Energy Expenditure in Different Modes of Exercise

One of the primary goals of an exercise program is to develop and maintain cardiorespiratory fitness. Many people engage in aerobic activities to improve their health status, reduce disease risk, modify body composition and improve all around physical fitness. It is important to select a mode of exercise that uses the large muscles of the body in a continuous, rhythmical fashion, and that is relatively easy to maintain at a consistent intensity. It is interesting to note that not all modes of exercise are comparable in terms of energy (caloric) expenditure. However, several factors, in addition to energy expenditure, should be considered when selecting an exercise mode.

Classification of Aerobic Exercise Modalities
The American College of Sports Medicine (ACSM) classifies aerobic exercise modes by the varying skill demands of the activity. Group I activities provide a consistent intensity and energy expenditure that are not dependent on the participant's skill level. These would include activities such as walking, cycling, jogging, and simulated stair climbing. With Group II activities, the rate of energy expenditure will vary greatly depending on the person's performance ability. With higher skill levels, a person can work harder and longer, and consequently burn more calories. Activities in this category would include aerobic dancing, bench stepping, hiking, swimming and water aerobics. The Group III activities, such as basketball, racquet sports, and volleyball are highly variable in terms of energy expenditure due to the performance demands of the activity. For long-term cardiovascular health, it is important to select a variety of activities that sufficiently stimulate the heart, lungs, and muscles.

Exercise Mode Considerations
In addition to energy expenditure, some factors to consider when selecting a mode of exercise include personal interest, equipment and facility availability, physical needs, injury risk and fitness goals. Therefore, selecting the appropriate mode(s) of exercise is essential for continued consistent energy expenditure. It is meaningful to note that additional health and fitness benefits will be attained as the amount and intensity of exercise increase.

Intensity of Exercise: Optimizing Energy Expenditure
A major way to optimize energy expenditure is to vary the intensity of the exercise. It is important to choose a mode of exercise that can be adjusted or graded to overload the cardiorespiratory system. For instance, treadmill walking can be made much more challenging by increasing the treadmill grade. Cycling intensity can be made more demanding by increasing the pedaling resistance. Adding a step riser to elevate the stepping height can boost the step aerobics workout intensity. In addition, choosing a mode that allows for high intensity intervals interspersed with low-to-moderate intensity intervals may also increase energy expenditure.

Upper and Lower Body Modalities
Some exercise modes involve both the upper and lower body muscles, such as swimming, rowing, and simulated skiing. Although these types of exercise engage more muscles, they do not necessary engage as much muscle mass as running, and so will expend slightly fewer calories at a similar level of intensity. However, swimming involves much less pressure on the bones and joints, which allows swimmers to exercise for a longer period of time, thus possibly expending as much energy as higher intensity workouts. Also, some upper and lower body exercise modes, such as simulated skiing, require a fairly proficient skill development phase before fully realizing the energy expenditure benefits.

Non-Weight-Bearing versus Weight-Bearing Modalities
Cycling and recumbent cycling are two very popular non-weight-bearing exercise modes, whereas walking and jogging are popular exercises in the weight-bearing category. At the same level of intensity, most persons will expend more calories performing a weight-bearing activity. An additional benefit of weight-bearing exercise is maintaining bone mass and preventing osteoporosis. However, with cycling and recumbent cycling there is much less trauma to the muscles and joints, heart rate is generally lower, and thus longer exercise bouts are possible.

Walking versus Running
Both walking and running require very little skill and are convenient modes of exercise. Brisk walking, which is one of the most popular aerobic activities in the U.S., has been shown to produce positive health benefits. From an energy expenditure standpoint, running will burn more calories than walking due to the increased intensity of the activity. However, increased zeal to boost energy expenditure with running compounds the risk of injury to the feet, ankles, knees and back. Some persons choose to carry hand-held weights in hope of enhancing energy expenditure when walking. Although the use of hand-held weights increases the perceived intensity of the exercise, research reveals that this additional equipment does not satisfactorily increase energy expenditure.

Choosing the Exercise Mode: The Final Decision
Although research results suggest that weight-bearing aerobic exercise, at a self-selected intensity, will elicit the highest energy expenditure, several other considerations have been discussed for selecting an exercise mode. Because of the great diversity of aerobic exercise equipment presently available, more and more exercise enthusiasts now prefer to cross-train on a variety of exercise modes, which combines high exercise enjoyment with reduced musculoskeletal risk.

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