



Police officer physical ability testing

Re-validating a selection criterion

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Abstract *The aim of this study was to determine the bona fide occupational requirements of general duty police work, and use this information to re-validate a physical abilities test used in the police recruit selection process. A systematic random sample (n = 267) of general duty police officers completed two questionnaires: one concerning "average" duties, and one concerning the most physically demanding critical incident occurring in the 12 months prior. Of those completing the surveys, observational data were collected on every second officer, resulting in observational data collected for 121 officers, involving the recording of all physical activities and movement patterns observed throughout a ten hour shift. Data collected suggest there is a core of bona fide occupational requirements for general duty police work – walking, climbing stairs, manipulating objects, twisting/turning, pulling/pushing, running, bending, squatting and kneeling, and lifting and carrying. Many of these are involved in physical control of suspects, and can be tested using a well designed physical abilities test that simulates getting to the problem, controlling the problem, and removing the problem.*

Like many occupations specializing in emergency services and crisis intervention, such as the armed forces and firefighters, there is no doubt that the physical demands of police work are higher than those occupations of a more sedentary nature. From the routines of shift-work and uneventful patrol to the physical responses and actions required in critical incidents, police officers must be physically capable of performing all occupational requirements successfully, and in a way which maximizes the safety and security of all those concerned (Anderson *et al.*, 2000; Bonneau and Brown, 1995). Failure to screen out candidates who cannot perform such duties can result in injury, long term disability, rapid employee turnover and poor productivity, each having both a human and an economic cost (Brownlie *et al.*, 1985; Superko *et al.*, 1988; Greenberg and Berger, 1983; Reilly *et al.*, 1979; Wilmore and Davis, 1979; Trottier and Brown, 1994).

In the early part of the last century, particularly in North America, police departments set arbitrary standards of height and weight, presuming large males were best suited for the rigours of police work, especially those aspects of the duty involving pursuit, confrontation and arrest. By the 1950s, however, many agencies realized the arbitrary and discriminatory nature of these requirements and began to lift the traditional height and weight restrictions which had prevented the employment of those who, although small in stature, were capable of performing the job-related duties. Eventually, in order to identify some way of ensuring that recruits could indeed perform these duties, “[i]t became necessary to define and measure the physical abilities needed to do police work in a manner that was objective, realistic and non-discriminatory” (Bonneau and Brown, 1995, p. 157). This need provided the impetus for the development of physical ability tests.

In both Canada and the USA, the development of such tests have been influenced by law. In the case of *Dorthard v. Rawlinson* (1977: 433 US 321) heard in the US Supreme Court, the judge encouraged occupations with specific physical demands that were related to satisfactory levels of performance to develop physical ability or agility tests that were objective, realistic and nondiscriminatory. This is also reflected in the Canadian Human Rights Act (CHRA, 1985) in the Bona Fide Occupational Requirements Guideline (CHRA, 1985: S1/82-83). Since these legislative landmarks, numerous tests have been developed for physically demanding occupations (Farenholtz and Rhodes, 1986; Bonneau, 1994, 1996; Jette *et al.*, 1990; Gledhill and Jamnik, 1992a, 1992b; Stevenson *et al.*, 1992; Jamnik and Gledhill, 1992; Wilmore and Davis, 1979; Greenberg and Berger, 1983).

Many of the selection criteria used in the past by law enforcement agencies have been challenged in court and dismissed as discriminatory. In particular, many of the physical abilities tests have been questioned in regard to their validity and adverse impact on female applicants (Greenberg and Berger, 1983; Evans, 1980). Much of the problem, from the courts’ point of view, has surrounded the difficulty in demonstrating the job-relatedness of the tests (Anderson *et al.*, 2000).

Since the mid-1980s municipal police departments throughout Canada’s westernmost province, British Columbia, have used the Police Officers’ Physical Abilities Test (POPAT) (Farenholtz and Rhodes, 1986) as a recruit selection tool. Since that time issues related to workplace equity and discrimination in hiring have brought such selection or screening devices under the legal microscope (Tinsley, 1999). For example, a 1997 challenge of the fitness standard for forestry firefighters in British Columbia by a female firefighter resulted in a 1999 ruling by the Supreme Court of Canada in favour of the firefighter. Citing problems in test construction and the assignment of criterion scores, the decision was based, in part, on factors related to the inability of the British Columbia Ministry of Forests to demonstrate conclusively the validity of the test (Anderson *et al.*, 2000).

Thus the issue of test validity has been brought to the fore in regard to defending the use of a physical abilities test as a job qualification criterion. Furthermore, the issue needs to be addressed in both general and specific terms. First, to what extent does the test constitute an accurate simulation of the physical actions and responses required by the job; and, second, to what extent does the test reflect changes to these actions and responses over time due, for example, to the introduction of new technologies or law reform affecting the job description and duties contained therein?

This paper describes the methods used to “re-validate” the POPAT, first developed and used as a selection tool for municipal forces in British Columbia in 1985. These methods are compared to those used previously in test development and the legal dimensions of test validation are also discussed.

Previous approaches to test development

Previous approaches to developing tests which purport to distinguish those physically capable of job performance from those incapable have tended to focus either on determining a general occupational fitness standard for the job or on determining each candidate’s ability to perform each of the physical activities required for satisfactory job performance. While the process for determining a minimal fitness standard is job-specific in that it takes into account the job-related physical demands of the occupation, it is less job-specific than the latter approach which involves a detailed analysis of the tasks which comprise the job and a procedure for incorporating these very tasks, or simulations of them, into the test itself. In this way, it is much easier to demonstrate that the test, as a selection criterion, is based on bona fide occupational requirements (BFOR) or bona fide occupational qualifications (BFOQ).

Osborn (1976) describes a task analysis methodology for developing bona fide occupational requirements using a self-report questionnaire survey of current employees to collect information about job-related duties and which divided the process into three distinct phases. These phases include: questionnaire development, test development and the establishment of clearly defined levels of performance. Osborn’s goal was to construct a physical agility test consisting of components which simulated actual field conditions as closely as possible. This methodology has been used by various agencies, including the Justice Institute of British Columbia (Farenholtz and Rhodes, 1986), the Royal Canadian Mounted Police (RCMP) (Bonneau, 1994, 1996; Gaul and Wenger, 1992), Canadian Infantry (Jette *et al.*, 1990), firefighters (Gledhill and Jamnick, 1992a, 1992b), Canadian Armed Forces (Stevenson *et al.*, 1992) and a large multi-faceted gas company (Jamnik and Gledhill, 1992) and is now embedded in the Bona Fide Occupational Requirements Guideline (CHRA, 1985: S1/82-83).

In terms of police-specific testing, several physical ability tests have been used in North America. One of the earliest of these was developed for the Los Angeles County Sherriff’s Department (Osborn, 1976). Using a questionnaire to

collect information about essential job-related duties, Osborn constructed a physical agility test which resembled, “as closely as possible, conditions in the field” (Osborn, 1976, p. 44). The test included a six-foot wall climb, a 440-yard run, a body transport, a balance beam walk, a vehicle push and a crawl. Time standards for each event were developed using 153 civilians and 89 deputies (although the exact procedure for deriving time standards was not identified).

Wilmore and Davis (1979) developed a job-related physical abilities test for the selection of California Highway Patrol officers. This test included a standard battery of field tests designed to assess the “discrete components” of cardiovascular endurance, muscular strength, flexibility and body composition, as well as two physical abilities tests: a barrier surmount and arrest simulation and a dummy drag injury rescue simulation. The physical abilities testing was added to the protocol because of “the State Personnel Board’s strong desire to correlate performance scores on the field test battery with an officer’s ability to perform some critically important job-related task that involves physical strength and ability” (Wilmore and Davis, 1979, p. 35). The barrier surmount and arrest simulation mimicked the work environment of highway patrol on a highway with a median divider and a perimeter fence. A foot chase for a highway patrol officer would typically involve vaulting one highway divider, scaling one perimeter fence, and arresting an uncooperative suspect, the latter of which was tested using an arrest resistor device.

A model to assess the ability to apprehend and restrain a resisting suspect in police work was developed by Greenberg and Berger (1983). In an effort to avoid unnecessary injury in testing, and due to the administrative infeasibility of simulating the restraint and apprehension of a suspect, these authors developed a regression equation that predicted the likelihood of success from the results of basic anthropometric and strength tests. They found that those who performed best in a combative task could be predicted from a composite strength score (maximal bench press, upright row and leg press), left hand grip strength, weight, height and gender.

Farenholtz and Rhodes (1986) developed a physical abilities test (POPAT) using the methods of Osborn (1976) and Wilmore and Davis (1979). The test was designed to “predict the potential physical ability of the participant to resolve a critical incident involving the average male suspect” (Farenholtz and Rhodes, 1986, p. 46). As did these previous authors, Farenholtz and Rhodes divided their test into three distinct portions: getting to the problem (pursuit), solving the problem (arrest) and removing the problem (lift and carry). Getting to the problem consisted of a 400-metre agility run, including changes in direction and stride length, and stairs; solving the problem involved a pushing and pulling apparatus demonstrating the ability to dynamically control 35kg. (80lb) of resistance using a machine similar to that of Wilmore and Davis (1979) and a series of squat thrusts; removing the problem involved a lift and carry of 45.5kg (100lb) over a 15.6m (50ft) distance.

The physical ability requirement evaluation (PARE) was developed by the RCMP and modelled after the work of Farenholtz and Rhodes (1986). Because

of the potential for adverse impact discrimination, with 65 per cent of females failing the POPAT, the RCMP re-evaluated those sections of the test which were most problematic: the push/pull, the vault and the time frame of the fight portion of the test (Bonneau, 1996). As a result of an independent evaluation, the push/pull resistance of 35kg was confirmed, but the vault component was eliminated. The original premise was that officers need to perform activities under maximal stress; however, since the run portion of the POPAT elicits a near maximal level of exertion the vaulting was deemed unnecessary. Further, as the fight sequence of the POPAT lasted almost twice as long as the average physical encounter in the field, the duration of this portion of the test was reduced.

The POPAT re-validation study

As a “re-validation” exercise, this study does not represent an attempt to develop, from scratch, a new physical abilities test for use as a selection tool for police officer hiring. However, by using and building on the methods for test development used by Osborn (1976) and Farenholtz and Rhodes (1986), the methods described here could well be used in situations in which no current testing criteria exist. Besides the survey of general duty police officers used in developing these previous tests, the present researchers also included an observational component, involving ride-alongs with officers on patrol. By elevating this design to a multi-method approach similar to that used by Leamon (1999) in her approach to developing screening criteria for the selection of US Border Patrol agents, the addition of this component provided an opportunity to assess the construct validity of self-report measures of job requirements and related levels of performance. Furthermore, the need to link physical requirements to the actual activities in and demands of the field environment is critical to reducing the vulnerability of test validity to discriminatory law suits (Copay and Charles, 1998, p. 418).

The survey component

A systematic random sample of officers listed as being assigned to “general duty” in June 1998 was drawn from all 11 municipal police departments in British Columbia. Every third officer was selected from a list provided by each department, yielding a total sample of 279 officers, of which 267 (96 per cent) actually participated in the survey. Each officer received two questionnaires, one which asked them to describe the physical aspects of their job “on average” (the Physical Work Record Survey Form) and another which asked them to describe the most physically demanding critical incident that they experienced in their most recent 12 months of work (the Critical Incident Survey Form). Both questionnaires were presented in a package along with a letter of introduction explaining the general purpose of the study, the voluntary nature of their participation, the confidentiality of all responses and instructions for returning the questionnaire to the researchers in a sealed envelope. Questionnaire packages were distributed to officers through the Training

Officer in each department who also collected them for forwarding to the researchers.

The observation component

The second component[1] of the study involved asking a sub-sample of every other officer surveyed to participate in a researcher ride-along exercise. In this component a research assistant rode with the officer for a full shift during which a detailed record was made of all physical activities performed by the officer. The research assistant recorded all instances of each of 30 different physical activities occurring within each minute of each shift, beginning from the time the officer leaves the briefing at the start of the shift through to attendance in the locker room at the end of the shift. As a rule, observations were recorded immediately on minute-by-minute tracking sheets; on some occasions they were recorded on audio-tape as the activity occurred and later transcribed onto tracking sheets.

Data were collected on as many as 720 minutes per 12-hour shift and as many as nine physical activities per minute. These data were combined with those from the questionnaire surveys into a single data set. Scheduling of ride-alongs ensured that all shifts and all days of the week were proportionately represented. The observed data were collected during 121 ride-alongs over a 12-month period spanning dates in both 1998 and 1999. The observational period included, in total, 75,867 minutes representing 1,265 hours of observation.

The samples

The primary sample of officers is representative of all officers assigned to general duty/patrol within municipal police departments in British Columbia. Table I shows there are wide ranges in the characteristics of participating officers: some were young (e.g. 24 years) or had only a few months of service

Characteristic considered	Overall sample		Officers participating in ride-alongs	
Age (years)	36	(24-55)	34	(24-51)
Female officers (%)	19		21	
Height (cm)	179	(155-198)	178	(160-198)
Weight (kg)	84	(50-140)	82	(50-113)
Weight of duty belt (kg)	7.3	(2-16)	7.1	(2-16)
Weight of body armor (kg)	2.5	(0.5-12)	2.5	(0.5-10)
Months in current position	53	(1-353)	46	(1-228)
Always worked with partner (%)	37		41	
Sometimes worked with partner (%)	28		26	
Work a full shift rotation (%)	87		94	
Length of shift (hours)	11	(10-12)	11	(10-12)
Work in patrol division (per cent)	91		97	

Note: All figures rounded (range in brackets)

Table I.
Characteristics of
officers sampled

(e.g. three months), while others were nearing retirement at 55 years old or had nearly 30 years (e.g. 353 months) experience in patrol division and this distribution is mirrored in the ride along sub-sample. The average officer was 36 years of age and had ten years of experience, which means that they were hired, on average, at 26 years of age, which is, in fact, the average age at which municipal police officers are hired in British Columbia.

In considering the sample of officers in the ride-along component it should be kept in mind that, while the study began with a systematic random sub-sample of officers, it was necessary to accommodate the logistics of scheduling research assistants to complete a representative range of shifts over the course of a one-year period. Also, during that year, selected officers moved out of patrol or were otherwise unavailable for scheduled shifts. Accordingly, some originally selected officers were replaced with others from the larger sample, and not all shifts were covered exactly proportionate to their occurrence over the days, weeks and months of the year. Nonetheless, the researchers are reasonably confident that the resulting sample of officers and shifts constitutes a very good representation of the officers and work activity involved in municipal policing in British Columbia.

General duty task analysis

Each of the 267 officers participating in the questionnaire survey completed the Physical Work Record, an instrument designed to provide self-reports regarding their assessments of the physical demands of general duty police work. The questionnaire asked officers to describe:

- how necessary it is that they be able to perform 15 selected physical activities;
- how frequently they perform these selected activities;
- how much time they spend on each activity during an average shift; and
- how much effort they feel is required to perform each activity.

The activities listed on the questionnaire were not intended to represent a comprehensive task analysis of general duty police work; however, they did include those proposed in earlier studies for consideration as bona fide occupational requirements of police work.

Necessity. In terms of how necessary officers believed it was that they be able to perform each of the 15 listed activities, the vast majority of respondents felt all but two (crawling and lifting above the shoulders) were necessary. The necessity of officers being able to perform these duties was confirmed further by ride-along observations. The research assistant necessity ratings were identical to those assigned by the officers in all but three cases (see Table II)[2].

Frequency and duration. The results regarding frequency mirrored those of necessity. When ranked from the most frequently to the least frequently performed, the ranking of activities is similar to that obtained for necessity. Only two activities were cited by the majority of responding officers as being

Physical activity considered	Average rating assigned by officer	Average rating assigned by observers
Standing	Very necessary	Very necessary
Walking	Very necessary	Very necessary
Sitting	Very necessary	Very necessary
Climbing up and down stairs	Very necessary	Very necessary
Handling/manipulating objects	Somewhat necessary	Very necessary
Twisting/turning upper body	Somewhat necessary	Very necessary
Pulling and pushing	Somewhat necessary	Somewhat necessary
Running	Somewhat necessary	Somewhat necessary
Climbing up/down from object	Somewhat necessary	Somewhat necessary
Bending, squatting, kneeling	Somewhat necessary	Very necessary
Lifting and carrying	Somewhat necessary	Somewhat necessary
Dragging	Somewhat necessary	Somewhat necessary
Leaping and jumping	Somewhat necessary	Somewhat necessary
Crawling	Neither	Neither
Lifting above the shoulders	Neither	Neither

Note: Five-point scale: very necessary; somewhat necessary; neither (neutral); somewhat unnecessary; very unnecessary

Table II.
Observed vs. officer ratings of how necessary it is that they be able to perform various physical activities

“never” or “seldom” performed (lifting above the shoulders and crawling). Ride-along observers provided confirmation of the reliability of these self-reports (see Table III). In terms of the amount of time spent engaged in various forms of job-related physical activity, Table IV reveals that officers surveyed reported spending, on average, more than half of each shift (373 minutes) sitting, just over two hours standing and about one and a half hours walking.

Physical activity considered	Average rating assigned by officer	Average rating assigned by observers
Standing	Constantly performed	Constantly performed
Walking	Constantly performed	Constantly performed
Sitting	Constantly performed	Constantly performed
Climbing up and down stairs	Often performed	Constantly performed
Handling/manipulating objects	Often performed	Constantly performed
Twisting/turning upper body	Often performed	Constantly performed
Pulling and pushing	Often performed	Often performed
Bending, squatting, kneeling	Often performed	Constantly performed
Lifting and carrying	Often performed	Often performed
Running	Occasionally performed	Occasionally performed
Climbing up/down from object	Occasionally performed	Occasionally performed
Dragging	Occasionally performed	Occasionally performed
Leaping and jumping	Occasionally performed	Occasionally performed
Crawling	Seldom performed	Seldom performed
Lifting above the shoulders	Seldom performed	Seldom performed

Note: Five-point scale: never performed; seldom performed; occasionally performed; often performed; constantly performed

Table III.
Observed vs. officer ratings of how frequently various physical activities are performed during duty

Table IV.
Average amount of time
police officers usually
spend during a shift
performing various
physical abilities

Physical activity considered	Average number of minutes per shift
Sitting	373
Standing	138
Walking	94
Bent over at waist	14
Lifting and carrying <i>below</i> shoulder	9
Pulling and pushing	7
Squatting, kneeling	7
Running	3
Lifting and carrying <i>above</i> shoulder	1
Crawling	–

Note: All figures rounded

Effort. Officers surveyed were asked about the amount of effort used to perform each of six physical activities at work. As Table V shows, all but one (climbing stairs) were cited as requiring at least “medium to maximum” or “maximum” effort. Ride-along observers again assigned the same average ratings as were assigned by the participating officers.

Recorded observations of physical activities. The ride-along component of the study involved research assistant observers accompanying 121 officers on a regular shift during which work activities were observed and recorded on a minute by minute basis. Observation records were made of the minutes (or times) in each shift that officers performed each of those activities listed in the officer survey. These results are summarized in Table VI and are extrapolated to yield estimates of the average number of shifts and minutes (or hours) per month that each officer will be required to perform these activities (see Table VII). Over all, there is no activity listed that officers should not expect to perform at least once per month, and the majority will be performed at least once per shift.

Table V.
Observed vs. officer
ratings of how much
effort they use in
performing various
physical activities
during duty

Physical activity considered	Less than medium effort (%)	Medium effort (%)	Medium to maximum effort (%)	Average rating assigned by observers
Running	5	13	88	Medium to maximum
Pulling and pushing	11	18	72	Medium to maximum
Dragging	10	24	66	Medium to maximum
Lifting and carrying	13	30	57	Medium to maximum
Leaping and jumping	17	27	58	Medium to maximum
Climbing up/down stairs	17	50	23	Medium

Notes:
All figures rounded
Five-point scale: minimum effort; minimum to medium effort (25% maximum); medium effort (50% maximum); medium to maximum effort (75-80% maximum); maximum effort

Activity considered	Per cent of officers observed performing activity	Average number of minutes the activity was performed	Median number of minutes the activity was performed	The range over which the activity was performed
Sitting	99	343	349	34-504
Standing	100	147	152	31-348
Walking	100	52	43	14-206
Bending	86	13	8	1-63
Lifting (below waist)	75	6 times	4 times	1-30 times
Climbing stairs (up)	98	4 times	4 times	2-11
(down)	98	4 times	4 times	1-11
Manipulating object	63	15 times	11 times	1-52 times
Squatting/kneeling	60	3 times	2 times	1-16 times
Twisting (excluding getting in/out of car)	45	5 times	4 times	1-19 times
Pulling/pushing	36	3 times	1 time	1-19 times
Running	22	1 time	1 time	0.33-4
Climbing objects	19	2 times	2 times	1-17 times
Balancing	10	2	2	1-7 times
Lifting (above shoulder)	6	4 times	1 time	1-22 times
Jumping	6	1 time	1 time	1-2 times

Notes: All figures rounded
Observation results: recorded information from ride-alongs

Table VI.
Percentage of officers observed in various forms of physical activity each shift and number of minutes involved in each form

Activity considered	Number of shifts per month where activity is required	Number of minutes (hours) per month the activity is required
Sitting	14	4,802 (80)
Standing	14	2,058 (34)
Walking	14	728 (12)
Bending	12	182 times
Lifting (below waist)	11	62 times
Climbing stairs (up)	14	46 times
(mean no. = 71 stairs/shift)	(down)	14
Manipulating object	9	132 times
Squatting/kneeling	8	27 times
Twisting (excluding getting in/out of car)	6	33 times
Pulling/pushing	5	15 times
Running	3	4
Climbing objects	3	5 times
Balancing	1	3
Lifting (above shoulder)	1	3 times
Jumping	1	1 time

Notes: All figures rounded
Figures assume an average of 14 shifts per month and represent observed data (results from ride-alongs)

Table VII.
Estimated number of shifts and number of minutes (hours) per month each officer will be required to perform various physical activities

Recorded vs. observed activities. Perhaps the most striking finding with regard to the observation data is the extent to which it corresponds to the self-report data (compare for instance the self-report estimates in Table IV to the data presented on sitting, standing, walking and bending in Table VI). Further, the 12 most frequently occurring activities observed are the same activities that officers most frequently cited as being “necessary” on the job, with at least 84 per cent of respondents describing each of these as either “somewhat necessary” or “very necessary”. In addition, of the 12 most frequently observed activities, 11 were self-reported as being “often” or “constantly” performed (the twelfth, running, was cited by 46 per cent of officers as being “often” or “constantly” performed).

Critical incident task analysis

As part of the survey component, officer respondents were asked to complete a Critical Incident Survey questionnaire, providing information about their most physically demanding critical incident within their most recent 12 months of work. A critical incident was defined to include all physical custody (arrests), all vehicle and foot pursuits, all dispatched code responses (emergency), all motor vehicle accidents that require physical work and all calls which present an active threat to life and/or property. These data provide a measure of what the physical demands of police work can be in the most difficult of circumstances.

The nature of critical incidents reported. Survey data indicated that critical incidents can occur at any time and under a variety of circumstances. For instance, while a greater percentage of critical incidents occurred at night and in May, June and July, significant amounts occur at all times of the day and throughout the year. Further, these incidents commonly occurred without much forewarning. Indeed, 37 per cent were initiated from observations of an officer as opposed to being despatched to the incident (50 per cent) or being called as backup (4 per cent). While many officers were able to describe the nature of the incident as either relating to a motor vehicle accident (4 per cent), domestic violence (12 per cent), social violence (10 per cent), or resistance resulting from an investigation (31 per cent), a full 43 per cent of officers responding had to describe the nature of the incident as something else (the list of which is too numerous to mention here). Even the locations of critical incidents were without a pattern. About half (51 per cent) of them were reported to have occurred on a street, highway, road, but they also occurred in many other locations.

In some respects then, there is no easy way to characterize critical incidents which responding officers describe as the most demanding; officers have to assume that such incidents occur any time, almost anywhere, and without warning. On the other hand, the results make it very clear that there are some commonalities among those incidents which officers describe as the most demanding. Specifically, they are likely to involve the officer having to deal with one or more subjects, each of whom is likely to be a suspect as opposed to

a victim or anyone else. Further, while 89 per cent of the time the incident will involve at least one subject (some incidents have no subjects; e.g. bomb scares), 20 per cent of the time it will involve two subjects, 12 per cent of the time it will involve three, and 6 per cent of the time it will involve as many four. More significantly, the subject is likely to be a young male, have average or better physical abilities, and be in a less than desirable mental state. Most of the time (60 per cent), at least one of the subjects will be violent and often, as Table VIII shows, the subject will often be taller and heavier than the officer involved.

Physical demands of critical incidents. Given the characteristics of the suspects involved in the critical incidents reported, it is not surprising that these incidents are also reported to be very physically demanding. Indeed, to gain control of such incidents officers are likely required to engage in a broad range of physical activity, and in doing so they can expect to exert considerable effort (see Table IX). Obviously, the primary reason that the physical demands are so great is that the suspect is resisting control in a variety of ways. The suspect is likely to pull or push on the officer to resist, and otherwise fight during the incident. The circumstances can also be extremely dangerous as suspects may also use (or threaten to use) a club, knife, or gun, and even attempt to take the officer's weapon.

Once the officer has control of the critical incident, significant physical demands commonly continue in removing the suspect. As Table X shows, the officer will often be required to lift, pull, drag, and push the suspect and in doing so be required to exert considerable effort. It is also worth noting that half the time (54 per cent) the officer is required to run to get to the incident,

Issue considered	Officer	Subject	Per cent (where applicable)
<i>Weight (kg)</i>			
Average weight (without armor and equipment)	84	76	
Average weight (with armor and equipment)	94	76	
Maximum weight of subject		140	
Per cent of subjects weighing more than 84kg			32
Per cent of time subject is heavier than the officer involved (without armor)			39
<i>Height (cm)</i>			
Average height	179	176	
Maximum height of subject		195	
Per cent subjects taller than 179cm			25
Per cent of time subject is taller than the officer involved			41
<i>Age</i>			
Average age	36	29	

Notes: All figures rounded
Results from section A, background information, Critical Incident Survey Form

Table VIII.
Relative size and age
of subjects involved in
critical incidents
reported

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24,1

Activity performed	Per cent of officers citing activity	Per cent citing maximum effort
Used verbal control tactics	76	52
Pulled and pushed a person	76	56
Twisted and turned controlling a person	76	53
Handcuffed a person	72	52
Applied control holds	67	57
Wrestled a person	47	73
Used a wrist/arm lock	44	53
Used a take-down	40	66
Lifted and carried a person	40	52
Struck a person	33	61
Twisted and turned using equipment	27	31
Pulled and pushed on object	25	29
Blocked a punch or kick	23	56
Lifted and carried an object	18	25
Used OC spray	17	42
Used a firearm	10	34
Used a baton	7	50
Other	6	62

20

Table IX.
Physical activities and effort required in controlling critical incidents reported

Notes:
All figures rounded
Results from section C, controlling the problem, Critical Incident Survey Form

Activity performed	Per cent of officers citing activity	Per cent citing maximum effort	Average distance involved (metres)
Lifting/carrying below shoulder level	46	44	22
Pulling a person or object	40	50	23
Pushing a person or object	36	43	8
Dragging a person or object	22	50	22
Lifting/carrying above shoulder level	6	50	42

Table X.
Physical activities required in removing the problem in critical incidents reported

Notes:
In over 80 per cent of these instances it was a person who was lifted, carried, pulled, pushed, or dragged
All figures rounded
Results from section D, removing the problem, Critical Incident Survey Form

make sharp turns in the process, and do all of this exerting considerable effort. As well, the officer may be required to climb, vault, or jump objects although most officers do not report these as requiring considerable effort. Finally, the results showed that the critical incidents reported were generally not over quickly; while 20 per cent were over in less than five minutes, 65 per cent lasted ten or more minutes, and nearly 15 per cent lasted an hour or more.

Recorded observations of physical activities. Over the course of the ride-alongs 14 incidents involving 12 different officers were recorded as “incidents involving significant resistance from a suspect”. Each of these was detailed using the same Critical Incident Survey Form as used in the survey component of the study.

The incidents themselves lasted an average of ten minutes (median = eight minutes) with a range of two to 29 minutes. They occurred in a variety of circumstances and involved male suspects who were most likely under the influence of alcohol or drugs. One-half of the suspects were violent and 79 per cent were of average or better fitness. In 36 per cent of the incidents the suspects were heavier than the officers, and in the same percentage of incidents (36 per cent) the suspects were taller than the officers (see Table XI).

Getting to the problem. In terms of “getting to the problem”, 50 per cent of the officers were required to run, and ran, on average, 87 metres (with a range of 5 to 350 metres). Of those required to run, 43 per cent reported to the observer that they expended either “difficult” or “maximum” effort.

Controlling the problem. In “controlling the problem”, 93 per cent of officers were required to push and pull the suspect and 86 per cent had to twist and turn and use control holds (see Table XII). Other frequent activities included applying a wrist or arm lock (72 per cent), wrestling (57 per cent) and using a take-down (43 per cent). Also, 36 per cent lifted and carried the suspect and, in 79 per cent of cases, the officer handcuffed the suspect.

Removing the problem. Table XIII summarizes the physical activities observed as officers dealt with this aspect of the critical incidents. A large

Issue considered	Officer	Subject	Per cent
<i>Weight (kg)</i>			
Average weight (without armor and equipment)	88	84	
Average weight (with armor and equipment)	98		
Maximum weight of subject		110	
Per cent of subjects weighing more than 88kg			36
Per cent of time subject is heavier than the officer involved (without armor)			14
<i>Height (cm)</i>			
Average height	181	178	
Maximum height of subject		191	
Per cent subjects taller than 181cm			36
Per cent of time subject is taller than the officer involved			21
<i>Age</i>			
Average age	33	28	

Notes: All figures rounded
Overall, 75,867 minutes (1,265 hours) of shift activity observed

Table XI.
Relative size and age
of subjects involved in
an observed critical
incident

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Activity considered	Per cent of officers performing activity	Per cent of officers using difficult or maximum effort
Pushed and pulled subject	93	46
Twisted and turned controlling a person	86	50
Applied control holds	86	42
Handcuffed the suspect	79	36
Used a wrist/arm lock	71	30
Wrestled the suspect	57	62
Used verbal control tactics	57	38
Used a take-down	43	50
Lifted and carried suspect	36	0
Struck the suspect	21	67
Pulled and pushed an object	7	0
Used a firearm	7	0
Lifted and carried an object	0	N/A
Twisted and turned using equipment	0	N/A
Used baton or OC spray	0	N/A
Blocked a punch or kick	0	N/A
Other	0	N/A

Table XII.
Activities performed by officers in controlling the problem

Notes: All figures rounded
Overall, 75,867 minutes (1,265 hours) of shift activity observed

Table XIII.
Physical activities performed by officers in removing the problem during observed critical incidents

Activity performed	Per cent of officers performing activity	Average mass involved (kg)	Average distance involved (meters)	Per cent citing difficult/maximum effort
Push	86	79 (30-100)	12 (0.5-95)	42
Pull	79	83 (40-110)	10 (0.5-65)	46
Lift below shoulder level	50	62 (2-100)	108 (1-750)	14
Drag a person or object	43	85 (50-110)	6 (0.5-30)	67
Lift above shoulder level	7	2	1	0

Notes: All figures rounded (range in brackets)
Overall, 75,867 minutes (1,265 hours) of shift activity observed

percentage of officers were required to lift, pull, drag and push objects of significant mass and to expend considerable effort in the process.

Recorded vs. reported activities. As was the case with the general duty survey, there was a remarkable correspondence between the self-reported and the observed activities involved in responding to critical incidents. Keeping in mind the large difference in sample sizes between the survey ($n = 267$ respondents reporting the one most demanding incident in the previous 12 months) and the observed critical incidents ($n = 14$), the similarities between Table IX (reported) and Table XII (observed) are considerable, as are those between Table VIII and Table XI. In fact, as noted earlier, the most striking

finding emerging from this re-validation exercise is the evidence from the observation data and the independent observer ratings of frequency, duration and effort with regard to job-related activities, which tends to substantiate the accuracy of self-reported estimates of these dimensions of police work. In other words, by using these additional measures, it has become possible to undertake a validation not only of the POPAT as a bona fide discriminant criterion, but also of the self-report measures on which it has been based. The data from this study clearly suggest that the self-report survey method can provide highly accurate measures and results on which to construct job-related physical abilities tests and simulations.

POPAT as a selection criterion

Selecting the right people for police work is not only important to the employer, but also in the best interest of the public. Police work, in general, can be quite sedentary; however, in the interest of public safety, police are expected to have the ability to apprehend (which may include running, tackling, pushing, pulling and wrestling), arrest and contain criminals (perform take-downs and handcuffing), remove people from damaged vehicles (lifting, carrying, pulling), control large crowds, and separate individuals who are arguing or fighting (pushing, pulling, restraining). Several of these tasks require maximal effort, and are extremely physically challenging.

Farenholtz and Rhodes (1986) developed the POPAT using the methods developed by Osborn (1976) and Wilmore and Davis (1979). Using a questionnaire survey to identify essential job-related duties, Osborn constructed a physical agility test with components which reflected conditions in the field. Wilmore and Davis included two physical abilities tests: a barrier surmount and arrest simulation and a dummy drag test. The POPAT was designed to “predict the potential physical ability of the participant to resolve a critical incident involving the average male suspect” (Farenholtz and Rhodes, 1990, p. 46), and was later used as the foundation of the PARE developed by the Royal Canadian Mounted Police (Bonneau and Brown, 1995). As did the previous authors, Farenholtz and Rhodes divided their test into three distinct portions: getting to the problem (pursuit), solving the problem (arrest) and removing the problem (lift and carry).

Getting to the problem

During a critical incident “getting to the problem” typically involves a pursuit or “catching up to” the suspect. In the present study getting to the problem involved walking, running, climbing over objects, vaulting objects, jumping down from objects and over objects, with multiple tasks required in each pursuit. Most often (56 per cent of the time) officers were required to run to the problem with officers exerting maximal effort in 75 per cent of cited incidents.

In the POPAT, the ability to “get to the problem” is tested through the use of a 400 meter agility run which includes changes in direction and stride length, and the climbing of stairs. As reported earlier, 88 per cent of the respondents in

the present study considered running to be an essential task, 92 per cent considered climbing stairs, and 67 per cent considered leaping and jumping to be essential tasks.

The existing data supports the applicability of the POPAT elements related to “getting to the problem”, although the run distance and times are longer than those reported. Officers report having to chase suspects on foot, changing direction and speed often, while avoiding or manoeuvring over or under objects. A total of 75 per cent of the officers surveyed in the present study reported encountering maximal exertion during their pursuits, and this is reflected in the POPAT – near maximal cardiovascular stress occurs in 90 per cent of the participants by the fourth lap (Bonneau, 1996).

Rhodes and Farenholtz (1992) found the average time on the run portion of the POPAT to be two minutes and 13 seconds. While the run is longer than the median distance encountered, the distance covered in the POPAT (400m) would fall at the 85th percentile of distances reported by Farenholtz and Rhodes (1986), and police officers should expect to run further distances at least once a year. Further, the total number of stairs encountered represents real life situations, although in the POPAT the stairs occur in blocks of six stairs rather than complete flights of stairs.

Controlling the problem

During a critical incident “controlling the problem” typically involves a physical struggle and arrest. In the present study it was found that 57 per cent of the suspects pushed or pulled on the officer to resist arrest, while 76 per cent of the officers cited pushing and pulling a suspect; 88 per cent of the police officers surveyed considered pushing and pulling an essential task.

Simulation of “controlling the problem” in the POPAT involves a pushing and pulling apparatus demonstrating the ability to dynamically control 35kg (80lb) of resistance such as that found when fighting an averaged sized individual. The resistance encountered has been validated elsewhere (as reported in Farenholtz and Rhodes (1990) and Bonneau (1996)), reflecting the resistance encountered during the arrest of the average male suspect.

There are very few methods of assessing one’s ability to control a dynamic resistance which are appropriate for a field test, and do not involve a large skill component. Standard fitness tests (push-ups, pull-ups and grip strength) do not correlate well with the “fighting” component of the POPAT (Rhodes and Farenholtz, 1992); however, data from the present study would support the notion that the pushing and pulling portions of the POPAT do reflect actual field conditions. For this reason it can be assumed that the pushing and pulling activities measured in the POPAT are essential job-related physical activities, and competency in these tasks is not merely a product of fitness.

The push and pull segment of the POPAT, however, while measuring unique physical abilities, uses a static body alignment without twisting and turning at the waist, which is not realistic. A total of 76 per cent of the officers in the present study reported the need to twist and turn at the waist during the

control and arrest of a suspect. There is, however, a safety issue concerning the lower back should twisting and turning at the waist be implemented into the test. This safety concern would also be the case should simulated “take-downs” and other controlling manoeuvres be introduced into the test, even though officers report these tasks to be essential.

A report by Loree (1995) clearly demonstrates that force is required to resolve many situations, and that failure to use force may jeopardize the safety of the public or fellow police officers. However, 80 per cent of the physical encounters last less than one minute, which is not in line with the time required to complete the “fight component” of the POPAT. In its present form Rhodes and Farenholtz (1992) report the average time to complete the “fight component” of the POPAT to be two minutes and 16 seconds. The time required to complete this section involves a period of time immediately after the push/pull during which subjects are required to vault over a height of 0.9 meters, perform a controlled landing, and then fall alternately on their back and their stomach. This portion of the test takes, on average, 60 seconds and was designed to elicit a maximal response from the candidate, during which conscious decisions to fall to the stomach or the back had to be incorporated. The movement patterns, however, are not specific to police work. In light of Bonneau’s (1988) demonstration that the run portion of the POPAT elicits a maximal cardiovascular response in 90 per cent of the participants after the completion of the fourth of six laps, the authors concur with previous research that suggests that the vaulting segment of the POPAT may not be required, or should be modified so as to reduce the length of the “fighting” segment of the POPAT.

Removing the problem

During a critical incident “removing the problem” typically involves the tasks of lifting or dragging a suspect, or carrying confiscated materials. In the present study 46 per cent of the officers surveyed reported having to lift and/or carry an object below shoulder level, 40 per cent reported pulling a person or object, 36 per cent reported pushing an object, 22 per cent reported dragging a person, and 6 per cent reported having to carry an object above shoulder level. Of those objects manipulated, 80 per cent of them involved moving a person.

Of the officers surveyed, 84 per cent in the present study considered lifting and carrying as essential tasks. These tasks are often performed at the end of a critical incident (46 per cent of the time), soon after maximal effort has been exerted. The POPAT simulates this scenario by having a lifting and carrying component following the modified squat thrusts at the end of the fight portion. The subject is required to lift and carry a 45.5kg sack a total of 15.25m, while negotiating one corner. Both the distance and mass carried appear reasonable, and if anything, conservative.

Summary

Analysis of present and past data indicates that the POPAT is a job-specific test which measures physical abilities required in the course of duty of a general duty police officer (see Table XIV). The present data, in general, support the physical tasks encountered in the POPAT. Discrepancies in distances covered and times of the events are evident however. That portion which is least supported would be the inclusion of the vaults at the end of the fight segment, with the vaulting involved in the POPAT being far more frequent than that reported, and out of sequence, disrupting the normal flow of pursuit, arrest, and removal of a person and/or property.

Data from the present study are similar to those used to construct the POPAT and its more recent iteration, the PARE (RCMP), especially when rank ordering as opposed to percentage of respondents reporting an activity is examined (see Table XV). It is important to keep in mind that the percentage differences are likely due to differences in methodologies among the studies. For example, in the present study, officers completed one survey reporting on their average shift and one reporting on the most physically demanding critical incident experienced in the past year, while the previous studies obtained multiple surveys from each officer, and include data concerning full shifts and not single incidents. By focusing on the most demanding incidents, the present

Rank	Present results (1999)	Restricted results ^a (1999)	Farenholtz and Rhodes (1986)	Bonneau (1996)
1	Sitting	Standing	Walking	Walking
2	Standing	Walking	Standing	Standing
3	Walking	Climbing stairs	Climbing stairs	Climbing stairs
4	Climbing stairs	Pulling/pushing	Running	Lifting
5	Manipulating objects	Running	Lifting	Carrying
6	Twisting/turning	Climbing object	Carrying	Running
7	Pulling/pushing	Lifting/carrying	Dragging	Pulling
8	Running	Dragging	Pulling	Pushing
9	Bend/squat/kneel	Jumping	Pushing	Jumping
10	Lifting and carrying	Crawling	Vaulting	Vaulting

Note: ^aRestricted to categories included in previous studies

Table XIV.
Most frequently performed physical tasks as found in various task analyses

Task	Present study		Bonneau (1988)		Farenholtz and Rhodes (1986)	
	Frequency (%)	Median	Frequency (%)	Median	Frequency (%)	Median
Running (m)	54	125	21	161	1.4	138
Stairs	4.0	3	69	54	36	64
Vaulting (cm)	13	150	6.0	137	2.9	152
Jumping (cm)	9	150	6.9	152	2.7	152

Table XV.
Frequency and median values for tasks performed in "getting to the problem"

study is able to address the validity of the POPAT from the point of view of its ability to reflect the higher levels of physical demand made on police officers. This is especially important in considering the authors' recommendation for removal of the vaulting segment and the consequent reduction in the length of the fight simulation sequence of the test.

Legal issues

Task analyses performed by police departments in developed nations all indicate that there is a core of essential job-related physical abilities that must be performed in the regular course of duty. In fact, there is "marked similarity in the type and intensity of physical activities reported" (Bonneau and Brown, 1995, p. 158). Few departments, however, have mandatory fitness or physical abilities requirements (or testing for same) past a probationary period (IACP, 1988).

Several reports have demonstrated that the majority of police work is essentially sedentary, with 80-90 per cent of the job being devoted to tasks involving limited physical activity (Maher, 1984; Balkin, 1988; Farenholtz and Rhodes, 1986). In fact, there is ample evidence supporting the notion that the physical requirements of police work do not occur frequently enough to maintain officers' fitness levels (McGhee, 1976; Wilmore and Davis, 1979; Charles, 1982; Metivier *et al.*, 1982; Maher, 1984; Bonneau and Brown, 1995). Collingwood (1974), in comparing the average police officer to the average inmate, found inmates to be more physically fit. Gaul and Wenger (1992), in examining the health habits of RCMP members outside of their work, found that only 17 per cent of the police officers surveyed engaged in physical activity at an appropriate intensity three times per week.

From a legal standpoint, this information opens the door to several lines of litigation. Task analyses demonstrate that the physical nature of police work does not change, at a given rank, with years of service (Farenholtz and Rhodes, 1986; Bonneau, 1988), yet there are no mandatory fitness or physical abilities requirements of police officers who have been in service for longer than their probationary period (IACP, 1988). Carter (1982, p. 15), legal advisor for the Waco, Texas police department, clearly states that "it makes no sense to select police officers on the basis of their physical fitness and abilities, and then have no requirement that minimum fitness and abilities are maintained". If physical fitness is truly job-related, all law enforcement officers should be required to maintain the same levels of fitness.

Moving towards global standards

Assuming the tasks identified are essential to satisfactory job performance, all individuals in similar positions should be required to reach the same standard. According to Bonneau and Brown (1995, p. 162) recent adjudication has suggested that "an employer cannot demand from applicants a level of performance not asked for from incumbents". If such a standard is not universally applied, litigation directed towards the standards will be difficult to

defend (McGhee, 1976; Ebel, 1977; Evans, 1980; Maher, 1984; Blair, 1995; Bonneau and Brown, 1995).

Moving towards a universal application is difficult, however, without the measure appearing to be “punitive” in nature. If the employer can demonstrate that the standards are critical to job-performance, reasonable to obtain, and it is “impossible to accommodate those who do not meet the standard, since it is based on the very nature of the work” (Bonneau and Brown, 1995, p. 161), it would be necessary to remove those from their positions who could not reach the standards set. This, according to Canadian courts, is acceptable provided the employees affected have been reasonably accommodated and provided a sufficient grace period to meet the standards set.

The RCMP have moved towards implementing a force-wide job performance standard. Gaul and Wenger (1992) describe the results of a two-year longitudinal study concerning the implementation of these standards, and the educational support they received during this period. Initially, of those attempting the, PARE 69 per cent were able to complete the PARE in less than four minutes, and 83 per cent were able to complete the PARE in less than 4:30. After an 18-month period these numbers improved to 72 per cent completing the PARE in less than four minutes and 88 per cent in less than four minutes and 30 seconds. While there were several medical exemptions to performing the PARE (20 per cent), 78 per cent of the constables were able to complete the PARE in under four minutes at the beginning of the project, while 93 per cent of them completed the PARE in under 4:00 minutes at the end of the project with fewer higher ranking officers passing the test. The conclusions suggested that the PARE was a reasonable and achievable standard for “most able-bodied regular members... if graduated goals are provided for members to attain (p. 83)”.

Tinsley (1999, p. 31) discusses the use of pre-employment tests as measures of bona fide occupational requirements. As defined by Tinsley, a bona fide occupational requirement is a rational link between a policy that “discriminates on a legislatively prohibited ground” and on occupation, and is defensible in a court of law. For example, in a recent case (*Public Service Employee Relations Committee v. British Columbia Government and Service Employee’s Union, 1997*) the British Columbia Court of Appeal overturned an arbitrator’s decision that required an employer to accommodate an employee on the basis that indirect discrimination had occurred. This case involved a female employed in a physically demanding role as a crew member of a British Columbia Ministry of Forests first response firefighting team. This role places large demands on the aerobic and muscular systems, and these demands have been defined as bona fide occupational requirements, as failure to perform on the job may jeopardize the safety of the crew member, the crew, or the general public. However, the fitness standard created resulted in a passing rate of only 35 per cent for females as compared to 65 per cent for males.

While on its face the fitness standard appears to be neutral, with all employees having to reach the same fitness standard, the large difference between the passing rates of males and females would suggest the fitness standard indirectly discriminates against women. In the ruling by the British Columbia Court of Appeal, the court reasoned that “because the distinction was not based on personal characteristics attributed to an individual solely on the basis of association with a group (i.e. females), but rather based on individual merits and capabilities relevant to the occupation, discrimination did not occur” (Tinsley, 1999, p. 25).

This decision was later appealed to the Supreme Court of Canada and a decision was rendered in favour of the firefighter. The decision was based on several factors, including: failure to demonstrate undue hardship; failure to demonstrate a safety risk (either personal or other); and problems in test construction and the assignment of criterion scores. According to Tinsley, this decision inaugurated a new unified approach to determining whether workplace standards are discriminatory by providing a three-step test for assessing BFOR validity:

To justify a discriminatory workplace standard, an employer must now establish the following steps on a balance of probabilities: (1) the standard was selected for legitimate purposes rationally connected to job performance, which includes, but is not limited to safety and efficiency. . . ; (2) the standard was adopted honestly and in good faith, without an unlawful ulterior motive; and (3) the standard is reasonably necessary to accomplish the employer’s legitimate work-related purpose, which can only be shown if it is ‘impossible to accommodate individual employees sharing the characteristic of the claimant without imposing undue hardship on the employer’ [*Public Service*, 1999] (Tinsley, 1999, pp. 41-2).

This ruling sets out a clearly defined precedent with components which must be addressed in a successful defense of the POPAT; however, in combination with the findings of this and previous studies defining the occupational requirements of police work (Bonneau, 1988; Farenholtz and Rhodes, 1990), a defense of the POPAT as a pre-employment screening device should be easier to mount and defend successfully.

Notes

1. A third component of the study involved each of those officers in the ride-along sub-sample being fitted with a heart monitor which records every heartbeat. The monitor was activated the minute the researcher began to record observations of physical activity at the beginning of the shift and, at the end of the shift, the heart rate data were downloaded into lap-top computers. Analysis of these data is still ongoing.
2. The reason officers assigned a lesser rating to each of the three, in the view of the research assistant observers, is that they perhaps did not include:
 - getting in and out of the patrol car and using the in-car mobile data terminal (MDT) as instances of “twisting and turning the upper body”.
 - using the radio as “handling and manipulating objects”; and
 - partial bending, such as in standing while working on report writing and in reaching for objects below the waist level.

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