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Exercise and health—new imperatives for public health policy in Hong Kong

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Physical inactivity is an important and largely avoidable cause of incapacity. Regular physical activity protects against several chronic diseases, including cardiovascular disease—one of the major causes of death in Hong Kong. Significant benefits can be achieved by regular participation in moderate amounts of either recreational or general lifestyle physical activities. Even more is gained from increasing the frequency, duration, and vigour of exercise. In Hong Kong, 59% of all adults lead a fairly sedentary lifestyle and only one in three exercise at levels that are thought to offer significant health benefits. An even more disturbing fact is that Hong Kong probably has the most inactive primary level schoolchildren in the world. The prevalence of these risk behaviours should make schoolchildren a priority for any public health prevention programme.

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Introduction

"Eating alone will not keep a man well; he must also take exercise. For food and exercise, while possessing opposite qualities, yet work together to produce health."[1]

As early as 3000 BC, the belief that moderation and prevention are the means to long life were described in the *Nei Ching*, the oldest known medical book from China.[2] Similar concepts also exist in other cultures—for example, in the above statement from Hippocrates around 400 BC. However, it was not until the latter half of this century that sufficient epidemiological and clinical evidence became available to support these notions.

Health effects of exercise: the evidence

There is now a reasonable understanding of how physical activity affects physiological function. The bodily response to physical activity includes important positive effects on the musculoskeletal, cardiovascular, respiratory, endocrine, and immune systems. But these results are reversed if activity is reduced or stopped. With the cessation of exercise, physiological function deteriorates substantially within 2 weeks and all gains are dissipated within 2 to 8 months.[3]

Several studies have shown that people of all ages who lead a sedentary lifestyle experience a 1.2- to 2-fold risk of premature death compared with those who are active.[4] Furthermore, there is a clear relationship between increased levels of physical activity and a reduced risk of death, which lends support to a causal relationship. Fortunately, however, the physiological and biochemical effects of prolonged inactivity are reversible, and by commencing moderately intense physical activity, it is possible to reduce the excess risk.[4] Moreover, the beneficial effects are evident across all ages, including people who are in their 70s or 80s.

As well as reducing all-cause mortality, there is good evidence that regular physical activity reduces the risk of coronary heart disease, stroke, hypertension, colon cancer, non–insulin-dependent diabetes mellitus, and improves mental health.[3] The evidence is particularly strong for cardiovascular disease, which is a major cause of death in Hong Kong. Physical activity has been found to be effective for all levels of heart disease prevention. A well-conducted meta-analysis found the summary relative risk of death from ischaemic heart disease to be 1.9 (95% confidence interval, 1.6-2.2) for those leading a sedentary lifestyle

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compared with those pursuing an active lifestyle.[5] This means that those who are sedentary are almost twice as likely to die from heart disease.

There is increasing evidence that exercise protects against breast cancer in women and may reduce the risk of developing obesity, osteoporosis, and depression as well as improve psychological well-being and quality of life.[3] Exercises involving forms of muscular strength (resistance) training and even those using mild techniques such as *T'ai Chi Chu'an* have also been shown to reduce the risk of falling and fractures among the elderly.[6]

It is important to also consider the risks associated with physical activity, the most common of which are musculoskeletal injuries. These can occur with excessive amounts of activity or when suddenly beginning an activity for which the body is not conditioned. Serious cardiac events or fatalities are rare and occur primarily among sedentary people with advanced atherosclerotic disease who engage in strenuous activity that they are unaccustomed to. In children and young adults, cases of exercise-induced sudden death are even more infrequent and are generally attributed to an undetected congenital heart defect.[7] The net effect of physical activity is positive, however, with most physically active people benefiting. The risks of trauma can be minimised by slowly increasing the training workload and by avoiding activities that involve high levels of intensity. In addition, those with a greater risk of having cardiovascular disease should consult a physician before embarking on a physical activity programme.

Although virtually every member of the community could benefit from an improved level of physical activity, the greatest reduction in all-cause mortality is seen when sedentary people become active.[8] In addition, an individual whose health is already compromised or who is infirm can benefit by improving their quality-adjusted life expectancy and by having greater independence in their later years. A more active lifestyle should thus be promoted for the entire community.

The amount and type of exercise needed for good health

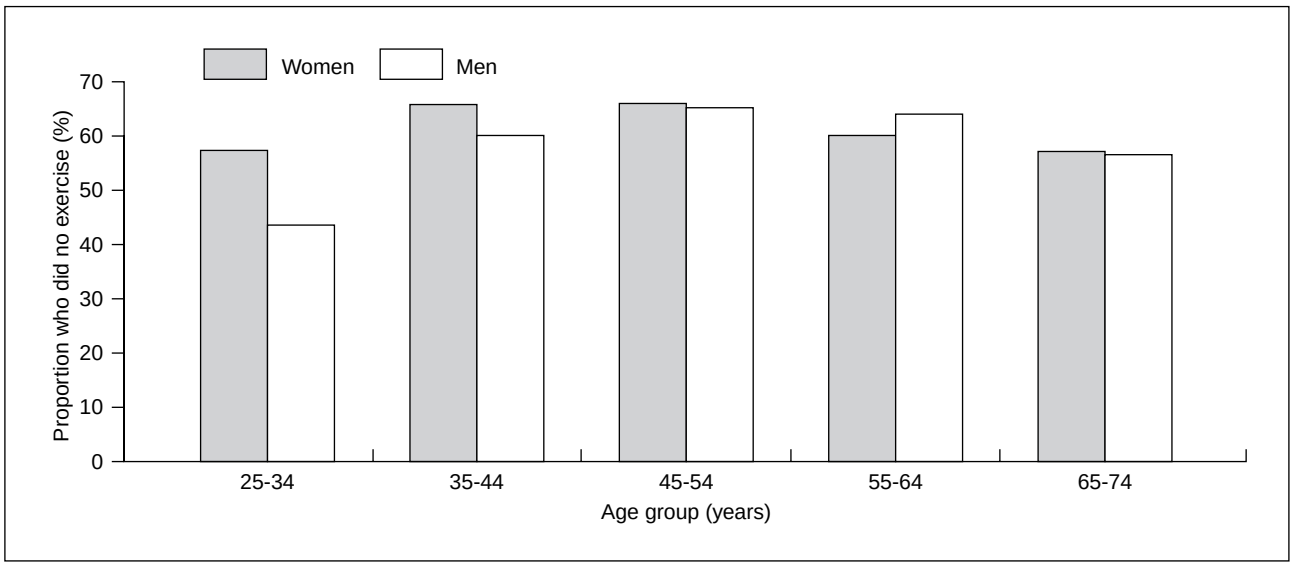
It is important to distinguish between physical fitness (an attribute) and physical activity (a behaviour). Physical fitness can be measured objectively with good accuracy and reliability and is often the measure used in physiological studies. The physiological adaptation to exercise depends on the frequency, intensity, and duration of training, as well as the body's initial level of fitness. The precise way in which these interrelated characteristics are associated with specific disease or health outcomes, however, is not known. Since measurements of physical fitness are time- and resource-consuming, most population studies rely instead on reported levels of physical activity.

Generally, two main types of physical activity can be distinguished: aerobic (cardiorespiratory) exercise, which involves repeated use of the large muscles (eg walking, jogging, cycling, swimming, dancing) and resistance exercise (eg weight lifting). Aerobic exercise has been better studied and most of the health benefits are derived from this type of activity. But, resistance activity is more important for musculoskeletal health because it helps to reduce the risk of falls and probably helps prevent the development of osteoporosis.

Traditionally, it was felt that most of the health-related benefits of exercise were associated only with relatively vigorous levels of activity. As a result, several international medical and sport associations recommended that at least 20 minutes of sustained vigorous activity on at least 3 days of the week were required to gain any cardiorespiratory benefit.[9] More recent studies have suggested that gains can be similar when physical activity occurs in several short sessions as when the same total amount and intensity of activity is condensed into one longer session.[10] The results of a recent study involving 50 sedentary Hong Kong individuals concurs with these findings.[11] In this study, two randomly assigned groups were asked to accumulate the same amount of exercise over an 8-week training period. The 'exercise prescription' group performed a 30-minute bout of moderate exercise three to four times each week while the 'lifestyle' group performed lighter activities over shorter 5- to 6-minute periods, five times each day, four to five times weekly. Even over this short period, both groups produced similar and significant improvements in their levels of aerobic fitness.

The latest guidelines from other countries recommend that everyone should accumulate 30 or more minutes of moderate intensity physical activity on most, and preferably all, days. These activities can be limited to either single sessions or accumulated in multiple bouts, each one lasting at least 10 minutes.[7] The type of activity can vary from recreational sports to general lifestyle activities such as brisk walking, climbing stairs, or doing household chores. Thus, the benefits of relatively mild forms of exercise, which

Fig 1. Proportion of men and women in Hong Kong (by age group; percentage of the population) who did no exercise in the 1-month period prior to the study[13]



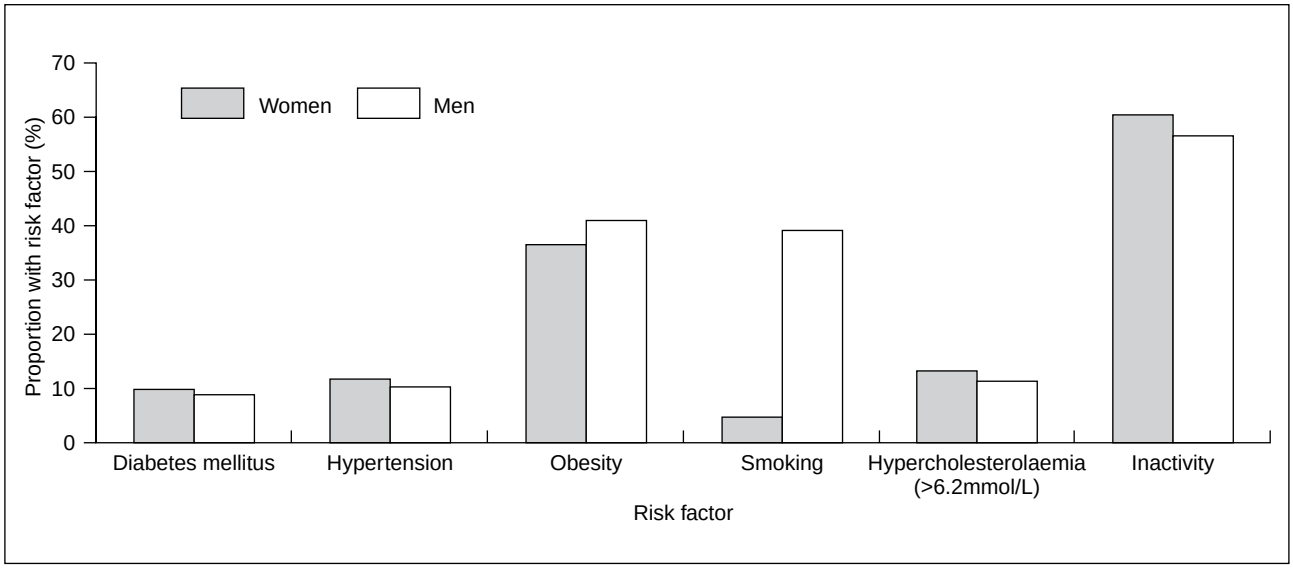
are often most suited to those beginning an exercise programme, should not be forgotten. For active individuals, even greater health benefits are gained by adding more time in moderate intensity activity or by substituting more periods of higher intensity activity.[4]

Physical inactivity: the size of the problem

In most developed countries, physical inactivity is widespread. The introduction of modern technology and practices has all but removed physical activity from daily life. Less than 50% of adults in the United States and United Kingdom are regularly active,[3] and fewer (approximately one third) are active at the levels recommended by most guidelines. In the United States, an estimated one third of all coronary heart disease deaths have been attributed to insufficient physical activity.[12]

Until recently, little was known about the level of physical activity in the Hong Kong population. However, a recent cross-sectional study—the Hong Kong Cardiovascular Risk Factor Prevalence Study—contains some useful data regarding this lifestyle factor.[13] This study enrolled nearly 8000 participants between the ages of 25 and 74 years and showed that more than 57% of men and 61% of women in Hong Kong did no sport or exercise over a 1-month period. Approximately one third reported doing exercise to the levels recommended by guidelines. Middle-aged people were the least active; the youngest age groups, particularly the men, were most likely to exercise (Fig 1). This trend

Fig 2. Estimates of the prevalence (percentage of the population) with selected risk factors for ischaemic heart disease in Hong Kong (1995-1996)[13]



is quite similar to that in other countries, where the proportion of the population that is physically inactive increases with age.[3]

Furthermore, physical inactivity is the most prevalent of the well-documented major risk factors for heart disease (Fig 2). This means that a relatively large proportion of the population's burden of disease can be attributed to inactivity and attempts to reverse the situation would have a significant impact on population health.

Increasing physical activity in Hong Kong: the challenge

So far, there has been only limited behavioural research into physical activity. At the individual level, several factors have been shown to influence participation in physical activity across the life span.[3] These have been summarised in the Surgeon General's Report as: having confidence in one's ability to be active (self-efficacy); enjoying physical activity; receiving support from family, friends, and peers; and perceiving that the benefits of activity outweigh the costs.[3]

Nevertheless, the influence of the sociocultural and physical environment on behaviour cannot be ignored. Providing a supportive environment for physical activity requires action at all levels. The departments of health, education, public transport, and planning, health professionals, architects, engineers, environmental groups, and the sport and recreation industry all have a part to play. Community facilities in the form of cycle routes, public walkways, parks, playgrounds, increased taxation on the use of cars, and the provision of accessible and affordable sports facilities can all encourage people to be physically active.

In addition to community approaches, interventions in schools, workplaces, and lifestyle counselling by physicians in health care settings have been shown to be effective in encouraging sedentary individuals to become active.[3] School-based interventions are particularly encouraging, both in terms of scope (most children attend school) and impact. The importance of targeting children is stressed by the physiologist Professor Roy Shephard.[8] Shephard states that since people in developed countries often have signs of advanced atherosclerosis by early adulthood, then to be successful, primary prevention measures against ischaemic heart disease must be initiated in early childhood. There can be no region with a greater need for such urgent intervention than the current Hong Kong Special Administrative Region, as recent studies suggest it has the most inactive primary schoolchildren in the world.

As early as 1985, a study in Hong Kong found that schools and teachers attach little importance to physical education (PE).[14] Physical education lessons were a low priority in terms of time and resource allocation, and little consideration was given to performance in physical activities. Unfortunately, the situation appears not to have improved in the intervening years: facilities, resources, and the importance given to PE in many Hong Kong schools are still inadequate. Unlike some countries, where 'daily PE' classes are recommended, Hong Kong primary schools generally allocate only two 35-minute lessons per week to PE. Furthermore, PE lessons are often the first to be cancelled for 'more important' events, and PE teachers are sometimes forced to teach two classes simultaneously. These factors may explain why Hong Kong primary schoolchildren only receive approximately 4 minutes of exercise at levels considered beneficial to cardiovascular fitness during their PE classes.[15]

Preliminary findings from the first comprehensive survey of the habitual physical activity of Hong Kong primary schoolchildren show that most are extremely inactive throughout the entire day.[16] On the day of measurement, 24% managed one continuous 10-minute period of exercise with their heart rates above 139 beats per minute (a rate equivalent to a brisk walk) and only 4% achieved a heart rate above 159 beats per minute for this period (equivalent to a mild jog). When interviewed about their normal exercise patterns, only one quarter could be classified as being 'active' (leisure time energy expenditures greater than 3 $kcal \cdot kg^{-1} \cdot d^{-1}$ [12.6 $kJ \cdot kg^{-1} \cdot d^{-1}$]).[8] In comparison, nearly 92% of American children and 65% of Canadian children achieved the same criteria.[8]

It is clear that a potential ischaemic heart disease 'time bomb' exists in Hong Kong, which could place massive demands on future health care resources. Substantial and successful primary preventive measures are therefore required to radically change Hong Kong culture and encourage a habitually physically-active lifestyle. Providing improved school facilities is perhaps not always feasible; yet, the Hong Kong Government is financially secure and should provide far more resources for PE. Other achievable goals include improving the status and number of PE lessons in schools and providing a range of more effective physical activities. The National Institutes of Health in the United States[7] advises that schools provide opportunities for physical activities that: are appro-

priate and enjoyable for children of all skill levels and are not limited to competitive sports or to PE lessons; will appeal to girls and boys of all ages; will serve as an effective foundation for activities throughout later life; and are offered on a daily basis.

Likewise, parents have an important role to play. Children whose parents are active are nearly six times more likely to be active themselves compared with the children of inactive parents.[17] Furthermore, active children are 10 times more likely to be active adults compared with inactive children.[18] Improving social awareness about the importance of physical activity and providing incentives for parents to regularly take their children to places with sports facilities are further steps toward achieving an active adult community.

Worksites can also potentially reach a large proportion of the population. Although insufficient research has been done, there is some suggestion that workplace policies, facilities, and programmes may be important factors in increasing population activity levels. Employers can also benefit, as studies show that absenteeism and health care costs are lower among employees who exercise regularly compared with those who do not.[19]

Conclusions

Physical inactivity is a widespread problem in Hong Kong among adults, but more particularly, in children. To develop a more active society, policies, as well as individuals, must change. Collaboration between the government and other agencies is required to promote an environment that is conducive to physical activity. Interventions should be targeted at schools, workplaces, and health care settings.

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