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EDITORIAL

A life course approach to physical activity, health, and aging

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The treatment of chronic diseases accounts for approximately 50% of global health care costs. The ongoing lengthening of life expectancy further adds to these and other costs for both societies and individuals as the number of chronic diseases and disabilities inevitably increases with advancing age. A typical situation in a developed country is exemplified by the results of a national survey carried out in Finland [1]. About one third of people aged 30–35 years suffered from a chronic disease or injury while the corresponding proportion among 50- to 55-year olds was about 50%. At the age of 70–75 years, about 20% were found to be healthy and at the age of 90–95 years, almost every respondent had at least one chronic disease. Multimorbidity also increased with advancing age, along with the decline in functional capability. Life expectancy at birth has increased substantially over the last decades to the current 76 years for men and 82 years for women. The number of healthy life years has also increased, although the trend in the relative proportion of healthy life years requires further clarification. These questions are relevant to all populations, large regional and national differences notwithstanding.

These developments are particularly challenging for developing countries, which face a double jeopardy with the increasing prevalence of non-communicable diseases (NCD) and the prevailing epidemic of communicable diseases.

The current interest in taking a life course approach to the prevention of adult chronic disease is based on increasing evidence showing that the risk of many NCDs begins in childhood and adolescence and even earlier during fetal development. Current aging research also highlights the consensus that the aging process has its beginnings in early life, and that adult function and age-related diseases have their origins in the experiences of early life and also share common risk factors [2, 3].

The present special issue of EURAPA opens with an overview of current orientations and models applying a life course approach to research on age-related diseases and capability. This is followed by four minireviews of selected fields of inquiry where physical activity has an established or potential role in modifying health and capability in aging. Furthermore, challenges for further research are also briefly outlined.

In his overview, Eino Heikkinen explains that the aim of the life course approach is to explore how biological, psychological, behavioral, and social factors, acting across the entire life course, influence health and diseases, functional capability, and disability. The most commonly used approaches in studying life course processes are defined in terms of biological programming, critical periods, pathways and accumulation. Of these, the accumulation model, showing the processes that underlie the impacts of life course on health and functional capability, has been most widely used in analytical and descriptive work. Risk factors at different life stages may accumulate over time, one adverse exposure or experience leading to another. This process may culminate in various health problems, implying that a person´s level of health tends to be a function of the proportion of their life course spent exposed to disadvantage [4]. The growing focus on life course determinants of aging and health also has implications for studies of long-term changes in physical activity and their role in determining health and functioning with aging.

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The review by Mirja Hirvensalo and Taru Lintunen indicates that intensive participation in physical activity in general and continuous activity during the school years are important predictors of active participation in adulthood. Physical inactivity, in particular, tends to track from youth into adulthood. Along with the cumulative effects of factors such as gender, socioeconomic status, place of residence, and social mobility, earlier physical activity remains a significant determinant of exercise participation into old age as well.

The focus of the article by Mikaela von Bonsdorff and Taina Rantanen is on the progression of functional limitation during the life course and the potential that physical activity during different life stages has in preventing risk factor accumulation. Functional limitations usually develop gradually over an extended period of time, and the level of functioning varies greatly already from midlife onwards. There is evidence that physical activity has beneficial effects on physical impairments and functioning at different life stages on the population level, but research findings are inconsistent regarding certain subsets of the population, such as obese persons. However, no follow-up data on the same individuals from early life to midlife and old age has been published so far.

Urho Kujala summarizes the main associations between physical activity and chronic diseases through the life course and suggests mechanisms via which physical activity has beneficial effects on health. He also draws attention to the important role of genes in the predisposition to chronic diseases and in explaining differences in physical fitness and exercise participation. Increased knowledge of the role of the nuclear and mitochondrial genome, epigenetics, telomeres, and the regulation of gene expression will further enhanced our understanding of their relationships with physical activity, aging, and morbidity.

Master athletes with optimized living habits throughout their lives provide a human research model of inherent aging, where age-related physiological changes are less influenced by factors such as sedentary life-style and associated diseases. The article by Harri Suominen shows that sport performance and underlying physical capacities can be preserved at an extraordinary high level up into old age, thus providing superior functional reserves for daily activities. Elite athletes utilizing their genetic potential for continuous training raise the ceiling of human performance and reduce the overestimation of functional decline in the older age groups.

The reviews also present challenges for the further development of life course approach, which is expected to help elucidate new mechanisms of disease causation and create measures for the maintenance of health and capability in aging. These include, for example, taking a holistic view of people that embraces a wide range of environmental and individual risk factors and their accumulation with advancing age, investigating to what extent physical and cognitive capability and their rates of changes are associated with each other, and under what circumstances, with what risk factors and at what ages these capabilities begin to differentiate, tracking the long-term pathways to different levels of physical activity, and developing means for effective preventive interventions, which start in early life and continue throughout the life course across different population subgroups. Intensifying collaboration for creating models on an interdisciplinary basis for the life course approach is also needed.

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