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Original article

Relationships between an occupationally relevant specialist police physical assessment and unloaded and loaded longer duration events

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Abstract

Specialist law enforcement personnel, including Police Tactical Group (PTG) operators, are required to perform a diverse range of physically demanding tasks under high-stress conditions. These tasks typically include short duration, explosive, high-intensity activities, such as casualty drags and obstacle negotiation, as well as extended-duration load carriage events, such as rural area searches. These tasks are performed while wearing and carrying personal protective equipment and a combat rifle. To assess occupational readiness, physical fitness assessments are routinely conducted within these units. The aim of this study was to determine relationships between an occupationally relevant urban-based fitness assessment (RUSH) and other, longer duration assessments, be they loaded or unloaded. Retrospective data from 145 male PTG operators (mean body weight = 91.07±10.45kg, mean age = 36.0±6.5yrs) from nine different PTG units were analyzed. Timed performance data were provided for the RUSH, a 2.4km and a 5km unloaded run and a 2km (17.5kg) and a 10km (25kg) loaded march. Correlations were determined via a Spearman's Rho with alpha levels set at 0.05. The unloaded 2.4km run was the only assessment to show a statistically significant (p=0.041), albeit weak (r=0.217), correlation with RUSH performance. These findings suggest that the RUSH assessment captures distinct physical fitness attributes not currently assessed in endurance-based events, be they unloaded or loaded. The RUSH assessment, designed to simulate intense, short duration, urban tasks, may offer valuable insights into operational readiness and could serve as a valuable component to the PTG fitness assessment battery.

Keywords: tactical, law enforcement, load carriage, physical employment standards, fitness testing

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Introduction

Tactical special operations law enforcement units are comprised of personnel specially trained to a higher level than general duties officers (Irving et al., 2019; Thomas et al., 2017). These elite units are internationally recognized under various designations, including Special Operations Units, Tactical Response Groups, and in the United States, Special Weapons and Tactics (SWAT) teams (Davis et al., 2016; Sarao, 2014). In Australia and New Zealand, comparable units are known as Police Tactical Groups (PTG), with individual members referred to as tactical group members or operators (Irving et al., 2019; Thomas et al., 2019). These PTG units are routinely engaged in high-risk, short-notice operations that demand rapid and complex decision-making, often performed under considerable psychological and physiological stress (Irving et al., 2019; Maupin et al., 2018; Robinson et al., 2018). Tasks typically involve the execution of high-risk warrants, emergent entries, apprehension of armed offenders, counter-terrorism responses, hostage rescue scenarios, and, in some jurisdictions, long range reconnaissance and covert surveillance missions (Irving et al., 2019; Marins et al., 2020). These duties are performed while carrying substantial occupational loads, often up to 28kg, which imposes significant strain on both the metabolic and musculoskeletal systems. (Irving et al., 2019; Orr et al., 2022; Thomas et al., 2017). During operations, tactical operators may also be required to execute fire and movement tactics, negotiate physical barriers, and extract injured civilians or fellow officers to safety (Irving et al., 2019). Such demands highlight the critical importance of physical capability within this specialist policing domain.

In their investigation of the occupational role and scope of PTG operators, Irving et al., (2019) identified a high risk warrant execution and long range rural search operations as being the two most common tasks performed. These tasks represent distinct physiological profiles. Where warrant executions can be typified as short-duration, high-intensity, activities, long range rural searches are generally more prolonged, even multi-day, activities (Irving et al., 2019; Orr et al., 2019). Importantly, both of these tasks, while taxing different energy systems, include elements of load carriage which is known to impact on tactical task performance (e.g., mobility and attention to task (Carlton et al., 2014)) in these high-risk environments (Orr et al., 2019; Robinson et al., 2018).

In law enforcement short duration tasks are often assessed through obstacle courses, designed to replicate explosive work in urban environments. Obstacles may include scaling walls and fences, sprinting, crawling, and dragging injured colleagues or members of the public to safety (Dawes et al., 2022; Lockie, Pope, et al., 2020). Such events require anaerobic power, absolute strength, and the ability to express power through explosive movements (Dawes et al., 2022; Lockie, Pope, et al., 2020; Moreno et al., 2019; Sax van der Weyden et al., 2021). For example, casualty drags, which often feature in obstacle course evaluations, are short-duration (i.e., <20m), high-intensity events that rely heavily on absolute muscular strength, particularly in the upper body, posterior chain, and hand grip (Lockie, Moreno, et al., 2022; Lockie, Moreno, et al., 2020; Moreno et al., 2019). In contrast, for longer duration load carriage tasks, which are conducted over greater distances and durations, relative strength, muscular endurance, and aerobic fitness are required (Cooper, 2014; Knapik et al., 2012; Mala et al., 2015; Orr et al., 2019; Robinson et al., 2018). While both task types (being short explosive obstacle courses and long duration load carriage activities) are vital to PTG occupational readiness, they rely on distinct physical modalities and energy systems (Lockie, Balfany, et al., 2019; Orr, 2012; Robinson et al., 2018). Nonetheless, there are some commonalities. Both typically involve operators to wear occupational loads, and both are influenced by critical velocity (i.e. the maximum speed or power output that can be maintained for a prolonged duration). Critical velocity has demonstrated a significant relationship with sprinting (Dawes et al., 2015; Dawes et al., 2017; Winters et al., 2021), performance in tactical load carriage tasks (Dicks, 2019), and has the added benefit of increasing survivability in combat environments (Dicks et al., 2021; Dicks & Pettitt, 2021; Lockie, Dawes, et al., 2019).

Given the distinct physical demands of short duration versus extended duration tasks, there is a need for an assessment tool which accurately reflects the operational realities of PTG operators. The urban rush (RUSH) is a new high-intensity, task-specific physical assessment designed to simulate tactical movements in urban environments. Unlike conventional obstacle courses which are typically completed by general duties police officers who do not wear tactical loads (Dawes et al., 2022; Janković et al., 2015; Lockie, Beitzel, et al., 2022; Lockie et al., 2018; Lockie, Moreno, Rodas, et al., 2021; Lockie et al., 2024; Lockie, Pope, et al., 2020; Stanish et al., 1999), the RUSH involves short, explosive efforts that closely replicate operational tasks such as crawling, sprinting, engaging targets, and dragging a casualty, all performed while wearing operational Personal Protective Equipment (PPE), and carrying a primary weapon system (i.e. a combat rifle) (Thomas et al., 2019). While the RUSH assessment has demonstrated relevance to occupational movements and tactical skills, it represents only a portion of the physical profile required for real-world operational roles (Strader et al., 2020; Thomas et al., 2019). Specifically, it may not adequately assess fitness components associated with longer duration tasks, such as sustained load carriage and extended patrol operations (Maupin et al., 2018; Thomas et al., 2019).

Currently, PTG units perform a variety of assessments to evaluate fitness attributes associated with occupational performance. While the 10km pack march wearing 25kg is widely adopted, other tests, including a 2km loaded move wearing 18 kg, and unloaded runs over 2.4km and 5km are used by some units (Thomas et al., 2019). Notably these physical assessments are predominantly aerobic in nature and therefore may not fully reflect the demands of key occupational tasks from which the RUSH test is derived. Given the limited time available in operational settings to conduct comprehensive physical evaluations, it is important to consider whether the RUSH test, despite its occupational relevance, captures distinct fitness components not already measured by existing protocols. Therefore, the aim of this study was to determine relationships between RUSH performance and other longer duration assessments currently used by PTG units, be they unloaded or loaded. It was hypothesized that the RUSH would not be significantly correlated to longer duration assessments currently used by units.

Methods

Experimental approach to the problem

This study was conducted as a retrospective cohort study with data provided by each of the Australia and New Zealand PTG units (n=9). The testing protocols were provided to the PTG trainers and the physical assessment data collected as part of each agency's normal physical training practices undertaken in the workplace. These assessments were supervised by either a qualified physical training instructor, senior PTG instructor, or strength and conditioning specialist depending on the unit's staffing.

Participants

Data were collected from 145 male specialist PTG officers (mean age = 36.2 ± 6.5 years: mean height = 182.3 ± 6.6 cm: mean weight = 91.1 ± 10.5 kg) who were representative of all nine PTG units. The inclusion criteria for this study were: operators had to be a fully qualified and current specialist operations law enforcement officer serving in their respective PTG; and of an operational deployable status (i.e., fully operational). The exclusion criterion was that an officer was on restricted duties due to medical or injury reasons which would prevent them from undertaking the physical protocols of the study. The PTG operators voluntarily completed the physical assessment as part of their general operational and physical training time in their respective specialist workplaces. Ethics approvals for this study were provided by Bond University Human Research Ethics (#15412) The research also adhered to the recommendations of the Declaration of Helsinki (World Medical Association, 1997).

Measurements and Procedures

Prior to the conduct of the five physical assessments, operators self-reported their age in years and height in centimetres. Self-report of these metrics is common in this population and has been found to be reliable (Dawes, 2019). Additionally, each participant was weighed on a scale both loaded and unloaded with the results recorded in kilograms to the nearest 100 grams.

The five physical assessments undertaken were the RUSH, a 2.4km unloaded run, a 5km unloaded run, a 2km loaded walk, and / or a 10km loaded walk. While all members from all units completed the RUSH, there were variations in the other tests with some units only completing either the 2.4km unloaded run, 5km unloaded run, or 2km and 10km loaded events. The research team were not involved in the decisions as to which tests were conducted at the units. All events were completed in the same week with the RUSH completed first and other assessments later in the week and separated by at least 24 hours. The protocols for each test are described below.

The RUSH has been described previously in the literature (Strader et al., 2020; Thomas et al., 2019) but is briefly summarized here. The RUSH assessment comprised of explosive sprints, prone crawls and casualty drags over 10 and 20m distances alternating directions 180 degrees whilst wearing full operational PPE and carrying a primary weapon. At commencement the operators were required to sprint to the first 10m cone then drop into a tactical crawl position, cradling their weapon in a safe manner as they rapidly crawled 10m to an 80kg mannequin, commonly referred to as a dummy. Participants were then required to stand, pick up the dummy under the arms, and walk backwards as fast as possible to the original 10m cone with their rifle slung. Throughout the course the operators were required to achieve a number of static kneeling shooting positions aiming their rifle at a circular target standing 185cm heigh at a distance of 30m. In each case the operators had to align their weapon system with the target as quickly as possible and illuminate the target with the visible red light laser designator affixed to the weapon. Progression could only continue once targeting had been confirmed by instructional staff. At the completion of the first dummy drag and completion of the kneeling unsupported firing position the dummy drag was repeated for a further 10m to the starting position. Once achieving target alignment the operator stood, pivoted 180 degrees and sprinted to the centre 10m cone, repeating the kneeling and target application process. This process of sprinting, changing direction, kneeling and target acquiring continued for an additional 10m (reaching the end), then a continuous 20m (back to the start) before the operators again picked up the dummy and dragged it 20m without stopping. After again adopting the kneeling shooting position, the operator proceeded to sprint 20m to the starting mark. The RUSH course depicted in Figure 1 was conducted indoors in an open gymnasium training space on non-slip dry flooring.

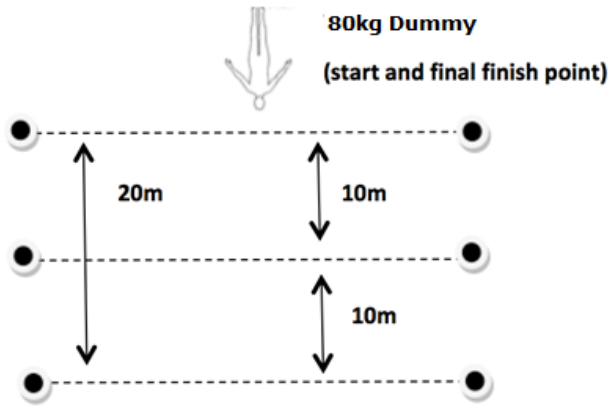

Figure 1. Schematic RUSH test set up.

If the operators stopped voluntarily, fell over, or the instructor ceased the activity due to concerns over the operator's health or safety, the test was ceased, and then restarted after a short rest (minimum of 3 minutes).

All operators were familiar with the test and performed the test once as fast as possible. Each of the operators were dressed based on their role and scope within the PTG. Load for each participant was based on the unit's jurisdictional 'high level' load out requirement (20-25kg) inclusive of their combat rifle (SR15 weighing 3.6kg - unloaded). Prior to the testing, operators underwent a formal warm up and equipment check as per their role.

For the loaded events, the PTG officers undertook the assessments dressed in their standard issue operational boots, fatigues, PPE, pack, and unloaded primary weapon. For the 2.4km event the officers were required to wear their operational PPE, including plate carrier, to a combined weight of 17.5kg and for the 10km March the officers were required to wear their operational issue backpack with a weight of 25kg. For those PTG units who volunteered to complete these two events, the events were undertaken at each of the jurisdictional policing agencies PTG unit base headquarters. The marches were conducted on set courses in these locations over flat ground on a mixture of surfaces, bitumen, concrete pavement, grass and hard dirt or soil looped tracks. These distances are standard practiced distances for these units, and all have dedicated routes regularly used as part of their occupational physical training, barrier assessments, and recruitment selection processes. The officers were requested to complete each of the distances to the best of their ability and were allowed to march or shuffle jog during the activity which replicated operational contexts. The exact locations of these assessment routes were not disclosed due to security provisions given the location of the training areas being in proximity to, if not within, the confines of the unit's bases. As part of the testing protocol however each route was required to be measured and marked utilizing Garmin Oregon 600t handheld GPS system (Garmin, Kansas City, USA) to ensure accuracy and the timed duration of each individual event was recorded by the qualified instructional staff using a handheld timer provided to all the units (Junsed 50, Hart Sport timer, Aspley, Brisbane, Australia). Each operator's completion time for the events was recorded in an excel spreadsheet and provided retrospectively to the researchers who then checked the data and converted the time to seconds.

The 2.4km and 5km timed events respectively were likewise undertaken at each of the jurisdictional PTG unit's base location for each volunteering unit. Each operator was dressed in their standard physical training clothing, traditional, sports shorts, t-shirt or singlet, running shoes-joggers, and sports socks. These events were undertaken unloaded, with no equipment worn or weapon carried. The operators were instructed to run the set distance as fast as possible. The routes, distance measures, supervision and time recording were precisely replicated for the loaded events as described above. All times were recorded in the manner described above.

Statistical analyses

The data were initially provided in a Microsoft Excel (Microsoft Office, 2016) spreadsheet, then transferred to the IBM Statistical Package for Social Sciences (SPSS) Statistics (IBM Corp., 2017) software program for analysis. Time was converted from mins: secs to secs for all timed variables. Once data were descriptively analysed, normality was assessed using the Shapiro-Wilk test. Correlations between the RUSH and timed events (2.4km and 5 km unloaded, and 2km and 10km loaded) were determined through either a Pearson's Correlation for normally distributed data or a Spearman's Rho for non-normally distributed data. For the strengths of correlations 0-0.19 was considered very weak, 0.2-0.39 as weak, 0.4-0.69 as moderate, 0.7-0.89 as strong, and 0.9-1.0 as very strong (Fowler et al., 1998). Alpha levels were set at 0.05 a priori.

Results

Of these 145 male operators for which data were obtained, 89 operators completed the unloaded 2.4 km run, 17 operators completed the unloaded 2 km run, 17 operators completed the 2 km loaded march, and 18 operators completed the 10 km loaded march. Only 6 operators completed more than one of the distance events completing both the 2.4 km and 5 km unloaded runs. Data for 9 operators who completed the RUSH

did not have corresponding distance event results due to their operational requirements. Descriptive data is provided in Table 1.

Table 1. Descriptive data for all variables collected

Variable	Min-Max	Mean ± SD
Age (yrs) (n=145)	25.0 – 60.0	36.2 ± 6.5
Height (cm) (n=145)	165.0 – 206.0	182.3 ± 6.6
Body Weight (kg) (n=145)	68.0 - 122.0	91.1 ± 10.5
Occupational Load (kg) (n=145)	14.0 - 31.4	19.5±2.9
Percentage Body Weight (%) (n=145)	13.7 - 31.2	21.5 ± 3.7
RUSH time (secs) (n=145)	74.0 – 161.0	1:47 ± 00:15
2.4km time (min:secs) (n=89)	1:14-2:41	953.2 ± 217.7
5km time (secs) (n=17)	1808 - 3090	2518.1 ± 372.1
Loaded 2km (secs) (n=18)	720.0 – 1080-2	857.0 ± 86.9
10km time (min:secs) (n=18)	83.01-90	86:45 ± 2:24

As data were not normally distributed a Spearman's Rho correlation was conducted with results presented in Table 2 below. The only distance assessment significantly (p=0.041) correlated with RUSH times was the unloaded 2.4km run, although this relationship was weak (r=0.217). No other variables were significantly related.

Table 2. Spearman's Rho correlations between variables.

Variable	2.4km time	5km time	Loaded 10km time	Loaded 2km time
RUSH(secs)	.217*	-0.075	0.370	0.213

Note: *Significant at $p < 0.05$, **Significant at $p < 0.05$

Discussion

The aim of this study was to determine relationships between RUSH performance and other longer duration assessments used by PTG units, be they unloaded or loaded. It was hypothesized that the RUSH would not be significantly correlated to longer duration assessments currently used by units. This hypothesis was partly proven. While no significant relationships were found between the RUSH and the unloaded 5km run, 2km loaded march, or 10km loaded march, a significant, albeit weak correlation (r=0.217), with the 2.4km unloaded run was found. These findings indicate that the RUSH primarily evaluates specific, task-focused components of fitness that are not strongly associated with performance in longer-duration events. Given that the operational demands of special operations units frequently encompass both short-duration, high-intensity tasks and, extended load carriage missions (Irving et al., 2019), it is important to consider literature that examines the distinct physical requirements associated with each of these occupational modalities (Maupin et al., 2018).

Research suggests that special operations law enforcement personnel may exhibit distinct muscular force profiles and engage different energy systems depending on the specific demands of their operational tasks (Carlson & Jaenen, 2012; Decker et al., 2022; Maupin et al., 2018; Talaber et al., 2022). In a review of the fitness profiles of specialist police officers, Maupin et al., (2018) reported that these personnel possess levels of strength, power, and both anaerobic and aerobic capacity that, in some cases, are comparable to those observed reported in elite athletes. Notably, the authors also highlighted the absence of standardized physical assessment protocols capable of encompassing all these fitness domains within this population. This observation is supported by Zulfiqar et al., (2021) who found that law enforcement agencies generally favor a battery of discrete fitness assessments rather than a single comprehensive measure. Similarly, Orr et al., (2021) described the broad spectrum of fitness requirements for tactical personnel and, correspondingly, the wide variety of assessment methods employed to evaluate them. Further, Orr et al., (2021) emphasized

the inclusion of occupationally relevant specialist physical assessments within tactical populations. As such, incorporating an occupationally relevant assessment such as the RUSH into a broader suite of assessments appears appropriate to reflect the demands placed on specialist tactical police.

Although the RUSH assessment is relatively new, limited research has evaluated its application within specialist police selection processes. Notably, one study reported that RUSH performance did not differentiate between successful and unsuccessful candidates during a selection course, with mean completion times being similar to those reported in this study (1:52 min:secs vs. 1:47 min:secs) (Thomas et al., 2019). In contrast, performance on a 2.4km loaded march significantly distinguished between these groups, suggesting that the latter test may have greater predictive utility for selection outcomes. At first glance, this finding of selection outcomes appears inconsistent with the weak but statistically significant correlation observed in the present study between RUSH performance and the unloaded 2.4km run. However, this difference likely reflects the distinct physiological demands of the two assessments and suggests that these two tests support different physical requirements. The weak correlation between the RUSH and the unloaded 2.4km run may therefore only reflect the shared anaerobic fitness component which can be seen in distance runs (Tharp et al., 1997). The weakness of this relationship may likewise limit the transferability to the longer duration events reported in this study.

As such, the weak relationships between RUSH performance and the 2.4km run does not support that the two tests measure equivalent occupational capabilities. These findings are consistent with those reported by Lockie et al., (2018). who investigated correlations between California's Work Sample Battery Test (WSBT) for law enforcement officers (which included a 99 yard obstacle course (99OC), a 74.84kg victim body drag, chain link fence barrier, solid wall climb and 500 yard run), and various fitness measures inclusive of a 2.4km unloaded run, push ups, sit ups, pull ups, a vertical jump, and a 201m run. Akin to the findings reported in this paper, a weak correlation was found between the 99OC and the 2.4km run ($r=0.026$, $p<0.01$), while measures of strength and short distance sprints were more strongly associated ($r=-0.33$ to 0.48, $p<0.05$) with the 99OC. These results further support the premise that assessments such as the RUSH are more reflective of task specific strength and anaerobic power than that of general aerobic capacity.

Within law enforcement, the use of occupationally relevant obstacle courses to assess physical assessments in general duties officers is common practice (Beck et al., 2015; Birzer & Craig, 1996; Dawes et al., 2022; Koedijk et al., 2020; Mangione et al., 2023; Rhodes & Farenholtz, 1992; Stanish et al., 1999; Weiner et al., 1988). These courses typically involve short bursts of sprinting interspersed with functional tasks such as jumping over barriers, scaling high fences, and victim drags. Such assessments are designed to be both anaerobic and aerobic in nature, reflecting the intermittent high-intensity efforts and sustained physical output required during operational engagements (Lockie et al., 2018; Lockie, Moreno, Cesario, et al., 2021). Many of these obstacle courses are completed without rest and range in duration from 4 minutes onwards. For example, the Physical Abilities Test (PAT) must be completed in 4m:15s (Lindsay et al., 2021; Rhodes & Farenholtz, 1992), the Physical Abilities Requirement Evaluation (PARE) must be completed in ≤4m:45s (Seguin, 2015) and the New Zealand Police Physical Competency Test (PCT) applies a timed standard to ensure operational relevance, (time not listed) (Dawes et al., 2022). As such the repeated, high-intensity efforts with substantial anaerobic contribution and task skill components become increasingly reliant on the aerobic system as the duration extends (Lockie et al., 2023; Rhodes & Farenholtz, 1992; Seguin, 2015). In contrast the WSBT conducted in California Law Enforcement separates each task into discrete components (Lockie et al., 2018). Within the same WSTB, the final 500 yard pursuit run, demonstrated a large correlation with the 2.4km run ($r=0.57$, $p<0.05$), consistent with greater aerobic demand over the longer bout (Lockie et al., 2018). Likewise, in a 400-m police physical competency test that strings multiple tasks together without rest, Lockie et al., (2023) found that the 2.4km run correlated strongly with completion time ($r_s=0.70$, $p<0.001$) and explained 42% of the variance in completion times. Earlier work by Stanish et al., (1999)

examining the Royal Canadian Mounted Police's PARE demonstrated that performance was influenced by a combination of muscular strength, muscular endurance, agility, and aerobic power. Specifically upper-body strength, explosive leg power, and agility explained 79% of PARE time variability among male applicants (Stanish et al., 1999). Consistent findings in broader police populations further support the predictive value of muscular endurance, and explosive leg power, and of aerobic fitness in simulated duty tasks of increasing durations (Teixeira et al., 2019).

The key distinction between these established assessments and the RUSH is in the integration of occupational load, none of the aforementioned tests required officers to perform tasks while wearing full standard occupational loads, this is of importance to note as wearing of occupational loads as light as 5kg is known to reduce officer mobility (Carlton et al., 2014; Joseph et al., 2018), power output (Orr et al., 2019; Thomas et al., 2017), speed (Dicks, 2019; Dicks & Pettitt, 2021), and agility (Joseph et al., 2018; Thomas et al., 2017).

The absence of significant relationships between the RUSH and loaded long duration events is unsurprising given the distinct physical characteristics underpinning these tasks. Robinson et al., (2018) investigated the relationship between strength, power, and aerobic fitness on 5km load carriage performance (load = 25kg). While strength and power variables were significantly correlated with load carriage performance, aerobic fitness displayed the strongest and most significant correlation (r=-0.712, -0.709 and -0.711 for trials respectively). These findings are supported by Feigel et al., (2024) who likewise found aerobic fitness to be the best predictor of soldier performance when completing a 2km loaded march. Conversely, tasks included in the RUSH, such as the victim drag, have found to be more strongly associated with elements of strength (Feigel et al., 2024) as have short distance sprints (5,10,20m) and elements of power (Dawes et al., 2015). The results and supporting evidence therefore suggest that a loaded march and RUSH task, representative of two leading PTG officer job tasks, require and assess different elements of fitness and are distinct from each other, reinforcing their complementary utility in physical assessment. These findings underscore the importance of implementing a multifaceted assessment battery capable of capturing the full spectrum of tactical performance requirements. This approach aligns with the recommendations of Zulfiqar et al., (2021) and Orr et al., (2021) who advocated for evaluation frameworks which reflect the diverse physiological demands of tactical performance.

Limitations

The data collection was reliant on the contributing specialist units undertaking the testing in their specific geographical location. Due to the large distance between each of the nine tactical group headquarter locations and time constraints, travel to each venue to quality assure the testing protocols was not possible. Accuracy in data collection was reliant on the individual instructional staff at each jurisdiction location. However, all assessors had received training in implementing the RUSH assessment and a standardized protocol was provided. Another limitation was the inconsistent completion of assessments across units; not all operators undertook every test due to time constraints and the voluntary nature of data collection. Finally, no morphological data were available. However, while morphological characteristics are known to influence fitness test outcomes in law enforcement (Janković & Koropanovski, 2024), the RUSH is a based on occupational requirements and tasks that are required to be completed regardless of morphology, age, or sex/gender (Orr et al., 2021).

Practical Implications

The findings of this study indicate that RUSH performance is not associated with longer duration loaded events, which are also recognized as being of importance to PTG officers. On this basis, the RUSH can be confidently used as a complementary assessment which evaluates distinct elements of fitness not currently assessed by other longer duration events. Its inclusion within a specialist police fitness battery can augment

the existing longer duration loaded march assessments as a comprehensive physical capability assessment within specialist police.

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References

Beck, A. Q., Clasey, J. L., Yates, J. W., Koebke, N. C., Palmer, T. G., & Abel, M. G. (2015). Relationship of Physical Fitness Measures vs. Occupational Physical Ability in Campus Law Enforcement Officers. *J Strength Cond Res*, *29*(8), 2340-2350. https://doi.org/10.1519/JSC.0000000000000863

Birzer, M. L., & Craig, D. E. (1996). Gender differences in police physical ability test performance. *American journal of police*, *15*(2), 93-108. https://doi.org/10.1108/07358549610122494

Carlson, M. J., & Jaenen, S. P. (2012). The Development of a Preselection Physical Fitness Training Program for Canadian Special Operations Regiment Applicants. *J Strength Cond Res*, *26*, S2-S14. http://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=77838613&site=ehost-live&scope=site

Carlton, S. D., Carbone, P. D., Stierli, M., & Orr, R. M. (2014). The Impact of Occupational Load Carriage on the Mobility of the Tactical Police Officer. *Journal of Australian Strength and Conditioning*, *22*(1), 32-37. http://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=95264188&site=ehost-live&scope=site

Cooper, D. R. (2014). Physical Preparation Methods for Combat Operations: A Narrative Review of the Literature. *Journal of Australian Strength and Conditioning*, *22*(2), 44-49. http://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=96676184&site=ehost-live&scope=site

Davis, M. R., Easter, R. L., Carlock, J. M., Weiss, L. W., Longo, E. A., Smith, L. M., Dawes, J. J., & Schilling, B. K. (2016). Self-Reported Physical Tasks and Exercise Training in Special Weapons and Tactics (SWAT) Teams. *J Strength Cond Res*, *30*(11), 3242-3248. https://doi.org/10.1519/jsc.0000000000001411

Dawes, J. J. (2019). Accuracy of self-reported height, body mass and derived body mass index in a group of law enforcement officers. *NBP. Nauka, Bezbednosti, Policija*, *24*(2), 7-15. https://doi.org/10.5937/nabepo24-21191

Dawes, J. J., Orr, R. M., Elder, C. L., Krall, K., Stierli, M., & Schilling, B. (2015). Relationship Between Selected Measures of Power and Strength and Linear Running Speed Amongst Special Weapons and Tactics Police Officers. *Journal of Australian Strength and Conditioning*, *23*(3), 22-26. http://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=102680117&site=ehost-live&scope=site

Dawes, J. J., Orr, R. M., Flores, R. R., Lockie, R. G., Kornhauser, C., & Holmes, R. (2017). A physical fitness profile of state highway patrol officers by gender and age. *Ann Occup Environ Med*, *29*, 16. https://doi.org/10.1186/s40557-017-0173-0

Dawes, J. J., Scott, J., Canetti, E. F. D., Lockie, R. G., Schram, B., & Orr, R. M. (2022). Profiling the New Zealand Police Trainee Physical Competency Test. *Front Public Health*, *10*, 821451. https://doi.org/10.3389/fpubh.2022.821451

Decker, A., Hilton, B., Dawes, J., Lockie, R., & Orr, R. M. (2022). Physiological Demands of Common Occupational Tasks among Australian Police Officers: A Descriptive Analysis. *Ann Work Expo Health*, *66*(7), 960-966. https://doi.org/10.1093/annweh/wxac012

Dicks, N. D. (2019). *Interval Training Methods to Increase Performance Markers and Load Carriage in Tactical Professionals* ProQuest Dissertations & Theses].

Dicks, N. D., Mahoney, S. J., Kramer, M., Lyman, K. J., Christensen, B. K., Pettitt, R. W., & Hackney, K. J. (2021). Increased velocity at VO(2)max and load carriage performance in army ROTC cadets: prescription using the critical velocity concept. *Ergon*, *64*(6), 733-743. https://doi.org/10.1080/00140139.2020.1858186

Dicks, N. D., & Pettitt, R. W. (2021). Optimization of the Critical Speed Concept for Tactical Professionals: A Brief Review. *Sports 9*(8), 106. https://doi.org/10.3390/sports9080106

Feigel, E. D., Sterczala, A. J., Krajewski, K. T., Sekel, N. M., Lovalekar, M., Peterson, P. A., Koltun, K. J., Flanagan, S. D., Connaboy, C., Martin, B. J., Wardle, S. L., O'Leary, T. J., Greeves, J. P., & Nindl, B. C. (2024). Physiological characteristics predictive of passing military physical employment standard tasks for ground close combat occupations in men and women. *Eur J Sport Sci*, *24*(9), 1247-1259. https://doi.org/10.1002/ejsc.12159

Fowler, J., Cohen, L., & Jarvis, P. (1998). *Practical statistics for field biology* (2nd ed. ed.). Wiley.

IBM Corp. (2017). *IBM SPSS Statistics for Macintosh*. In (Version 24) Armonk, NY.

Irving, S., Orr, R., & Pope, R. (2019). Profiling the Occupational Tasks and Physical Conditioning of Specialist Police. *Int J Exerc Sci*, *12*(3), 173-186. https://doi.org/10.70252/LGPE4029

Janković, R., & Koropanovski, N. (2024). Correlation of Morphological Characteristics with Police Specific Fitness Test in Police Students. SportLogia, 20(1). https://doi.org/10.7251/SGIA2420048J

Janković, R. Z., Dopsaj, M., Dimitrijević, R., Savković, M., Koropanovski, N., & Vučković, G. (2015). Validity and reliability of the test for assessment of specific physical abilities of police officers in the anaerobic-lactate work regime. *Facta Universitatis, Series: Physical Education and Sport*, 19-32.

Joseph, A., Wiley, A., Orr, R., Schram, B., & Dawes, J. (2018). The Impact of Load Carriage on Measures of Power and Agility in Tactical Occupations: A Critical Review. *Int J Environ Res Public Health*, *15*(1), 88. https://doi.org/10.3390/ijerph15010088

Knapik, J. J., Harman, E. A., Steelman, R. A., & Graham, B. S. (2012). A Systematic Review of the Effects of Physical Training on Load Carriage Performance. *J Strength Cond Res*, *26*(2), 585-597. https://doi.org/10.1519/JSC.0b013e3182429853

Koedijk, M., Stuurman, H. F., Renden, P. G., Hutter, R. I., Strating, M., & Oudejans, R. R. D. (2020). The physical competence test of the Dutch National Police: The effects of wearing a police uniform on test performance. *Police practice & research*, *21*(3), 264-278. https://doi.org/10.1080/15614263.2019.1658583

Lindsay, K. G., Lockie, R. G., Orr, R. M., Alvar, B. A., Kornhauser, C., Holmes, R. J., & Dawes, J. J. (2021). Exploring associations between physical fitness tests and a law enforcement specific Physical Ability Test using principal components analysis. *Journal of sports sciences*, *39*(23), 2642-2648. https://doi.org/10.1080/02640414.2021.1949135

Lockie, R. G., Balfany, K., Denamur, J. K., & Moreno, M. R. (2019). A Preliminary Analysis of Relationships Between a 1RM Hexagonal Bar Load and Peak Power with the Tactical Task of a Body Drag. *J Hum Kinet*, *68*, 157-166. https://doi.org/10.2478/hukin-2019-0064

Lockie, R. G., Beitzel, M. M., Dulla, J. M., Dawes, J. J., Orr, R. M., & Hernandez, J. A. (2022). Between-Sex Differences in the Work Sample Test Battery Performed by Law Enforcement Recruits: Implications for Training and Potential Job Performance. *J Strength Cond Res*, *36*(5), 1310-1317. https://doi.org/10.1519/JSC.0000000000003671

Lockie, R. G., Dawes, J. J., Balfany, K., Gonzales, C. E., Beitzel, M. M., Dulla, J. M., & Orr, R. M. (2018). Physical Fitness Characteristics That Relate to Work Sample Test Battery Performance in Law Enforcement Recruits. *Int J Environ Res Public Health*, *15*(11), 2477. https://doi.org/10.3390/ijerph15112477

Lockie, R. G., Dawes, J. J., Kornhauser, C. L., & Holmes, R. J. (2019). Cross-Sectional and Retrospective Cohort Analysis of the Effects of Age on Flexibility, Strength Endurance, Lower-Body Power, and Aerobic Fitness in Law Enforcement Officers. *J Strength Cond Res*, *33*(2), 451-458. https://doi.org/10.1519/JSC.0000000000001937

Lockie, R. G., Dawes, J. J., Sakura, T., Schram, B., & Orr, R. M. (2023). Relationships Between Physical Fitness Assessment Measures and a Workplace Task-Specific Physical Assessment Among Police Officers: A Retrospective Cohort Study. *J Strength Cond Res*, *37*(3), 678-683. https://doi.org/10.1519/jsc.0000000000004301

Lockie, R. G., Moreno, M. R., Cesario, K. A., Dulla, J. M., Orr, R. M., & Jay Dawes, J. (2021). With great power comes great ability: Extending research on fitness characteristics that influence work sample test battery performance in law enforcement recruits. *Work*, *68*(4), 1069-1080. https://doi.org/10.3233/wor-213437

Lockie, R. G., Moreno, M. R., Dawes, J. J., Orr, R. M., Rodas, K. A., & Dulla, J. M. (2022). An Analysis of the Body Drag Test in Law Enforcement Recruits with Consideration to Current Population Demographics. *Int J Exerc Sci*, *15*(7), 276-288. https://doi.org/10.70252/EWQH6598

Lockie, R. G., Moreno, M. R., Ducheny, S., Orr, R. M., Dawes, J. J., & Balfany, K. (2020). Analyzing the Training Load Demands, and Influence of Sex and Body Mass, on the Tactical Task of a Casualty Drag via Surface Electromyography Wearable Technology. *Int J Exerc Sci*, *13*(4), 1012. https://doi.org/10.70252/rpjf6453

Lockie, R. G., Moreno, M. R., Rodas, K. A., Dulla, J. M., Orr, R. M., & Dawes, J. J. (2021). With great power comes great ability: Extending research on fitness characteristics that influence work sample test battery performance in law enforcement recruits. *Work 68*(4), 1069-1080. https://doi.org/10.3233/WOR-213437

Lockie, R. G., Orr, R. M., Sanchez, K. J., Gonzales, S. M., Viramontes, E., Kennedy, K., & Dawes, J. J. (2024). Relationships Between Physical Ability Test Performance and Fitness in Recruits From a Southeastern U.S. Police Department. *J Strength Cond Res*, *38*(8), 1472-1478. https://doi.org/10.1519/JSC.0000000000004797

Lockie, R. G., Pope, R. P., Saaroni, O., Dulla, J. M., Dawes, J. J., & Orr, R. M. (2020). Job-Specific Physical Fitness Changes Measured by the Work Sample Test Battery within Deputy Sheriffs between Training Academy and their First Patrol Assignment. *Int J Exerc Sci*, *13*(4), 1262-1274. https://doi.org/10.70252/NCHZ6196

Mala, J., Szivak, T. K., & Kraemer, W. J. (2015). Improving Performance of Heavy Load Carriage During High-Intensity Combat-Related Tasks. *Strength Cond J*, *37*(4), 43-52. http://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=108710943&site=ehost-live&scope=site

Mangione, A., Maret, M., Melton, B., Acevedo, A., & Zeigler, Z. (2023). Bodyfat as a Predictor of the Peace Office Physical Aptitude Test in Police Cadets. Int J Exerc Sci,

Marins, E., Barbosa, O., Machado, E., Orr, R., Dawes, J., & Del Vecchio, F. (2020). Profile of Self-Reported Physical Tasks and Physical Training in Brazilian Special Operations Units: A Web-Based Cross-Sectional Study. *Int J Environ Res Public Health*, *17*(19). https://doi.org/10.3390/ijerph17197135

Maupin, D., Robinson, J., Wills, T., Irving, S., Schram, B., & Orr, R. (2018). Profiling the metabolic fitness of a special operations police unit. *J Occup Health*, *60*(5), 356-360. https://doi.org/10.1539/joh.2018-0029-OA

Microsoft Office. (2016). *Microsoft Excel*. In

Moreno, M. R., Dulla, J., Dawes, J., Orr, R. M., Cesario, K. A., & Lockie, R. G. (2019). Lower-Body Power And Its Relationship With Body Drag Velocity In Law Enforcement Recruits. *Int J Exerc Sci*, *12*(847-858).

Orr, R. M. (2012). Load Carriage for the Tactical Operator: Impacts and Conditioning - A Review. *Journal of Australian Strength and Conditioning*, *20*(4), 23-28. http://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=84427853&site=ehost-live&scope=site

Orr, R. M., Dawes, J., Lockie, R. G., & Godeassi, D. (2019). The Relationship between Lower-Body Strength and Power, and Load Carriage Tasks: A Critical Review. *Int J Exerc Sci*, *12*, 1001. https://doi.org/10.70252/ovvg8388

Orr, R. M., Robinson, J., Hasanki, K., Talaber, K. A., Schram, B., & Roberts, A. (2022). The Relationship Between Strength Measures and Task Performance in Specialist Tactical Police. *J Strength Cond Res*, *36*(3), 757-762. https://doi.org/10.1519/JSC.0000000000003511

Orr, R. M., Sakurai, T., Scott, J., Movshovich, J., Dawes, J., Lockie, R., & Schram, B. (2021). The use of fitness testing to predict occupational performance in tactical personnel: a critical review. *Int J Environ Res Public Health*, *18*(4), 7480. https://doi.org/10.3390/ijerph18147480

Rhodes, E. C., & Farenholtz, D. W. (1992). Police Officer's Physical Abilities Test compared to measures of physical fitness. *Can J Sport Sci*, *17*(3), 228-233.

Robinson, J., Roberts, A., Irving, S., & Orr, R. (2018). Aerobic Fitness is of Greater Importance than Strength and Power in the Load Carriage Performance of Specialist Police. *Int J Exerc Sci*, *11*(4), 987-998. https://doi.org/10.70252/iwxe4027

Sarao, S. (2014). The Job of SWAT: Understanding the Need for Special Weapons and Tactics Capabilities. *Kennedy School review*, *14*, 80.

Sax van der Weyden, M., C, D. B., Larson, D., Rollberg, B., & J, A. C. (2021). Development of a Fitness Test Battery for Special Weapons and Tactics (SWAT) Operators-A Pilot Study. *Int J Environ Res Public Health*, *18*(15). https://doi.org/10.3390/ijerph18157992

Seguin, R. A. (2015). *Factors Associated with Success in Pare Testing Among Rcmp Officers* ProQuest Dissertations & Theses].

Stanish, H. I., Wood, T. M., & Campagna, P. (1999). Prediction of Performance on the RCMP Physical Ability Requirement Evaluation. *J Occup Environ Med*, *41*(8), 669-677. http://www.jstor.org/stable/44995570

Strader, J., Schram, B., Irving, S., Robinson, J., & Orr, R. (2020). Special Weapons and Tactics Occupational-Specific Physical Assessments and Fitness Measures. *Int J Environ Res Public Health*, *17*(21). https://doi.org/10.3390/ijerph17218070

Talaber, K. A., Orr, R. M., Maupin, D., Schram, B., Hasanki, K., Roberts, A., & Robinson, J. (2022). Profiling the absolute and relative strength of a special operations police unit. *BMC Sports Sci Med Rehabil*, *14*(1), 111. https://doi.org/10.1186/s13102-022-00502-5

Teixeira, J., Monteiro, L. F., Silvestre, R., Beckert, J., & Massuça, L. M. (2019). Age-related influence on physical fitness and individual on-duty task performance of Portuguese male non-elite police officers. *Biology of Sport*, *36*(2), 163-170. https://doi.org/10.5114/biolsport.2019.83506

Tharp, L., Berg, K., Latin, R. W., & Stuberg, W. (1997). The relationship of aerobic and anaerobic power to distance running performance. *Sports medicine, training, and rehabilitation*, *7*(3-4), 215-225. https://doi.org/10.1080/15438629709512084

Thomas, J. M., Pohl, M. B., Shapiro, R., Keeler, J., & Abel, M. G. (2017). Effect of Load Carriage on Tactical Performance in SWAT Operators. *J Strength Cond Res*. https://doi.org/10.1519/JSC.0000000000002323

Thomas, R., Schram, B., Irving, S., Robinson, J., & Orr, R. (2019). Associations between Specialist Tactical Response Police Unit Selection Success and Urban Rush, along with 2.4 km and 10 km Loaded Carriage Events. *Int J Environ Res Public Health*, *16*(19). https://doi.org/10.3390/ijerph16193558

Weiner, J. A., Berner, J., Norborg, J. M., Kreuger, K. G., & Honey, R. A. (1988). *Criterion-related validation study of the POST Work Sample Test Battery*. Cooperative Personnel Services.

Winters, J. D., Heebner, N. R., Johnson, A. K., Poploski, K. M., Royer, S. D., Nagai, T., Randall, C. A., Abt, J. P., & Lephart, S. M. (2021). Altered Physical Performance Following Advanced Special Operations Tactical Training. *J Strength Cond Res*, *35*(7), 1809-1816. https://doi.org/10.1519/JSC.0000000000003087

World Medical Association. (1997). World Medical Association Declaration of Helsinki. Recommendations guiding physicians in biomedical research involving human subjects. *JAMA*, *277*(11), 925-926.

Zulfiqar, M. M., Wooland, J., Schram, B., Dawes, J. J., Lockie, R., & Orr, R. (2021). Battery Fitness Testing in Law Enforcement: A Critical Review of the Literature. *Int J Exerc Sci*, *14*(4), 613-632. https://doi.org/10.70252/PYWH7079