

Body-mass index and mortality

In their review of body-mass index (BMI) and mortality (March 28, p 1083),¹ the Prospective Studies Collaboration concludes that a BMI of 22.5–25.0 kg/m² is optimum in adults, and the accompanying Comment² emphasises the “unspeakable fact” that a BMI of 18.5–22.5 kg/m² is associated with increased mortality.

However, these conclusions might not extend to young adults. First, the youngest age category analysed in the study is 35–59 years: no conclusion can therefore be inferred to younger people. Second, several large cohort studies³ have shown that long-term mortality is lowest among adults in their 20s or 30s at inception with BMI values ranging between 20.0 and 22.5 kg/m². In a study of 45 920 Swedish men aged 19 years at baseline,⁴ mortality over the next 38 years was lowest, and virtually identical, for the BMI categories of 17.0–18.4 kg/m² and 18.5–24.9 kg/m². To imply that the optimum BMI in young adults should range between 22.5 and 25.0 kg/m² is thus unsubstantiated by the evidence.

Moreover, such a public health message is likely to fuel weight gain at this crucial young age. Although most of us tend to gain weight after our teenage years, a large minority keep their BMI in the low range of 17.0–22.5 kg/m² into their early 20s, with a beneficial effect on mortality.

The question of optimum BMI might well be settled in middle-aged and older adults,² but further appraisal is needed in young adults. This research issue should be addressed urgently if health messages are to be tailored appropriately.

We declare that we have no conflicts of interest.

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The Prospective Studies Collaboration¹ states that it did not correct for regression dilution bias “since one BMI [body-mass index] measurement is highly correlated with the long-term usual BMI”. However, I and colleagues have found in two separate Cox regression analyses that use of usual BMI rather than one BMI measurement caused substantial increases in the hazard ratio for obesity.^{2,3} These increases were larger than achieved by dividing the regression coefficient for the one BMI measurement by the regression dilution ratio, unless we excluded individuals with serious illness and smokers. The Collaboration did not exclude smokers nor individuals with a history of cancer or emphysema in some of their analyses, suggesting that these analyses might have been affected by regression dilution.

I wonder if the Collaboration agrees that the correlation between one BMI measurement and the long-term usual BMI is an indicator of the level of measurement error rather than the level of regression dilution.

I declare that I have no conflicts of interest.

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- 1 Prospective Studies Collaboration. Body-mass index and cause-specific mortality in 900 000 adults: collaborative analyses of 57 prospective studies. *Lancet* 2009; **373**: 1083–96.
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The Prospective Studies Collaboration's analyses of 900 000 adults followed up for a mean of 13 years¹ confirm the earlier finding, based on a prospective cohort of Americans in the NHANES follow-up cohort study,² that replacement of blood cholesterol by body-mass index (BMI) can be used to assess cardiovascular disease (CVD) risk. Over the same BMI range (15–40 kg/m²), non-HDL blood cholesterol patterns showed a linear relation between BMI values of 15–30 kg/m², then a flattening off at higher BMI values. However, up to a BMI of 35 kg/m², there seems to be a linear relation between the ratio of non-HDL cholesterol to HDL cholesterol, which is regarded as a better index of the CVD risk than total, non-HDL, or HDL cholesterol alone.³

Furthermore, the relation between BMI and diabetes persisted throughout the entire range of BMI values. In the NHANES non-laboratory risk model, a reported history of diabetes was used, and here again the use of BMI would have been able to pick up risk among those undiagnosed with diabetes, particularly in developing countries where screening for diabetes is limited. Thus an overview of two different population studies led to the conclusion that BMI can correctly serve as a low-cost proxy for lipid-related and undiagnosed diabetes-related CVD risk over the full range of BMI.

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