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THE IMPACT OF LOAD CARRIAGE ON MOBILITY AND MARKSMANSHIP OF THE TACTICAL RESPONSE OFFICER

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BLUF

The loads carried by specialist tactical police officers may decrease their mobility over short distances but improve their marksmanship performance at close range.

INTRODUCTION

The ability to carry load while performing duties is an occupational requirement of specialist tactical personnel. While carrying this load, the specialist tactical operator must be able to move quickly and engage potential targets accurately if they are to reduce risks to themselves and members of the public. The New South Wales Police, Tactical Operations Unit (TOU), consists of specialist police officers who are required, often at short notice, to carry operational loads into potentially hostile situations where mobility and potentially marksmanship are vital to mission success.

In current literature, load carriage has been suggested to decrease the mobility of military soldiers during short explosive tasks (1) and over longer duration marches (2). Research also indicates that load carriage impacts on a soldier's lethality and shooting accuracy when engaging a target (2,3). Currently, research on the impacts of load carriage on specialist police officers is lacking.

The purpose of this study was to investigate the impact of load carriage on the mobility and marksmanship of specialist police officers.

METHODS

Six male (age 33.7 ± 3.7 years) Police Force members from the Tactical Operations Unit (TOU) were recruited, declared fit for participation by their senior supervisor, and gave written, informed consent to participate in the study. Officers were tested under two load conditions throughout the entirety of the study, unloaded (UL) and tactically loaded (TL). The UL condition consisted of the officer dressed in police issued fatigues, boots, primary weapon (M4 carbine assault rifle) and a secondary weapon (9mm Glock pistol). The TL condition consisted of the UL condition plus full standard tactical assault clothing and equipment, including body armour and helmet, equating to a total mean weight of 22.8 kg (±1.8 kg).

The Mobility Task

The mobility task consisted of a tactical approach over a 25m course. This course incorporated a 10m straight-line sprint followed by a tactical move through two doorways, a descent of seven stairs, movement through another doorway and then a target approach. Primary weapons were carried in the 'shouldered' position with muzzles raised. All times were measured using a light-beam SMARTSPEED timing gate system (Fusion Sport, Queensland: AUS, 2013).

The Marksmanship Task

On arriving at the firing line the "target up" command was given at which time the primary weapon was slung, and the secondary weapon upholstered. The target was then engaged with five deliberate shots. Target engagement duration was timed from the firing of the first shot to the firing of the fifth shot with any stoppages recorded. Marksmanship measures evaluated were shot accuracy, horizontal displacement (X) and vertical displacement (Y). Shot accuracy was defined as the mean of the sum of distances measured from the center of the 25mm discoid target to the center of the fall-of-shot (distance to center of target or DCOT) for each bullet, recorded to the nearest millimeter. The X displacement was defined as the distance between the two farthest horizontally displaced falls-of-shot measured in millimeters and Y displacement as the distance between the two farthest vertically displaced falls-of-shot. X and Y displacements were used to increase sensitivity of the marksmanship results through isolating potential influencing factors along these two axes.

Statistical Analysis

Before any comparative analyses were conducted, consideration was given to the assumption of normality and the assumption of homogeneity of variances. The SPSS Version 20 statistical software package (SPSS Inc., Delaware, USA) was used to undertake paired t-tests to evaluate the difference between UL and TL mobility trials and the means of the UL and TL marksmanship measures (DCOT, X, Y displacement). Significance was set at $p < 0.05$.

Ethical Approval

Ethical approval for this research was provided by Bond University Human Resources Ethics Committee (BUHREC).

RESULTS

Although slower, no significant differences in speed for the UL (18.59 ± 2.44 sec) and the TL (19.89 ± 1.61 sec) conditions ($t(5)=-1.78$, $p=0.136$) were found. A post-hoc analysis comparing two sub groups of the officers (carrying less than 25% body weight ($n = 3$) and greater than 25% of body weight ($n = 3$)), found a statistically significant decrease ($t(2)=-19.698$, $p=0.003$) in speed in the group carrying greater than 25% of their body weight when TL (20.08 ± 0.94 sec) compared to UL (17.19 ± 0.70 sec). This trend was not found in the group with the relative load less than 25% of their body weight ($t(2)=0.836$, $p=0.491$).

Due to occasional loss of fifth rounds off the target space (n=4 from all trials), only the four most accurate falls of shot were used for all measures. There were no significant differences between the shooting periods from each condition ($p=0.30$).

Although DCOT measures improved when the officers were TL, there was no significant difference (t[5]= 0.456, p=0.667) between the UL (*m*=69.7mm ± 34.98 mm) and TL (*m*=63.75mm ± 33.75mm) conditions. Similar results were found for X dispersion (t[5] = 1.388, p=0.224: UL: *m*=116.66mm ± 57.83mm; TL: *m*=78.16mm ± 40.44mm). Y dispersion, while not reaching significance (t[5] -0.224, p= 0.831), showed a decrease in performance when officers were TL (TL *m*=89.83mm ± 44.85mm: UL*m*=84.33mm ± 25.93mm).

DISCUSSION

These results suggest that the loads carried by specialist tactical police officers may decrease their mobility (especially when carrying loads greater than 25% body weight) but may improve their marksmanship. While the results of the mobility trials in this study are consistent with current literature, the marksmanship findings differ. A potential reason for these differences include the consistent marksmanship training of these personnel while wearing loads and a potential stabilizing effect of the body armour. This later point is of note as the loads carried by participants in previously reviewed literature did not include body armour. Further research with officers wearing body armour conducted over various distances and tasks is needed.

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