ABSTRACT

Introduction In order to overcome the work demands of the battlefield safe and effectively, soldiers need a substantial all-round capacity of both strength and endurance. Albeit, an increasing number of military tasks are solved using drones and robots several situations still need to be solved manually on the ground. However, ongoing rationalization of duty hours and high focus on technical and tactical training limit the time allocated for physical training to develop or maintain the needed physical capacity. Therefore, there is an ongoing search for optimized training methods that effectively enhance the soldiers' operative physical performance and reduce the risks of injuries with as little time as possible invested. Thus, the overall focus of this thesis was to investigate the effectiveness of a proposed training regime, 'micro-training'. Specifically, the effectiveness of 8x15 min training session (micro-training), feasible to fit into breaks and waiting time, as opposed to intensity and volume matched 2x60 min training sessions (classical training). Furthermore, a secondary objective was to explore individual adaptations to strength and endurance training in relation to initial training status. The hypotheses were that micro-training would induce superior adaptations compared to classical training and that individual adaptations to training could be related to initial training status.

Methods This thesis is compiled of one paper from a pilot study, two (submitted) papers from a main study and additional unpublished data analysis from the main study. In the pilot study, 29 military interpreter students participated in a 8 week training intervention divided into two groups: a 'micro-training group' (MIC) completed 9x15 min training sessions per week of either strength or endurance training and a 'classical-training' group (CLA) conducted identical strength and endurance training distributed as 3x45 min sessions per week. In the main study, a total of 290 basic army training conscripts participated in a 9 week training intervention divided into three groups: MIC completed 8x15 min training sessions per week of either strength or endurance training, CLA conducted identical strength and endurance training distributed as 2x60 min sessions per week and a 'control' group (CON) performed 2x60 min standard military physical training sessions. Strength and endurance were evaluated physiologically in muscle morphology, maximal voluntary contraction (MVC), oxygen consumption (VO₂) capacity, enzymatic activity, and mitochondrial protein content and as functional performance of run performance, strength and strength-endurance exercises.

Results In the pilot study, adaptations between MIC and CLA were more or less similar, but MIC tended to have superior changes in measures of both strength and endurance. In the main study, similar adaptations between MIC and CLA were observed. Knee extensor MVC, run performance and strength endurance and pull-up performance increased to the same extend, while upper body MVC and functional measures of leg strength remained constant. Only MIC increased VO₂ capacity. In regards to individual adaptations, both oxygen consumption capacity and measures of functional strength and endurance improved dependent on initial training status while MVC measurements were unaffected.

Conclusion Micro-training did not induce superior adaptations compared to classical training but the present results supports the use of micro-training with expected training outcomes corresponding to volume and intensity matched classical training outcomes. Furthermore, there was a relationship between individual initial training status and adaptations to training hence there appears to be a potential to optimize training outcomes by applying training programs adjusted according to initial training level.