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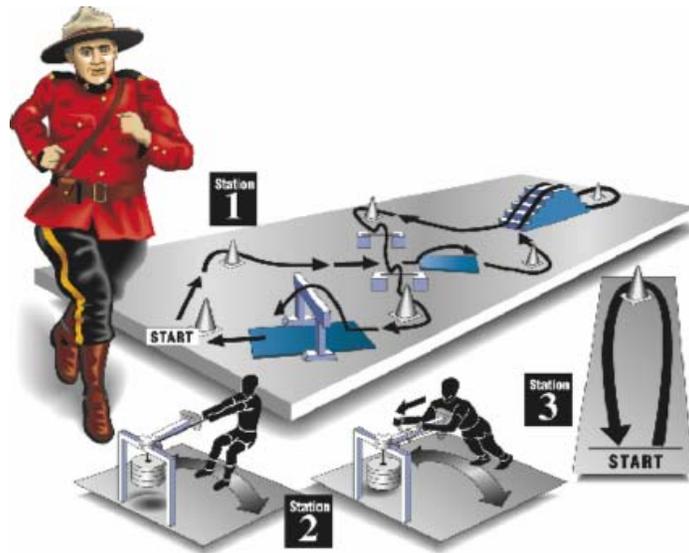
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Physical Abilities Requirement Evaluation (PARE)

Phase 1: Task Analysis



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Physical Abilities Requirement Evaluation (PARE)

Phase 1: Task Analysis

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Introduction:

While police work is primarily sedentary, police officers are required to frequently engage in near maximal workloads for short periods of time during incidents of a critical nature (Anderson et al., 2001). Critical incidents are often extremely physically challenging while the failure of officers to perform in such situations could clearly endanger themselves, their fellow officers, and the general public. For this reason many police organizations around the world have introduced bona fide occupational requirement or fitness testing procedures (IACP, 1988).

Occupational fitness component or task simulation testing have been used to screen potential recruits in many physically demanding occupations, including police work. These tests must be able to demonstrate a valid and reliable relation to the frequently encountered job specific demands, while being independent of specific job related skill (Anderson et al., 2001; Shephard, 1991; Hogan, 1991). Their role is to screen for individuals who possess critical fitness related deficiencies, maintaining a work force of individuals who are physically capable of performing all bona fide occupational demands. However, many of these selection criteria have been challenged in court in the past on grounds of validity and adverse impact issues. For a bona fide occupational requirement testing procedure to withstand this scrutiny, it is imperative that a well-structured approach to test development is taken.

Bona fide occupational requirements can be defined as “a condition of employment that is imposed in the belief that it is necessary for the safe, efficient, and reliable performance of the job and which is objectively, reasonably necessary for such performance (Gledhill, Jamnik and Shaw, 2001: p 9).” Organisations who wish to impose a bona fide occupational requirement are required to identify the most demanding and most representative tasks performed in the occupation, and determine the physiological requirements that are required for the successful completion of these tasks (Deakin et al., 2001). People seeking employment in, or those already employed in the profession, should then be expected to exhibit these characteristics as they are related to the person’s ability to successfully performed their expected job duties.

Historical Overview of the PARE:

In 1986, the Royal Canadian Mounted Police (RCMP) National Health Services received the mandate to find an alternative to the Canadian Fitness Test which was used for the selection process of RCMP applicants, with the 25th percentile as the criteria. After reviewing the different tests used in police practice, the RCMP examined the possibility of adopting the Police Officer Physical Ability Test (POPAT) developed by Farenholtz and Rhodes (1986) for municipal police officers in British Columbia.

The POPAT simulates a situation where a police officer must chase a suspect, physically control the suspect and carry the suspect or evidence collected away from the scene. It consists of:

- A 400 m (440 yd) agility run that requires participants to complete six laps of a course which includes changes in direction, leaping over a 1.8 m (6 ft.) mat, climbing stairs up and down (1.2m or 4 ft high), and jumping over two 45 cm. (18 in.) hurdles.
- A push/pull section with a resistance of 36 kg (80 lbs) of dead weight on a push/pull unit. The participant performs six 180 degree arcs pushing, and then pulls the same weight and performs another set of six 180 degree arcs.
- 10 vaults and controlled falls, where the participant must vault 10 times over a 0.9 m (3 ft.) barrier performing a modified squat thrust and stand after each repetition.
- The agility run, push and pull, and the vaults are included in the performance time. Participants must complete these three stages in less than 4 minutes and 15 seconds.
- Immediately after the timed portion the participants pulse is taken, and after a minimal rest (eg. 30 seconds) the participant must lift and carry a 45 kg (100 lbs) bag over a 15m (50 feet) distance. (Farenholtz and Rhodes, 1986)

In 1987, the RCMP conducted a Task Analysis (Bonneau 1998) within its own ranks to determine if the data would support the work from Farenholtz and Rhodes (1986). The RCMP analysis showed similar results and supported the data used in the development of POPAT.

Bonneau (1994) suggested that the "POPAT has undergone sufficient scrutiny by both the police and the scientific community to be considered having face validity. Furthermore, its choice of activity confers it construct validity. In a validity study conducted by the RCMP on 114 of its members in the Vancouver mainland area, all participants (male and female) agreed that POPAT was a reasonable test and accurately depicted police work (p. 26)." However, while the study showed support for the POPAT, it also demonstrated a 65% failure rate for females which raised concern for potential adverse impact discrimination. Other

elements of the test were also questioned, such as the controlled fall placement. As a result, the RCMP undertook to re-evaluate the portions of the test which were most problematic. These were: the push/pull because of the resistance encountered and the greater failure rate amongst women; the time frame of the fight portion of the test, because it exceeded what was reported in the field; and the 10 vaults and controlled falls because of their lack of face validity (Bonneau, 1989). The following decisions were made:

a. Push/pull section: To determine the criteria for the push/pull section of the POPAT (which was to simulate the physical control portion of the scenario) Farenholtz had tested the ability of male prisoners and prison guards to push and pull on a dynamometer in a controlled manner. The 36 kg (80 lb) resistance was slightly less than the average obtained but similar to the mode of the reported data (Farenholtz and Rhodes, 1985; Farenholtz and Rhodes, 1990). Under contract to the RCMP, the University of Toronto repeated this process using both male and female subjects. To fully understand the complexities of the push and pull segments these activities were performed statically and dynamically, in both a rested and fatigued state. Following their analysis, and the similarity in findings to those of Farenholtz, the 36 kg (80 lb) of resistance was deemed to be both realistic and reasonable. The RCMP retained the 36 kg (80 lb) of resistance for the push/pull section as part of their test revisions as reported by Bonneau, in the PARE Standard Summary (1996).

In addition, the RCMP included four controlled falls between the pull and push activities, to simulate the possibility of an officer being knocked down or falling during an altercation. The participant would have to perform six 180° pull or push arcs, and lowers the weights in a controlled manner. Before re-engaging in their push or pull activity, they would perform four falls (2 on their front and 2 on their back) showing control by getting up to a ready position after each fall, and touching the chest pad on the machine placed at 0.9 m. (3 ft.) from the floor. While the weight for the push/pull section remained the same, it now included 4 controlled falls between the two activities.

b. Time frame portion of the push/pull section: In POPAT the combination of the push/pull activities with the 10 vaults/falls lasts on average one minute and 52 seconds in individuals that successfully complete the test (Rhodes and Farenholtz, 1992) – much longer than the average physical encounter met in the field (80% of which are less than one minute) (Bonneau, 1990).

The RCMP eliminated the 10 consecutive vaults/falls after the push/pull section and included only four controlled falls between the two activities, reducing the time frame portion of this section to approximately 70 sec. (25 sec. for the push, 20 sec. for the falls, 25 sec. for the pull), which made it better aligned with the reported data.

c. 10 consecutives vaults and falls: The original intent of such an activity was to insure that high levels of cardiovascular strain were obtained at the end of the test. Under high levels of cardiovascular strain participants are required to

remain focused mentally while motor skills deteriorate – a situation a police officer may be faced with in the apprehension and control of a suspect and the removal of evidence. The RCMP saw this as a trainable aspect that can be addressed at the Training Academy, and was not specifically related to the ability to perform job duties successfully. In addition, police officers in the field would not be expected to vault over a barrier and fall 10 consecutive times. This raised some concerns in regards to face validity (ability for the test to represent items that would be expected in the field).

The RCMP dispersed six of the 10 vaults and controlled falls throughout the run portion of the test. During each of the six laps, participant would have to jump over a 0.9m (3 ft) barrier, land in a controlled manner, then fall on their front or back, get up and continue to run. This was deemed relevant as one could possibly have to scale or vault over a fence during the apprehension of a suspect.

Further studies by the RCMP (Bonneau, 1988; Gaul and Wenger, 1992) and Neary (1998) demonstrated that most participants reached near maximum heart rates (90% HRmax) after the fourth lap, reaching the push/pull station at or near maximum heart rate. The push/pull section then serves as a benchmark for testing one's ability to perform under conditions of high cardiovascular strain.

In 1989, with the significant changes made to the POPAT, the RCMP named the new evaluation the PARE. Jean Bonneau, Chief of Health Promotion (1983-2002), RCMP National Health Services, described the PARE as a measure of “the essential physical occupational capacities to perform satisfactory police work” (Bonneau, 1990).

The PARE is divided into three sections (see Figure 1) which also represents a situation where a police officer must chase a suspect, physically control the situation and carry a person or an object away from the scene. It consists of:

- A 340 m (1116 ft.) obstacle course that requires participants to complete six laps of a course which includes changes in direction, having to jump over 1.8 m (6 ft.) mat., climbing of stairs, jumping over two 45 cm. (18 in.) hurdles, jumping over a 0.9 m (3 ft.) barrier and followed a controlled fall.
- This is immediately followed by the push/pull section where the participant pushes a weight of 36 kg (80 lbs) on a push/pull unit and performs six 180 degree arcs, then performs four controlled falls and completes the section with pulling 36 kg (80 lbs) and performing another set of six 180 degree arcs. This ends the timed portion of the test. For applicants the weight is adjusted to 32 kg (70 lbs) for the push/pull section
- After a 2 minutes rest, the participant must lift and carry a 45.5 kg (100 lbs) bag over a 15m (50 feet) distance. For applicants the weight is adjusted to 36 kg (80 lbs) for the weight carry section.

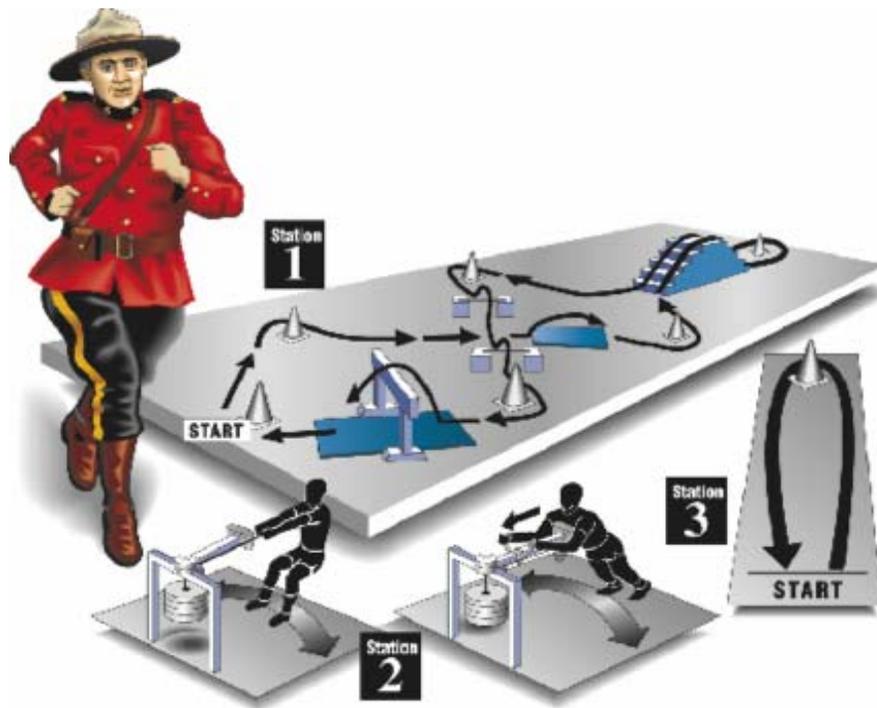


Figure 1: A schematic representation of the PARE.

In 1991 the RCMP started using the PARE for applicants as part of their recruiting process (requiring PARE in 4:45 min. or less) as well as an exit criteria for recruits at the Training Academy (requiring PARE in 4:00 or less).

In 1995 following a complaint from an applicant heard by a Canadian Human Rights Tribunal in regard to the 1.8 m (6 foot) mat, the mat distance was changed to 1.5 m (5 foot), and a 5 second penalty was added when one failed to fully clear the mat. At this time a two second penalty was also added when knocking down a hurdle. The original protocol was asking participant to redo the jump over the mat or to go back and replace the stick and redo the jump over it when failing these items. These changes were better aligned with what would be expected in the field.

In 1996 the RCMP required PARE participation from their incumbent officers as part of their Periodical Health Assessment (every two years). While the participation was mandatory, the police officers did not have to meet a specific standard, with the exception of certain specialized units requiring a PARE of 4:00 minutes or less.

In 2006 the PARE was removed from the Periodic Health Assessment and placed under the Training portfolio. It is now linked with Operational Skills

Maintenance along with firearm qualification, use of Oleoresin Capsicum spray, use of the extendable defensive baton, use of carotid control techniques and completion of first aid and CPR training. Once again police officers must participate in PARE but do not have to meet a specific standard, with the exception of certain specialized units requiring a PARE of 4:00 minutes or less.

In 2007 the RCMP undertook the first step in the re-validation of the PARE – with the current Task Analysis.

PARE Re-validation: Phase 1

Occupational fitness is a relatively new term, emerging as a growing body of literature supports the notion that there are physical capabilities that are pre-requisite to successful completion of job-related tasks in many physically demanding occupations (structural firefighters, wildland fire fighters, armed forces personnel, search and rescue personnel, and nuclear power plant personnel, to name a few). In police work, these demands include the ability to apprehend and restrain a subject, remove people from damaged cars, control large crowds, and separate individuals who are arguing or fighting, to name a few. These activities may stress the cardio-respiratory system; demand a certain level of muscular strength, endurance and power; as well as speed, agility and movement efficiency. These activities often require running, pushing, pulling, lifting, carrying, bending, climbing, balancing and jumping. Several of these tasks require maximal effort, and are extremely physically challenging. Further, the inability to perform these duties would clearly endanger themselves, their fellow officers, and the general public.

Selecting the qualified people for police work is not only important to the employer, but also in the best interest of the public. There is a perception in the public, fuelled through popular media, that police work is physically demanding, and the public expects police officers to be fit enough to perform their duties without endangering either themselves, or the public. While the use of physical standards in the selection or retention employees is a contentious issue, their use can be justified on several levels (Campion, 1983; Dunsmore and Hunter, 2001; Anderson, Plecas and Segger, 2001). Failure to screen those individuals who can not adequately perform the physical duties required of a police officer may result in increased incidents of injury, long term disability. In turn, organisations may incur rapid employee turnover and poor productivity, having both a human and economic cost (Brownlie et al., 1985; Superko, Bernauer and Voss, 1988; Greenberg and Berger, 1983; Reilly, Zedeck and Tenopyr, 1979; Wilmore and Davis, 1979; Lonsway, 2003; Taylor and Groeller, 2003). In short, the consequences of employing an unfit work force in physically demanding jobs can have major cost-related implications.

Human Rights legislation in most developed countries state that any selection criteria for employment must be directly related to job requirements, and be essential components critical to successful job performance (Farenholtz and Rhodes, 1990; Sothman et al., 2004). Each employer must be able to demonstrate that selection criteria are not discriminatory, demonstrate that each criterion is critical to job performance, and have clearly defined minimal acceptable levels for each of the selection criteria (Anderson et al., 2001; Rayson, Holliman and Belyavin, 2000). Each of the selection criteria must be a valid representation of the true job requirements, or a legal case can be successfully mounted against the employer. Following the Meiorin Decision not only are employers required to demonstrate the traditional requirements for establishing bona fide occupational requirements, but are now required to

demonstrate that any “fitness standards imposed on applicants or employees are designed and implemented in a manner that accommodates individual and group differences to the extent reasonably possible (Eid, 2004; p53).”

Many of the past selection criteria used by police agencies (particularly in the United States) have been challenged in court (height, weight, physical agility and fitness tests) and dismissed as discriminatory. Many of the tests have been questioned in regards to their validity, job-relatedness and adverse impact on females (Greenberg and Berger, 1983; Evans, 1980; Eib, 2001; Lonsway, 2003). For this reason, the development of such tests must first address the core set of physical competencies that are deemed essential to the performance of police work, and then develop a test that adequately measures one’s ability to perform these physical competencies. To use such tests, each agency has the responsibility of establishing the validity of its selection criteria and demonstrates that they are truly bona fide occupational requirements (BFOR) (Eib, 2001).

Police will generally agree that the nature of police work changes over time with the introduction of new technology, laws and police practices. However, this being the case, bona fide occupational tests developed in the past must re-addressed at regular intervals to insure their relevance (Taylor and Groeller, 2003). The purpose of this project was to re-evaluate the core set of physical competencies required to successfully perform the duties of a police officer.

Task Analyses:

Several papers provide examples of task analyses of various occupations, although few address police work specifically (Anderson, Plecas and Segger, 2001; Bonneau and Brown, 1995; Farenholtz and Rhodes, 1990; Greenberg and Berger, 1983). A task analysis is “undoubtedly the most crucial phase in the development of any test or standard (Bonneau and Brown, 1995: p.159),” providing a framework through which job-relatedness can be demonstrated. While the process of performing a task analysis has been recently reported for the selection of armed forces personnel (Rayson, 1998), and the results of task analyses for general duty police work can be found in the literature (Anderson, Plecas and Segger, 2001), Figure 2 provides a general overview of the process of completing a comprehensive task analysis. The process requires a period of job review and familiarisation, which often includes input from subject matter experts in the form of forums, or the use of a scientific advisory committee. Data is then collected concerning the frequency, intensity and necessity of tasks performed in the course of general duty police work through one or a combination of methods including telephone surveys, surveys and direct observation (Anderson, Plecas and Segger, 2001). These data are analysed to identify those physical tasks, or groups of tasks (constructs), which are absolutely essential to general duty police work. The tasks and/or constructs are then used to provide a framework for bona fide occupational requirement test development.

Anderson, Plecas and Segger (2001) reported the results of a comprehensive task analysis of municipal police officers in British Columbia in order to re-assess the validity of the POPAT. This test was developed and initially validated in the mid-eighties, and since then has been used as a police recruit selection tool by most municipal police departments throughout the province of British Columbia.

In this original work on POPAT revalidation, job familiarisation was performed through the development of a comprehensive literature review, and through subject matter experts who formed a scientific advisory committee. The scientific advisory committee provided content concerning essential tasks which were included in the questionnaire portion of the study. Results from the questionnaire and subject matter expert opinion were used to develop a paper and pencil recording mechanism for the transcription of physical tasks during the observation phase of the task analysis.

In the revalidation study (Anderson, Plecas and Segger, 2001) two surveys were sent to a random sample of general duty police officers was drawn from the pool of officers performing general duty police work. The first questionnaire asked officers to describe the physical aspects of an average shift (the Physical Work Record Survey Form). The second asked officers to describe the physical requirements of the most physically demanding critical incident that they experienced in their most recent 12 months of work (the Critical Incident Survey Form).

A random sample of 131 officers who completed the survey were asked to participate in a direct observation phase (131 ride-alongs by a research assistant). The ride along entailed direct observation of work shifts during which a research assistant compiled a detailed record of all physical activities performed by the police officer, including measures of weights, distances, and number of repetitions. Direct observations of over 30 specific tasks were recorded in one-minute intervals throughout the entire shift from the time the officer left the briefing at the start of the shift through to attendance in the locker room at the end of the shift.

Officers who were being observed wore a Polar R-R Interval Recorder to monitor heart rate throughout the shift. This heart rate data was aligned with the observation data and was used to help quantify physical and psycho-social stress (Anderson et al., 2002).

Results of Anderson et al. (2002) showed a strong relationship between self-reported and observed data during both general duty and critical incidents. In fact, within the category of general duty, perhaps the most striking finding of the observation data is the extent to which it corresponds to the self-report data. Strong relationships between observed and self reported data were used to validate the questionnaires. In fact, in comparing the ride along and self report data 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% 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% of officers as being 'often' or 'constantly' performed).

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 are considerable. In fact, one important 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, through observation data it was possible to undertake a validation of the self-report measures for both general duty and critical incident surveys. The data from Anderson et al. (2002) clearly suggest that the self-report survey method can provide highly accurate measures and results upon which to construct job-related physical abilities tests and simulations. For this reason, this methodology was adopted for the present analyses and no ride-alongs were performed during the data collection.

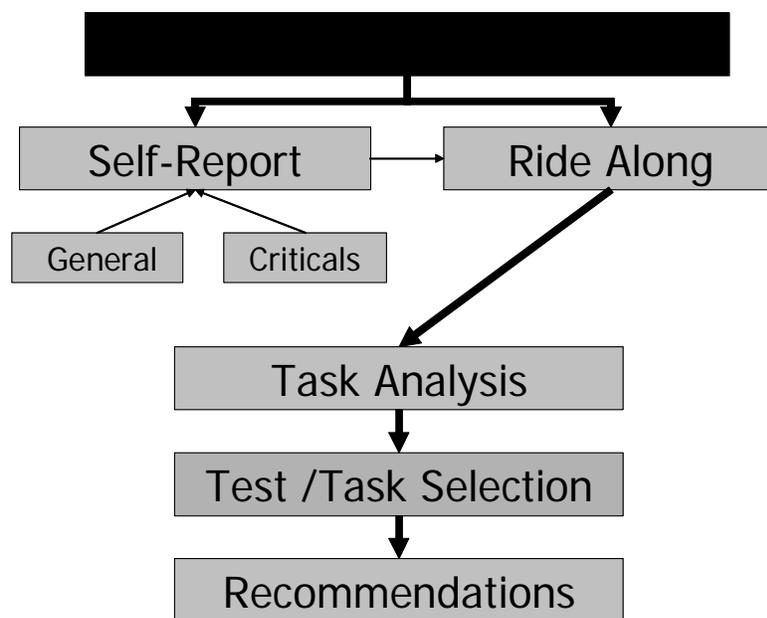


Figure 2: An overview of the bona fide occupational requirement “task analysis” phase.

Methods:

The original plan for this study was to survey virtually all constables assigned to general duty with the Surrey RCMP Detachment in B.C. which offers a blend of urban and rural settings. Accordingly, a research assistant associated to the study attended shift briefings during the month of April to hand out questionnaires to all officers attending. Overall, it was expected that this would put the researchers in contact with approximately 244 police officers. However, due to scheduling difficulties and operational requirements, the research assistant was only able to hand out questionnaires to 142 general duty officers. While the resulting sample is not random, the researchers have no reason to believe that it is not representative of general duty members in general in Surrey. In any case, of the 142 officers attending, 116 officers returned the questionnaires (for a response rate of 82%) of which 112 contained complete data that could be used in the present study.

In terms of detail, 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 adapted from the POPAT re-validation study (Anderson and Plecas, 1999), with slight modifications to include specific data on service area. The two 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.

The analysis of the Physical Work Record Survey Form is based on the responses of all 112 officers, while the analysis of the Critical Incident Survey Form is based only on the responses of the 74 officers who had at least one year of service and who reported on an incident which occurred within the past year. In this regard, 34 of the 112 officers had less than one year service and 8 officers described critical incidents which were more than one year old. Importantly, when the results of these 42 officers were included in the analysis, the results were not significantly different.

Results:

For the present report the analysis is focused largely on a descriptive analysis of the *Physical Work Record Survey Form* and the *Critical Incident Survey Form*, and on considering the results in light of the PARE.

Physical Work Record Survey

The *Physical Work Record Survey* component of the *Police Officer Physical Abilities Study* enabled officers to provide their self-report regarding their assessment of the physical demands of general duty police work. Specifically, the questionnaire asked officers to describe:

1. How necessary it is that they be able to perform selected physical activities;
2. How frequent they perform these selected physical activities;
3. How much time they spend doing these selected physical activities during an average shift, and;
4. How much effort they feel is required to perform these selected physical activities.

While the listing of physical activities addressed by the questionnaire does not constitute the basis for a comprehensive task analysis of general duty police work, it does include all of those activities which have been shown by earlier studies to be the basis for arguing for selected bona fide occupational requirements in police work.

The Necessity of Selected Physical Activities

Officers participating in the survey were asked to consider how necessary they believed it was that they be able to perform each of a list of fifteen physical activities during duty, and as Table 2 and Table 3 illustrate, it is clear that the vast majority of officers felt all activities but two (i.e. crawling and lifting above the shoulders) were necessary.

Table 2. RCMP police officers' ratings of how necessary it is that they be able to perform various physical activities during duty.

Physical Activity Considered	% Who Rate Activity as Unnecessary	% Who are Neutral	% Who Rate Activity as Necessary
Standing	2	3	95
Walking	1	5	94
Sitting	4	3	93
Pulling and pushing	6	4	89
Handling/manipulating objects	2	10	88
Running	6	6	88
Climbing up and down stairs	5	10	85
Twisting/turning upper body	7	9	85
Bending, squatting, kneeling	8	11	84
Lifting and carrying	8	13	81
Climbing up/down from object	5	16	78
Dragging	10	15	75
Leaping and jumping	14	16	70
Crawling	37	23	40
Lifting above the shoulders	27	33	41

* All figures rounded.

* **Bold:** activities currently included in PARE

Table 3. Self-reported ratings of how necessary it is that RCMP officers be able to perform various physical activities.

Physical Activity Considered	Average Rating Assigned By Officer
Standing	very necessary
Walking	very necessary
Sitting	very necessary
Climbing up and down stairs	somewhat necessary
Handling/manipulating objects	somewhat necessary
Twisting/turning upper body	somewhat necessary
Pulling and pushing	somewhat necessary
Running	somewhat necessary
Climbing up/down from object	somewhat necessary
Bending, squatting, kneeling	somewhat necessary
Lifting and carrying	somewhat necessary
Dragging	somewhat necessary
Leaping and jumping	somewhat necessary
Crawling	neither
Lifting above the shoulders	neither

* **Bold:** activities currently included in PARE

5-Point Scale: very necessary, somewhat necessary, neither (neutral), somewhat unnecessary, very unnecessary.

The Frequency of Selected Physical Activities

Officers participating in the survey were asked how frequently they performed each of a list of fifteen physical activities in their work. Specifically, they were to consider the same listing of fifteen physical activities they had assessed in terms of necessity.

Perhaps as would be expected, the results respecting frequency very much mirrored those respecting necessity. That is, when the activities are ranked from those activities which are most frequently performed to those which are the least performed, the resulting ranking is basically the same as the ranking respecting necessity shown by Table 2 earlier. As Table 4 and Table 5 show, only two activities were cited by the majority of officers as being seldom or never performed. At the same time, ten of the remaining thirteen activities were cited as often or constantly performed by the majority of officers.

Related to the issue of frequency is the issue of how much time officers spend on selected physical activities, and once again the activities which were assessed by officers as the most frequently and necessarily performed are those which they spend the most number of minutes on during a 12 hour shift. Specifically, as Table 6 illustrates, officers spend (on average) 59% of each shift sitting (i.e. 425 minutes), 22% standing (i.e. 156 minutes), and 11% walking (i.e. 81 minutes). The next most frequent physical activities were bending (at 7 minutes per shift), squatting/kneeling (at 6 minutes), and running and lifting below the shoulder (both at 5 minutes) each of which were less than 1% of the shift. Pushing and pulling was next at an average of 4 minutes per shift.

Table 4. Self-report ratings of how frequently RCMP officers perform various activities during duty.

Physical Activity Considered	Never or Seldom Performed	Occasionally Performed	Often or Constantly Performed
Sitting	0%	1%	99 %
Standing	1 %	5 %	94 %
Walking	1%	4 %	94 %
Handling/manipulating objects	4 %	16 %	80 %
Climbing up and down stairs	6 %	16 %	79 %
Bending, squatting, kneeling	7 %	26 %	70 %
Twisting/turning upper body	12 %	19 %	69 %
Running	11 %	32 %	56 %
Climbing up/down from object	18 %	32%	50 %
Pulling and pushing	19 %	38 %	44 %
Lifting and carrying	32 %	35 %	41 %
Leaping and jumping	31 %	35 %	33 %
Dragging	35 %	37 %	28 %
Lifting above the shoulders	61 %	25 %	13 %
Crawling	75 %	20%	5 %

* All figures rounded.

* **Bold:** activities currently included in PARE

Table 5. Self-report ratings of how frequently various physical activities are performed during duty by RCMP police officers.

Physical Activity Considered	Average Rating Assigned By Officer
Standing	constantly performed
Walking	constantly performed
Sitting	constantly performed
Bending, squatting, kneeling	often performed
Climbing up and down stairs	often performed
Handling/manipulating objects	often performed
Twisting/turning upper body	often performed
Climbing up/down from object	often performed
Running	often performed
Lifting and carrying	occasionally performed
Pulling and pushing	occasionally performed
Dragging	occasionally performed
Leaping and jumping	occasionally performed
Crawling	seldom performed
Lifting above the shoulders	seldom performed

* **Bold:** activities currently included in PARE

5–Point Scale: never performed; seldom performed; occasionally performed; often performed; constantly performed

Table 6. Average amount of time RCMP officers usually spend during a shift performing various physical abilities.

Physical Activity Considered	Average # of minutes per shift	Range
Sitting	425 (59%)	60 - 720
Standing	156 (22%)	20 - 600
Walking	81 (11%)	5 - 300
Bent over at waist	7 (1%)	0 - 60
Squatting, kneeling	6 (1%)	0 - 75
Lifting and carrying <u>below</u> shoulder	5 (1%)	0 - 40
Running	5 (1%)	0 - 30
Pulling and pushing	4 (1%)	0 - 30
Lifting and carrying <u>above</u> shoulder	1 (<1%)	0 - 40
Crawling	1 (<1%)	0 - 15
Average Shift (minutes)	718	

* All figures rounded.

* **Bold:** activities currently included in PARE

Effort Required to Perform Selected Physical Activities

Officers participating in the survey were also asked about the amount of effort they use to perform each of a listing of six physical activities in their work, and as Table 7 shows, all but one (i.e. climbing up and down stairs) were cited as requiring greater than medium effort by the majority of officers.

Table 7. RCMP officers' ratings of how much effort they use in performing various physical activities during duty.

Physical Activity Considered	Less than Medium Effort	Medium Effort	Greater than a Medium Effort
Running	5 %	26 %	69 %
Pulling and pushing	8 %	25 %	67 %
Dragging	10 %	27 %	63 %
Lifting and carrying	12 %	38 %	50 %
Leaping and jumping	17 %	33 %	51 %
Climbing up/down stairs	26 %	47 %	27 %

* All figures rounded.

5-Point Scale: minimum effort; minimum to medium effort; medium effort; medium to maximum effort; maximum effort

* **Bold:** activities currently included in PARE

Critical Incident Survey:

The *Critical Incident Survey* portion of the current *Police Officer Physical Abilities Study*, as noted earlier, are based on self-reports from 74 police officers (only those officers who had 12 or more months of service and who described a critical incident occurring within the last 12 months). Those officers were asked to provide information about their most physically demanding critical incident within their most recent twelve months of work. The results are important because they provide a measure of what the physical demands of police work can be in the most difficult of circumstances.

The sample of officers used for this analysis had an average length of service of 6.4 years (77.3 months), with 18.3% of the sample being female. The average officer was 34.1 years of age (see Table 8). The national data from the RCMP for General Duty officers are similar. The average age for RCMP constables (as of July 1st, 2007) was 35.6 years of age, while 23.7% of the officers were women.

Table 8. Characteristics of officers (n = 74) completing the critical incident survey.

Characteristic	Value	Range
Average Age (yrs)	34.1	23 – 54
% Female	18.3	
Average Height (kg)	177.4	130 – 198
Average Weight (cm)	84.1	42 – 120
Length of Service (mo)	77.3	12 – 392
% working 12 hour shift	90.1	
% below average fitness	6.1	

While the results reported here are based on 74 incidents, it is important to be aware that responding officers were asked to place their completed assessment in perspective to all others in their careers. That is, after completing the *Critical Incident Survey Form*, officers were asked to consider their most demanding critical incident of the last twelve months of work in comparison to other equally or more physically demanding incidents they have experience over their entire career. They were asked to recall the number of such incidents they have had over their career, and the results suggested that critical incidents equally or more demanding as those reported here occur for each officer at a rate of one every three months.

The Nature of Critical Incidents Reported

One of the things asked for by the survey was background information on the critical incidents reported, and the results indicated that the most demanding of critical incidents can occur at any time and under a variety of circumstance. For instance, as Table 9 shows, while a greater percentage of critical incidents occurred at night and in certain months of the year significant percentages occur at all times of the day and throughout the year. Further, as Table 10 shows, while the vast majority of incidents (81%) came in response to a dispatched call for service, others were initiated in response to an observed infraction (9%), being called as backup (4%), or through planned action (3%). As well, while many officers were able to describe the nature of the incident as either relating to a motor vehicle accident (3%), domestic violence (14%), social violence (16%), or resistance resulting from an investigation (34%), a third (33%) 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 are without a pattern. More than a third of them (38%) were reported to have occurred on a street, highway or road, but as Table 11 shows, they also occur 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 anytime, and almost anywhere. 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 suspects, each of whom is likely to be a suspect as opposed to anyone else (e.g. victim, as per Table 12). Further, 97% of the time the incident will involve at least one suspect. In fact, 44% of the time it will involve at least two suspects. Again, as per Table 12, regardless of the number involved, each is likely to be a suspect as opposed to anyone else. 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 (58%), at least one of the suspects will be violent and 76% of the time at least one of the suspects will be under the influence of drugs or alcohol. Finally, as Table 13 shows, the suspect will often be taller and heavier than the officer involved.

Table 9. Occurrences of reported critical incidents by month and time of day.

Month	% of Yearly Total	Time	% of Daily Total
January	2 %	0:01 - 2 AM	9 %
February	12 %	2:01 - 4 AM	13 %
March	17 %	4:01 - 6 AM	7 %
April	9 %	6:01 - 8 AM	5 %
May	4 %	8:01 - 10 AM	6 %
June	2 %	10:01 - Noon	6 %
July	5 %	12:01 - 2 PM	4 %
August	5%	2:01 - 4 PM	10 %
September	7 %	4:01 - 6 PM	8 %
October	5 %	6:01 - 8 PM	7 %
November	10%	8:01 - 10 PM	8 %
December	12 %	10:01 - Midnight	18 %

* All figures rounded.

Table 10. The nature of critical incidents reported by RCMP officers.

Type of Incident	% of Total Reported
Motor vehicle accident	3 %
Domestic Violence	14 %
Social Violence	16 %
Resistance resulting from investigation	34 %
Other	33 %

How the Incident was Initiated

Other	3 %
Back-up	3 %
Planned	4%
Observed	9 %
Dispatched	81 %

* All figures rounded.

Table 11. Location of critical incidents reported by RCMP officers.

Location Listed	% of Total Reported
Street, highway, road, vehicle	38 %
Private residence	19 %
Residential yard	16 %
Sidewalk	9 %
Apartment building/basement suite	8 %
Bar, pub, club	5 %
25 other locations, none of which were cited by more than 3% of the officers responding	5%

* All figures rounded.

Table 12. Characteristics of subjects involved in critical incidents reported by RCMP officers.

Subjects' Status	Subject 1	Subject 2
% encountered	97	44
% suspect	77	74
% victim	20	13
% other	3	13

Subjects' Gender

% male	84	70
% female	16	30

Subjects' Mental State

% violent	41	21
% under the influence of drugs and/or alcohol	56	50
% mentally unstable, unpredictable	37	17
% emotional, upset, abusive	32	29
% calm, reasonable, cooperative	14	16

Subjects' Physical State

% below average fitness and abilities	22	18
% average fitness and abilities	49	59
% above average fitness and abilities	19	23

* All figures rounded.

Table 13. Relative size and age of subjects involved in critical incidents reported by RCMP officers.

Issue Considered	RCMP Officer	Subject	% (where applicable)
Weight			
average weight (without armour and equipment)	81 kg	82 kg	
average weight (with armour and equipment)	94 kg	82 kg	
maximum weight of subject	120 kg	180 kg	
% of subjects weighing more than 81 kg			39 %
% of time subject is heavier than the officer involved (without armour)			38 %
Height			
average height	177 cm	177 cm	
maximum height of subject	198 cm	190 cm	
% subjects taller than 177 cm			51 %
% of time subject is taller than the officer involved			40 %
Other			
% Male	82	84	
average age	33	31	

* All figures rounded.

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 14). For example, 67% of the officers reported applying control holds, and of those, 66% cited performing difficult or maximum effort.

Obviously, the primary reason that the physical demands are so great is that the suspect is resisting control in a variety of ways. As Table 15 shows, 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. Specifically, as Table 16 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%) the officer is required to run to get to the incident, make sharp turns in the process, and do all of this exerting considerable effort (see Table 17). As well, the officer may be required to climb, vault, or jump objects - although most officers don't report these as requiring considerable effort.

Finally, the results showed that the critical incidents reported were generally not over quickly. Specifically, while 28% were over in less than five minutes, 57% lasted ten or more minutes, and 13% lasted an hour or more (see Table 18).

Table 14. Physical activities and effort required in controlling critical incidents reported by RCMP officers.

Activity Performed	% of Officers Citing Activity	% Citing Difficult or Maximum Effort
Pulled and pushed a person	76	58
Handcuffed a person	76	50
Twisted and turned controlling a person	73	55
Applied control holds	67	66
Used verbal control tactics	65	53
Wrestled a person	56	66
Used a take-down	51	66
Used a wrist / arm lock	46	63
Lifted and carried a person	46	56
Struck a person	35	69
Blocked a punch or kick	27	59
Pulled and pushed on object	26	29
Twisted and turned using equipment	24	20
Lifted an carried an object	21	29
Used OC spray	16	30
Used a firearm	12	0
Used a baton	11	11
Other	5	75

* All figures rounded.

* **Bold:** activities currently included in PARE. All other activities are included in various RCMP Operational Skills Maintenance for police officers, with the exception of lifting and carrying a person which is only included as part of cadet training.

Table 15. Types of resistance used by subjects in critical incidents reported.

Resistance Used	Subject 1	Subject 2
Pushed or pulled an officer to resist	61 %	35 %
Grasped officer's clothing to resist	31 %	30 %
Grasped object to resist control	30 %	13 %
Wrestled officer using holds	28%	9 %
Struck officer (punch, kick, knee...)	24 %	13 %
Used other resistance	22 %	4 %
Threatened or seized a knife	8 %	0 %
Threatened or seized a gun	1 %	0 %
Threatened or seized a club	4 %	0 %
Attempted to take officer's weapon	7 %	0 %

* All figures rounded.

Table 16. Physical activities required in removing the problem in critical incidents reported.

Activity Performed	% of Officers Citing Activity	% Citing Difficult or Maximum Effort	Average Distance Involved (meters)	Average Weight (kg)	Object was a person (%)
Pulling a person or object	24	59	6	87	96
Pushing a person or object	23	37	8	81	86
Lifting / carrying below shoulder level	18	37	17	76	69
Dragging a person or object	11	50	6	83	100
Lifting / carrying above shoulder level	2	0	10	15	0
* In over 80% of these instances (pulling, pushing, lifting, carrying and dragging) the activity involved a person.					

* All figures rounded.

* **Bold:** activities currently included in PARE

Table 17. Physical activities and effort required in getting to critical incidents.

Activity Performed	% of Officers Citing Activity	% Citing Maximum Effort
Walking	73	5
Running	44	41
Climbing over objects	18	33
Jumping over objects	12	15
Vaulting over objects	7	100
Jumping down from objects	5	15

* All figures rounded.

* **Bold:** activities currently included in PARE

Table 18. Time elapsed during the officers' involvement in the critical incident.

# of Minutes	% of Officers Citing Time Elapsed
0 - 5	29 %
6 - 10	14 %
11-15	14 %
16 - 20	13 %
21 - 30	11 %
31 - 60	7 %
> 60	13 %

* All figures rounded.

Mean time elapsed = 32 minutes (range 2 – 300 minutes)

Discussion:

The present results are remarkably similar to those of previous findings (Anderson and Plecas, 1999; Anderson, Plecas and Segger, 2001) in respect to both the results of the Physical Work Record Survey and Critical Incident Survey. A direct comparison of the current task analysis can be made to the results of Anderson and Plecas (1999) as published by Anderson, Plecas and Segger (2001) demonstrating that police work has not changed significantly since the previous two studies. For example, Table 19 demonstrates the similarity in ratings of frequency of activities between the present data and that of Anderson, Plecas and Segger (2001). Only 3 of 15 tasks were not rated identically. Similar results are demonstrated for effort use in performing various physical activities during duty in Table 20.

Similarities also persisted in respect to results obtained from the Critical Incident Survey. Table 21 provides a comparison between activities performed by officers in controlling the problem. The rank ordering of tasks between the two studies were different for only 3 of 18 tasks (Table 21). The same can be said for the types of resistance used by subjects in critical incidents reported, as presented in Table 22, although an increase in the number of suspects threatening officers with other types of resistance, and encounters with clubs and knives have increased slightly. Further, it appears that more suspects attempt to take the officer's weapon during altercations.

The present results support the data previously compiled by Anderson and Plecas (1999) and would suggest that information pertaining to the physical tasks of police work are similar across both studies, and a comparison is presented here to previous work.

Table 19. Comparing self-report ratings of how frequently various physical activities are performed during duty.

Physical Activity Considered	Anderson & Plecas, 2007 (RCMP)	Anderson & Plecas 1999 (BC)
Standing	constantly performed	constantly performed
Walking	constantly performed	constantly performed
Sitting	constantly performed	constantly performed
Climbing up and down stairs	often performed	often performed
Handling/manipulating objects (i.e. flash light, radio)	often performed	often performed
Twisting/turning upper body	often performed	often performed
Pulling and pushing	often performed	often performed
Bending, squatting, kneeling	often performed	often performed
Lifting and carrying	occasionally performed	often performed
Running	often performed	occasionally performed
Climbing up/down from object	often 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

5-Point Scale: never performed, seldom performed, occasionally performed, often performed, constantly performed

* **Bold:** activities currently included in PARE

Table 20. Comparing self-report ratings of how much effort they use in performing various physical activities during duty.

Physical Activity Considered	Anderson & Plecas, 2007 (RCMP)		Anderson & Plecas 1999 (BC)	
	Medium Effort	> Medium Effort	Medium Effort	> Medium Effort
Running	26 %	69 %	13 %	82 %
Pulling and pushing	25 %	67 %	18 %	72 %
Dragging	27 %	63 %	24 %	66 %
Lifting and carrying	38 %	50 %	30 %	57 %
Leaping and jumping	33 %	51 %	27 %	58 %
Climbing up/down stairs	47 %	27 %	50 %	23 %

* All figures rounded.

Table 21. Activities performed by officers in controlling the problem.

Activity Performed	Anderson & Plecas, 2007 (RCMP)	Anderson & Plecas 1999 (BC)
Pulled and pushed a person	76	76
Handcuffed a person	76	72
Twisted and turned controlling a person	73	76
Applied control holds	67	67
Used verbal control tactics	65	76
Wrestled a person	56	47
Used a take-down	51	40
Used a wrist / arm lock	46	44
Lifted and carried a person	46	40
Struck a person	35	33
Blocked a punch or kick	27	23
Pulled and pushed on object	26	25
Twisted and turned using equipment	24	27
Lifted an carried an object	21	18
Used OC spray	16	17
Used a firearm	12	10
Used a baton	11	7
Other	5	6

* All figures rounded.

* **Bold:** activities currently included in PARE. All other activities are included in various RCMP training course for police officers, with the exception of lifting and carrying a person which is only included as part of cadet training.

Table 22. Types of resistance used by subjects in critical incidents reported.

Resistance Used	Anderson & Plecas, 2007 (RCMP)		Anderson & Plecas 1999 (BC)	
	Subject 1	Subject 2	Subject 1	Subject 2
Pushed or pulled an officer to resist	61 %	35 %	57 %	34 %
Grasped officer's clothing to resist	31 %	30 %	28 %	17 %
Wrestled officer using holds	28%	9 %	26 %	15 %
Grasped object to resist control	30 %	13 %	23 %	9 %
Struck officer (punch, kick, knee...)	24 %	13 %	23 %	9 %
Used other resistance	22 %	4 %	14 %	19 %
Threatened or seized a knife	8 % *	0 %	4 % *	2 %
Threatened or seized a gun	1 %	0 %	4 %	2 %
Threatened or seized a club	4 % *	0 %	2 % *	4 %
Attempted to take officer's weapon	7 % *	0 %	2 % *	2 %

* All figures rounded.

Previous Direct Observation Data:

Previous work (Anderson and Plecas, 1999) reported the results of direct observation of ride-alongs with 121 officers (75,867 minutes or 1265 hours of direct observation), during which work activities were observed and recorded. To date, this appears to be the largest direct observation data set to be presented in the literature. Activities were recorded in one-minute intervals with as many as nine activities being recorded for any single minute. Accordingly, the data collected could be described in terms of what officers do, on average, in every minute of every shift.

In terms of “getting to the problem”, it is noteworthy that 50% of officers were required to run, and on average they ran 87 metres (range from 5 to 350 metres). Further, 43% of officers reported using either difficult or maximum effort in this activity.

In terms of “controlling the problem”, 93% of officers were required to push and pull the suspect, 86% had to twist and turn and use control holds to control the suspect, 72% had to use a wrist/arm lock, 57% had to wrestle the suspect, and 43% used a take-down (Table 23). Further, 36% lifted and carried the suspect, and 21% found it necessary to strike the suspect. In 79% of cases, the officer involved also handcuffed the suspect. All in all, it amounts to a broad range of physical skills and abilities carried out in a relatively short period of time expending considerable effort.

The incidents themselves lasted, on average, 10 minutes (range from 2 to 29 minutes; median of 8 minutes). However, while the incidents lasted on average 10 minutes, fights were less than 1 minute, while wrestling a subject lasted less than 1.5 minutes and tussles lasted 2.5 minutes. Half (50%) of the suspects were violent, and 79% were in average or better fitness. As well, in 39 % of the incidents the suspects were heavier than the officer involved and in a similar percentage of incidents (31%) the suspects were taller than the officer involved.

Table 23. Percentage of officers observed in various forms of force or force readiness activity each shift and number of minutes involved in each form (Anderson and Plecas, 1999).

Activity Considered	% of officers observed performing activity	Average # of minutes the activity was performed	Median # of minutes the activity was performed	The range over which the activity was performed
Tussle	8 %	2.5	1	1 – 12
Wrestling	4 %	1.4	1	1 – 3
Full fight	1 %	1.0	1	1 – 1
Incidents of baton or OC spray	3 %	1.0 time	1 time	1 – 1 Time
Incidents of handcuffing	26 %	1.4 times	1 time	1 – 3 times

* All figures rounded. Observation results: recorded information from ride-a-longs and direct observation of 1265 hours of shiftwork.

Recommendations:

From 1998 to 2002, a total of 8,320 RCMP police officers participated in PARE with 72% of them completing PARE in four minutes or less (Girard et al., 2003). During this five year span, 2504 PARE surveys were sent to police officers in each division across Canada within one to twelve months following their participation in the PARE. A total of 1,221 police officers responded to the survey (49% response rate), of which 75% completed the test in four minutes or less (very close to the overall success rate). Their results (Girard et al., 2003) provide general support for the PARE in its present form. For example, 100% of respondents reported it was important (21%) or very important (79%) for a police officer to be physically fit. Further, 71% reported that PARE is representative (48%) or very representative (23%) of the physical activities you may encounter in police work. 27% felt it was partially representative while only 3% felt it was not representative at all. In addition, it is interesting to know that PARE participation also had a positive impact on the level of physical activity prior and post test. In the three months before the PARE, 20% increased their level of physical activity (77% maintained it, 3% lower it), while In the three months following the PARE, 14% increased their level of physical activity (76% maintain it, 10% lowered it)

The data from Girard et al. (2003), the present and past Task Analyses, show strong support for the PARE in its actual format. This being said, when examining each section from of the test individually, there is room to improve the PARE. Slight modifications could be made to the current three sections while new sections could be added based on the work done in the development of physical abilities tests used in the police world. The proposed modifications will be examined section by section, before making recommendations for possible additions to the test.

Obstacle Course Section:

In the present study 44% of the officer ran during a critical incident, for an average of 195 meters (range of 2 – 2000 meters). Of these, 79% reported working a medium to maximum effort, with 30% reporting working at maximum effort. Of those who ran, 61% made sharp turns, and 16% ran up stairs. While 18% reported climbing/vaulting as an activity, 16% climbed over objects while 7% reported vaulting an object. A comparison to previous data from Canadian sources is provided in Table 24.

The PARE test provides for changes of direction and jumps during 6 laps of a figure eight obstacle course covering a distance of 340m with seven obstacles (mat, stairs (twice), 2 low obstacles, 1 barrier and one fall). The obstacle portion of the PARE takes approximately 25 seconds per lap for a total of 2 minutes and 30 seconds.

The present and past data, would support this section of PARE, but generates questions related to the length of the course, the controlled falls after each vault and the height of the barrier.

The length of the course

In half of the critical incidents reported (44%) the officer is required to run to get to the incident, making sharp turns in the process. Of these officers, 41% reported this chase to require maximal effort. The median distance was 50m for critical incidents, (although the range was large). Further, 18% of the officers cited climbing over objects, 12% cited jumping over objects, and 7% cited vaulting over objects during the chase. These chases require changes in direction, stride and decisions to vault or jump over objects which are reflected in the PARE. The median distances reported (Table 24) ranged from 50m to 195m in previous studies. The range of minutes run is reported by Anderson and Plecas (1999) to be 20 seconds to 4 minutes

During an average shift 56% of the officers reported running often, while 88% rated the activity as necessary. On average officers spend 5 minutes per shift running. Similarly, 85% of the officers rate climbing stairs as necessary, while 79% state the activity was often performed, and 78% and 70% of the officers rated climbing up and down from an object and leaping and jumping as necessary. These activities were reported in 11 – 16% of the critical incidents reported in the present study.

Table 24. Comparison of previous Canadian findings with respect to “getting to the problem”.

Task	2007 (UCFV)		1999 (UCFV)		1988 (RCMP)		1986 (JIBC)	
	Freq.	Median	Freq.	Median	Freq.	Median	Freq.	Median
Running	44%	50m	54%	125m	21%	161 m	1.4%	138 m
Stairs	11%	25	3%	3	69%	54	36%	64
Vaulting	16%		13%	1.5 m	6%	1.4 m	2.9%	1.5 m
Jumping	16%	1.3 m	9%	1.5 m	7%	1.5 m	2.7%	1.5 m

2007 (UCFV) – present results

1999 (UCFV) – Anderson and Plecas, 1999

1988 (RCMP) – RCMP data from Bonneau, 1988

1986 (JIBC) – JIBC data from Farnholtz and Rhodes, 1986

The obstacle course section of the test lasts approximately 2 minutes and 30 second and includes obstacles encountered in the field (with the exception of the controlled falls).

We recommend:

- Maintaining the total distance at or near 340m

- Maintaining the time frame portion of the obstacle course at or near 2 min. 30 sec.

The controlled falls (following the vaults): No incidence of falling while climbing objects were recorded in direct observation of officers (Anderson and Plecas, 1999). As described in the historical overview of the PARE, it seems that the falls were inherited from the POPAT which used them (along with 10 vaults) to make sure that participant were reaching maximal heart rate.

The falls were not associated with any specific task analysis nor did they offer face validity since a police officer would unlikely fall every time they have to jump over a barrier.

We recommend:

- Removing the six controlled falls from the obstacle course section.

The height of the barrier: In the PARE, the height of the barrier is set at 0.9 m (3 feet). This seems to have been inherited from the POPAT which also used at 0.9 m (3 feet) barrier. While the inclusion of vaulting over a barrier is supported by the data available, the height is not in alignment with the reported data. In fact, when considering the previous Canadian findings with respect to “getting to the problem” (Table 24) the three studies which document the height of the vault refer to a height of (or near) 1.5 m (5 ft.). The Test d’Aptitudes Physiques – École Nationale de Police du Québec (TAP-ENPQ) includes two fences 183cm in height (6 feet) – one flat fence with no texture on the fence surface and one chain link fence with the ability to place toes into the fence material to aid in the scaling of the obstacle (Leger, 2004). The California Highway Patrol also uses a 183 cm chain link fence.

In the present study 12.1% of the officers were found to climb over an object, while 87.7% used medium to difficult effort. Of these, 71.4% climbed over a fence with an average height of 1.6 meters, and median height of 1.5 meters.

We recommend:

- To replace the 0.9 m (3 feet) barrier by a 1.5 – 1.8m (5 - 6 feet) barrier/wall, which would be better aligned with the reported data; and
- To consider including a wire grid or ridge on the obstacle to replicate the kind of grip that would be expected from a similar structure in the field.

Push/Pull Section:

The use of the push and pull activities is supported in both the previous and present data. The present data found 61% of the suspects to offer physical resistance pushing and/or pulling on the officer. In response, the officers reported pushing and pulling a suspect 76% of the time which also included twisting and turning in an attempt to control the suspect 73% of the time, with suspects being handcuffed 76% of the time. Previous data (Anderson, Plecas and Segger, 2001)

suggest that 76% of the officers pushed and pulled subjects, twisted and turned in the control process, resulting in handcuffing 72% of the time.

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. Anderson and Plecas (1999) in reporting the results of direct observation predicted that an officer can expect to engage in tussling 14 times per year, and wrestling 7 times, while only twice per year (on average) are they likely to engage in full-scale fighting. Further, those fights are not likely to last more than a minute each, although range from 10 seconds to 12 minutes. Bonneau (1988, 1990) reported 80% of the physical encounters last less than one minute. The 'fight segment' of the PARE lasts approximately 70 seconds (25 seconds for each of the push and pull, and 20 seconds for the controlled falls), and while longer than the average encounter, is well within the realm of possibility.

The present, and past data, would support this section of PARE, with questions relating to the controlled falls included between the push and the pull activities and the resistance to be used for the push/pull section.

The controlled falls (between the push and pull activities): The controlled falls between the push and pull activities offer some face validity as a police officer could very well fall during the apprehension of a suspect, as part of tussle, or in gaining control or fighting with a suspect.

The inclusion of four controlled falls as part of the push/pull section brings the total time of this section to 70 seconds, which is still 10 second more than the reported data. In addition, while a police officer may be expected to fall during a tussle or a fight, it seems unlikely that they would do so four consecutive times. The inclusion of two falls, instead of four would bring the average time for the push/pull activity to 60 seconds, which would be well aligned with the reported data, and would offer greater face validity.

We recommend:

- Including two controlled falls (instead of four) between the push and pull activities.

The resistance for the push/pull section: Present data can not shed light on resistance encountered; however, Farenholtz and Rhodes (1990) reported on a prisoner's ability to perform both static and dynamic pushing and pulling. The average adult male prisoner was reported to be able to exert a maximum isometric pulling force of 51.5 kg (113 lbs), and pushing force of 53.6 kg (118 lbs), with a mathematical prediction of maximal force capacity of 55 kg (121 lbs). As the maximal directional force dissipates with dynamic activity in relation to rate of change in direction, the maximal force was reduced by 30% to reflect the resistance that would be encountered when controlling a resistive suspect who provides dynamic resistance and hence the 36.5 kg (80 lbs) of resistance in the POPAT (Farenholtz and Rhodes, 1986).

Table 25. Comparisons of previous Canadian findings with respect to “Pushing and Pulling”.

Task	2007 (UCFV)		1999 (UCFV)		1988 (RCMP)		1986 (JIBC)	
	Freq.	Median	Freq.	Median	Freq.	Median	Freq.	Median
Pushing	23 %	81 kg	36 %	80 kg	7.5 %	61 kg	3.3 %	41 kg
		8 m		2 m		4.6 m		3 m
Pulling	24 %	87 kg	40 %	80 kg	16 %	61 kg	4.6 %	60 kg
		6 m		3 m		9.1 m		3 m

2007 (UCFV) – Present results

1999 (UCFV) – Anderson and Plecas, 1999

1988 (RCMP) – RCMP data from Bonneau, 1988

1986 (JIBC) – JIBC data from Farenholtz and Rhodes, 1986

For the time being, we recommend:

- To maintaining the 36 kg (80 lbs) resistance for the push and pull activities for the reasons outlined in the Historical Overview of PARE.

Within the next three years (with the most the recent research on this topic dating back to 1990), we also recommend:

- To investigate the resistance that can be exerted by both young male and female subjects (RCMP applicants, cadets, and/or Police officer) using the push/pull unit.
- To investigate the resistance that can be exerted by both young male and female subjects (students or prisoners) using the push/pull unit.

Weight Carry Section:

As reported elsewhere in the literature (Anderson and Plecas, 1999; Anderson, Plecas and Segger 2000; Farenholtz and Rhodes, 1990), the most frequently lifted and carried object is a male suspect. In critical incidents in the present study 34% of the officers cited lifting and carrying, and 11% reported dragging. Originally, the lift and carry activity was placed in the POPAT instead of dragging to allow for better standardization. This was subsequently maintained in PARE.

Lifting, carrying below the waist and dragging are often performed in the “removal of the problem” (see Table 26). While the inclusion of a Weight Carry Section in PARE is supported by the current and previous task analysis, there are some indications that this activity offers very little discrimination value. People performing the test suggest that less than 1% of the participants fail this particular task. With a success rate greater than 99%, the value of maintaining

this section of the test in its present format could be questioned. In addition, when considering that the most frequently lifted and carried “object” is a male suspect, it may be worth considering different avenues to modify or replace this section of the test.

Table 26. Comparison of previous Canadian findings with respect to lifting, carrying, and dragging.

Task	2007 (UCFV)		1999 (UCFV)		1988 (RCMP)		1986 (JIBC)	
	Freq.	Median	Freq.	Median	Freq.	Median	Freq.	Median
Lift/Carry	24 %	76 kg	46 %	75 kg	34 %	31 kg	13 %	27.3 kg
		17 m		5 m		15 m		7.6 m
Dragging	11 %	83 kg	22 %	80 kg			4.6 %	60 kg
		6 m		5 m				3 m

2007 (UCFV) – present results

1999 (UCFV) – Anderson and Plecas, 1999

1988 (RCMP) – RCMP data from Bonneau, 1988

1986 (JIBC) – JIBC data from Farenholtz and Rhodes, 1986

One option would be to increase the weight of the bag, used for the Weight Carry section, to a value comparable to the average male suspects. While this option could be supported by the task analysis it may generate unnecessary risks associated with having to fully lift and carry a heavy object over a set distance.

A more convenient and safer approach may be to replace the Weight Carry section by a Dummy Drag. This would help simulate the ability of having to partially lift and carry a person, dragging the person over a set distance. It would also add to the face validity of the test by using a Dummy replicating the need to lift, carry and/or drag a male suspect as part of police work.

We recommend:

- To replace the Weight Carry section by a Dummy Drag using a value comparable to the average weight of male suspects;
- To have the Dummy Drag section considered as a pass/fail item and to not be included in the final time;
- To include the skill of lifting and carrying a real person as part of the Operational Skills Maintenance of RCMP police officers, not only for cadets training.

Considerations for additional elements in the PARE:

When examining the task analysis data and the development of other physical abilities test for police work we can consider some additions to the PARE. These would be related to tasks that have identified in the analysis but that are not included in PARE, namely the physical abilities required for handcuffing and manipulating objects.

Handcuffing simulation: In real life, tussling, pushing, pulling, and fighting to gain control over an uncooperative suspect is followed immediately by handcuffing in 76% of the encounters (See table 21). Handcuffing requires a certain set of skills which are taught at the Training academy and as part of the Operational Skill Maintenance for police officers. But handcuffing also requires a certain degree of physical abilities (independent of skills) in order to be able to perform the task. These physical abilities are not included in PARE but have been included in other physical abilities tests used in the police world.

The Ontario Physical Readiness Evaluation for Police (PREP) test (Ontario Ministry of Public Safety and Security, 2002) includes a section using a handcuffing simulator where the person has to “depress the handles on the grips of both arms of the simulator. It takes 14.5 kg (32 lb) of force to depress each grip. With the grip constantly depressed, the arms of the equipment are forced together and then returned to their starting position. It takes 16 kg (35 lb) of force to retract each arm.” Requiring police constable candidates in Ontario to pass the PREP gained the support of the Ontario Human Rights Commission which found it to be a reasonable and bona fide requirement in 2002.

We recommend:

- To add a Handcuffing Section in PARE, using the same simulator, protocol and weight as for the PREP;
- To include the Handcuffing Section immediately after the Push/Pull Section and before the Weight Carry Section
- For the Handcuffing Section to be timed and included in the final PARE time.

Manipulating an object: Manipulation of an object such as a radio or flashlight is frequently performed (Anderson and Plecas, 1999). The recent Test d’Aptitudes Physiques – École Nationale de Police du Québec (TAP-ENPQ) developed by Leger and colleagues (Leger, 2004) used as part of the selection process for candidates at the Québec Police Academy requires the use of a flashlight to trigger a photo-cell that initiates and concludes the timing of the run. This task demonstrates fine motor control in a rested and fatigued state. This element may be related to use of a flashlight, or, use of a firearm under these conditions.

We recommend:

- Investigating the potential merits of including a similar task as part of the PARE

Further Information Required:

Finally, in order to collect data from those that work with the PARE on a day-to-day basis, with RCMP members, it would be useful to collect data from those that administer the PARE protocol to RCMP members prior to any re-development initiatives. This questionnaire can glean information from PARE administrators concerning their perception of the test and potential modifications based on member feedback they receive in the field (see attached questionnaire in Appendix C). Some of this information may already exist within the RCMP (Girard et al., 2003).

We recommend:

- To collect data from PARE Administrators for RCMP applicants, cadets and police officers

Where to From Here?

The first phase of bona fide occupational test development includes a comprehensive job review and task analysis, as described in this report. Following this process, discrete items are chosen for inclusion in the test and the test is designed. As the new test in this case would be a modification of the PARE, this phase would involve testing new additions to the PARE which, after expert review, may include: the new obstacle course section (with a higher barrier and no controlled falls); the revised push/pull section (with only two controlled falls between the push and the pull); the new handcuffing section (the same as the one used in PREP); the new Dummy Drag section replacing the weight carry section; and the potential use of a light-sensors for a timing switch (triggered by pointing a flashlight at it).

Once the revised test was be developed and found to be representative, a criterion score would need to be developed to reflect the minimal occupational requirement – a score that below which performance is unsatisfactory as the satisfactory performance of job tasks is unlikely. This phase would require a lengthy process of collecting data on a pool of applicant, cadets and police officers, and analysing the results of both time and the representativeness of each discrete item through the use of a Likert Scale. Using the data from the participants (mean, mean +1 SD, mean +2 SD, mean +3 SD, mean +4 SD) videos would be developed depicting the speed at which subjects would move through each segment of the test. These performances would be viewed by subject matter experts and be determined to be either acceptable or not acceptable for completion of work in the field (see Sothman et al., 2004). This would help determine a performance criteria based on the point where subject matter experts could no longer agree if the performance time was acceptable or not. This criteria could then be used to examine adverse impact (see Figure 3). This portion of test development may well take 18-24 months and require at least 1 full time employee to coordinate data collection, coding and assembly.

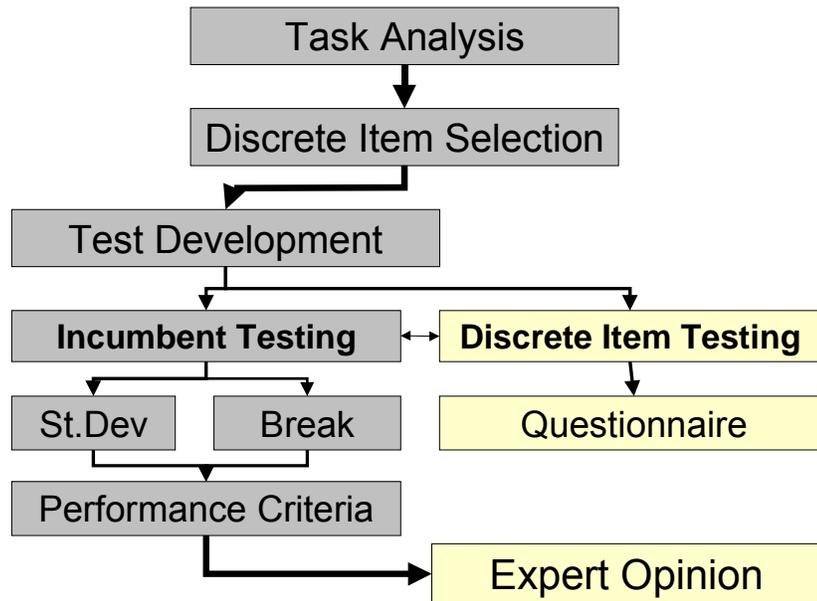


Figure 3: An overview of the bona fide occupational requirement “test development” phase.

While consideration should be given to the enhancement of the PARE, the current and previous task analysis do support the test in its actual format. The actual PARE is also well supported by RCMP police officers who find it to be representative or very representative of police work (Girard et al., 2003). Several other Canadian police forces also report using the PARE as part of their candidate selection and with their police officers. While there appears to be sufficient data and support from the field to continue the use of the PARE in its present format, the RCMP should consider updating the PARE and conducting further research to examine the recommended enhancements and their implementation in the near future.

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Appendix A

Physical Work Record Survey Form

Appendix B

Critical Incident Survey Form

Appendix C

PARE Questionnaire

Phase 3: Lift and Carry

The lift and carry segment is, in general:

Very Realistic	Realistic		Not Realistic	Very Unrealistic
<input type="checkbox"/>				

Rate each of the following: Very Realistic Very Unrealistic

The length of the carry	<input type="checkbox"/>				
The weight of the carry	<input type="checkbox"/>				
Time provided	<input type="checkbox"/>				

Comments: _____

Professional Opinion:

If reconstructing the PARE what elements would you absolutely retain?

What would you add to the test?