Injury Prevention: Just the Facts

Extreme Conditioning Programs

FACT SHEET 12-003-0915

What are extreme conditioning programs?

Extreme conditioning programs (ECPs) are high-intensity interval training (HIIT) programs that use rapid, successive, near-maximal sets of various exercises, with very little rest between intervals. ECPs incorporate a variety exercises, including Olympic and power lifting (e.g., snatch, squat, overhead press, deadlift), plyometric and gymnastic-type movements (e.g., box jumps, burpees, and rope climbs), running (intervals training) and rowing. Though focused on anaerobic exercises, the pace is touted to increase aerobic fitness as well. ECPs are marketed as a form of "elite" training designed to burn calories, build muscle, and reach peak physical fitness quickly.[1-5]

ECPs are commercially available as instructional videos or programs at specific facilities. Some organizations offer instructor certification in ECP-like programs. The fast-paced style and atmosphere of competition created by ECPs are elements many Soldiers find appealing. Additionally, the high physical demand and skill needed to execute ECP workouts may appeal to some Soldiers who feel these programs can improve their combat readiness. In fact, ECPs have become such a popular form of physical training among Soldiers that some installations, units, and Morale Welfare and Recreation (MWR) programs sponsor ECP events or are incorporating ECPs into their physical training (PT) programs.

Army Images (Army.mil)

Are ECPs endorsed by the Army?

While ECPs are not officially endorsed by the Army, there is evidence that they can improve physical fitness (i.e., aerobic cardiovascular endurance, muscular strength and endurance, and body composition). However, existing studies are small, have several limitations, and do not provide enough evidence to compare benefits from an ECP to the Army Physical Readiness Training (PRT) program (FM 7-22).[6,7] Though specific exercises differ, PRT also uses a cross training approach, mixing aerobic and anaerobic, strength, and mobility exercises. Although the Army has no official position on the use of ECPs in PT programs, there is concern that ECPs might increase the risk of injuries in some individuals.

What injuries can be caused by ECPs?

Studies indicate that the shoulders, knees, and lower back are the most common body regions injured during ECPs. The most common injury types include ligament sprains, muscle strains, and tendon issues, as well as general pain and inflammation. More serious but less common injuries include torn ligaments, stress fractures, and exertional rhabdomyolysis (a rapid breakdown of skeletal muscle, caused by heavy physical activity). Most injuries are reported as acute incidents, but some soft tissue injuries may be due to overuse.

Can ECPs increase the risk for training injuries?

Two studies to date have specifically evaluated ECP-related injury rates.[4-5] Both studies were conducted on commercially-controlled civilian programs that included certified ECP instructors. These studies describe self-reported ECP injury rates of 20% or 3 injuries per 1000 training hours, similar sports such as Olympic weightlifting or gymnastics. Currently, only one Army study has compared Soldiers performing traditional physical training to a group that incorporated ECPs into their regimen.[7] While the study did show similar risk factors for injury (e.g., low aerobic fitness, cigarette smoking, high BMI) as found in traditional PT programs, there was no difference in injury incidence between the ECP and non-ECP groups. However, this single study of a controlled, instructed group does not provide adequate evidence to fully understand the injury risk to Soldiers from ECPs.

Studies to date have suggested that the degree and quality of instructional training provided to participants appears to affect injury risk. ECPs that are developed and "instructed" by personnel who lack proper training and certifications may potentially increase the risk of injury for participants. In the studies of instructed ECPs, males had a greater injury risk than females, possibly because they were less likely to seek instruction from the trainers or they pushed themselves beyond their limit.[4-5]

How can ECP-related injuries be prevented?

When engaging in any new exercise program, the risk of injury can be higher if an individual does not follow proper physical fitness training principles. Due to ECPs' focus on maximizing effort and short recovery periods, proper technique and form may be lost to speed and fatigue. This may leave participants vulnerable to injury. For example, while Olympic lifting focuses on technique for a single maximal lift, ECPs focus on maximizing the number of lifts in a short period of time. The table on the next page provides some basic principles to apply to ECP training.

While it is not clear that ECPs result in more injuries than other forms of physical training, injuries especially to the shoulders, back, and knees do occur. At present, it appears the most effective form of ECP injury prevention is to ensure proper certified instruction and supervision during all training sessions.

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How to Prevent Injuries Related to Extreme Condition Programs (ECPs)

Guidelines to Ensure Safety and Avoid Injury

1. Participate in ECPs taught by trainers with certifications from a nationally recognized and accredited organization**

- Not all certifications are equal – check both certifying organization and specific type of certification.**
- Be advised that ECPs or events on military installations may not be taught by certified personnel.
- Army Leaders should strive to ensure that:
  - ECPs on military facilities are instructed and supervised by certified professionals.
  - Military exercise facilities and equipment are conducive for safe conduct of ECPs.

2. Be aware of risks and ensure proper health and fitness levels *prior to* beginning an ECP.

- Soldiers who *smoke*, have *low aerobic fitness*, *high body mass index* (BMI), or *who run high mileages* per week have a higher risk of injury, so may need to follow a more moderate training regimen before attempting high intensity ECP workouts.
- Soldiers with a current or previous health condition (e.g., a prior heat or musculoskeletal injury, high blood pressure, mild traumatic brain injury) should obtain medical guidance before starting an ECP.

3. Customize ECP workouts to Soldiers' individual fitness, ability levels, needs, & goals.

- ECPs taught by certified instructors can accommodate changing individual and group needs.
- Gradually adjust the amount of weight used, number of repetitions and sets, and the difficulty of exercises.
- Always pay attention to form when performing a lift or exercise – reduce weight and speed, and increase rest if form is lost in later reps.

4. Plan ECP workouts around other physically demanding activities to avoid overexertion and minimize overuse injuries.

- Schedule rest days before or after vigorous military training to optimize recovery.
- Avoid back-to-back ECP or other high intensity workouts especially if they involve similar muscle groups.
  - *For example:* avoid performing upper body strength workouts on consecutive days (consider 2-3 a week) or performing exercises that use different upper body muscles if performed consecutively. Also, do not follow a hard lower body workout day with a day of hard running.
- Maximize the duration of rest intervals during exercise sessions.

5. Look for signs of overtraining

- Pay attention to any unusual or chronic soreness (especially in the shoulders, back, or knees), unusual fatigue, decreased physical performance and weakness – these signs of overtraining can progress and result in an injury.
- Watch for signs and symptoms of mild to severe cases of rhabdomyolysis (severe muscle pain, nausea, or extremely dark urine).

Information Sources:

1) Bergeron MF, Nindl BC, Deuster PA, Baumgartner N, Kane SF, Kraemer WJ, et al. Consortium for health and military performance and American College of Sports Medicine consensus paper on extreme conditioning programs in military personnel. *Current Sports Medicine Reports,* 10*(6),* 383-389. 2011.
2) Jones BH. Human Performance Optimization and Injury Prevention During Deployments (U.S. Public Health Command Information Paper). 2012.
3) U.S. Army Public Health Command PHN No. 0312-01. What Army Leaders Should Know about Extreme Conditioning Programs. 2012.
4) Hak PT, Hodzovic E, & Hickey B. The nature and prevalence of injury during CrossFit training. *Journal of Strength and Conditioning Research.* Published ahead of print, 2014.
5) Weisenthal BM, Beck CA, Maloney MD, DeHaven KE, & Giordano BD. Injury rate and patterns among CrossFit athletes. *Orthopaedic Journal of Sports Medicine.* 2*(4)*. 2014.
6) U.S. Army Field Manual (FM) 7-22, Army Physical Readiness Training. Oct 2012.
7) Grier T, Canham-Chervak M, McNulty V, & Jones BH. Extreme conditioning programs and injury risk in a US Army brigade combat team. *U.S. Army Medical Department Journal,* 36-47. 2013.

******** *Recommended certifications include: ACSM Certified Personal Trainer® (CPT), ACSM Certified Health Fitness Specialist℠ (HFS), ACSM Certified Group Exercise Instructor℠ Certified Strength and Conditioning Specialist®, NSCA-Certified Personal Trainer® (NSCA-CPT), NSCA Tactical Strength and Conditioning-Facilitator (TSAC-F), CrossFit Level II Trainer/Certified CrossFit Coach*