**Reaping the rewards of exercise: It is never too late to start.**

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Almost every country in the world is experiencing growth in the number and proportion of older people in their population. According to figures from the World Health Organization, the number of people aged 60 years and above is set to increase globally from 900 million in 2015 to two billion by 2050, 80% of whom will reside in low and middle-income countries.1 An ageing population is poised to become one of the most significant social transformations of the 21st century, with widespread implications not least from a healthcare perspective. Advancing age is associated with an increase in cardiovascular morbidity and mortality due to a combination of age-related degenerative changes in the cardiovascular system but also from accumulation of risk factors for atherosclerosis. Over a fifth of the health service budgets are consumed in the management of ischaemic heart disease, stroke and heart failure in this population including pharmacological therapies for secondary prevention.

Exercise has irrefutable benefits for curbing risk factors for cardiovascular disease and is associated with a 40-50% reduction in adverse events from coronary disease.

The benefits of exercise among older adults (aged 60 years and above) are similar to those in the general population. A physically active lifestyle maintained through middle and older age translates into better health and reduced mortality.2–6 Even in previously sedentary individuals, commencing a new exercise regimen at an older age will lead to significant health improvements by attenuating the risk factors of cardiovascular and metabolic disease7,8 as well as improving cognitive capacity2,9,10. Exercise also promotes muscular strength, balance and coordination,11 which help reduce the risk of falling and subsequent co-morbidities associated with such events.12 Indeed, active frail elderly patients have a lower cardiovascular event rate compared with robust inactive elderly patients.13

While the benefits of regular moderate exercise on cardiovascular outcomes are relatively well-established, it is unclear whether short-term changes in physical activity have a significant impact on cardiovascular morbidity and mortality in the older population. Such information has the potential to impact on population health, reduce the burden on financially constrained health services and maintain independence in a cohort that becomes increasingly vulnerable with senescence.

In this study, Park and colleagues investigated the relationship between changes in exercise frequency and cardiovascular outcomes in a large Korean population of older adults with a mean age of 66.9 years old and with near equal representation of males (47.2%) and females (52.8%). Over 1.1 million individuals aged ≥ 60 years old without overt cardiovascular disease were identified from the Korean national health insurance service database who underwent two consecutive health assessments in 2009/10 and 2011/12 respectively. The risk of cardiovascular disease was prospectively assessed until 2016, in relation to changes in physical activity from moderate intensity to vigorous intensity or vice versa between the two screening periods.  Compared to sedentary behaviour, moderate physical activity was defined as brisk walking ≥ 30 mins and vigorous activity was defined as jogging, cycling or performing some other form of aerobic exercise ≥ 20 mins between 1-5 times per week. Individuals were broadly characterised into 2 groups: (a) increase in moderate to vigorous activity from the first assessment and (b) decrease in moderate to vigorous activity from the first assessment.

Over three quarters of the population (78.2%) remained physically inactive between the two assessment points. 21.8% increased their physical activity. Specifically, 11% changed from being physically inactive to performing moderate to vigorous activity 1-2 x *per* week; 6.1% changed from physically active to performing moderate to vigorous activity 3-4 x *per* week; and 4% changed from being physically inactive to performing moderate to vigorous activity ≥ 5 x *per* week. Over half of the physically active population (54.4%) became inactive between the first and second evaluations.

Data were collected and adjusted for risk factors for atherosclerosis, co-morbidities, disabilities, medications and socioeconomic status. Increasing physical activity from a sedentary state between the two screening periods was associated with up to a 15% reduction in cardiovascular events relating to coronary heart disease and stroke, following adjustments of the co-variates above. Conversely, decreasing physical activity and returning to sedentary levels was associated with up to a 20% increase in cardiovascular events (Figure).

Compared to continuously active individuals who were performing moderate to physical activity 1-2 x *per* week, those who became inactive had an increased risk of total cardiovascular disease. Among these moderately active individuals, increasing the frequency of moderate to vigorous activity to 3-4 x *per* week or ≥ 5 x *per* week did not reveal asignificant difference in cardiovascular disease risk. Similarly, the reduction of physical activity from 3-4 x *per* week to becoming inactive was associated with an increased cardiovascular risk but increasing physical activity to ≥ 5 x *per* week did not confer additional protection for cardiovascular disease events.

Park *et al.* report a large, prospective study specifically of an older cohort in South East Asia without overt cardiac disease. Although 78% of the 1.1 million people were inactive during the screening periods, the remaining cohort of over 300,000 subjects who altered their physical activity status during this period is notable and provide yet further compelling scientific evidence about the cardiovascular benefits of exercise in the older population. Commencing physical activity, albeit in the seventh decade of life, still reduced cardiovascular events even among those with chronic risk factors for atherosclerosis and physical disabilities. Conversely, adopting a sedentary lifestyle, after having previously been active, increased the risk of cardiovascular events. Interestingly, the study showed that even walking for 30 minutes at a frequency of 1-2 times *per* week, reduced the risk of cardiovascular events compared with sedentary people, highlighting that it is never too late to gain the positive effects of exercise. Furthermore, the study also alludes to a possible ideal dose of exercise which appeared to be 3-4 bouts of brisk walking for 30 minutes or light jogging, cycling or aerobic exercise for 20 minutes on a weekly basis and this is well within the conforms of the current exercise recommendations from the European Society of Cardiology.14

There are some important limitations to note. The amount of physical activity was based on a self-reported health questionnaire which introduces subjective bias. In addition, description of the intensity of exercise performed was rather arbitrary; the authors defined moderate physical activity as light walking and vigorous activity as running cycling and aerobic exercise and made no reference to strength training which is considered an important component of exercise in the elderly. The authors also did not have the benefit of the qualitative component of physical training or the motivation for starting exercise. Although the study included patients with physical disability, individuals with non-disabling stroke, previous acute coronary syndrome or left ventricular dysfunction, were not represented yet these comorbidities are which are highly prevalent among the older population.

Highlighting the numerous beneficial effects of exercise is a well-trodden path. Park and colleagues have helped fill a void in the literature pertaining to trends in cardiovascular disease after short-term changes in exercise behaviour among a large cohort of older, Korean adults. The message could be delivered with a triumvirate of key points: firstly, exercise is a life-long medicine that should be promoted in all age groups; secondly, one does not have to exceed current recommendations to benefit from exercise; and finally, it is never too late to take up exercise to reap the beneficial rewards on the cardiovascular system.

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