

## Healthy aging and longevity

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### ABSTRACT

Aging societies reflect a triumph of science and technology over premature death. In less than a century, technological and medical advances—coupled with large-scale public health efforts that improved sanitation, purified waterways, and increased safety—led to substantial improvements in health of populations in the Western world. The first half of the twentieth century witnessed gains in life expectancy largely due to reductions in infant and maternal mortality. In the second half of the century, life expectancy continued to increase in adulthood, largely due to medical advances, in the treatment of cardiovascular disease. All told, nearly 30 years were added to average life expectancy in a single century. Increases continue today, with 3 months added to life expectancy at 65 every year. Low to middle income nations have longer development ahead of them but head in the same direction. Improvements in health have been extended into old age. Each cohort that has arrived at old age has been healthier than the one before it. Keep in mind that genetically speaking, we are highly similar to our ancestors 10,000 years ago.

To some extent, the increase in chronic disease reflects the simple fact that more people are surviving acute diseases. The increase in chronic diseases reflects changes in lifestyles. The bottom line is that we need to change the way we live. The largest contributors to chronic disease are lifestyle choices made over the entire life span, including environmental exposures starting in childhood, improper balance of sedentary time and physical activity, and poor diet. Increasing numbers of older citizens means that larger proportions of the population will, in the foreseeable future, experience physical infirmities; and, of course, virtually all people experience illness prior to death. In addition to medical treatments that target disease,

the focus must expand to encompass behavior change aimed at disease prevention. Even with decades of research on strategies aimed at fostering healthy behaviors, there remain few generalizable and effective strategies that effectively change behavior in enduring ways. Population-level environmental interventions, varying from increasing access to sidewalks, banning smoking at restaurants and bars, to healthier food options at schools, worksites, and convenience stores, all facilitate healthy choices in a variety of daily settings.

In the last 10 years, the increasing availability of mobile technologies has created a new avenue to influence health behaviors. Devices that measure a number of physiological parameters or behaviors are now becoming commonplace and can be referred to as the general category of “wearables”. With more precise measurement of activity behavior recommendations for physical activity can be tailored to individuals across the life span and particularly for the aging population.

Given the scope of the challenges in changing a wide range of health-related behaviors, we will need to motivate a number of small lifestyle changes through a variety of techniques across a wide range of ages.

The near doubling of life expectancy is among the greatest achievements in history. Our best chance of realizing the potential gift that longevity represents lies in science and technology; Biologists are on the cusp of understanding and modifying the basic processes that making aging the key risk factor for a vast array of diseases.

The sobering news at this point in history is that gains to fitness have not only ceased, they are reversing. Chronic diseases and infirmities do not need to afflict future generations in mid-life.