OCCUPATIONAL APPLICATIONS We investigated the wearing comfort of nine devices for monitoring physical activity in a military context. In general, the questionnaire-based survey revealed that the devices were highly acceptable. For long-term monitoring of physical activity in soldiers (>5 days), slightly more participants (85.2%) found that sensors not located at the chest would be more acceptable compared to the chest-worn devices (66.7%). More specifically, our results suggest that devices placed on or around the upper arm, the hip, or the shoe will be preferred over devices worn around the wrist or on or around the chest in a military context. The placement of physical activity monitoring devices around the chest, in particular, can be expected to lead to discomfort due to incompatibilities with military equipment.

TECHNICAL ABSTRACT Background: Military organizations use body-worn devices for ambulatory monitoring of physical activity in soldiers. However, little is known regarding the wearing comfort and acceptability of ambulatory monitoring devices as used in the military context. Purpose: To investigate the wearing comfort and acceptability of nine body-worn devices for monitoring physical activity in soldiers. Methods: A total of 27 male volunteers wore three randomly assigned devices simultaneously for one day of basic military training. The participants then completed a questionnaire designed to assess comfort and acceptability. Results: Devices worn on or around the chest were associated with lower wearing comfort and acceptability scores (overall scores of 59.7, 70.8, and 80.9 for Hidalgo EQ02, TICKR X, and ActiHeart, respectively). Devices worn around the wrist, Mio FUSE (80.9), GENEActiv (81.3), and fenix 3 (85.3), had mid-range scores. The highest scores were obtained for the devices Blue Thunder, worn on the shoe (85.5), Axiamote PADIS 2.0, worn on the hip and the backpack (88.9), and Everion, worn on the upper arm (90.1). Conclusions: Body-worn devices for monitoring physical activity are well-accepted in soldiers. The differences between the devices were small for several parameters. Nevertheless, devices that are attached to, or around, the chest, were typically perceived as having a slightly more negative impact on the body.
Both wrist- and chest-worn devices received some reports of interfering with military equipment or military tasks.

KEYWORDS Wearable devices, device placement, army, questionnaire, usability/acceptance, measurement and research

1. INTRODUCTION

Military occupations are physically demanding. For this reason, it is crucial to objectively describe the requirements of different functions to ensure a balance between physical demands and physical capability, and, therefore, to prevent injuries to soldiers (Rosendal, Langberg, Skov-Jensen, & Kjaer, 2003; Wyss, Roos, Hofstetter, Frey, & Mäder, 2014; Wyss, Scheffler, & Mäder, 2012). Objective continuous data obtained while undertaking physical activities during military training allow for monitoring of the development of physical demands. It is desirable to identify whether these demands progressively increase during the course of military training, as it has been shown that this is another important factor in injury prevention (Roos et al., 2015; Wyss et al., 2014). Therefore, military organizations in different countries already use body-worn measuring devices to objectively assess the physical activities of, and demands on, soldiers (Burrell, Love, & Stergiopoulos, 2016).

Most of these devices, which are either self-developed or commercially available, use variables such as heart rate and acceleration to estimate energy expenditure and/or distance covered on foot. These values are then used as representative measures of physical demands. It should be noted that there is a balance between accuracy and wearability of a device; accuracy could be most important if the purpose is to guide medical decisions or even to predict individual performance limits, but high precision and accuracy are less important for ambulatory assessment of soldiers’ physical demands. Although the validity of such body-worn devices has already been studied (Dannecker, Sazonova, Melanson, Sazonov, & Browning, 2013; Lee, Kim, & Welk, 2014), little is known regarding their acceptability and perceived wearing comfort from the user experience perspective.

However, there is evidence to show that wearing comfort is crucial for the collection of valid data, since study participants are likely to behave more naturally and to be more compliant with wearing devices if they find them comfortable (Bergmann & McGregor, 2011). Therefore, the North Atlantic Treaty Organisation (NATO) “Human Factors and Medicine (HFM)-260: Enhancing soldier effectiveness with wearable biosensors & physiological models” research panel conducted the present cooperative study, in which different monitoring devices, worn simultaneously by the same participants, were directly compared. The aim of this study was to examine the wearing comfort and acceptability of nine different body-worn devices for monitoring physical activity in soldiers.

2. METHODS

2.1. Participants and Experimental Procedure

The wearing comfort of nine different devices was tested among volunteers from a basic military training school of the Swiss Army infantry. Only male volunteers were included in this investigation due to the fact that the majority (99.53%) of Swiss soldiers are male (Federal Department of Defence, Civil Protection and Sport DDPS, 2017). In total, 27 men completed the study, with mean (SD) age of 20.1 (1.1) years, stature of 1.8 (0.1) m, body mass of 77.4 (13.5) kg, and body mass index of 24.3 (3.0) kg/m². This research was performed in accordance with the principles of the Declaration of Helsinki and was approved by the local Ethics Committee of Northwest and Central Switzerland. Each participant signed an informed consent form. Anthropometric measurements were made two weeks prior to the actual data collection, using a portable stadiometer (Seca model 213, Seca GmbH, Hamburg, Germany) and a calibrated scale (Seca model 861). In order to assess wearing comfort and acceptability, each participant received one of three randomly assigned devices for each of three body parts (wrist/chest/other). These devices were worn simultaneously for one working day during basic military training (approximately...
12 hours), after which the participants completed a questionnaire regarding different aspects of wearing comfort and acceptability.

### 2.2. Questionnaire

The questionnaire was designed on the basis of the survey conducted by Tharion, Buller, Potter, Karis, Goetz, and Hoyt (2013), and consisted of five main topics: 1) wearing comfort, 2) impact on the body and on military performance, 3) emotional (affective) state, 4) device displacement, and 5) acceptability. A short description of each dimension is provided as follows. Overall wearing comfort was judged on a 7-point Likert scale ranging from 1 (very uncomfortable) to 7 (very comfortable). Participants were also asked if they found it less comfortable to wear the devices during specific activities (Yes/No), and if “Yes” to specify during which activities this was the case (open-ended question with space for comments). Several 5-point Likert scales ranging from 1 (extremely negative impact) to 5 (no negative impact) were used to rate the impact of the device on the body and on the military performance of the participants. For the impact on military performance, participants were asked to distinguish between three conditions: without protection equipment, with protection equipment other than body armour, and with body armour. While body armour is mostly associated with a flak jacket, other protection equipment consists of, for example, a helmet and protection goggles. Emotional state while wearing the device was rated on six thermometer-style questions, in accordance with Knight and Baber (2005), where the scales ranged from -10 (negative feeling) to 10 (positive feeling). The six sub-dimensions for the emotional state were concern (worried vs confident), attachment (feel the device vs device is worn and forgotten), harm (causes harm vs is beneficial), perceived change (feel strange vs feel the same), movement (restricts movement vs freedom of movement), and anxiety (feel insecure vs feel secure). Device displacement was rated by answering “Yes” or “No” to the question: “Did the device change its position during the day?” Finally, acceptability was rated by two Yes/No questions: “Would you wear the device for a period of 8 or more hours?” and “Would you wear the device for a period of 5 or more days?” All questions were the same for each device, and participants took approximately 30 minutes to complete the questionnaire.

### 2.3. Devices

Nine monitoring devices were investigated, each of which are either already used in military organizations or were suggested as potentially applicable in the military setting by experts of the NATO HFM-260 research panel. Three devices were worn on or around the chest, three devices were worn around the wrist, and one device each was worn on the upper arm, the hip and the backpack, and the shoe. Two devices (fenix 3 and Axiamote PADIS 2.0) must be paired with a heart rate monitor for full function, however, in the current study participants rated only the device itself, without any additional heart rate monitor. Table 1 and Figure 1 show the characteristics and location of each device.

### 2.4. Data Analysis and Statistics

Parametric procedures were chosen for the Likert-type and thermometer questions (wearing comfort, impact on the body or military performance, and affective state), as this has been proposed in the literature (Sullivan, & Artino, 2013). Furthermore, and based on visual inspection of QQ-Plots and by Shapiro-Wilk analysis, data appeared approximately normally distributed (for example: emotional state, $p = .055$ to .804 for tests of non-normality). Means and standard deviations were calculated for responses to each question. For questions relating to the emotional state, the mean value of the six sub-dimensions was used for further analyses. Percentages were calculated for the Yes/No questions (device displacement and acceptability). Open-ended comments were transliterated in groups, using frequently appearing key words. In order to make an overall comparison and to rank the devices, standardized responses were derived: all answers were re-scaled from 0 to 100, where 0 corresponded to the most negative possible answer and 100 corresponded to the most positive possible answer. A total score was calculated for each device, and spider charts containing the six sub-dimensions of the questionnaire were generated using Excel for Windows (Microsoft Corporation, Redmond, USA). IBM SPSS Statistics 24 for Windows (IBM Corporation, Armonk NY, USA) was used for further statistical analyses. A multiple comparisons analysis of variance was conducted to identify group differences, with Bonferroni post hoc corrections applied for multiple group comparisons where necessary. The level of statistical significance was set at $p = $
<table>
<thead>
<tr>
<th>Body part</th>
<th>Device</th>
<th>Parameters measured</th>
<th>Parameters estimated</th>
<th>Producer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest</td>
<td>ActiHeart</td>
<td>HR (ECG), Acc</td>
<td>TEE, PAEE</td>
<td>CamNTech, Cambridge, UK</td>
</tr>
<tr>
<td></td>
<td>Hidalgo EQ02</td>
<td>HR (ECG), breathing rate, Acc, steps, skin temperature</td>
<td>Speed, distance, TEE, PAEE, BMR</td>
<td>Equivital, Cambridge, UK</td>
</tr>
<tr>
<td></td>
<td>TICKR X</td>
<td>HR, Acc</td>
<td>TEE</td>
<td>Wahoo Fitness, Atlanta, USA</td>
</tr>
<tr>
<td></td>
<td>fenix 3*</td>
<td>HR, distance, altitude, speed, temperature</td>
<td>—</td>
<td>Garmin, Olathe, USA</td>
</tr>
<tr>
<td></td>
<td>GENEActiv</td>
<td>Acc, temperature, light photo diode</td>
<td>—</td>
<td>Activinsights, Cambridgeshire, UK</td>
</tr>
<tr>
<td></td>
<td>Mio FUSE</td>
<td>HR, Acc, steps</td>
<td>Distance, TEE, PAEE</td>
<td>Mio Global, Vancouver, Canada</td>
</tr>
<tr>
<td>Wrist</td>
<td>HD200</td>
<td>HR, Acc</td>
<td>TEE</td>
<td>Activinsights, Cambridgeshire, UK</td>
</tr>
<tr>
<td>Other</td>
<td>Axiamote PADIS 2.0*</td>
<td>HR, Acc, steps</td>
<td>Speed, distance, TEE, PAEE</td>
<td>Axiamo, Biel, Switzerland</td>
</tr>
<tr>
<td></td>
<td>Everion</td>
<td>HR, Acc, steps, blood pressure wave, blood perfusion</td>
<td>TEE</td>
<td>Biovotion, Zurich, Switzerland</td>
</tr>
<tr>
<td></td>
<td>Blue Thunder</td>
<td>Acc</td>
<td>—</td>
<td>IMeasureU, Auckland, New Zealand</td>
</tr>
</tbody>
</table>

Notes: *Must be combined with a heart rate monitor for full function. HR = heart rate, ECG = electrocardiogram, Acc = acceleration, TEE = total energy expenditure, PAEE = physical activity energy expenditure, BMR = basal metabolic rate.
.05. Note that the research staff checked that all participants fully completed the questionnaire, meaning that no data were lost or missing.

3. RESULTS

Table 2 summarizes the primary results for each dimension and device. Subsequent sub-sections provide the results in more detail, separately for each main topic.

3.1. Wearing Comfort

No significant differences in wearing comfort were found between the devices. However, the difference between devices worn on the shoe, on the hip or around the upper arm (5.7 (1.8), “Comfortable”) and devices worn on or around the chest (4.6 (2.0), “Slightly comfortable”) approached significance ($p = .109$), while devices worn around the wrist (5.2 (2.0), “Slightly comfortable”) were rated comparable to the first-mentioned ($p = .777$). Approximately a quarter (23.5%) of the participants indicated that there were specific activities during which they found it more uncomfortable than usual to wear the device (44.4% chest, 22.2% wrist, and 3.7% other body parts). In the open-ended comments, 12.3% of participants reported problems during close-quarters combat and sports activities, as well as with body armour, when wearing a device on or around the chest. 4.9% of participants reported that measuring devices worn around the wrist caused problems during shooting and while doing push-ups.

3.2. Impact on the body and on Military Performance

Participants rated devices worn on or around the chest as having significantly more negative impact on
the body (4.3 (1.0), “Slight negative impact”) compared to devices worn around the wrist (4.8 (0.4), “No negative impact”; \( p = .027 \)) and on or around other body parts (4.9 (0.3), “No negative impact”; \( p = .002 \)). For all investigated devices, poor wearing comfort was the most frequently reported negative impact (21.0%), followed by interference with equipment (9.9%), limited free moving space (7.4%), unesthetic design (6.2%), and thermoregulation (4.9%). The participants indicated that the negative impact occurred more frequently during intense activities (18.5%) than during moderate (11.1%) and light activities (2.5%), or inactivity (2.5%). All devices were rated as having no negative impact on military performance while wearing either no protection equipment or protection equipment other than body armour. However, while wearing body armour, the participants rated devices worn on or around the chest as having a significantly more negative impact (3.9 (1.3), “Slight negative impact”) than devices worn around the wrist (4.7 (3.4), “No negative impact”; \( p = .004 \)), or on or around other body parts (5.0 (0.2), “No negative impact”; \( p < .001 \)).

3.3. Emotional State

Regarding overall emotional state, the participants rated devices worn on or around the chest as less positive (2.4 (4.0)) than devices worn around the wrist (4.8 (3.4); \( p = .051 \)), or on or around other body parts (6.5 (3.2); \( p < .001 \)). No significant differences between devices worn on or around different body parts were found in the subdimensions of emotion (2.2 (4.7), 3.9 (3.9), and 3.4 (4.9) for the chest, wrist, and other body parts, respectively) and anxiety (4.5 (4.9), 6.1 (4.9), and 7.2 (4.1) for the chest, wrist, and other body parts, respectively). However, devices worn on or around the chest were rated significantly less positively than devices worn on or around body parts other than the chest or the wrist, in the subdimensions of harm (0.9 (5.6) chest vs 5.4 (5.0) others; \( p = .006 \)) and movement (5.3 (5.8) chest vs 8.5 (3.4) others; \( p = .047 \)). In the subdimension of perceived change, devices worn on or around the chest (2.3 (5.9)) were rated as significantly worse than devices worn around the wrist (5.8 (4.6); \( p = .032 \)) and on or around other body parts (7.7 (4.4); \( p < .001 \)). With regard to attachment, devices worn on or around other body parts were rated significantly more positively (6.8 (5.0)) than devices worn on or around the chest (-0.6 (6.3); \( p < .001 \)) or around the wrist (2.8 (6.2); \( p = .42 \)).

3.4. Device Displacement and Acceptability

The initial wearing position was not changed by measuring devices worn on or around the chest and

<table>
<thead>
<tr>
<th>Table 2. Primary results for each dimension and device.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Chest</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Wrist</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Overall</td>
</tr>
</tbody>
</table>

Notes: SD = standard deviation
Wearing comfort: 1 = very uncomfortable; 7 = very comfortable
Impact on body: 1 = extremely negative impact; 5 = no negative impact
Impact on military performance (with body armour): 1 = extreme negative impact; 5 = no negative impact
Emotional state: -10 = negative feeling; 10 = positive feeling
Displacement: % of No-answers to the question: “Did the device change position during the day?”
Acceptability: % of Yes-answers to the question: “Would you wear the device for 5 or more consecutive days?”
around the wrist in 77.8% of the participants, while 85.2% of the participants stated that devices worn on or around other body parts remained in the positions in which they had been attached initially. Devices worn on or around the chest were indicated as acceptable by 77.8% of the participants for 8 hours, and by 66.7% of the participants for 5 or more days. Almost all (96.3%) of the participants reported they would agree to wearing devices around the wrist for 8 hours, and 85.2% would agree to do so for 5 or more days. All participants indicated that they would wear devices on or around other body parts for 8 or more hours, and 85.2% would do so for 5 or more days.

3.5. Overall Scores and Ranking of Devices

Comparison between devices in terms of standardized responses are shown in Figure 2. The overall ranking, calculated on the basis of the overall scores, shows a clear picture: Ranked 1 to 3 are the devices Everion, Axiamote PADIS 2.0, and Blue Thunder, which are all worn on or around body parts other than the chest and wrist. The devices worn around the wrist (fênix 3, GENEActiv, and Mio FUSE) were ranked 4 to 6. The lowest ranked devices (7–9) were ActiHeart, TICKR X, and Hidalgo EQ02, which are all attached to, or around, the chest. In interpreting the rankings, it must be considered that Axiamote PADIS 2.0 and fênix 3 must be combined with a heart rate monitor in order to function fully.

4. DISCUSSION

All of the investigated monitoring devices were positively rated, showing that body-worn devices for the ambulatory monitoring of physical demands are likely to be generally accepted by soldiers. For several of the investigated outcome measures, the differences between the devices were not statistically significant or relatively small. Nevertheless, it is advisable to choose a device that is as comfortable as possible, as it has been shown previously that wearing comfort is a crucial factor avoiding disruptions to normal activities and to supporting collection of valid data over a multi-day study (Bergmann & McGregor, 2011). Apart from wearing comfort, researchers should also weigh feasibility, compatibility with other devices, and the data accuracy of different measurement devices.

The present results indicate that, in a military setting, devices that are worn on or around body parts other than the wrist and the chest are slightly preferred. This finding is consistent with the results of an earlier study. Specifically, Huberty, Ehlers, Kurka, Ainsworth, and Buman (2015) reported that, outside the military setting, a device worn on the upper arm (SenseWear Mini, BodyMedia, Pittsburgh, USA) was rated as being the most conveniently placed and more comfortable compared to devices worn around the wrist (GENEActiv) and the hip (GT3X, Actigraph, Pensacola, USA). However, Huberty et al. (2015) also found that the female participants in their study preferred the wrist-worn device compared to the device that was attached at the hip, which indicates that device-preferences may differ between genders and situations. In a questionnaire-based study, Bergmann, Chandaria, and McGregor (2012) reported that participants chose the wrist as their favourite place to wear a device, followed by the arm, “anywhere”, the torso/abdomen, and the waist. This finding indicates that the wrist might be the preferred location for wearable technology for people with a less physically demanding lifestyle. To conclude, we suggest it is probable that there is no universally optimal body part to which wearable technology could be attached, but that the living conditions of different individuals must be considered. Even though the results of the present study are primarily representative of a military setting, it is conceivable that the findings also apply for other occupations involving a high degree of physical work and protection equipment, for example firefighters, policemen, and rescue technicians (Bos, Mol, Visser & Frings-Dresen, 2004; Taylor, Lewis, Notley & Peoples, 2012).

It should be considered that the monitoring devices used in the present study may also have been rated in relation to the presented alternatives. For example, the chest-worn devices may have been rated more positively if less comfortable alternatives had been presented. This suggestion is supported by a comparison of the present data with the results of Tharion et al. (2013), who compared the Hidalgo EQ01 to the Hidalgo EQ02 system and found that the latter was superior in terms of comfort, impact on the body, impact on military performance, and emotional state. Nevertheless, when results for the EQ02 results are compared between the two studies, it becomes clear
that the same device was rated more highly in the previous investigation (4.8 (1.4) vs 3.6 (1.8) for wearing comfort, 4.8 (0.5) vs 4.2 (0.8) for impact on body, 4.2 (1.8) vs 3.8 (1.6) for impact on military performance, and 4.4 (4.3) vs 3.8 (0.3) for emotional state). These differences could also result from assessing different populations, but the results should be comparable since both studies were conducted with male infantry soldiers.

The current device rankings might help researchers and practitioners in choosing suitable devices for future investigations. However, it should be reiterated that two of the devices tested that were ranked highly (Axiamote PADIS 2.0 with overall rank 2, and fenix 3 with overall rank 4) must be combined with some type of heart-rate monitor for the collection of valid data. A chest belt or a photoplethysmographic device could be used for this purpose. However, in both cases the heart rate monitor, primarily when worn on or around the chest, might lead to limited wearing comfort of the “complete” system, which would likely have resulted in a lower overall rank for these specific devices in the present study.

Unfortunately, the body placement for best wearing comfort is not necessarily the body placement for best data accuracy. This aspect has to be considered as well when making an informed decision as to which measuring device to use in a field study. The monitoring devices

FIGURE 2. Spider charts of the results. Overall scores are shown in brackets. Middle of spider = 40% rating; edges of spider = 100% rating. Dimensions: C = wearing comfort; IB = impact on body; IP = impact on military performance; E = emotional state; D = displacement; A = acceptability. *Must be combined with a heart rate monitor for full function.
investigated in the current study are primarily used for ambulatory assessment of heart rate, energy expenditure, and (in some cases) walking speed in soldiers. Concerning the accuracy of heart rate data, sensor placement on/around the chest is still superior compared to placement on the upper arm or wrist (Spierer, Rosen, Litman, & Fujii, 2015). For accurate activity recognition and energy expenditure estimation based on a single inertial- or acceleration sensor, sensor placement near the centre of body mass was reported to be most accurate (Bouten, Sauren, Verduin, & Janssen, 1997; Yang & Hsu, 2010). Thus, a placement on the hip, the chest, or the lower back would be preferable to a placement on the wrist or shoe. For detection of walking speed, the best sensor placement is not clear. A sensor placement on the lower back, hip, and foot was applied with high accuracy in walking speed detection (Yang, & Li, 2012). However, for data accuracy in different monitoring devices, there are many other hardware and software factors to be considered. For customers, only the final data accuracy of a certain product is of interest. Therefore, the nine specific devices investigated in this study were compared to a reference device, to determine their data accuracy for energy expenditure and heart rate. These results are forthcoming, and together with the present evidence on wearing comfort may be helpful for informed decision making in military research.

4.1. Strengths and Limitations

The key strength of the present study is that it included a large spectrum of nine very different devices that are already in use, or have the potential to be used, for ambulatory monitoring in a military setting. In addition, the participants wore the devices during their daily military routine, which guarantees that the results are representative of the use of the devices in soldiers. Finally, the questionnaire was compiled of questions that have already been used in other studies of soldiers to allow for comparison of results. Despite these strengths, there are also limitations to be noted. First, the participants wore the devices for only one day, which might be insufficient to make inference for longer-term usage. Second, three devices were worn simultaneously, which might have had an impact on the perception of each single device. Third, it can be supposed that soldiers with a special interest in body-worn devices were more likely to participate in this study, which might have led to a subsample of individuals who were not representative of the larger soldier population.

4.2. Perspectives

One major question that remains unanswered relates to why there were differences between devices worn on or around the same body part. For example, GENEActiv and Mio FUSE were rated as having a lower wearing comfort than fēnix 3, although both devices are worn around the wrist and the fēnix 3 is larger than GENEActiv. It is possible that a preference for the design of the fēnix 3, and the fact that real-time data are shown on a display, may have led to greater acceptability of this device. Such an effect would be in accordance with the findings of Huberty et al. (2015), who reported that informational feedback was most valued by their female participants. Another remaining question is why there was a lower score for the Hidalgo EQ02 compared to the other chest-worn devices. We suspect this might be due to the size or the design of this device. Specifically, the sensor of the Hidalgo EQ02 is worn in a tight fitting holster, which reminded some of the male participants of a sports bra and might become rather uncomfortable after wearing the device for a full (working) day. However, as no specific questions related to these factors were included in the questionnaire used in the present study, the level of importance to male soldiers remains unclear. A question addressing this aspect would be one possible useful development of the questionnaire. Additionally, the present results revealed that not all questions showed the same sensitivity. Further investigations could focus on those aspects of the questionnaire that are most meaningful for the assessment of the overall wearing comfort, for example emotional state and acceptability. Finally, it should be noted that the assessment of wearing comfort is but one important aspect of useful, body-worn devices. Validity and feasibility are equally important to consider; therefore, future studies should aim to combine the assessment of all these features.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.
ACKNOWLEDGMENTS

We thank the volunteering soldiers and the military staff of the infantry training school for their participation and support in this study. Furthermore, we would like to express gratitude to Daniel Agostino, Joël Bättig, Jannik Brunschwiler, Florian Herren, and Nicolai Muff for their assistance during data collection.

FUNDING

This study is a collaboration between Switzerland, Netherlands, United States of America and United Kingdom through NATO Panel HFM-260. The views expressed in this paper are those of the authors and do not reflect the official policy of their employers or respective governments. The authors and parent organizations do not endorse any of the products assessed in this study.

REFERENCES


N. Beeler et al.