

Accepted manuscript (author version)

To appear in Exercise Physiology and Performance (EPP)

Received: 2025-05-01 Accepted: 2025-05-28 Published: 2025-06-05

DOI: doi.org/10.71951/epp.2025.202505131206698

Physical Activity and Modern Technology: The Highway to Dynamic Aging

Rahele Samouei^{1*}

1 - Social Determinants of Health Research Center Isfahan University of Medical Sciences, Isfahan, Iran.

Dear Editor-in-Chief,

The increase in the elderly population, as one of the most challenging demographic developments of the current century, has made it more than ever necessary to reconsider the attitude towards this stage of life. In the meantime, physical activity and exercise are considered as a preventive solution and as an efficient tool for rehabilitating lost functions and improving the quality of life of the elderly.

Regular physical activity in old age can have significant effects on the physical and mental health of individuals. From slowing down the rate of muscle loss and improving bone density to increasing balance and flexibility, all are considered undeniable benefits of exercise in this period of life. Interestingly, targeted exercises, by stimulating neural flexibility, improve cognitive functions and delay the aging process of the brain. For example, gentle aerobic exercises such as brisk walking or swimming, by increasing the secretion of nerve growth factors, play an effective role in maintaining and strengthening memory; however, despite these promising findings, the elderly's acceptance of sports activities is not very impressive. This issue can be caused by several factors, including fear of injury and ignorance of safe sports methods, lack of appropriate facilities, social misconceptions, and the like. Many elderly people avoid participating in physical activities due to misconceptions such as "the inappropriateness of sports at this age." However, designing personalized sports programs, tailored to each individual's conditions and limitations can be an effective step in removing these barriers. Also, emphasizing functional exercises such as getting up from a chair or carrying everyday objects is both safer and significantly increases people's motivation.

Another important point is the profound impact of sports activities on the mental and social health of the elderly. Participation in group and intergenerational programs, in addition to strengthening motivation, helps to reduce feelings of loneliness and isolation. In this context, the use of new technologies such as sports applications with simple user interfaces facilitates access to safe and

* Corresponding author: samoueir@gmail.com

Accepted manuscript (author version)

effective exercises for this group. These technologies are able to provide personalized recommendations using advanced machine learning algorithms. Also, virtual and augmented reality technologies, by simulating attractive and safe environments, enable balance and movement exercises to be performed even at home. On the other hand, new generation smartwatches count the number of steps and predict the risk of falling by analyzing walking patterns. In this regard, online sports platforms for the elderly have also made access to safe exercises easier for this group by providing interactive training videos and the possibility of live communication with expert trainers. These platforms, which are often equipped with artificial intelligence systems, can analyze and modify sports movements. However, challenges such as the digital divide, the high cost of some technologies, and the need for training in their use still persist. For this reason, investing in the development of affordable and user-friendly technologies, along with planning for digital education of the elderly, is a necessity in this field. In conclusion, it seems that the intelligent integration of new technologies with traditional sports programs can be a big step towards achieving active and high-quality aging. This requires the cooperation of sports science experts, medical engineers and health policy makers. It is hoped that by adopting a comprehensive approach and careful planning, there will be a fundamental transformation in the quality of life of the elderly and that old age will become a productive and valuable period of life.

Keywords

Active aging, Physical activity, Modern technology, Elderly health, AI in elderly care

Acknowledgement

This work is based upon research funded by Iran National Science Foundation (INSF) under project No. 4026656

Accepted