Importantly, findings from a Cochrane review of 35 randomised controlled trials suggest that harmful effects of stress in people with coronary heart disease are not attributable to confounding. Interventions that improved psychological symptoms, including stress, led to a reduction in cardiovascular mortality (relative risk 0·79, 95% CI 0·63–0·98).[4]

The different mortality association for job strain and effort–reward imbalance in our study might reflect a better opportunity of individual-level control for effort–reward imbalance. Previous studies show that men with high atherosclerotic burden tend to reduce working hours;[5] this reverse causation effect will improve the effort–reward ratio.

Premenopausal protection of female sex leads to lower cardiovascular disease risk in women, but women with diabetes or coronary heart disease have higher mortality rates than men with these diseases.[6,7] We do not know the reasons for the observed sex difference in the association between job strain and mortality in participants with cardiometabolic disease in our study. Further research is needed to examine, for example, whether stressors other than job strain might be more important in terms of mortality risk for women than for men.

We declare no competing interests.

*Mika Kivimäki, Jaana Pentti, John Deanfield
m.kivimaki@ucl.ac.uk

Department of Epidemiology and Public Health, University College London, London WC1E 6BT, UK (MK); National Centre for Cardiovascular Prevention and Outcomes, University College London, London, UK (JD); and Clinicum, Faculty of Medicine, and Helsinki Institute of Life Science, University of Helsinki, Helsinki, Finland (MK, JP)

1 Kivimäki M, Pentti J, Ferrie JE, et al. Work stress and risk of death in men and women with and without cardiometabolic disease: a multicohort study. *Lancet Diabetes Endocrinol* 2018; **6:** 705–13.
2 Kivimäki M, Nyberg ST, Batty GD, et al. Job strain as a risk factor for coronary heart disease: a collaborative meta-analysis of individual participant data. *Lancet* 2012; **380:** 1491–97.
3 Kivimäki M, Steptoe A. Effects of stress on the development and progression of cardiovascular disease. *Nat Rev Cardiol* 2018; **15:** 215–29.
4 Richards SH, Anderson L, Jenkinson CE, et al. Psychological interventions for coronary heart disease: Cochrane systematic review and meta-analysis. *Eur J Prev Cardiol* 2018; **25:** 247–59.
5 Sokejima S, Kagamimori S. Working hours as a risk factor for acute myocardial infarction in Japan: case-control study. *BMJ* 1998; **317:** 775–80.
6 Chung SC, Gedeborg R, Nicholas O, et al. Acute myocardial infarction: a comparison of short-term survival in national outcome registries in Sweden and the UK. *Lancet* 2014; **383:** 1305–12.
7 Prospective Studies Collaboration and Asia Pacific Cohort Studies Collaboration. Sex-specific relevance of diabetes to occlusive vascular and other mortality: a collaborative meta-analysis of individual data from 980 793 adults from 68 prospective studies. *Lancet Diabetes Endocrinol* 2018; **6:** 538–46.

Rebuking the concept of ageing as a disease

It was with concern that we read the title of a recent Editorial[1] in *The Lancet Diabetes & Endocrinology* entitled "Opening the door to treating ageing as a disease". Although the purpose of the Editorial may have been to stimulate debate, we believe that any attempt to rebrand ageing as a disease is fundamentally misguided and retrograde.

First, age is not a stable category but rather humans are part of different age cohorts throughout life. Ageing is a normative biological process that varies within and between species with marked biological heterogeneity. Whereas chronological age represents a major risk factor for disease, the ageing process is characterised by the presence of high inter-individual variation between individuals of the same chronological age.[2] If we accept that there is large heterogeneity in the rate of ageing, on what basis are we justified in treating ageing as a disease?

Second, rebranding ageing as a disease does nothing to further our understanding of the ageing process—the life-course social, behavioural, biological, and genetic influences that contribute to it—nor indeed the underlying cellular and molecular processes that accelerate it. To this end, much research effort is currently being directed in the field of geroscience towards identifying ageing biomarkers that predict lifespan better than chronological age.[3,4]

Third, we feel the Editorial is in danger of confusing a risk factor for disease with a disease outcome. At what age do we label ageing a disease? Is there some arbitrary cut-point above which ageing is no longer considered normative? How should we determine that threshold?

Finally, we feel that labelling ageing as a disease serves to reinforce ageist stereotypes and risks legitimising insidious prejudice and discrimination of older people on the basis of age. A growing body of research indicates that such prejudice affects not just psychological health but also physical function, wellbeing, and mortality.[5,6]

With reference to the Editorial's opening metaphor, we believe that the scientific community should shut the door firmly to the concept of ageing as a disease.

We declare no competing interests.

*Cathal McCrory, Rose Anne Kenny
mccrorc@tcd.ie

Department of Medical Gerontology, Trinity College Dublin, Dublin D2, Ireland (CM, RAK), and Mercer's Institute for Successful Ageing, St James Hospital, Dublin D8, Ireland (RAK)

1 The Lancet Diabetes & Endocrinology. Opening the door to treating ageing as a disease. *Lancet Diabetes Endocrinol* 2018; **6:** 587.
2 Shiels PG, Stenvinkel P, Kooman JP, McGuinness D. Circulating markers of ageing and allostatic load: a slow train coming. *Practical Laboratory Medicine* 2017; **7:** 49–54.
3 Horvath S. DNA methylation age of human tissues and cell types. *Genome Biol* 2013; **14:** R115.
4 Jylhava J, Pedersen NL, Hagg S. Biological age predictors. *EBioMedicine* 2017; **21:** 29–36.
5 Allen JO. Ageism as a risk factor for chronic disease. *Gerontologist* 2016; **56:** 610–4.
6 Freeman AT, Santini ZI, Tyrovolas S, Rummel-Kluge C, Haro JM, Koyanagi A. Negative perceptions of ageing predict the onset and persistence of depression and anxiety: Findings from a prospective analysis of the Irish Longitudinal Study on Ageing (TILDA). *J Affect Disord* 2016; **199:** 132–38.