

Activity tracker uses heart rate to personalize amount of exercise needed to prevent death

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A novel activity tracker has been developed that uses heart rate data to personalise the amount of exercise needed to reduce the risk of death from cardiovascular disease. The science behind the tracker is presented for the first time today at ESC Congress 2016.

"The health benefits of regular exercise are well established, but individuals do not know how much they need to prevent cardiovascular disease and premature death," said lead author Dr Javaid Nauman, a researcher in the Cardiac Exercise Research Group (CERG), Norwegian University of Science and Technology in Trondheim, Norway.

ESC guidelines recommend adults do 150 minutes of moderate or 75 minutes of vigorous exercise weekly, or a combination of intensities to achieve the same energy expenditure.² But each year lack of exercise contributes to more than five million deaths globally and over €80 billion in healthcare spend across Europe.

"People may be insufficiently active because they do not have personalised, meaningful information about how much physical activity they require, and at what intensity," said Dr Nauman.

Heart rate is the single-most accurate reflection of the body's response to activity. The current study describes the science behind Personal Activity Intelligence (PAI), the first activity tracking [score](#) that uses [heart rate](#) to help people achieve optimal health.

PAI translates heart rate data from any physical activity (i.e. walking, swimming, dancing, cycling) and personal information (age, gender, resting and [maximum heart rate](#)) into one simple score. "The goal is to keep your PAI score above 100 over a seven-day rolling window to protect yourself from premature death related to heart disease," said Dr Nauman.

To develop PAI, the researchers used data on 4637 individuals from the HUNT Fitness Study. An algorithm was derived based on questions relating to frequency, duration and intensity of exercise where relative intensities of low, medium and high corresponded to 44%, 73% and 83% of heart rate reserve.

The algorithm was validated in 39 298 healthy Norwegian men and women from the Hunt Study.³ Participants were divided into four groups according to their PAI score (0, 1-50, 51-99, >100). A score of 0 was considered inactive and used as the reference group for comparison. After a median follow-up of 28.7 years, there were 10 062 deaths, including 3867 deaths from [cardiovascular disease](#) (CVD).

Men and women with a PAI level >100 had 17% and 23% reduced risk of CVD mortality compared to the inactive group, respectively, after adjustment for multiple confounders. The corresponding risk reduction for all-cause mortality was 13% and 17% for men and women, respectively. PAI level >100 was associated with similar reductions in all-cause and CVD mortality regardless of age and risk factors such as smoking, hypertension, overweight or obesity.

The reductions in risk of all-cause and CVD mortality compared to the inactive group were dose dependent by PAI score (1-50, 51-99, >100), with those achieving the recommended level of >100 PAI having the highest reductions in risk.

Dr Nauman said: "PAI is for everyone, young and old, fit and unfit, and it's an easy-to-understand number. Regardless of the [physical activity](#), every time you raise your heart rate, you contribute to your PAI score, which can be calculated with the PAI app.⁴ The more elevated your heart rate is during [exercise](#), the more quickly you accumulate PAI points, but you can also work out at lower intensities for longer durations to earn PAI. Our research shows that keeping your PAI score at 100 or above could prevent [premature death](#)."

More information: "Personal activity index (PAI) for promotion of physical activity and prevention of CVD" ESC Congress 2016.

Provided by European Society of Cardiology

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