

Title: Identifying and characterising the physical demands for an Australian specialist policing unit

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ABSTRACT

Many police organisations incorporate specialist policing roles where incumbents are tasked with providing operational response capabilities above and beyond the general duties policing role. The current research utilised subjective job task analysis methods to identify and characterise the physically demanding, frequently occurring and operationally important tasks, as well as the dominant fitness component for each task, inherent to specialist policing roles in an Australian policing organisation. This was achieved through engagement with subject matter experts and online survey responses from specialist police incumbents. In total, 11 criterion tasks were identified, which covered a range of physical capacities including muscular strength, muscular endurance and aerobic power. The most physically demanding tasks included those with an arrest component, requiring high muscular strength and power capacities. Having identified the criterion tasks, three operational scenarios were constructed, which incorporated each of the 11 tasks in different operational contexts. The criterion tasks and composite scenarios will allow practitioners within specialised police units to develop evidence-based strategies, including physical selection procedures and physical training programs, specific to the demands of their work.

Keywords: job task analysis; police; physical employment tests; criterion tasks

1. INTRODUCTION

Global trends indicate that various forms of crime have remained steady in the past decade, with some forms of criminal activity actually increasing (UN, 2015). As crime evolves and diversifies, policing organisations need to become more adaptable, and officers trained to respond to new and unique challenges. One element of this challenge is remaining physically capable of dealing with the types of physical challenges inherent to police work. It has long been recognised that policing roles entail unique physical movements such as wrestling and restraining, induced by crowd and offender intervention, resolution of physical disputes, and victim rescues (Charles, 1982). However it is also well documented that policing roles can be characterised as highly sedentary (Lonsway, 2003), often with prolonged periods of inactivity. On the basis of such fluctuations in physical demands, policing roles have been described as low-intensity interspersed with relatively short periods of high-intensity activity (Andersen et al. 2001; Mol and Visser, 2004). The current state of knowledge regarding the physical demands of police work largely originates from research that has profiled the physical demands of general duty police officers, (Charles, 1982), or analysis of the task demands inherent to specific job roles (Mol and Visser, 2004). Where general duties officers are responsible for the prevention of crime and maintenance of the law, specialist policing units (SPUs) provide operational response capabilities above and beyond the general duties policing role, often in high-threat situations. In Victoria, Australia, there exists one such SPU (VicPol, 2015). The unit provides a rapid-response capability and comprises officers who are highly trained and proficient in weapons and tactics. Consequently, in addition to the baseline physical capabilities necessary for general duty roles, SPU personnel may require advanced physical conditioning to work safely and productively in hostile environments.

Developing a robust and comprehensive understanding of occupational roles requires the completion of a job task analysis, which identifies the physical capacities inherent to the tasks performed by incumbent personnel (Payne and Harvey, 2010; Rayson, 2000). Such analyses can be undertaken using subjective or objective methods (Larsen and Aisbett, 2012), with subjective analysis being common practice in emergency response or safety-critical roles, where objective measures may be otherwise unattainable (Tipton et al. 2012). In such contexts, the experiences of incumbent personnel, supervisors, and other and subject matter experts (SME) are harvested to identify and characterise discrete tasks (Tipton, 2012). Their characterisation usually includes perceived physical demand, frequency of completion, operational importance, and predominant fitness component (Larsen and Aisbett, 2012). Thereafter they are distilled into the most demanding or important tasks (Larsen and Aisbett, 2012), often referred to as ‘criterion’ tasks which are thought to capture the inherent requirements of the occupation (Tipton, 2012). Once a job task analysis has been

performed at the task-level, it is also important for researchers and organisations to combine the tasks into a relevant operational sequence for training and testing purposes. Development of these scenarios also reflects the fact that job tasks are unlikely to occur in isolation during a shift.

Where validated job task analysis procedures have been documented amongst North American and European police officers (Bonneau and Brown, 1995; Farenholtz and Rhodes, 1990; Gledhill, 2001; Mol and Visser, 2004), there is a paucity of research detailing the inherent job demands of Australia police officers. Furthermore, there is little published research outlining the job demands of SPUs in any international jurisdiction. Currently, information exists on SPUs functioning in Canada (McGill et al. 2013) and the United States (Pryor et al. 2014), however such research relates to the physical fitness profiles of incumbents and does not describe the job demands explicitly. Given the scarcity of research detailing the specific physical demands of Australian policing officers and SPUs in general, the aim of the current study was to conduct a job task analysis on an Australian SPU using established subjective job task analysis methods. Identifying the inherent physical demands for this SPU will provide an important foundation for specialist policing units to implement strategies relating to the physical performance of operational personnel, including physical training, physical selection procedures, injury management, and return to work policy.

2.0. MATERIALS AND METHODS

This paper describes a subjective job task analysis, incorporating a series of consultative and collaborative techniques between investigators and SPU personnel to establish criterion tasks and representative operational scenarios. It is important that a number of SME are employed during subjective analysis stages, to ensure individual responses are aggregated as a way of overcoming any individual bias in the job description (Landey and Vasey, 1991). Our research employed four discrete stages, run in sequence, as described in the remainder of this section (2.1 to 2.4). Similar to the four stages of job task analysis conducted by Patterson et al. (2008), the current research employed elements of literature review, SME consultation, and subjective feedback mechanisms. Participants in the current research included a combination of SPU SME and incumbent officers, with each cohort involved at various stages of the experimental protocol. The SME cohort was put together based on advice received by Victoria Police. All SME were currently active in SPU field operations. These panel members were stratified according to experience, with three members accruing one to three years' SPU experience, two members with three to five years' experience, and two panel members with more than five years' experience. This stratified approach aligns with recommendations made in our earlier work (Larsen and Aisbett, 2012) that perceptions of task frequency vary with experience and therefore

small SME committees should represent a range of experience levels. All experimental procedures were approved by the Deakin University Human Research Ethics Committee, the Victoria Police Research Coordinating Committee and the Victoria Police Human Research Ethics Committee prior to the commencement of the research.

2.1. Review of the literature

The initial stage of the job task analysis required investigators to develop a comprehensive understanding of SPU operational duties, through review of the organisational literature. Literature in this context is defined as policy documentation, standard operating procedures, training manuals, and any other supporting documentation that provided knowledge on SPU roles, responsibilities, tasks, training strategies, and equipment usage (Larsen and Aisbett, 2012). This approach reflects similar preliminary actions adopted by Arvey and Landon (1992), who reviewed organisational documentation in the development of physical activity categories for general duty police officers in the US. The review of literature lead to the development of a job task inventory, which listed all operational tasks. Upon construction of the job task inventory, investigators engaged with each member of the SME panel to independently assess the inventory and provide feedback to enable task categorisation and inform task validity.

2.2. Synthesis of Job Task Inventory

Following the review of the literature and development of the job task inventory, a workshop was undertaken between investigators and the SME panel. The purpose of the workshop was to synthesize the current list of job tasks into a list of common and physically demanding tasks that would subsequently be included in an online survey, through consultation between investigators and SME. The SME panel was provided with a 'workbook' of all of the job tasks identified in the literature review, and were asked to individually rank these tasks in terms of task frequency and physical demand. They provided their individual responses to the research team who collated these results. The group results were then presented in an SME panel session where task frequency and demand ratings could be finalised, debated, and resolved. The two-stage (individual assessment, followed by group discussion) process parallels the multi-round consultation used in the Delphi technique recommended as best practice for small group job task analyses research (Larsen & Aisbett, 2012).

2.3. Online Survey

Upon synthesis of the job task inventory, investigators developed an online survey to be distributed to the entire SPU incumbent workforce. The survey included the newly established list of frequently performed and physically

demanding tasks, and underwent extensive pilot testing and re-testing with SME members (who did not participate in the survey stage of the research) to maximise comprehension and response clarity. Subsequently, the survey was disseminated amongst the SPU workforce via a Deakin University survey platform. For each job task included in the survey, the job task was briefly described (see Table 3) and respondents were asked to respond to four distinct categories: (i) task frequency, (ii) physical demand, (iii) operational importance, and (iv) fitness components (response options are shown in Table 1). Thus, each question in the survey was structured in the same way; only the task itself changed. The terminology for each response has been adopted from previous job task analyses surveys (Jamnik et al. 2010; Larsen and Aisbett, 2012). The definition for each fitness component (Beache and Earle, 2008), along with a working example (Appendix A), was included to enhance participant understanding. For the task frequency category, respondents were further asked to delineate between what they do operationally and their training requirements. The inclusion of the ‘training’ context was used to capture tasks that may be performed infrequently ‘on the job’ but are a necessity to maintain operational proficiency (e.g. effectively employing a firearm; Larsen and Aisbett, 2012).

Table 1: Categories and response options for physically demanding tasks included in the online survey.

	Task Frequency	Physical Demand	Operational Importance	Fitness Component*
Response Options	(1) Each shift	(0) Task not completed	(1) Not at all	(0) None
	(2) Weekly	(1) None	(2) Low	(1) Aerobic power
	(3) Monthly	(2) Very light	(3) Slightly	(2) Anaerobic power
	(4) Every three months [^]	(3) Light	(4) Somewhat	(3) Muscular power
	(5) Every six months	(4) Moderate [^]	(5) Moderately	(4) Muscular strength
	(6) Yearly	(5) Heavy	(6) Very [^]	(5) Muscular endurance
	(7) Never performed only witnessed	(6) Very heavy	(7) Extremely	(6) Agility
	(8) Neither witnessed nor performed	(7) Maximum		

[^] Responses were delimited, based on this rating within the scale. * Respondents asked to provide the dominant fitness component for each task

Owing to the categorical nature of the questions, responses were presented as mode data, indicating the most frequent response for each category within the survey (Larsen and Aisbett, 2012). If a survey respondent reported having not performed a task (in both operations and training), any response relating to physical demand and fitness component from that respondent was disregarded. Analysis of the data included the implementation of cut-off scores, primarily to establish the commonly performed and/or physically demanding tasks. These cut-off scores were 4 for performance frequency and physical demand (equivalent to ‘every three months’ and ‘moderate’ respectively), and 6 for

operational importance (equivalent to 'very important'). A task was included if it was performed at least 'every three months' (either operationally or in training) by a minimum of 75% of respondents and was deemed 'moderate' or higher in physical demand by at least 50% of respondents. This removed tasks which were reported as 'rarely' conducted and not physically demanding to perform. The task 'Communicate via radio', deemed by SME to be frequently performed, low in physical demand, and highly important was included as a method to ascertain participant understanding and response validity.

2.4. Criterion Task Identification & Development of Operational Scenarios

The concluding phase involved a final workshop between investigators and the SME panel. In the early stages of the workshop, the SME panel were presented with the outcomes from the previous stage. Workshop participants were asked to re-consider these tasks to verify whether these were indeed the appropriate tasks. Once verified, the final list of tasks were considered the criterion tasks, representing those most physically demanding, frequently occurring, and critical to operational roles (Tipton, 2012).

Using these criterion tasks, SME were asked to articulate typical operational scenarios factoring in the common sequencing of tasks. The development of operational scenarios would provide a realistic work-flow pattern where performance on a single tasks may affect performance on subsequent tasks, as would occur in operations. Investigators reminded SME that, if appropriate, it was permissible to include each discrete task into more than one operational scenario. Following the development of the scenarios, SMEs were further required to ascribe performance parameters to each scenario, including typical duration, urgency of the scenario (akin to performance intensity), number of personnel required, equipment used, and the typical operating/threat environment. Information relating to the operational scenarios was provided in a qualitative account of the work chronology, described as a set of instructions which relate to the sequence of tasks.

3. RESULTS

Descriptive characteristics of the SME panel and incumbent SPU officers are presented in Table 2.

Table 2: Descriptive characteristics of the two study cohorts; the subject matter expert (SME) panel and the incumbent SPU officers.

Characteristic	SME panel (n=8 males)		Incumbent SPU officers (n=78 males, 3 females)	
	Mean \pm SD	Range	Mean \pm SD	Range
Age (y)	36 \pm 5	30 - 43	37 \pm 7	25 - 56
VicPol [†] service (y)	10 \pm 4	6 - 19	13 \pm 7	2 - 32
SPU service (y)	3 \pm 2	1 - 5	4 \pm 4	1 - 20

[†]VicPol = Victoria Police. State police force, Victoria, Australia. SPU = specialist policing unit.

3.1. Review of the Literature

The review of organisational literature led to the development of a task inventory comprising 68 tasks. Upon examination of the types of tasks included in this inventory, and after feedback was received from SME, investigators were able to classify each task into one of six categories: (1) administration/advisory tasks, (2) employ weapons systems, (3) use of physical force, (4) high stamina/endurance tasks, (5) chemical/biological/radiation incidents, and (6) negotiator/close personal protection/escort tasks. All 68 tasks, grouped into their respective categories, were presented to the SME during the initial workshop.

3.2. Synthesis of Job Task Inventory

As a result of discussions during the workshop, all tasks within the ‘chemical/biological/radiation incidents’ category were excluded due to this incident response type as this incident response type is seldom performed by SPU personnel. After removal of those tasks, the panel reached agreement on the 16 most frequent and physically demanding tasks that should be further investigated in the online survey. One non-physically demanding task, ‘Communicate via radio’, was deliberately listed as a validity check for the subsequent online survey.

3.3. Online Survey

Eighty-one incumbent SPU officers completed the online survey, which reflects 50.6% of the total SPU population. The responses to the online survey (comprising the 16 tasks identified in the Synthesis of Job Task Inventory) are contained in Table 3. It was found that there was considerable variability in the responses for the three survey categories: task frequency, physical demand and importance. Regarding performance frequency, the most common response was ‘yearly’ for operations and ‘monthly’ for training. In general, tasks were performed more frequently in training, when compared to operations. For ratings of physical demand, all possible responses (none – maximum)

were cited at least once, with half of the tasks having a physical demand rating of ‘moderate’ or above and half the tasks having a rating of ‘light’ or below. Finally, when examining the importance ratings, the majority of tasks (12 out of 16) had an importance rating of ‘very’ or greater, with six of these tasks having the maximum possible rating, ‘extremely’.

Table 3: Online survey responses from incumbent SPU personnel for 16 tasks presented. Mode responses are shown (including the percentage of responses this encapsulated) along with the percentage of responses that met inclusion criteria (i.e. performed at least every 3 months; physical demand rated ‘moderate’ (4) or above; importance rated ‘very important’ (6) or above).

Task Description	Task Frequency				Physical Demand		Importance	
	Operations		Training					
	Mode	≥ 3 months	Mode	≥ 3 months	Mode	≥ 4*	Mode	≥ 6^
Cell clearance	6 32%	20%	4 30%	53%	5 31%	90%	5 24%	31%
Forced entry searches utilising specialist equipment (e.g. ram, hux bar)	6 32%	28%	3 54%	91%	4 40%	98%	7 41%	81%
Carry additional equipment during deployment (e.g. ram, ladder)	2 35%	87%	3 51%	90%	4 40%	88%	6 47%	69%
Fire a shotgun	7 44%	6%	4 41%	86%	3 37%	41%	6 40%	75%
Wrestle, restrain and handcuff someone resisting arrest while in full SPU kit	3 32%	61%	3 41%	80%	7 33%	100%	6 38%	72%
Load/unload equipment	1 97%	99%	1 65%	92%	2 33%	31%	7 44%	81%
Fire a Taser (may include removing probes)	7 50%	8%	4 44%	77%	2 35%	8%	7 48%	89%
Fire a semi-automatic weapon	8 93%	7%	3 57%	94%	2 42%	15%	7 48%	85%
Run long distances in full SPU kit in support of dog squad operations	8 30%	27%	4 30%	44%	6 42%	100%	5 30%	38%
Stand and/or sit in full SPU kit for extended periods in varied climatic conditions	3 37%	97%	3 45%	87%	5 27%	76%	6 31%	54%
Negotiate obstacles during cordon and contain activities in full SPU kit (e.g. scaling a fence)	3 36%	90%	3 39%	83%	5 41%	91%	6 42%	62%
Respond to suspicious substance/package incidents	6 30%	25%	6 40%	13%	1 46%	8%	4 24%	23%
Safely handle and deploy the baton	6 39%	18%	4 35%	56%	2 42%	22%	2 22%	32%
Deploy from vehicles continuously whilst performing close personal protection and / or high-risk escorts	8 35%	49%	8 27%	30%	2 27%	36%	6 28%	48%
Maintain the required level of physical fitness	1 73%	95%	1 41%	93%	4 35%	96%	7 46%	89%
Communicate via radio	1 94%	99%	1 36%	94%	1 72%	0%	7 51%	90%

*Score of 4 corresponds to ‘moderate’ physical demand. ^Score of 6 corresponds to ‘very important’ for operational importance.

3.4. Criterion Task Identification & Development of Operational Scenarios

From the original list of 16 tasks presented to survey respondents, five tasks were eliminated, leaving 11 tasks for final consideration. Three of the five task eliminations were as a result of failing to meet the requirements for task frequency (‘performed at least every three months’), physical demand (‘moderate demand’), and operational importance (‘very important’). One task was eliminated since it was not considered an operational task, and another

task was eliminated since it was only included as a measure of survey response validity. Following the presentation of the remaining 11 tasks from the survey analysis, SME confirmed this to be an accurate and representative list, with no tasks needing to be added or removed. These 11 tasks were therefore identified as the criterion tasks (Table 4).

Table 4: The 11 criterion task identified for the SPU and the dominant fitness component (mode response) cited for each task.

Task Description	Fitness Component
C1: Cell clearance	Muscular Strength
C2: Forced entry searches utilising specialist equipment (e.g. ram, hux bar)	Muscular Power
C3: Carry additional equipment during deployment (e.g. ram, ladder)	Muscular Strength
C4: Fire a shotgun	Muscular Strength
C5: Wrestle, restrain and handcuff someone resisting arrest while in full SPU kit	Muscular Strength
C6: Load/unload equipment	(none)
C7: Fire a Taser (may include removing probes)	(none)
C8: Fire a semi-automatic weapon	Muscular Endurance
C9: Run long distances in full SPU kit in support of dog squad operations	Aerobic Power
C10: Stand and/or sit in full SPU kit for extended periods in varied climatic conditions	Muscular Endurance
C11: Negotiate obstacles during cordon and contain activities in full SPU kit (e.g. scaling a fence)	Agility

As illustrated in Table 4, a range of dominant fitness components were identified across the 11 criterion tasks. The most common dominant fitness component was muscular strength; however, this was only evident amongst four of the 11 criterion tasks. Notably, two criterion tasks ('Load/unload equipment' and 'Fire a Taser') did not include a dominant fitness component.

With the 11 criterion tasks established, SME proceeded to define three operational scenarios, representative of typical task sequences, which encompassed all criterion tasks. These operational scenarios included: (1) extrication of a non-compliant offender from a police cell, (2) supporting a dog squad operation during the tracking and arrest of an alleged offender, and (3) cordoning and containing a suspected offender and/or stronghold. Where scenarios (2) and (3) incorporated several discrete tasks, scenario (1) comprised a single task from the criterion task list ('Cell clearance', Table 4). It was agreed by workshop personnel that this task can exist as a stand-alone scenario, since no tasks precede or follow it in typical operations. Each operational scenario, with an accompanying description of the sequence of tasks, is illustrated in Table 5.

Table 5: Operational scenarios developed for SPU operations. Following the identification of 11 discrete criterion tasks, three operational scenarios were developed. The scenarios represent typical and critical sequences of work tasks common to the SPU operational duties.

Operational Scenario	Description and Progression of Tasks
Extrication of a non-compliant offender from a police cell.	In a team of six execute a cell clearance of a single non-compliant offender. <i>Criterion task(s) included: C1</i>
Supporting a dog squad operation during the tracking and arrest of an alleged offender.	1. Draw gear from storage centres and load into vehicle. 2. Upon arrival at location, don uniform and personal protective equipment. 3. Trail a tracking dog for 10 minutes at an average pace of 10 km.h ⁻¹ (generally performed as repeated efforts with short recovery periods interspersed). 4. Once dog has located offender, perform a short, high effort sprint (typical distance = 50 m) to location of offender. 5. Effect an arrest of the offender, engaging in wrestle, restrain and cuffing actions where necessary. 6. Doff uniform and personal protective equipment and load into vehicle. <i>Criterion task(s) included: C5, C6, C7 and C9</i>
Cordoning and containing a suspected offender stronghold.	1. Draw gear from storage centres and load operational vehicle. 2. Upon arrival at location, don uniform and personal protective equipment. 3. Set cordon (deliberate action to maintain element of surprise and security; usually includes negotiating obstacles and scaling fences). 4. Undertake one of a series of active duties: a. Static duties: maintaining a static weapon hold b. Dynamic duties (EA): effecting an arrest, engaging in wrestle, restrain and cuffing actions where necessary c. Active shooter duties: firing ammunition at a non-compliant offender 5. Doff uniform and personal protective equipment and refurbish. <i>Criterion task(s) included: C2, C3, C4, C5, C6, C7, C8, C10 and C11</i>

The three operational scenarios encapsulated the 11 criterion tasks. Notably, some of these tasks (e.g., ‘Wrestle, restrain and handcuff someone resisting arrest while in full SPU kit’ and ‘Load/unload equipment’) appeared in multiple scenarios.

4. DISCUSSION

This paper details a comprehensive job task analysis, which enabled the identification of criterion tasks and the development of operational scenarios inherent to the roles of a SPU within Australia. Through a series of consultations

with SPU subject matter experts and incumbent officers, 11 criterion tasks that represent the most physically demanding and frequently occurring requirements of the job, have been identified. Since operational tasks are rarely performed in isolation, further feedback from study participants allowed these tasks to be contextualised into three operational scenarios, which provide a typical sequencing of tasks common during operations.

Seven of the 11 criterion tasks were rated 'moderate' or higher for physical demand. The task 'Wrestling, restraining and handcuffing someone resisting arrest while in full SPU kit' was perceived to require 'maximum' physical demand and challenge respondents' muscular strength. Muscular strength was also the predominant fitness component for the highly demanding 'Cell clearance' task. The characteristics for these two tasks align with similar duties described by correctional officers operating in Canada, who also identified the importance of muscular strength for completing their inherent job demands (Jamnik, 2010b). The importance of muscular strength for four of the most physically demanding tasks (including firing a shotgun and carrying additional equipment) in the current study also aligns with recent research in general duties police officers. Diler et al. (2014) reported a strong correlation between muscular strength and the capacity to complete 'arrest and restrain' tasks successfully in Norwegian general police. The current results also highlight the sustained and dynamic nature of specialist police work. Respondents identified that standing for long periods and running long distances to support the dog squad, both in full SPU kit, were heavily demanding and challenged their muscular endurance and aerobic power, respectively. They also nominated negotiating obstacles during cordon and contain activities as highly demanding and requiring high levels of agility, whilst forced entry challenged their muscular power and was considered moderately demanding.

For the four tasks which had a physical demand rating of less than 'moderate', the mode response for two of these tasks ('Load/unload equipment' and 'Fire a Taser') for the physical capacities was 'no fitness component'. This is particularly interesting for one of the tasks, "Load/unload equipment", given the heavy nature of some equipment items involved. Perhaps these results indicate that respondents only selected a dominant fitness component for more taxing tasks. Unfortunately, how respondents reached their conclusions cannot be gleaned from online survey procedures. Researchers interested in respondents' decision-making may need to consider workshop approaches to job task analyses, but accept the smaller sample sizes that come with this methodology (Phillips et al. 2012).

When examining the operational performance frequency of tasks, the minority of tasks (5 out of 11) actually had a frequency of 'every three months' or less. Evidently, the majority of criterion tasks are typically performed less than four times a year by SPU personnel, supporting previous descriptors of police duties comprising only intermittent high

intensity work (Andersen et al. 2001; Mol and Visser, 2004). The tasks performed most frequently during operations included 'Carry additional equipment during deployment' and 'Load/unload equipment' which have been reported as common tasks amongst other general duty policing roles (Anderson et al. 2001; Arvey and Landon, 1992). However, perhaps the most important observation from the frequency responses was the discrepancy between the frequency of tasks in operational and training scenarios. The criterion tasks were all rated with a greater frequency during training than during operations, with one exception: 'Carry additional equipment during deployment' (e.g. ram, ladder). This is not surprising, since it would be expected that specialist police officers train for tasks more than carry out live scenarios to maintain competency. Future researchers should consider interrogating training practice in their job task analyses to ensure they are capturing the full demands of the role.

For ratings of task importance it was observed that 9 of the 11 criterion tasks had a rating of 'very' or 'extremely' important. The remaining two tasks, 'Cell clearance' and 'Run long distances in full SPU kit in support of dog squad operations' elicited only 'moderate' importance ratings, but were maintained in the final list because of their high physical demand. The importance ratings were also instrumental in the decisions to re-include tasks which would have otherwise been eliminated based on their physical demand rating. For example, the three tasks involving the firing of a weapon system (shotgun, Taser, semi-automatic weapon) were rated as 'light' or 'very light' in physical demand, yet were included due to their extreme importance for SPU roles. These ratings are in line with previous assessments of policing roles (Arvey and Landon, 1992), where firing weapons ranked as the most important tasks. Similar to the firing weapon tasks, the 'Load/unload' task was re-included based on high level of importance, as 69% of respondents believed the loading and unloading of equipment was 'very' important to SPU roles.

Once criterion tasks had been established, investigators and the SME panel constructed three representative operational scenarios that encompassed all of the criterion tasks. Constructing operational scenarios provides a realistic sequence of work tasks where fatigue may manifest throughout the scenario, affecting physical performance on the latter tasks. The first of these scenarios, 'Extrication of a non-compliant offender from a police cell', was actually a direct replication of a single criterion task, since this task was considered a stand-alone entity. Feedback from the discrete task indicate that the physical demands called upon to perform this scenario are high, where the dominant physical capacity is muscular strength (Table 3). The second operational scenario 'Supporting a dog squad operation during the tracking and arrest of an alleged offender' was associated with a heavy aerobic demand (the prolonged chase component), followed by a demonstration of muscular strength through the wrestle, restrain, and handcuff actions that would comprise an arrest. It was identified for this scenario that the chase element when

supporting the tracker dog was performed for a typical duration of 10 minutes whilst maintaining an average speed of 10 km.h⁻¹. Without personal protective equipment conditions, such a pace may be equivalent to a moderate level of exertion, dependent upon fitness levels (Knapick et al. 1996). However, the additional burden elicited by personal protective equipment worn by police officers (typical mass = 10 kg; Anderson, 2001), and specialist equipment carried by SPU officers, increases the demands considerably. External borne loads during exercise are associated with increases in thermoregulatory and cardiovascular demands as well as reduced tolerance times (Holster et al. 2009; McLellan et al. 1993) when compared to wearing no personal protective equipment. These elevated demands have been demonstrated specifically amongst policing populations (Blacker et al. 2013) when wearing external borne loads.

Like the 'Support dog squad' scenario, the final scenario, 'Cordoning and containing a suspected offender stronghold' comprised a series of tasks characterised by muscular strength demands (e.g., arrest and restrain). However, there were additional physical demands observed in this scenario depending on the whether it eventuated in the static, dynamic, or active shooter phases. For example, in the static phase there is stage of holding the weapon statically whilst focussing on a target, an action which requires a sustained isometric contraction capable of inducing high physiological strain (Bhargava et al. 2004). Furthermore, agility is required during the 'set cordon' stage of this scenario, where personnel may be required to scale objects to reach desired locations. Presumably, these actions also draw on incumbents' muscular power, though it was not identified as the dominant fitness component for this task (Table 4). The development of these scenarios show that a range of fitness components can be required to complete operational tasks in sequence. From the current results, these traits span muscular strength through to power and agility, before or after demonstrations of muscular endurance and aerobic power. The breadth of these fitness components provide a challenge for researchers and organisational personnel striving to develop operationally relevant testing and training regimes to select and condition SPU personnel.

No previous research has identified and characterised the job tasks of an Australian SPU; thus, this study reflects a novel contribution to the literature in this space. Nevertheless, it is important to note that the study utilised solely subjective job task analysis methods (rather than objective), which relies on participant recall and may be susceptible to responder bias. Direct observation of SPU tasks in the field may be impractical or unsafe for JTA practitioners, and emergency service roles inherently contain tasks that are crucial to good performance but occur infrequently (and thus may not be detected within the observation timeframe; Larsen et al, 2012). For these reasons, a subjective job task analysis was considered preferable for this cohort. The study also followed well-established methodology (i.e., through the use of an SME panel and incumbent survey) to increase the accuracy of the results, and thus, the processes

described may prove useful for researchers conducting job task analyses across other occupational domains. Using the results of the current research, a practical next step is to build upon subjective responses with objective data on the task duration, task distance, and objects characteristics (e.g., mass, dimensions) that comprise criterion tasks and operational scenarios. With this additional information, practitioners can construct and validate physical employment tests that incorporate the 11 criterion tasks, the physical capacities which underpin these tasks, and importantly, the order in which they unfold. The implementation of such testing regimes has a flow-on effect for the development of physical training programs, promoting a functionally fit workforce capable of performing the unique job demands of specialist policing roles.

5. CONCLUSIONS

The current research established a series of criterion tasks and representative operational scenarios that embody the inherent physical requirements of a SPU within Australia. In total, 11 criterion tasks representing the most physically demanding, frequently occurring, and important operational SPU tasks were identified. These tasks were then incorporated into three operational scenarios which describe the typical sequence of tasks which would unfold amongst SPU personnel. Understanding the physical requirements of job roles for SPUs predicates strategies relating to the physical performance of SPU personnel, such as physical training programs, physical selection procedures, injury management, and return to work policy.

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APPENDIX A – FITNESS COMPONENT DEFINITIONS

FITNESS COMPONENT	DEFINITION	WORKING EXAMPLE
Aerobic Power	Moderate to long duration sustained effort activities.	Walking 5 km over undulating terrain.
Anaerobic Power	Short duration high intensity activities.	Having to sprint 30 m.
Muscular Power	Activities that require a high level of muscular effort to be applied within a short period of time.	Jumping to scale a wall / fence.
Muscular Strength	Activities that require high levels of muscular effort.	Individually lifting a trunk weighing 30 kg from the ground and placing it into a vehicle or trailer.
Muscular Endurance	Activities that require repeated muscular efforts at a low-moderate level of muscular effort.	Moving or holding relatively light objects for an extended period of time.
Agility	Activities requiring acute changes in direction or changes in body orientation.	Manoeuvring around (or over) an object or into (or within) a tight space.