

Promoting physical activity for population health

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The chronic disease burden has risen globally. In Singapore, between 2007 and 2021, the crude prevalence of hyperlipidaemia (8.2–13.9%), hypertension (12.7–15.7%) and diabetes (4.9–6.9%) has increased.¹ Based on the Global Burden of Disease Study (2019), lack of physical activity and other modifiable risk factors contribute 35% of the disability-adjusted life-years burden.² Hence, increasing physical activity is a crux in preventing chronic diseases and improving health outcomes.^{3,4}

Physical activity has been defined as “any bodily movement produced by skeletal muscles that significantly increases energy expenditure”, regardless of intensity or duration.^{3,5} Hence, physical activity may occur at any time: during transport between locations (transport-related), as part of work (work-related) or during leisure time (leisure-related). Leisure-related physical activity is a voluntary form of exercise, which usually entails a planned and structured set of repeated movements with or without an explicit direction towards improving physical fitness, such as aerobic capacity, muscle strength, balance, coordination and flexibility.^{3,5} The World Health Organization recommends a minimum of 150 minutes of moderate or 75 minutes of vigorous-intensity physical activity per week.³ Exercise, while often used interchangeably with physical activity, is a subcategory of physical activity. It is characterised as being “planned, structured, and repetitive, in which bodily movements are performed with or without the explicit intent of improving or maintaining of one or more components of physical fitness (i.e. aerobic capacity, muscle strength power and endurance, balance, coordination, and flexibility).”³

Benefits of physical activity. Physical activity is instrumental in lowering the risk of premature death and cardiovascular disease while improving mental health, sleep and obesity.^{3,4} It has been demonstrated to positively affect drivers of ageing, including chronic mitochondrial dysfunction, inflammatory processes and defective cell autophagy, among others.³ Physical activity, alongside other lifestyle factors, serves both as a preventive measure in maintaining physiological

function and preserving health, as well as a treatment modality, whether in a primary role such as for sarcopaenia or adjunct for managing Parkinson’s disease, depression and metabolic diseases.³

Benefits of physical activity are particularly significant for older adults, for whom the effects of ageing have accumulated chronically. Ageing results in negative body composition changes: reduced bone density and muscle mass, and increased adipose tissue.³ Functional capacity and cognitive ability also decline, resulting in decreased ability to perform daily activities independently.³ These can result in pathological states: general frailty, sarcopaenia, osteoporosis and others. Notably, the increase in adiposity has been linked to metabolic derangements and higher levels of inflammation, predisposing individuals towards diabetes and cardiovascular diseases.³ Physical activity attenuates the detrimental effects of ageing and thereby delays or improves these disease states.³ Besides enhancing muscle strength and mobility, such activity optimises body mass and cardiorespiratory fitness, thereby preserving functional ability/independence and ameliorating disease states such as sarcopaenia and osteoporosis. Cognitive function also improves, postulated to be mediated via neurotrophic factors and changes within the cerebral blood flow and brain structures.³ This also results in improvements among patients suffering from depression, dementia or Parkinson’s disease.³

In this issue of the *Annals*, Koh et al. provide a cross-sectional observational study looking at the associations between self-reported domain-specific physical activity levels (leisure, work and transport) and point-prevalence of chronic metabolic diseases (diabetes mellitus and hypertension).⁶ They found that individuals with higher leisure-related physical activity had lower odds of chronic disease, while those with prolonged sedentary times (>8 hours) had higher odds of chronic disease. However, there appeared to be no such relationship for transport- or work-related physical activity. Of note, the authors also found a dose-response relationship, where increases in leisure physical activity were

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associated with lower odds of diabetes. Although the research is limited by the lack of temporal information, the study's findings are nevertheless in line with existing evidence described before, emphasising the importance of lifestyle modification and physical activity.^{3,4}

While increasing overall physical activity has benefits, as evidenced by the lower risks associated with shorter sedentary times, leisure-related physical activity appears to be distinctly superior to transport- or work-related physical activity. Although the exact mechanisms are unclear, it is suggested that the benefits arising from leisure-related physical activity were of sufficient intensity for short periods with ample recovery time, conducted under controlled and self-regulated conditions. This is in contrast to other forms of physical activity where intensity or duration may be insufficient or harmfully excessive, lack appropriate recovery time, or conducted under adverse conditions, such as hot and stressful environments.^{3,7}

Challenges to increasing physical activity. It is increasingly recognised that an individual's health is affected by a complex range of social, economic and environmental factors.^{8,9} Koh et al. found an association between leisure activity, sedentary time and chronic diseases,⁶ highlighting the importance of addressing not just health but also social issues in order to promote healthy behaviours. Subramaniam et al. found multiple factors at the individual, personal, interpersonal, environmental, sociocultural and policy levels that facilitated or obstructed such healthy behaviours in Singapore's context.⁹ In particular, the study highlighted the need to address complex interrelated factors that influenced individuals' adoption of behaviours. Within this context, the multifaceted role of the healthcare provider as an educator and supporter is paramount.

Given the complexity of factors driving behaviours, it is therefore insufficient to merely provide the advice of "exercise more". It is necessary to first understand the patient's circumstances and perspectives through a collaborative process of engagement; and subsequently, through various methods, to empower patients in increasing physical activity by evoking motivation and providing continual support. These empowerment measures may include: a collaborative goal-setting process with patient self-monitoring, usage of reward strategies, proactive problem solving (e.g. stimulus control and environmental modification), and tapping social support (such as family, friends and co-workers) and community providers such as the Health Promotion Board (National Steps Challenge) and Sport Singapore (Active SG).⁸ Such a collaborative patient-centred

approach has been demonstrated to be more effective than a directive approach.^{10,11}

Two commonly used approaches are the transtheoretical model (stages of change) and motivational interviewing. These have demonstrated effectiveness in multiple areas including and beyond that of physical activity.

Increasing physical activity

Transtheoretical model.¹⁰ The transtheoretical model considers behavioural change as a non-linear progression through various stages, influenced by processes undertaken by patients. These include: precontemplation (unaware or not intending to change); contemplation (considering change); preparation (making small changes); action (actively engaged in change); maintenance (continuation of change over a period of time); and relapse (reversion to a previous stage). Each stage describes the patient's state of mind, awareness and their motivational level. The model describes various processes that influence each stage, described as experiential (knowledge, emotions and perceptions regarding physical activity) or behavioural (actions undertaken such as goal setting or environmental modifications). Earlier stages (precontemplation, contemplation) are more strongly influenced by experiential processes, while later stages (preparation, action) are more strongly influenced by behavioural processes. Hence, the actions to be taken by the provider would substantially differ depending on the stage. Application of this model would therefore be a 2-step process: first assessing the patient's stage, before providing the appropriate supportive actions, be it education and awareness raising, or active goal setting and problem solving.

Motivational interviewing.¹¹ Motivational interviewing is a counselling method focused on behavioural change. It examines the patient's perceptions and circumstances regarding the behaviour (physical activity) and provides support towards the behaviour, while resolving potential obstacles or conflicts. The underlying principles of motivational interviewing are based on it being a non-judgemental and empathic collaboration between healthcare provider and patient, with the intent of respecting patient autonomy and empowering them towards their goals. In practice, this may entail the following: building a relationship (engagement); focusing on high priority areas; evoking the motivation towards change, contextualised within their life priorities ("talking themselves into changing"); and providing aid in concrete action.

In the face of an increasingly ageing population and rising prevalence of chronic diseases, there is a greater emphasis on proactive prevention. Alongside dietary and other lifestyle measures, increasing leisure-related physical activity and reducing sedentary time is one of the key focal points towards improving the health of the individual and of the population. The multifaceted role of the healthcare provider—as educator, motivator and supporter—in empowering patients to increase physical activity is crucial for success.

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