Interval Run Training vs. Steady-State Run Training in Military Personnel

A Study Review of Stone et al. (2020)

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Due to the importance of both aerobic and anaerobic fitness for Army operations, Stone et al. (2020) examined the effects of both a traditional military running program and an experimental interval-based running program on 2-mile run times in the Army Physical Fitness Test (APFT). This study dealt specifically with cadets in the Army ROTC program at the University of Oklahoma. Within this specific sub-population within the Army, cadets have various academic and training duties that can conflict with the ability to have enough time to dedicate to fitness training. However, a similar time conflict also exists within the Army (and tactical populations as a whole) among active-duty and reserve elements, especially during pre-deployment and deployment periods.

The study authors examined if optimal levels of aerobic fitness could be obtained through an experimental, interval-based run program, which utilized all three primary energy systems (phosphagen, glycolytic, and oxidative) in shorter time periods than traditional military running programs. The authors also sought to discover if results could offer a template for military units to use for high quality conditioning programs which could increase aerobic fitness while simultaneously utilizing all three energy systems so as to not negatively affect anaerobic abilities.

To carry out this study, the researchers formed two groups from ROTC cadets – both male and female – and separated them into two different groups. Participants were placed into one of two groups randomly. Both groups underwent the same 8-week preliminary training period which utilized the Army's Physical Readiness Training (PRT) program. After this, the groups were separated. One group performed a 4-week experimental run program (EXP) while the other performed a traditional Army run program (TRA). One "washout" week followed, in which no conditioning was done by either group. Using a

crossover design, the researchers then switched the EXP and TRA groups for another 4 week conditioning period in which the original EXP group now performed the traditional run program and the original TRA group now performed the experimental run program. To assist the researchers in ascertaining the magnitude of the EXP training intervention on the 2-mile run, a 2-way analysis of variance was utilized to gather statistical data.

Prior to beginning the study, however, participants underwent the APFT, which along with the 2-mile run is preceded by the 2 minute push-up test and 2 minute sit-up test. This initial test was the baseline test. The APFT was repeated at the end of the first 4 weeks ("post 1" test) as well as at the end of the second four weeks ("post 2" test). During each testing of the APFT, the strength endurance tests were included to mimic the muscular fatigue that can occur during the APFT prior to the 2-mile run.

Of the seventy-four cadets who began the study, fifty of them finished all training sessions needed for inclusion in the study results. There were no significant differences between anthropometric and baseline variables, which demonstrated that the two groups were matched in such a way that would not create a study limitation. The primary findings of this study was that the original EXP group significantly decreased their 2-mile run times after the first 4-week run training program, demonstrated by mean run times that were 17.9 seconds better than baseline (961.3 ± 155.8 at baseline and 943.4 ± 140.2 at post 1 test). In contrast, the TRA group's time increased by a mean of 12.9 seconds (901.0 ± 79.2 at baseline compared to 913.9 ± 82.9 at post 1).

The results from the post 2 test, at the end of the study, further reinforced that the experimental anaerobic/aerobic approach was superior to the traditional steady-state distance running approach for improving aerobic fitness. After the group crossover for the second 4 weeks, the original EXP group's times increased after performing the traditional run program, whereas the original TRA group, which then performed the experimental program, decreased their 2-mile run times.

The authors' primary findings were: that an experimental, interval-based running program which utilized all three energy systems is superior to a traditional run program over a four-week period; and that the detrimental effects of a traditional run program could be ameliorated by participation in a subsequent experimental, interval-based program. An additional important finding was that the benefits of interval-based run training (which were superior to those of a traditional run program) were obtained in less time than it took to perform the traditional run program. Specifically, the authors point out that while

the traditional run program took 60 minutes to complete, the experimental program took an average of 43.2 minutes. This is a highly important finding, and the utilization of an interval-based run program has a number of implications for strength and conditioning specialists. Firstly, the authors point out that the extra time afforded by performing an interval-based program can provide "more time for the individual to participate in various recovery and rehabilitative measures" such as "mobility work, manual therapy, [and] corrective exercises" (p. 3437). Due to the high number of injuries that occur within military populations, this is a key finding allowing for more time to reduce the risk of injuries or rehabilitate those which have occurred. Secondly, though not directly stated by the authors, this extra time can also be used for resistance training, cognitive performance training, or job-specific training.

There were only a few possible limitations to the present study, which included: the length of the program; the time constraints of the subjects; the drop-out rate of the subjects; and fluctuations in fall temperature throughout the duration of the study. Rather than the length of the program negating any of its findings, the authors pointed out that even with the short time period, "positive effects for the experimental group and negative effects for the traditional program were evident" (p. 3437). The drop out rate of subjects was high, though did not significantly affect the quality of the data collected. Temperature fluctuations were a possible limitation as well, though were regarded as a minimal one due to temperature fluctuations being the norm for most ROTC and military units. The authors recommend that future research explores "similar protocols with an extended duration [of 8-12 weeks]" (p. 3437) in order to further add to current knowledge of the role that interval training can have on aerobic fitness.

This study has reaffirmed what a substantial amount of recent research has demonstrated, namely, that interval training is *at least* equal to steady-state training in developing aerobic capacity as well as being a much more time-efficient model (Gillen et al., 2016; MacInnis & Gibala, 2017; Rowan et al., 2012). Some research has even shown that high-intensity interval training, consisting of near-maximal efforts, may improve mitochondrial content more than steady-state training (MacInnis & Gibala, 2017). Taken together, the current study and noted supporting research can help tactical human performance specialists to create metabolic conditioning programs that are time efficient while simultaneously increasing both anaerobic and aerobic capabilities.

References

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