

To: Transport & Health Policy Makers, & Practitioners
From: Prof Adrian Davis, TRI, Edinburgh Napier University
Date: 9th April 2020
Subject: Essential Evidence 4 Scotland No. 26 Age-related decline and cycling

Top Line: While aging is a fact of life the pace of the aging process appears to be compounded by modern sedentary lifestyles. By contrast, high levels of cycling, which often include bouts of vigorous activity, results in little age-related muscle decline. Moreover, immune system decline with age is lessened by this type of physical activity.

Since the early decades of physical activity research there has been a growing understanding as to the importance of active lifestyles in reducing the risk of ill-health and premature death. Routine cycling has become a focus of research internationally given the co-health benefits derived from cycling as a utility transport mode in meeting access needs. Cycling tends to include bouts of vigorous physical activity which is especially beneficial in terms of improving cardiorespiratory fitness.¹ Increased fitness is associated with improved health status including through lower blood pressure and less body fat. A UK study found that the order of difference in fitness in favour of cyclists is equivalent to that of being 5 years younger (cyclists in general) or up to 10 years younger (for regular cyclists).² Other studies have found less heart disease among regular cyclists than the general population. Heart disease where it was present among cyclists was found among older cyclists and with similar disease progression to that of younger non-cyclists.³

Two 2018 studies have added to the evidence base regarding age-related decline in health through the role of cycling as a form of physical activity. Through a study of thigh muscle cell health among high mileage cyclists aged 55-79, researchers examined the relationship between age and physiological function.⁴ Various aspects of cell health were examined with little or no signs of aging, including in mitochondrial⁵ protein content. The second study addressed the gradual deterioration of the immune system brought on by natural aging and what the effects were on the high mileage cyclists.⁶ The study aimed to determine to what extent this deterioration with age may be a consequence of modern sedentary lifestyles rather than aging itself. One important finding was that T-cells, critical for immunity, did not decline in the cyclists but did in the control group. By contrast, physical inactivity, which as a lifestyle is reversible, may make a significant contribution to several aspects of deterioration of the immune system associated with the aging process.

¹ De Geus, B., De Smet, S., Nijs, J., Meeusen, R. 2007 Determining the intensity and energy expenditure during commuter cycling, *British Journal of Sports Medicine*, 41: 8-12.

² Tuxworth, B., Nevill, A., White, C., Jenkins, C. 1986 Health, fitness, physical activity, and morbidity of middle aged male factory workers, *British Journal of Industrial Medicine*, 43: 733-753.

³ Kennedy, A. 1997 Exercise and heart disease: Cardiac findings in fatal cycle accidents, *British Journal of Sports Medicine*, 31(4): 328-331.

⁴ Pollock, R. et al 2018 Properties of the vastus lateralis muscle in relation to age and physiological function in master cyclists aged 55-79 years, *Aging Cell*: e12735

⁵ Mitochondria are small structures within a cell that are made up of two membranes and a matrix. The membrane is where the chemical reactions occur and the matrix is where the fluid is held. The main job of mitochondria is to perform cellular respiration. This means it takes in nutrients from the cell, breaks it down, and turns it into energy.

⁶ Duggal, N. et al 2018 Major features of immunosenescence, including reduced thymic output, are ameliorated by high levels of physical activity in adulthood, *Aging Cell*, e12750.