

The Wisdom of Cross Training

Edmund R. Burke, Ph.D., C.S.C.S.
Biology Department
University of Colorado at Colorado Springs

CROSS TRAINING DESCRIBES the technique of using multiple activities to achieve total body fitness. The emphasis is on comprehensive conditioning. This is not a new concept. For years many individuals have run, lifted weights, and swam for a total body workout.

The benefits of cross training are numerous. A sensible cross training program enables one to develop the five major components of fitness: cardiorespiratory capacity, muscular endurance, muscular strength, flexibility, and skill. The emphasis is on comprehensive conditioning of the total body.

With these considerations in mind, an analysis of cross training is presented to clarify its meaning and define its strengths and limitations. The analysis begins with a discussion of the general benefits of cross training for the recreational exerciser and the physiological basis for using a cross training approach in conditioning. Then the concepts of sport-specific training and the integration of cross training are compared in the light of improving sports performance.

■ Increased Fitness Benefits

There's certainly no shortage of benefits from cross training. It relieves boredom, helps prevent injuries, helps maintain fitness during recovery from injury, and makes exercising more enjoyable. By developing and maintaining a sensible program, one can experience (2) the following:



Balance

There will be a balance between cardiovascular conditioning, strength, coordination, and flexibility. Participation in a variety of activities helps recruit new muscle fibers and develops new neuromuscular pathways. Aerobic ca-

capacity and muscular strength and endurance can be increased, as well as total body flexibility.

Exercisers often report reaching a plateau that seems to prohibit further improvement. A runner, for example, who does 5 miles a day eventually reaches a peak and then gradually begins to decline. Only by running faster, longer, or more often, or by adding new exercises, will the runner continue to improve his or her fitness level. The new challenges and overloads afforded by cross training allow one to work more and differently. This can provide the motivation to overcome a stalled program.

Conditioning

One can achieve comprehensive cardiorespiratory conditioning. Cross training is one of the most powerful techniques for achieving total body fitness and health benefits. The aerobic portion of a cross training program can improve the efficiency of the heart and lungs. It can also help control weight and improve the way the body handles cholesterol.

© 1994 National Strength & Conditioning Association

Muscular Balance

One can condition for total body muscular balance. The average fitness enthusiast is becoming more educated about the importance of muscle symmetry—the appropriate balance between strength and flexibility in opposing muscle groups. Overworking one group of muscles allows them to become too strong and their opposing muscles will be disproportionately weak. Well-balanced muscle pairs working in concert allow for more effective and efficient movement and may decrease injuries. Cross training allows for greater muscle symmetry.



Reduced Injuries

Many people find that some diversity in their exercise routine helps avoid injury. By spreading out the exercise stress on more muscles and joints, they are able to do more exercise with less overload in the vulnerable areas. For example, an individual who develops foot problems from too many miles of running may be able to switch to a few days on a stair-stepper and to cycling. Cross training reduces the total impact forces and spreads the stress of the work to a variety of muscle groups and anatomical structures.

Variety

Variety of exercises makes exercise more exciting and challenging. Studies of exercise adherence indicate that many people drop out of exercise programs because

they become burned out or bored. Variety is the spice of life. Cross training, with a variety of challenges, can stimulate motivational levels as well as muscles.

Weight Loss

Individuals who need to lose weight must design a program that promotes mobilization and burning of fat. This is usually accomplished when one exercises for longer periods of time (over 30 min) and at an intensity of 60 to 75% of maximum heart rate. Overweight individuals can extend their workouts safely and enhance weight loss by combining activities. For example, an exerciser can ride a bicycle for 20 to 30 minutes and then walk for an additional 20 to 30 minutes.

■ Physiological Basis for Cross Training

Cardiorespiratory cross training places demands on the heart and circulation. Referred to as central adaptations, these changes include increased cardiac output, increased blood volume, and more red blood cells which enhance the body's ability to transport oxygenated blood to the muscles. Similar central adaptations occur during most cardiorespiratory activities regardless of the sport practiced. Oxygen is only the first step, however, since the muscles must be able to take that extra oxygen from the blood and put it to use to produce energy.

Peripheral changes occur at the muscle level to allow them to contract repeatedly and more efficiently during exercise. These adaptations include an increase in the number of capillaries feeding the muscles, an increase in the number and size of mitochondria and the enzymes needed for energy production, and increased

carbohydrate and fat stores. Peripheral adaptations will differ from activity to activity (5).

Peripheral and central adaptations together enhance performance. However, one without the other produces little improvement. Cross-country skiers cannot transfer their high endurance training to swimming, for example, because the peripheral muscle adaptations required for performance are different for each sport. So, while cross training may offer advantages for the fitness enthusiast, it may have limitations for the serious athlete in training.



■ Cross Training vs. Specificity

The cross training concept is in direct opposition to a traditional principle of sport called specificity of training. By definition, specificity of training implies that sport movements and training that are specific to one sport do not improve performance in another sport. This form of training overloads only the muscles involved in a specific activity, and it must overload them in a specific way. If a cyclist wants to be a competitive road cyclist, he or she must ride long distances. Swimming and rowing will not help him/her become a great cyclist.

To experience any cross training effect in the trained athlete,

movements must be very similar. For example, a basketball player or soccer player needs a high level of cardiovascular conditioning. The players could get this conditioning by cycling or swimming, but activities such as running, stair stepping, interval training, and rope jumping will all have better carry-over value for their sports. The important idea here is that through careful and accurate physiological and kinesiological analysis, one should select cross training activities with the highest carry-over value toward a selected sport (1).

One also needs to analyze the energy systems used in a particular sport. Once again, in sports such as basketball or soccer, an interval training session can be conducted on a stationary bicycle or a stair stepper.



This is not to say that one should avoid resistance training and flexibility exercises. Some additional resistance exercises will actually increase overall strength and may reduce injuries. Cross training also avoids both the boredom of single-sport specificity and the self-destructive tendency of overtraining. Excellent reviews by O'Shea (4) and Napp (3) provide additional information on cross training vs. specificity of training when working with athletes. The key is to balance the conditioning activities with the practice activities.

Cross training can also be instituted in the off-season to enhance physical and mental skills. Gymnasts could engage in rock climbing to improve power, balance, and total body awareness. Downhill skiers can use mountain biking to improve their skills. Running and tumbling exercises can better prepare a cyclist to handle falling from a bicycle. Ballet can be used as a supplemental activity for football players because it would help increase their flexibility. Be creative when designing a cross training program; make it fun.

■ The Spice of Life

In summary, cross training can benefit both the fitness enthusiast and the competitive athlete. By learning new sports and physical activity skills, recreational exercisers will find new exercise opportunities. Increasing their repertoire of physical activities will help them find several that they really enjoy, thereby ensuring that exercise is recreational and not just routine.

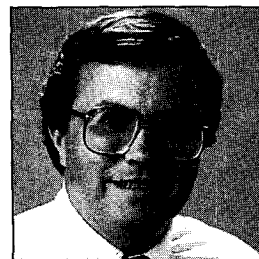
As it relates to athletes, we cannot overlook the primary need for specificity of training. But when cross training can be incorporated into an athlete's training, it may well improve overall fitness, help avoid injury, keep the athlete motivated throughout the season, and reduce the chances of overtraining. ▲

■ References

1. Bray, B. Cross training. *Amer. Fitn. Quar.* April, pp. 8, 60. 1990.
2. Cross training to achieve your fitness goals. *Reebok Instructor News.* Spring, p. 7. 1990.
3. Napp, J. Cross-training vs. overtraining. *Amer. Fitn. Quar.* January, pp. 28, 37. 1989.
4. O'Shea, P. The science of cross training: Theory and application

for peak performance. *Nat. Strength Cond. Assoc. J.* 12(6): 40-44. 1990.

5. Stamford, B. Task-specific training vs. cross training. *Phys. Sportsmed.* 19(7):113-114. 1991.



Edmund R. Burke is an Associate Professor in the Department of Biology at the University of Colorado, Colorado Springs. He coached the 1980 and 1984 U.S. Olympic Cycling Teams and was director of sports science and technology for the National Cycling Team from 1981 to 1987. He holds a doctorate in exercise physiology from The Ohio State University.

NSCA Services & Information

(402) 472-3000

Circulation, products, address changes.....	Natalie Lehner
Advertising, mailing list & exhibit booth sales, career services.....	Lisa Windhusen
Marketing, conferences, clinics <i>NSCA Bulletin</i> , scholarships.....	Donna Welsh
Article submissions & inquiries	Harvey Newton, CSCS
Education, state directors	Bill Allerheiligen, CSCS
Certification registration	Janet Owens
CEUs & study aids.....	Dan Brown
Legal counsel	Jim Zalewski, (402) 438-2500
Liability insurance	Hagen Benefits, 1-800-456-0737
NSCA VISA card	MBNA, 1-800-847-7378 ext. 5000
Conference travel	MIC, 1-800-442-7485

NSCA
P.O. Box 81410, Lincoln, NE 68501
Tel (402) 472-3000 Fax (402) 476-6976