and “the accuracy of the results are significantly compromised” (23). This could mean a drastic difference in the results obtained when compared to those from an indirect test at the same level of fitness. Simply stated, field tests of cardiovascular fitness are insufficiently accurate to use for decisions about employability.

Other tests designed to assess specific muscle groups or joints are more exact but limited in what they measure. Flexibility tests present the same type of problems. The sit and reach test, often used by police departments, is supposed to measure the flexibility of the lower back muscles. The results of this test are difficult to interpret. Ice hockey players, for example, do very poorly on this test because of the effect skating has on hamstrings. It would be wrong to conclude they did not have the physical abilities to do police work. Measures of body fat content are similarly inaccurate unless performed with expensive and time consuming techniques. Moreover, there is no solid evidence to relate fatness and fitness. In some activities, weight may be a distinct advantage.

In conclusion, to truly determine total body strength, endurance and flexibility a multitude of physiological or medical tests must be used. This is time consuming, expensive, and requires experienced testers. We believe that job related fitness testing is the most practical and exact approach to fitness testing in police work.

THE TASK ANALYSIS

In order to determine the degree of job related fitness needed to do police work, it is first necessary to define police work. If one determines that an individual is, or is not, "fit", then one must answer the question: "Fit for what?"

Police work is complex and varied. This complexity has prompted some (24) to define police work as an open task. Because of this, it was deemed impossible to define and measure the job. This is not the case. Functional job analysis or task analysis (4) provides the tools to describe the tasks of employment in a manner that allows the development of a physical abilities standard.

Task analysis is undoubtedly the most crucial phase in the development of any test or standard. In order to obtain a good evaluative instrument it is necessary to identify the exact nature of each task and to determine it's frequency, intensity and duration. Osborn (25) was the first researcher to attempt the identification of the physical components of police work. An important part of his work was based on the methodology of Denning (26).

By observing police officers during regular shifts, Osborn was able to identify the physical abilities needed to do the job, the frequency of specific actions, as well as their characteristics. With this information, he developed a physical ability questionnaire. Osborn then asked 200 highway patrollers to fill in this questionnaire during 10 consecutive shifts. Next, he interviewed a representative group of these patrollers and, finally, observed them at work, filling in the same questionnaires and comparing his data to that of the police officers. With this method, Osborn could be reasonably

certain that the data reported was representative of what happened on the job. The data could then be used in the development of a test to measure the occupational fitness, or physical readiness, that was clearly and demonstrably linked to police work.

The twelve physical activities that police officers most often perform in the course of their duty are the following: running, jumping, crawling, balancing, vaulting, climbing, lifting, carrying, pushing, pulling, fighting and dragging. Others have used similar methodology and obtained the same results (7,10,12,27,28).

The next step, before moving to the development of a test, is to break down each task in term of physical abilities. This information, as pointed out by Fleishman (29,33) is critical, as it ensures the tests assess all the physical abilities required to do the job.

Functional job analysis, as developed by Fine, may be seen as an extension of the work of Fleishman. The methodology consists of using subject matter experts (workers) in a focus group setting to develop an exhaustive list of the different physical tasks performed. The list normally includes the type, frequency and perceived intensity of the tasks. The task list is then submitted for review and comments from a second group of subject matter experts. This revised task list is then submitted to a representative sample of workers.

The sample should be large enough to permit comparison between unique subgroups. The unique subgroups generally accepted are distinguished by common factors such as sex, experience, or operational setting. Usually the respondents are asked to rate the importance of each task as well as its frequency. A numeric or descriptive scale is used. The researcher will retain only the tasks that respondents judge as “very important” or higher. Some researchers have also developed and validated a list of sequenced tasks which they included in the questionnaire sent to respondents. The information gathered is then analysed and the elements deemed important, essential and critical are retained in order to develop the test. In some cases the researcher has gone on to a characterisation stage where respondents, once the test is developed, are asked to evaluate the appropriateness of the various test element. Three questions are asked: the importance of the task, the reality of the task and the suitability of the task. Elements that are scored less than “very important”, are eliminated from the test.

Whether the questionnaire method proposed by Osborn or the focus group method is utilised, the information gathered can now be used to develop a test. Farenholtz (7), Bonneau (11) and Bard (13) have successfully analysed the tasks performed by police officers in their respective police departments. It is interesting to note that these three authors did not know of the work of the others yet, when they compared notes afterwards, they had found similar tasks at similar frequencies and intensities. The analysis conducted in the USA for St. Paul, Minnesota (30), the San Bernardino

County, California (31), or Pennsylvania State University (32) produced similar results. This tends to confirm the supposition that there is a common core of physical abilities required for police work which is independent of jurisdiction or geography.

DEVELOPING THE TEST

Having concluded that physical abilities are required to safely and effectively do police work, and having determined what those abilities are, we must now develop a test to measure these abilities. In the past, job related tests where chosen by many employers as the preferred instruments to evaluate fitness for the job. Unfortunately, many of these tests were not based on a thorough task analysis and were often hastily put together by employers eager to meet the requirement of the law. Many such tests did not survive challenge under human rights legislation in Canada and the USA and were deemed to be discriminatory. This resulted in many employers abandoning the idea of job related testing. Several of these police departments changed to fitness related tests since they appeared more defensible. We believe this to have been an error.

Another problem with the early job related tests was that they often depicted “worst case scenarios” that an officer may not experience more then once in his whole career. Often these tests were judged discriminatory because of their negative impact on certain candidates, particularly women and others of smaller stature.

In order to use a test to determine suitability to obtain or maintain employment the tests selected must present two obvious qualities. Firstly, the test must be exact with a very small margin of error. Secondly, the test must clearly measure physiological parameters demonstrably related to the task analysis, or functional job analysis, of police work. If a certain level of physical ability is required to safely do the job then that level is required, regardless of age or gender. This is necessary unless one wishes to restrict police women to arresting women, to restrict police officers of small stature to dealing only with short and slim criminals, or to restrict older police officers to arresting older criminals. In Canada, the majority of people who get arrested or who resist arrest, are young males, with an average weight of 160 Ibs and measuring 69 inches. (7,5,11)

Several tests in Canada and the United States have done this quite successfully. The TAPE (Test d'Aptitude Physique Essentielle) from Quebec (13), the POPAT (Police Officer Physical Ability Test) from British Columbia (7) and the PARE (Physical Abilities Requirement Evaluation) from the RCMP (4) have been used by several police department for over five years for recruit selection. The same applies for the test developed by the California Highway Patrol (34).

We believe that the PARE, which was derived from POPAT, is a defensible, easily administered occupational fitness test for police work which would survive a Human Rights challenge. The test is described in details elsewhere.

Briefly, PARE is a circuit 80 feet long by 20 feet wide. It is based on the philosophy of getting to the problem, solving it and removing it. All the activities encountered in the test, as well as their duration, are found in the task analysis.

The subject in each lap of the test must jump over a six foot long mat representing a ditch, go up and down steps jump over obstacles set 18 inches high, vault a three foot rail, fall and pick himself up and make a series of turns both left and right. The subject must complete six laps of the circuit. The total distance covered is approximately 375 yards. Once the circuit is completed the subject moves to a pull/ push machine where he alternatively pushes and pulls against a 80 Ibs resistance executing six arcs of each. In between the push and the pull, the subject must execute six falls, three on the stomach and three on the back. This ends the timed portion of the test. The subject is given a 60 seconds to rest and then asked to lift and carry a 100 Ibs torso bag over a distance of 50 feet. To be successful the subject must do the timed portion of the test in 4 minutes or less and carry the bag over the set distance.

Today most of the job related tests use similar scenarios where running, jumping, stair climbing and some form of pushing, pulling, carrying and dragging are incorporated.

All job related tests discriminate against smaller candidates since some of the activities, such the push/pull and the bag carry, are mass related and favour larger candidates. We are ready to accept and defend this discrimination since it reflects the reality in the field. In an altercation for instance, the heavier combatant has a better chance of winning by the mere fact of his body mass. The same applies when the need arises to remove an inebriated person off the street, separate combatants in a family dispute, or force open the door of a damaged car at an accident scene. This is the reason why, in several sports activities, weight class are enforced. In some circumstances, technique can replace sheer force but only if the larger combatant doesn't posses equivalent mastery of the technique. In rescue situations the larger individual will usually be favoured and will almost always be better able to carry a victim to safety. Being able to successfully perform the task may be the difference between life and death. The advantage of a truly job related test is that it can honestly and ethically ignore racial and gender issues by reproducing actual physical tasks necessary to safely do the job. Once the test is developed, we have to determine what level of performance is acceptable, and the pass mark for the test.

THE STANDARD

A standard is established by the appropriate authority as a measure of quality, performance or efficiency. In the domain of employment, a standard must be related to the duties to be performed and not be capricious. The standard must be fair and attainable. A standard must be unique (as opposed to dual) and must be related to the duties performed, not the individual performing the duties.

The courts in North America have ruled that a standard can discriminate (35), that is to say, it can have a negative effect on a particular group of individuals. This is only permissible if it has been established as a Bona Fide Occupational Requirement (BFOR), or Qualification (BFOQ), and if the employer has made all possible efforts to accommodate (36).

It becomes the employer's responsibility to demonstrate that the standard is based on essential and critical elements of the work, that the performance level demanded is reasonable, and that it is impossible to accommodate those who do not meet the standard, since it is based on the very nature of the work.

Setting a standard has always been a problematic issue for any type of testing. In the past there has been a tendency to have large number incumbents take a test, or various parts of a battery of tests, and establish the level of acceptable performance at a point representing the average result, plus or minus one standard deviation.

This sort of process also guarantees that a segment of the population doing the work will be declared unfit, and therefore incapable of performing the physical element of the work. The next logical step is to remove these people from the field until they can successfully pass the test. Such a situation would create havoc in any department. This is why the courts, in Canada, have deemed it acceptable to introduce a new standard for present employees only when a grace period has been planned and a program of assistance has been provided to the employees to facilitate their achieving the new standard (37,38,39). Employers have used "grandfathering" as means of getting around the problem. Recently, however, it has been judged that the use of a "grandfather clause", is discriminatory since it creates two classes of employees and, therefore, a dual standard (36).

Some employers have elected to only require applicants, or recruits, to meet the fitness standard. Once the person is hired they are never tested again. This is similar to grandfathering and the employer is vulnerable to the observation that if the serving police officer does not need to pass a test to be considered safe and competent to do the physical parts of policing, then to require a physical ability level of a recruit is discriminatory. Recent adjudication, in North America (38), has suggested that an employer cannot demand from applicants a level of performance not asked from

incumbents. To do so greatly reduces the likelihood of successfully defending the standard in court.

For job related testing, Farenholtz and Bonneau have used the performance of prison inmates and the general public, on the same test, to set their standards (7,40). Although the use of inmates may be questioned, since their participation in the experiment can only be voluntary, Bonneau demonstrated that the average performance of the two groups was very close to the point where the standard could be set to the level of the general public (40). The result is that the standard selected corresponds to the physical abilities of that segment of the population police officer must either confront or assist. Based on the data collected by Farenholtz and Bonneau (7,40) this segment was mainly (80%) composed of males in their early twenties of average height and weight and, generally, moderately fit. It appears logical to set the standard at the average level of their performance on the test.

To be successful on the PARE, a member of this force must complete the timed portion of the test in 4 minutes or less, and carry the torso bag over the set distance. Today, most job related test use similar scenarios where running, jumping, scaling stairs is followed by some form of pushing, pulling, carrying or dragging.

SAFETY

It is essential for the test to be safe. For fitness testing, safety criteria have already been set by reputable organizations (American College of Sports Medicine in the USA, or Canadian Society for Exercise Physiology in Canada) and, although they are not law, they have become the industry's operational standards. The extension has not yet been made to job related tests, or even field tests. Consider the number of police departments using the 1.5 mile run to determine aerobic fitness. Even though in the original version Cooper (41) advises males over 35 not to take the 12 minute test without proper medical screening, most police departments, in the past, have not taken this recommendation into account. By setting a minimal level for success, or giving points for time, they have indeed enshrined the need for maximum performance. The subject is therefore forced to run rather then walk or jog, in order to do his best. For many, if not all, of subjects the test becomes one of maximal exertion. Done in a laboratory setting, the subject would have gone through an elaborate medical screening and would not have been permitted to take such a test until obtaining medical clearance from a physician. Unfortunately, this is not the case for field test nor for job related testing.

Most job related test should be considered has maximal exercise tests and it is the responsibility of the employer to ensure that employees who take the test are protected against the possible negative affect the test can have on their health. The PARE (4)

and POPAT (7) elicit, for most subjects, maximum heart rate after the fourth lap. This implies that subjects taking the test will be working at, or close to, their maximum for approximately two minutes. This is a potentially dangerous situation and has prompted us to link PARE to the Periodic Health Assessment required on all members of the force every two years. Members of the RCMP taking PARE must receive a medical clearance before hand. A member not medically cleared will be automatically referred to a force physician to determine the reason and the extent of the medical problem. If the problem becomes permanent the case is referred to the appropriate medical personnel. The force will try to accommodate the member's medical limitations but, if this is not possible, the member may be discharged on medical grounds.

Members of the force who take the test must have their blood pressure and resting heart rate checked before actually beginning. Readings must fall within the ranges recommended by the Canadian Society of Exercise Physiology. If not, a second reading is taken after five minute of rest. If any of the readings fall outside the range specified, then the member is referred to a physician for further evaluation. We believe this conservative approach will help minimise the incidents during the test. Furthermore, testers must maintain a current cardio-pulmonary resuscitation certificate and are instructed to stop the test at any time if they feel the member is stressed beyond his capacity, or shows sign of distress.

Finally, every time a PARE test is administered, the test site advises the local hospital so that, if an emergency arises, prompt intervention is assured. We hope that these precautions will protect our members. Moreover, if we honestly believe that the test mimics what the police officer does in the field, or on the street, then we are not subjecting the police officer to any risk he or she would not be taking while on the job. The difference is that we will have ensured medical clearance and we have trained personnel standing by in case something goes wrong.

CONCLUSION

We have demonstrated the need for police officers to attain and maintain a reasonable level of physical ability to safely do police work. There exits a core of physical activities that are common to police work regardless of location or jurisdiction. We have described the PARE, a test specifically designed to measure physical abilities specific to police work.

There still exits controversy regarding the type of test to be used to determine the state of physical readiness for police work. There are adherents to physiological or health related testing and supporters of occupational fitness testing. It is our opinion that this polarisation need not occur. Both type of tests have their place in the realms of police work and are not mutually exclusive. Fitness tests are educational and must continue

to be used to help police officers understand the need to stay physically fit for the job as well as the way fitness impacts on their total health and wellbeing. Occupational fitness testing, in particular PARE, is appropriate to determine fitness, or lack of fitness, to do police work.

There are two reasons for testing physical readiness in policing. The first reason is the ensurance that prospective and existing police officers possess the minimal level of physical ability to perform their duty of protecting the public safety. The second reason is to underscore the importance of physical activity in relation to personal health. A healthy workforce is more productive, takes less sick leave, and lives longer to enjoy retirement. In the final analysis this must be considered a most worthwhile goal.

REFERENCES:

1. Smith C, Pehlke D, Weller C. Role performance and the criminal justice system. Detailed Performance Objective (vol.1 1). Cincinnati: Anderson Publishing, 1976.

2. Maher P T. Police physical ability tests: can they ever be valid? Public Personnel Management Journal 1984; 13:173-l 83.

3. Balkin J. Why policemen don't like policewomen. Journal of Police Science and Administration 1988; 16(l): 29-38.

4. Trottier A, Brown J. La Sante du policier : Guide du medecin charge de l'Examen medical des agents de police. Groupe Communication Canada, 1994.

5. Bonneau Jean. Revision to doghandlers task analysis. Unpublished paper for internal discussion. January 1994.

6. Superko R H. Bernauer E, Vars J. Effects of a mandatory health screening and physical maintenance program for law enforcement officiers. The Physician and Sports Medecine 1988; 16(9); 99-109.

7. Farenholz D, Rhodes E C. Police officer physical abilities study. Vancouver Justice Institute of British Columbia. November 1986.

8. Cimon L. lnventaire des activites physiques afferentes au travail des agents et agentes de la paix de la fonction publique. Direction de la recherche et de la reglementation, Direction g&-&ale de la recherche et du developpement. Quebec: Gouvernement du Quebec, Office des ressources humaines, decembre 1985.

9. Physical fitness testing in law enforcement : implications of the American with Disabilities Act, Civil Rights Act of 1991, and the Age Discrimination in Employment Act. Major City Chiefs National Executive Institute Associates Federal Bureau of Investigation Academy, based on a conference of the Major City Chiefs Association, National Executive Institute Association and the Federal Bureau of Investigation, August 1993.

10 Henderson J. Personal communication. Royal Ulster Constabulary, 1995.

11 Bonneau J. Task analysis RCMP: Surrey and rural studies. Unpublished paper. 1988.

12. Physical performance evaluation within the Victoria Police Physical Unit. Victoria: Victoria Police Academy. Unpublished paper. December 1992.

13. Bard C et al. Elaboration des normes physiques d'admission aux corps d'agents de la paix, Quebec. Rapport presente a l'Office des Ressources humaines du Gouvernement du Quebec, octobre 1985.

14. Collingwood T R. A comparison of policemen versus offender fitness. Texas: Monography Series of Fitness, National Consortium for Education, 1974.

15. Pollock M L, Gettman L R, Ulluman Meyer 9. Analysis of physical fitness and coronary heart desease risk of Dallas area police officers. J Occup Med 1978; 20:393-398.

16. Klingzing J E. The physical fitness status of police officers. J Sports Med & Phys Fitness 1980; 20:291-6.

17. Wilmore J H. Davis J A. Validation of a physical abilities field test for the selection of state traffic officers. J Occup Med 21 (1): 33-40.

18. Bonneau, J. A position paper on fitness and lifestyle for the Royal Canadian Mounted Police : employer employee responsability. Unpublished. 1987.

19. Burelle C, Ricci J, Peronnet F. Condition physique des policiers de la communaute urbaine de Montreal. Medecine du sport 1987; (1): 18-16.

20. Gaul C A, Wenger H A, RCMP physical abilities requirement evaluation demonstration project. August 1990 - August 1992, Final Report, August 1992.

21. Carter R W. Legal aspects of maintaining physical fitness. The Police Chief 1992; 59(3): 15.

22. Vaughn J R. IACP 1987 annual law enforcement survey: executive summary. The Police Chief 1988; 55(I): 38-42.

23. Certified Fitness Appraisal Resource Manual, a project of the Canadian Society for Exercise Physiology. Ontario: Gloucester 1993.

24. Collingwood R. Physical fitness standards : measuring job relatedness. The Police Chief 1995 (2): 31-47.

25. Osborn G D. Validation physical agility tests. The Police Chief 1976; 43: 43-46.

26. Denning D L. Applying the Hogan model of physical performance of occupational tasks. Toronto: Paper presented at the American Psychological Association Convention. 1984.

27. Wilson D, Bracci R. The police agility test. Law and Order 1982; 30:36-42.

28. Gruber G P et al. Physical fitness standards for the Calgary police service. Calgary: Police Service, Project no. 83, Report 3, 1983.

29. Fleishman E A. Toward a taxonomy of human performance. Am Psycho1 1975; 30: 1127-l 149.

30. Selecting Police Officers. A study of suburban police by the Metropolitan Area Management Association and the Metropolitan Council. St Paul: Metropolitan Council, May 1978.

31. Nylander S W, Carmean G. Medical Standards Project: Final Report (3rd edn). County of San Bernardino; October 1994.

32. Landy F J et al. Alternatives to chronological age in determining standards of suitability for public safety jobs. The Aging and Public Safety Project, Equal Employment Opportunity Commission. The Pennsylvania State University, January 1992.

33. Fleishman E A. Evaluating physical abilities required by jobs. The Personnel Administrator 1984; 112-126.

34. Bernauer E et al. Final report on the validation of physical maintenance standards for state traffic officers. State of California Personnel Board and California Highway Patrol, Sacramento: Limited State, 1984.

35. The Canadian Human Rights Commission. Bona fide occupational requirement policy. Policy statement, August 1988.

36. Courteau J. Legal implications for PARE, Internal Communication 1993.

37. Canadian Human Rights Report. Ontario board of inquiry finds mandatory retirement policy violates human rights code. August 1991.

38. In the Matter of an Interest Arbitration Between North Bay Police Services Board and the North Bay Police Association Adjudicator, Robert Joyce. November 1991.

39. Canadian Human Rights Act I.S.C. 1976-77 c. 33 amended as Human Rights Tribunal Lafontaine, Seguin Tuskovich 1993.

40. Bonneau J. Performance of a cross section of the population on PARE. Unpublished report. September 1991.

41. Cooper K H. The Aerobics Way. New York: Bantam Books, 1981.

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