Ambulatory Physical Activity in Swiss Army Recruits

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Abstract

The aim of this study was to objectively assess and compare the type, duration and intensity of physical activity during the basic training provided by each of 5 selected Swiss Army occupational specialties. The first objective was to develop and validate a method to assess distance covered on foot. The second objective was to describe and compare physical activity levels among occupational specialties. In the first part of the study, 30 male volunteers completed 6 laps of 290 m at different gait velocities. Data from 15 volunteers were used to develop linear regression equations for the relationship between step frequency and gait velocity, and data from the other 15 volunteers were used to verify the accuracy of these equations. In the second part of the study, 250 volunteers from 5 military schools (each training school for a different occupational specialty) wore heart-rate, acceleration and step-count monitors during workdays of weeks 2, 4, 8 and 10 of their basic training. Sensor data were used to identify physically demanding activities, estimate energy expenditure (based on already published algorithms) and estimate distance covered on foot (based on the algorithm developed in the first part of this study). A branched model using 2 regression equations (gait velocity = 0.705·step frequency for walking speeds below 1 m/s and gait velocity = 1.675·step frequency – 1.464 for faster gait velocities) was shown to be accurate for estimating distance covered on foot. In the training schools investigated, average physical activity energy expenditure was 10.5 ± 2.4 MJ per day, and trainees covered 12.9 ± 3.3 km per day on foot. Recruits spent 61.0 ± 23.3 min per day marching and 33.1 ± 19.5 min per day performing physically demanding materials-handling activities. Average physical activity energy expenditure decreased significantly from week 2 to week 8. The measurement system utilised in the present study yielded data comparable to those of prior studies that applied alternative methods. Nevertheless, the new sensor-based, objective measurement system used provided more information on daily physical activity and demands than traditional, single measurement instruments. The average daily total energy expenditure values in all training schools investigated were within the range found for the armed forces of other nations and for professional athletes.

Introduction

To assess the physical job requirements of military occupations, prior studies have attempted to identify either the type of the most frequently performed physically demanding activity or the intensity of daily physical activity. The most frequently performed physically demanding activities were investigated using self-report questionnaires [12, 17]. Rayson [17] showed that 89 % of physically demanding tasks in British Army occupations involved either lifting or carrying loads. Walking, marching with a backpack, running and physically demanding materials-handling (including lifting and lowering loads, lifting and carrying loads, and digging) were identified as the key common tasks performed in recent and current military missions of the North Atlantic Treaty Organization (NATO) [12]. The intensity of daily physical activity was investigated by estimation of energy expenditure using the doubly labelled water (DLW) method [5, 10, 21, 22, 25] or by estimation of distance covered on foot using pedometers [14]. The total energy expenditure (TEE) assessed during the daily military routine ranged from 14.1 MJ/d for US support soldiers to 17.2 MJ/d for US Special Forces [21]. In their meta-analysis, Tharion et al. [22] summarised TEE values as 16.8–17.1 MJ/d during basic training (BT), which is comparable in duration to that

of the Swiss Army. However, objectively determined values for type, duration and intensity of military-specific activities have not yet been assessed to quantify job requirements in Swiss Army occupational specialties.
The aim of the present study was to quantify the type, intensity and duration of physical activity during the BT of 5 selected Swiss Army occupational specialties. Recently published objective measurement methods were applied [27,28]; these allow for the recognition of military-specific activities and the estimation of energy expenditure during daily military routines using body-fixed accelerometer and heart-rate monitors. The GT1M accelerometer (ActiGraph LLC, Fort Walton Beach, FL), was used to record subjects' hip accelerations and step frequency (SF). Since SF is linearly related to gait velocity (GV) over a large range of walking speeds [6,7,18,20], a second aim of the present study was to define an algorithm to calculate a subject's daily distance covered on foot based on SF recorded at 0.5 Hz.

Materials and Methods
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Participants and measurement protocol

Linear regression between SF and GV

In the first part of the study, to estimate the multiple linear regression equation between body height, SF and GV in young men, 30 healthy male volunteers (age range 20–30 years) were recruited from students of the Swiss Federal Institute of Sports, Magglingen. Since previous studies have shown that body weight has no influence on the relationship between SF and GV, only body height was measured and included in regression models [19,26]. The volunteers completed 6 laps of 290 m each on a level floor while wearing a GT1M on the hip. At the start of each lap, participants were verbally instructed to walk at a given speed. The speed was prescribed in broad categories and increased from a very slow walk (stroll) in the first lap to aerobic running (at the individual's preferred running speed) in the last lap. 15 randomly chosen volunteers were allocated to the training-data group, and the other 15 to the control-data group. Data from the training-data group were used to develop the linear regression equations for body height and SF as independent variables, and GV as a dependent variable. Data from the control-data group were used to verify the accuracy of the developed GV estimation algorithm.

Ambulatory physical activities during Swiss Army BT

In the main part of this study, to assess ambulatory physical activity during Swiss Army BT, 5 occupational specialties were investigated. 4 Swiss Army training schools (rescue technician, armoured infantry, fusilier infantry and reconnaissance infantry) were chosen to meet the criterion of being physically demanding, based on expert appraisal. Further, the communications intelligence training school was chosen to represent the less physically demanding occupational specialties. In all these occupational specialties, BT consisted of a general basic training (GBT) for the first 7 weeks and a functional basic training (FBT) for the subsequent 6 weeks. The designated GBT content was similar for all occupational specialties: approximately 1 day in a classroom and 4 days in the field, with 180 min of physical training per week, and a focus on learning basic military skills. However, appraisals of people involved indicated that the physical activity and physical training in different battalions may differ substantially, depending on the priorities set by each commander. During FBT, recruits learn specific skills needed in their branch of the armed forces. In this part of BT the physical tasks differ between occupational specialties. Rescue technicians focus on working on site with heavy equipment, reconnaissance recruits focus on walking long distances, armoured and fusilier infantry focus on various physically demanding field tasks, whereas communications intelligence recruits have no specific physical tasks.
All male recruits at the 5 training schools were asked to volunteer for the study. Of these volunteers, 50 subjects were randomly chosen from each school to participate. Participants received comprehensive information on the study, and each provided written informed consent for participation, as approved by the Cantonal Ethics Committee of Bern, Switzerland. The study was performed in accordance with the ethical standards for sport and exercise science research [11].
Each participant's height, weight and age were assessed at the start of BT. Age was recorded as the difference between date of birth and date of starting BT. Participants were asked to wear a heart-rate monitor on the chest, a GT1M on the hip and another GT1M on the backpack during each day of weeks 2, 4, 8 and 10 of their military BT. Weeks 2 and 4 represented GBT, and weeks 8 and 10 represented FBT. Body-fixed sensors had to be worn from the time participants woke in the morning until they went to bed in the evening. Since the majority of trainees in Swiss Army BT do not serve at weekends, only Mondays to Fridays were included in the investigation. Sensors were therefore distributed on Sunday evenings and collected on the following Saturday morning.

Instruments

Body height was measured to the nearest 0.1 cm using a stadiometer (Seca model 214, Seca GmbH, Hamburg, Germany), and body weight was measured to the nearest 0.1 kg on a calibrated digital balance (Seca model 877, Seca GmbH, Hamburg, Germany). A heart-rate monitor (Suunto Smartbelt, Suunto, Fantaa, Finland), and a GT1M combined step and acceleration monitor were used to register data for physical activity-related parameters. GT1Ms were wrapped in waterproof plastic and placed in belt pouches worn on the waist above the right anterior axillary line, and on the side strap of the personal backpack. The sensors were programmed to store heart-rate, hip-acceleration, step-count and backpack-acceleration data at 2-s intervals.

Data processing and statistical analysis

Statistical analyses were performed using SPSS for Windows (version 16.0, SPSS Inc., Chicago, IL) with an alpha level of 0.05 to indicate statistical significance. Group results are presented as mean ± standard deviation.

Linear regression between SF and GV

To derive GV and SF, the distance (290 m) and the measured number of steps were divided by the time taken per lap.
Data from the training-data group were used to calculate a multiple linear regression equation using body height and SF as independent variables and GV as the dependent variable. This regression equation and that of Terrier and Schutz [20] were applied concurrently to data from the control-data group. For approximately normally distributed data, a paired *t*-test was conducted to detect statistical differences between estimated and measured GV values. Errors of estimated GV were quantified with a 95 % confidence interval of differences (CI-95 %). Further, Pearson's correlation tests and Bland-Altman plots were per-

formed between estimated and measured GV. Using GV, the distance covered during each 2 s time interval was calculated. The sum of distances calculated for all investigated time intervals per day represented the daily distance covered on foot.

Ambulatory physical activities during Swiss Army BT

Data from those volunteers who provided over 480 min of sensor signals per day were included in the analyses. For each investigated day of BT, the median of distance covered on foot, minutes spent in military-specific activity classes or in other activities, intensity level and physical activity energy expenditure (PAEE) were calculated.

Heart-rate, hip-acceleration, backpack-acceleration and step-frequency data were synchronised for each volunteer by a self-programmed application. Next, these were processed utilising the algorithms presented in previous studies [27,28] using Matlab (Matlab 5.3, MathWorks, Natick, Massachusetts).

First, synchronised sensor data were used to identify physically demanding military-specific activities. Activity recognition was performed using a decision tree developed and validated by Wyss and Mäder [27]. The decision tree assigned data at 1 min intervals, either to 1 of 6 military-specific activity classes or to an 'other activities' class. The military-specific activity classes included walking, marching with a backpack, lifting and lowering loads, lifting and carrying loads, digging, and running.

Second, based on activity recognition and sensor data, PAEE was estimated at 1-min intervals. Therefore, the activity class-specific multiple linear regressions of Wyss and Mäder [28] were used, with heart rate and acceleration as independent variables. TEE values were calculated as the sum of PAEE and resting energy expenditure (REE). REE was determined using anthropometric data applied to the formula for males by Mifflin et al. [16]. To compare TEE with values published in the compendium of physical activity intensity of Ainsworth et al. [1,2], the results were additionally expressed as metabolic equivalent (MET) intensity levels. One MET is equivalent to 69.78 J/kg/min [2]. Using these MET values, the 'other activities' class was further subdivided into 4 intensity categories: inactivity (< 1.5 MET), low intensity (1.5–3.0 MET), moderate intensity (3.0–6.0 MET) and vigorous intensity (> 6.0 MET). For some activities, such as 'taking a shower' or 'changing clothes during the day', participants took off their sensors. These time sequences were added to the low-intensity activity class.

Finally, step-count data were used to estimate distance covered on foot in 2-s intervals, according to the algorithm developed in the first part of this study.

One-way analyses of variance (ANOVAs) with Tukey's post-hoc tests for multiple comparisons were conducted to compare anthropometric data, PAEE, distance covered on foot and time spent in physically demanding activity classes among weeks and occupational specialties.

Results

Linear regression between SF and GV

Body height did not differ between study groups (179.4 ± 6.1 cm and 178.8 ± 8.0 cm, p = 0.819) and had no significant influence on GV in the regression model. The resulting linear regression model was: $GV = 1.675 \cdot SF - 1.464$.

Applying the linear regression equation to data from the control-data group resulted in a correlation of r = 0.92 (p = 0.000) between directly measured and estimated GV. However, the Bland-Altman plot showed systematic underestimation of GV for slow walking speeds below 1 m/s (Fig. 1a). On the other hand, GV estimation using Terrier and Schutz's regression equation ($GV = 0.705\ SF$) was demonstrated to be more accurate at a slow

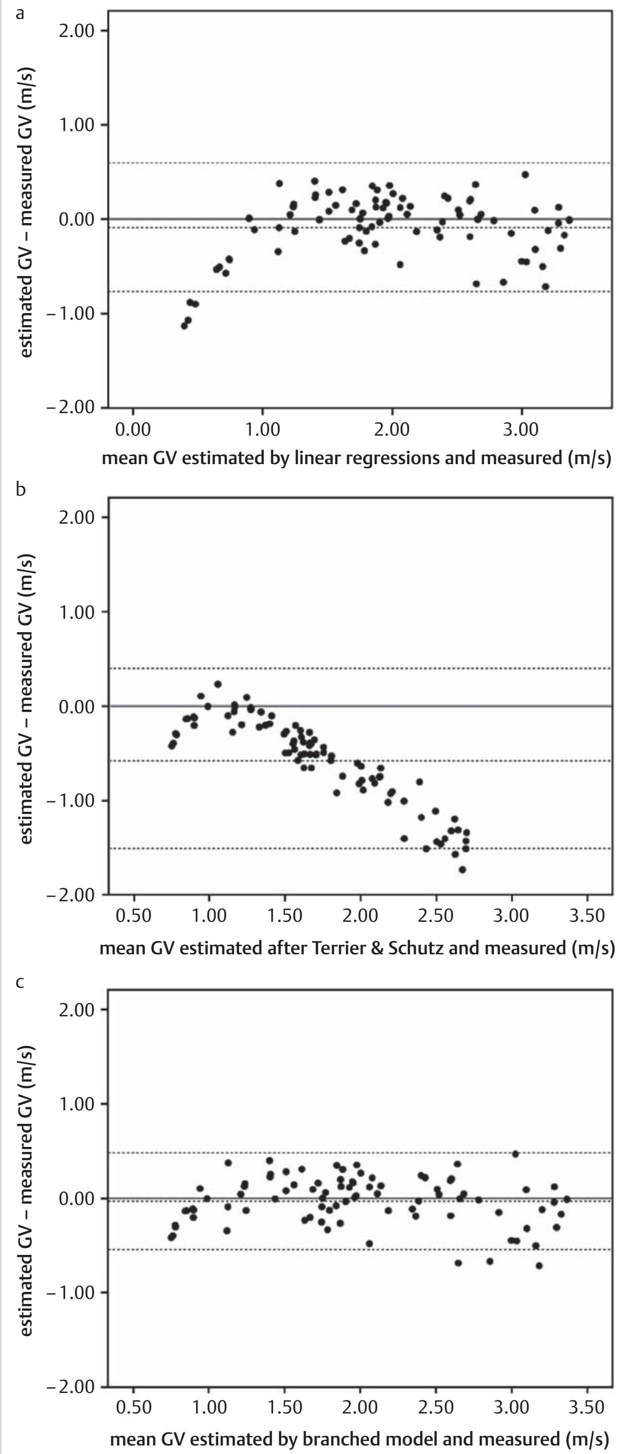

Fig. 1 a–c Bland-Altman plots on gait velocity (GV) of the control-data group (n = 15) measured and estimated using **a** the linear regression model developed in the present study, **b** the regression from Terrier and Schutz (2003) and **c** the branched model. The dashed lines represent the mean of the differences between measured and estimated GV values and the limits of agreement (± 2 standard deviations). The full line represents the zero line.

Table 1 Anthropometric data of participants in the 5 study groups.

	Rescue technicians (n = 45)	Armoured infantry (n = 46)	Fusilier infantry (n = 45)	Reconnaissance infantry (n = 44)	Communications intelligence (n = 34)
age [y]	20.42 ± 0.96	20.60 ± 0.95	20.73 ± 1.18	20.69 ± 1.36	20.37 ± 1.22
height [cm]	180.00 ± 6.78	176.60 ± 6.86	179.34 ± 6.50	179.49 ± 6.02	179.26 ± 6.81
weight [kg]	77.21 ± 11.04	73.05 ± 6.80	75.90 ± 13.28	73.98 ± 9.77	70.79 ± 8.32
BMI	23.76 ± 2.67	23.43 ± 1.92	23.60 ± 3.92	22.92 ± 2.29	22.02 ± 2.20

BMI = body mass index

Table 2 Average daily physical activities and demands in Swiss Army training schools.

	Rescue technicians	Armoured Infantry	Fusilier infantry	Reconnaissance infantry	Communications intelligence
PAEE [MJ/d]	10.46 ± 1.11	13.23 ± 1.03 ^{e}	10.30 ± 2.06	10.51 ± 3.16	8.11 ± 1.81 ^{b}
REE [MJ/d]	7.54 ± 0.60	7.27 ± 0.41	7.46 ± 0.64	7.38 ± 0.53	7.25 ± 0.47
TEE [MJ/d]	18.00 ± 1.11	20.50 ± 1.03 ^{e}	17.76 ± 2.06	17.89 ± 3.16	15.36 ± 1.81 ^{b}
distance on foot [km/d]	12.33 ± 1.30	15.61 ± 1.85 ^{e}	13.93 ± 1.66 ^{e}	14.74 ± 2.77 ^{e}	7.72 ± 1.52 ^{b,c,d}
marching [min/d]	64.19 ± 14.54 ^{e}	65.50 ± 16.42 ^{e}	80.00 ± 8.29 ^{e}	69.25 ± 24.80 ^{e}	26.25 ± 6.99 ^{a,b,c,d}
running & sports [min/d]	13.50 ± 15.59	36.75 ± 21.70	35.75 ± 28.83	46.75 ± 20.53	48.25 ± 32.18
PDMH [min/d]	32.85 ± 10.75	60.50 ± 14.27 ^{c,d,e}	22.75 ± 15.24 ^{b}	25.75 ± 18.30 ^{b}	23.75 ± 13.65 ^{b}
inactivity [min/d]	85.65 ± 13.38 ^{e}	71.50 ± 20.79 ^{d,e}	97.50 ± 21.93 ^{e}	147.00 ± 42.37 ^{b}	170.25 ± 37.83 ^{a,b,c}
low OA [min/d]	478.34 ± 40.79	453.00 ± 64.53	489.25 ± 64.62	512.75 ± 47.93	530.25 ± 54.25
moderate OA [min/d]	293.36 ± 40.06	346.25 ± 21.88	229.25 ± 76.36	262.00 ± 84.32	225.25 ± 52.09
vigorous OA [min/d]	6.38 ± 1.89 ^{b}	16.25 ± 3.59 ^{a,c,d,e}	5.5 ± 2.38 ^{b}	6.75 ± 4.50 ^{b}	5.75 ± 3.86 ^{b}
night's rest [h/night]	7.76 ± 0.62	6.54 ± 1.53	8.00 ± 0.55	6.17 ± 1.09	6.84 ± 1.78

PAEE = physical activity energy expenditure, REE = resting energy expenditure, TEE = total energy expenditure, PDMH = physically demanding materials-handling, OA = other activities
a, b, c, d and e, respectively = significantly different ($p < 0.05$) from: rescue technicians (a), armoured infantry (b), fusilier infantry (c), reconnaissance infantry (d) or communications intelligence (e)

walking speed, whereas a growing underestimation was observed with increasing walking speed (◉ **Fig. 1b**). Therefore, the regression of Terrier and Schutz [20] was used for slow walking speeds below 1 m/s (corresponding to an SF of up to 1.42 steps per second), while the linear regression equation developed in the present study was used for higher SFs. Average GV estimated using this branched model (1.97±0.75 m/s) did not differ from measured GV (2.00±0.77 m/s, p=0.281, CI-95% = −0.08–0.03 m/s); both types of data acquisition were highly correlated (r = 0.94, p = 0.000) and showed no systematic misclassification in the Bland-Altman plot (◉ **Fig. 1c**).

Ambulatory physical activities during Swiss Army BT

36 volunteers (14.4 %) did not provide sensor data because they were excluded from the BT during the first week of their military service on medical or psychological grounds. On average, the remaining 214 volunteers were 20.6 ± 1.2 years old, 178.8 ± 6.6 cm tall, weighed 74.2 ± 10.4 kg and had a body mass index of 23.2 ± 2.8 (◉ **Table 1**). Age and anthropometric data of volunteers did not differ among the 5 study groups.
As volunteer involvement was low on Fridays, only data collected on Mondays to Thursdays were included in the analysis. Of the sensor data collected on those days, 58.7 % were used for analysis. The other 41.3 % of data were excluded either because participants did not wear the sensors (61 % of data loss) or due to technical problems or mechanical defects in the sensors (39 % of data loss).
In the Swiss Army training schools investigated, the average PAEE was 10.5 ± 2.4 MJ/d, and trainees covered 12.9 ± 3.3 km/d on foot. Recruits spent 61.0 ± 23.3 min/d marching (30.4 ± 22.5 min/d with a backpack), 33.1 ± 19.5 min/d performing physically demanding materials-handling activities, 36.2 ± 25.2 min/d in running and sports activities, 8.1 ± 5.2 min/d in other activities of vigorous intensity, 271.2 ± 70.2 min/d in other activities of moderate intensity and 492.7 ± 30.0 min/d in other activities of low intensity. During 114.4 ± 46.7 min/d, trainees were inactive (◉ **Table 2**).
Average estimated PAEEs for the physically demanding activity classes were: 22.2 ± 3.3 kJ/min for walking, 29.4 ± 7.4 kJ/min for marching with a backpack, 26.2 ± 4.0 kJ/min for materials-handling activities and 34.1 ± 13.8 kJ/min for running and sports. Thus, TEE intensity levels were 5.3, 6.7, 6.1 and 7.6 MET, respectively.
In most of the training schools investigated, physical demands decreased from week 2 to week 8 of BT (◉ **Fig. 2**, **3**). Average PAEE values over all 5 study groups decreased significantly from week 2 to week 8, with a difference of − 2.9 ± 3.0 MJ/d.

Discussion
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Energy expenditure

The present study assessed volunteers' daily PAEE since this value represents the intensity and duration of physical activity. Results demonstrated that recruits in Swiss Army BT are physically more active (PAEE = 10.5 ± 2.4 MJ/d) than the male civilian population (4.6 ± 1.5 MJ/d) of similar age, weight and height [9]. However, for a military setting, no other PAEE data have been published so far. Therefore, TEE was calculated from PAEE and REE to compare the physical demands in the Swiss Army with those in other armed forces. TEE in the Swiss Army rescue technician, fusilier infantry and reconnaissance infantry training schools (about 18 MJ/d, ◉ **Table 2**) was similar to values assessed for various other international military BTs (17–18 MJ/d) of sim-

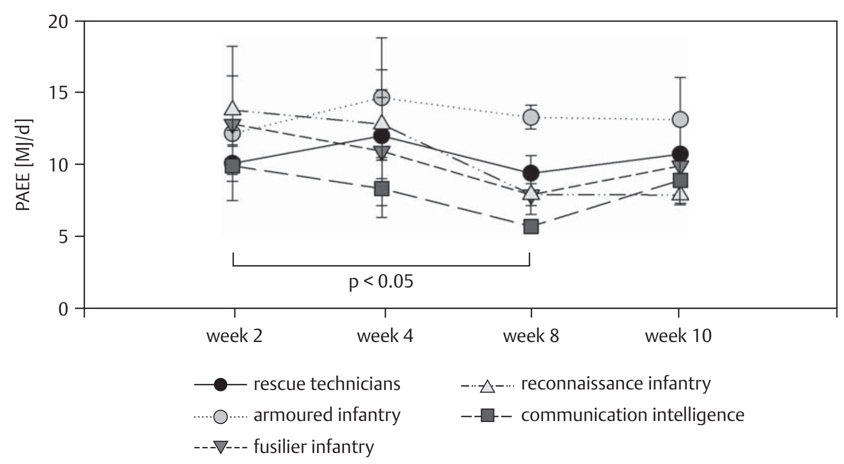

Fig. 2 Physical activity energy expenditure (PAEE) during daily military routine in weeks 2, 4, 8 and 10 of basic training in 5 occupational specialties of the Swiss Army. Average PAEE values over all 5 of the study groups significantly decreased from week 2 to week 8 ($p < 0.05$).

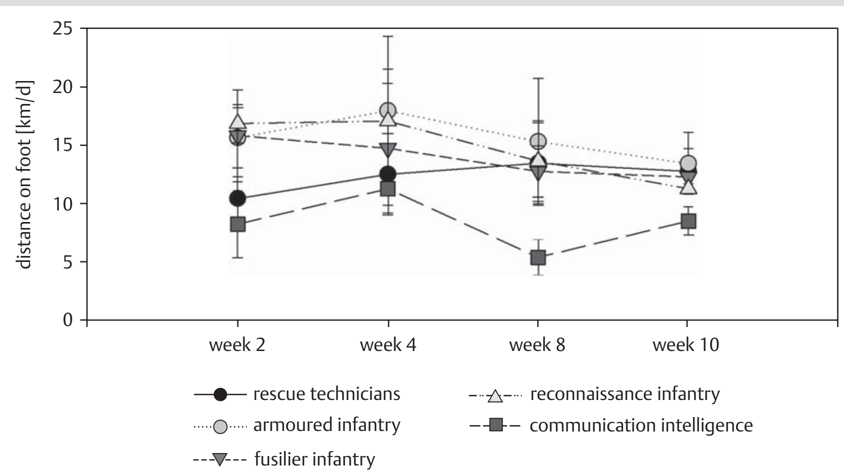

Fig. 3 Daily distance covered on foot during military routine in weeks 2, 4, 8 and 10 of basic training in 5 occupational specialties of the Swiss Army.

ilar duration [10,22,25]. TEE in the Swiss armoured infantry training school (21 MJ/d) was in the upper range, while TEE in communications intelligence (15 MJ/d) was in the lower range of these comparative results.

During Swiss Army BT, the TEE values are in the same range as those found in professional athletes of similar age and anthropometry engaged in their daily routines including exercise training [8,24]. Professional soccer players, for example, have been found to exhibit an average TEE of 15 MJ/d [8], and elite cyclists during preseason training have an average TEE of 19 MJ/d [24]. In contrast to professional athletes, recruits often do not have a history of specific physical preparation and adaptation to high physical demands. However, a relevant difference between the daily physical activities of athletes and recruits is that athletes perform at high intensity for a few hours a day, while recruits perform mostly at moderate intensity, but for many hours a day (**Table 2**).

The average TEE intensity levels that were estimated during specific activity classes in the present study (walking: 5.3 MET; marching with backpack: 6.7 MET; materials handling: 6.1 MET; and running: 7.6 MET) correspond well to values published in Ainsworth et al.'s compendium of physical activity intensities (for example, level walking at 4 mph: 5 MET; backpacking: 7 MET; loading and unloading truck: 6.5 MET; running at 5 mph: 8 MET) [1,2]. This indicates strong validity of the method for energy expenditure estimation applied in this study [28].

Distance covered on foot

Using the new algorithm to estimate distance covered on foot, additional information on ambulatory physical activities can be derived from the body-wearable sensors applied originally for activity recognition and energy expenditure estimation according to Wyss and Mäder [27,28]. Particularly in a military setting, distance covered on foot is a relevant metric for quantifying a soldier's job requirements.

Recruits in the Swiss armoured infantry training school covered greater distances on foot (15.6 km/d) during daily military routines than trainees in the US Army BT (11.7 km/d; range 9.7–14.0 km/d among the 10 companies investigated [14]). The distances covered on foot by Swiss Army rescue technicians, fusilier and reconnaissance infantry recruits (12.3–14.5 km/d) were in the upper range of comparative data of trainees in the US Army BT. Recruits in the communications intelligence training school covered shorter distances (7.7 km/d) than trainees in US Army BT [14]. There are some possible explanations for the wide range of distances covered on foot in BT among differing companies in the Swiss Army compared to the US Army. US Army BT provides generalised training to develop basic soldiering skills, whereas in the Swiss Army BT, additional training is provided in branch-specific skills. Further, distances to field training areas differ among Swiss Army barracks. Finally, it appears that school commanders in the Swiss Army have more autonomy in defining the content of their training than US Army commanders.

Male US citizens of similar age (i. e., 19 years) perform an average of 11 660 steps per day [23]. Using an average step length of 0.73 m assessed among young adults by Menz et al. [15], a total daily distance of 8.6 km/d is obtained. Therefore, we conclude that trainees in most occupational specialties of the armed forces walk more than comparative civilians in their daily routines.

Development of physical demands during BT

It is a well established fact in sports and exercise sciences that subjects should gradually adapt to new kinds of physical demands. This is particularly true for recruits in the first weeks of BT. Therefore, the physical training programme should always start with an appropriate, reduced level of demand and then increase progressively during subsequent weeks of training. However, the present study showed that the opposite is practised, namely a high level of physical demand at the beginning of BT (week 2) followed by a decrease, rather than progression, in physical demand during the first 8 weeks of BT (▶ **Fig. 2**, **3**). The same pattern of inappropriately high levels of physical demand at the beginning and lack of gradual adaption in physical demand for the first 9 weeks of BT in British Army parachute recruits [25] and South African Army recruits [13] has been related to an increased number of injuries. This indicates that methods must be found to introduce a more progressive development of physical demand in Swiss Army training.

Limitations

Sensor defects and failure of participants to wear all 3 sensors reduced the dataset by 41.3 %. The number of complete datasets may have been increased by any of the following: a smaller number of sensors per participant, daily surveillance of participant involvement or an improvement in the mechanical stability of the sensors.

The BT weeks investigated (weeks 2, 4, 8 and 10) represent only a portion of the BT in Swiss Army training schools. It is possible that the weeks not investigated contained different patterns of physical demands. However, weeks 2 and 4 represent the GBT and weeks 8 and 10 represent FBT. Based on the content of appraisals by school commanders and their weekly military training plans, the weeks investigated appear to be representative of all weeks in each part of BT.

Strengths

The objective method employed was unobtrusive and did not restrain daily military training. Body-fixed sensors were used successfully to assess the type, duration and intensity of physical activity in different military occupational specialties. Therefore, the method used allowed objective quantification of the physical job requirements of soldiers. An example of a detailed characterisation and comparison of different occupational specialties is presented in ▶ **Table 2**.

Implications

This study provides novel reference data for quantifying the physical demands of daily military routines, and supplements already published values of energy expenditure during daily military routines in the armed forces of various countries. Further, the present study is one of the first to quantify distance covered on foot. Moreover, to our knowledge, it is the first to objectively quantify the time spent in military-specific activities.

This study demonstrates that more information on occupational physical activity can be derived from the recently applied body-worn sensors [3,4,14,25] than only the quantification of direct outcomes such as cardiovascular strain (using heart-rate monitors), physical activity intensity (using accelerometers) or step count (using pedometers).

For the Swiss Army, this study provides new objective information to describe and compare physical job requirements across different occupational specialties.

Conclusion

The measurement system utilised in the present study yields data comparable to prior studies that applied alternative methods. Nevertheless, the sensor-based, objective measurement system provides more information on daily physical activity and demands than traditional, single measurement instruments.

Physical activity in Swiss Army training schools varies among occupational specialties. However, the average daily TEE values in all investigated occupational specialties are within the range of values found among other national armed forces, as well as among professional athletes. The results demonstrate that physical demands in the Swiss Army decrease between the second and eighth week of BT. We therefore conclude that the actual development of physical demand during the first 8 weeks of military training does not meet the principle of progressive loading recognised in sport sciences.

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