

## “Role of Physical Fitness on Health” by Captain Dr. M. BUTALE ( Botswana)

**EVIDENCE**-- Pertinent physiological, epidemiologic, and clinical evidence, including primary research articles and recent review articles were appraised.

### Key Concepts

- ✓ Physical fitness includes muscular strength and endurance, flexibility, cardiorespiratory endurance.
- ✓ Fitness influences other aspects of life.
- ✓ Positive lifestyle changes are important factors in reducing cardiovascular disease.

### Introduction

The past decade has exhibited a resurgence of interest in physical fitness and exercise. Awareness of the benefits of regular exercise and what is considered to be appropriate physical activity is however limited. Further, exercise as a therapeutic regimen has also been largely ignored by health professionals. Although the health benefits accrued from exercise have not been fully assessed, continuing research has suggested that appropriate physical activity can enhance approaches to the treatment and prevention of heart disease, obesity, hypertension, diabetes, musculoskeletal problems, stress, anxiety, and depression.

Physical fitness is achieved when “the organic systems of the body are healthy and function efficiently so as to enable the fit individual to engage in vigorous tasks and leisure activities”. Studies have indicated that physical fitness significantly lowers the risk of morbidity and mortality.

Physical activity has increasingly become an integrated part of both the prevention and treatment of many diseases as stated above. This approach is based on data from large studies linking either physical activity or physical capacity to the incidence of disease.

Furthermore, regular physical activity can influence health indirectly, since people who become physically active also tend to change other health-related habits in a positive direction.

This paper will focus on the following components:

- A. Musculoskeletal Health and Functional Capabilities
- B. Cardiorespiratory and Vascular Fitness
- C. Mental Dynamism
- D. Oncologic concerns
- E. Recommended Quantity and Quality

### **A     Musculoskeletal health & functional capabilities**

This component of physical fitness is fundamental for enabling the body to carry out efferent tasks set out by the central nervous system. The soldier's ability to maintain posture, march, run, push, lift and pull are familiar models of the demands made on the muscles. The greater the muscle strength, the greater will be the ability to perform tasks.

Overall muscle strength and mass decline 30-50% between the third and eighth decade, and a 40% reduction in muscle area. The loss of muscle mass accounts for most of the loss of strength. The loss of muscle tissue is due to a decrease in the number of muscle fibres and atrophy of the type II muscle fibres. The declining strength reduces the capacity to carry out basic activities of daily life and puts people at risk for falls and dependence.

Brisk endurance exercise training elicits neovascularization, heightened oxidative enzyme activity, and a significant improvement in oxygen utilization. Likewise, progressive resistive training results in muscle hypertrophy and improves neural factors involved in force production, if the training stimulus is of a sufficient intensity and duration.

Although it is well documented that physical activity participation can bring about improvements in musculoskeletal fitness, related health implications have only been substantiated in the elderly. Currently, interpretations of the results of musculoskeletal fitness appraisals for the general population are based largely on an intuitive belief that enhanced musculoskeletal fitness is associated with higher levels of health throughout adulthood. Several studies indicate that musculoskeletal fitness is related to health in males and females aged 15 to 69 years.

Physical activity also has the potential to postpone or prevent prevalent musculoskeletal disorders, such as mechanical low back pain, neck and shoulder pain, and osteoporosis and related fractures. Exercise can contribute to the rehabilitation of musculoskeletal disorders and recovery from orthopedic surgery.

A substantial part of the age-related decline in functional capabilities is not due to aging per se but to decreased and insufficient physical activity. Physical activity has great potential to favorably influence both the normal and pathological structures, functions, and processes. Musculoskeletal benefits of physical activity can be attained by people of all ages and with various diseases. This potential is substantial because many benefits are gained by activity which is moderate in amount and intensity.

Scientific evidence is sufficient to recommend regular lifelong physical activity as part of a healthy lifestyle for everyone in order to enhance musculoskeletal health and functions for individual and population levels. However, several important issues regarding the effects, effectiveness, feasibility, and safety of exercise to improve various aspects of musculoskeletal health and functional capabilities need further research.

## **B. Cardiorespiratory and Vascular Fitness**

It is known from prospective studies that the incidence of coronary heart disease (CHD) is lower in the physically active compared with the sedentary. The rate of CHD is lower with higher

fitness level. In studies where both physical activity and fitness are assessed, only fitness, and not physical activity, appear to be an independent predictor of mortality from CHD.

It is unclear whether other fitness components than maximal oxygen uptake have a beneficial effect on the rate of CHD. Further, it seems likely that there is an upper threshold of fitness above which no further improvement in risk factors for CHD is found. However, most middle-aged people have fitness levels below this threshold.

There is no doubt that the middle-aged sedentary person benefits from physical activity regardless of type and intensity, and it may be easier to motivate a sedentary person to carry out moderate physical activity. However, it is likely that the best effect is achieved by performing physical activity of a type and intensity sufficient to improve the fitness level.

This paper also looks at the potential of active daily living as a means of gaining the cardiovascular and health rewards previously sought through vigorous aerobic fitness programs. Cross-sectional studies of occupational and leisure activity show encouraging associations between such activity and good health.

#### C. Mental Dynamism

In recent years health promotion programs have generated many worthwhile psychologic and physiologic benefits but frequently with less than optimal long-term adherence. Incorporating approaches such as mind body exercise with existing health promotion and cardiac rehabilitation services can improve self-efficacy and long-term adherence to healthy behaviors as well as improve personal stress management skills.

Exercise directs internal focus so that the individual produces a temporary self-contemplative mental state. The internal focus is in contrast to conventional aerobic and muscular fitness exercise in which there is little or no mindful component

#### D. Oncologic Benefits

Physical activity is associated with a reduced risk of all-cause mortality and colonic cancers, and it seems to exert a weaker effect on the risk of breast, lung and reproductive tract tumours. Restriction of physical activity by pre-existing disease may contribute to the association with lung cancers, but seems a less likely explanation for other types of tumour. Indirect associations through activity-related differences in body build or susceptibility to trauma seem of minor importance.

Links between regular exercise and other facets of lifestyle that influence cancer risks are not very strong, although endurance athletes are not usually smokers, and regular leisure activity is associated with a high socioeconomic status which tends to reduce exposure to airborne carcinogens, both at work and at home. Obesity seems a major component in the exercise-cancer relationship, with a particular influence on reproductive tract tumours.

Apparent gender differences in the benefits associated with regular exercise reflect gender differences in the hormonal milieu. The immune system is active at various stages of tumour initiation, growth and metastasis. However, acute and chronic changes in immune response induced by moderate exercise are rather small, and their practical importance remains debatable. Oncologists are confronted by a plethora of interesting hypotheses, and further research is needed to decide which are of practical importance.

#### **E. Recommended Quantity & Quality**

The combination of frequency, intensity, and duration of chronic exercise has been found to be effective for producing a training effect. The interaction of these factors provides the overload stimulus. In general, the lower the stimulus the lower the training effect, and the greater the stimulus the greater the effect. As a result of specificity of training and the need for maintaining muscular strength and endurance, and flexibility of the major muscle groups, a well-rounded training program including resistance training and flexibility exercises is recommended.

Although age in itself is not a limiting factor to exercise training, a more gradual approach in applying the prescription at older ages seems prudent. It has also been shown that endurance training of fewer than 2 d/wk, at less than 50% of maximum oxygen uptake and for less than 10 min/d, is inadequate for developing and maintaining fitness for healthy adults.

In the interpretation of this position statement, it must be recognized that the recommendations should be used in the context of participants' needs, goals, and initial abilities. An appropriate warm-up and cool-down, which would include flexibility exercises, is also recommended. Emphasis should be placed on factors that result in permanent lifestyle change and encourage a lifetime of physical activity for a healthier living.

#### **F. Conclusion**

To improve health and fitness effectively through physical activity or exercise, we need to understand how this comes about. For many of these changes, the stimulus has been grossly defined in terms of type, intensity, duration, and frequency of exercise, but for others a dose-response relationship has not been determined.

Physical activity that appears to provide the most diverse health benefits consists of dynamic, rhythmical contractions of large muscles that transport the body over distance or against gravity at a moderate intensity relative to capacity for extended periods of time during which 4 kilocalories per kilogram of body weight are expended.

For optimal health benefits, such activity should be performed daily or at least every other day and should be supplemented with some heavy resistance and flexibility exercises. The greatest benefits are achieved when the least active individuals become moderately active; much less benefit is apparent when the already active individual becomes extremely active.

Overexertion or inappropriate exercise can produce significant health risks. Research is needed to characterize better the health-promoting features of physical activity and exercise.



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**Role of Physical Fitness on Health**

**Evidence**

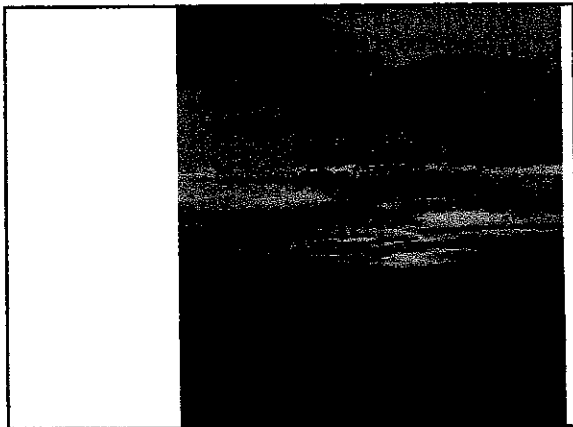
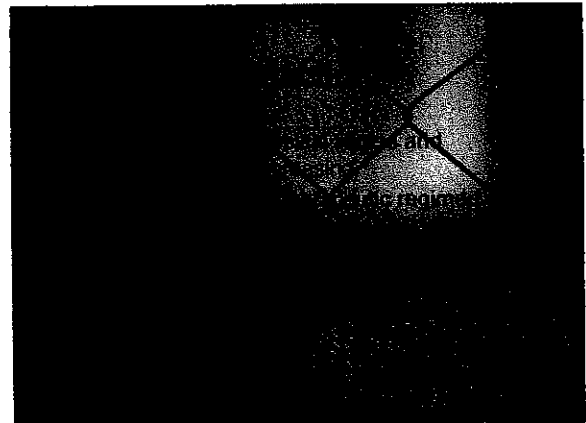
- Pertinent physiological, epidemiologic, and clinic evidence, including primary research articles and recent review articles



**Topics**



- A. Musculoskeletal Health and Functional Capabilities
- B. Cardiorespiratory and Vascular Fitness
- C. Mental Dynamism
- D. Oncologic Concerns
- E. Recommended Quantity & Quality
- F. Conclusion



**Musculoskeletal Health and Functional Capabilities**

- This component is fundamental for enabling the body to accomplish any work, the ability to maintain posture, walk, lift, push and pull activities



## Mental Dynamism



- Mentally healthy individuals respond to their problems, accept responsibility, plan ahead without fear and are able to establish realistic goals.
- One of the best ways to handle stress is to exercise.



- There is growing evidence to suggest that during exercise the body produces an influx of chemicals called *endorphins*. (These opiate like substances produce mild druglike euphoria).
- Exercise can improve self efficacy and long term adherence to healthy behaviors and stress management.

## Oncologic Benefits

- Physical activity is associated with a reduced risk of all cause and colonic cancers.
- It seems to exert a weaker effect on the risk of breast, lung, reproductive tract tumors.



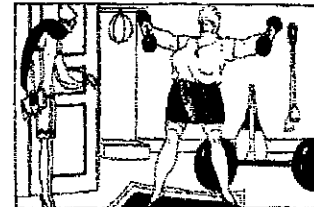
- Obesity is related to a higher incidence of cancer, with a particular influence on reproductive tract tumors.
- A desirable body weight could improve overall health and lead to more successful management of cancer should it develop.

- Moderate exercise is known to exert acute and chronic changes in immune response against tumours



## Recommended Quantity & Quality

- Training Effect is obtained from a combination of
  - frequency
  - intensity
  - duration

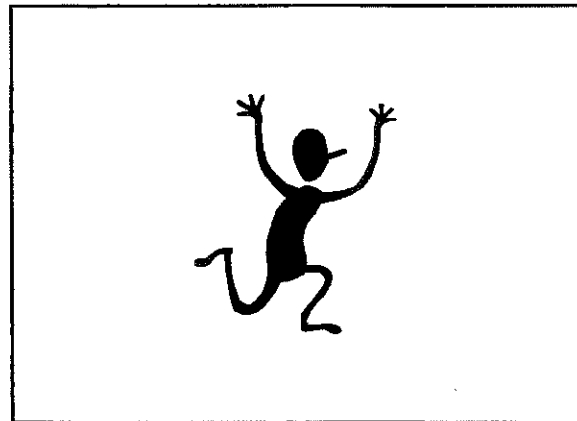


Examples of common physical activities for healthy adults illustrating how the intensity level (in METs) of similar activities may vary as a consequence of individual differences in perception of work effort.<sup>19</sup>

Activity	Light (<3 METs or <4 kcal/min)	Moderate (3-6 METs or 4-7 kcal/min)	Hard/vigorous (>6 METs or >7 kcal/min)
Walking	Slowly, strolling	Bristly	Bristly uphill, or with load
Cycling	Stationary, very light effort	Recreational or transportation	Fast or racing

Swimming	Slow treading	Moderate effort	Fast-treading or crawl (free-style)
Home activities	Carpet sweeping, vacuuming	General cleaning, standing packing or unpacking, occasional lifting of household items	Moving furniture, moving household items, carrying boxes
Child care	Sit/stand playing with child	Sit/stand feeding or grooming child	Walk/run playing with children

Shopping	Walking (non-grocery shopping)	Walking (with grocery cart)	
Home repair	Carpentry	Painting	
Mowing lawn	Riding power mower	Walking with power mower	Walking with hand mower
Gardening	Walking, applying fertiliser, seeding lawn	Planting seedlings, weeding	



## Conclusion

- To improve health and fitness effectively through physical activity or exercise, we need to understand how this comes about
- Activity that provides the most diverse health benefits consists of dynamic rhythmical contractions of large muscles at a moderate intensity

- Such activity should be performed daily or at least every other day.
- Overexertion or inappropriate exercise can produce significant health risks.
- Research is needed to characterize better the health-promoting features of physical activity and exercise