Excess weight and multimorbidity: putting people's health experience in risk factor epidemiology

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Prospective cohorts have greatly advanced our understanding of the causes of premature death and disease occurrence. This knowledge has subsequently been used to improve public health through disease prevention, ranging from policies to control tobacco and alcohol for entire populations, to guidelines for blood pressure and lipid management in individual patients.[1] In particular, analyses of prospective cohorts have shown that excess weight, as measured by BMI, is a risk factor for all-cause as well as cause-specific mortality.[2,3] With rising BMI in most countries and regions,[4] overweight and obesity are now a leading cause of global mortality from cardiovascular diseases, diabetes, and chronic kidney disease.[5]

A distinct body of work in medicine, population health, and health services has focused on defining and measuring multimorbidity, a phenomenon that is familiar to primary care providers who see many people and patients simultaneously affected by multiple conditions.[6-8] Although ageing is a key determinant of multimorbidity, multimorbidity affects people throughout the lifecourse, and is especially high in those afflicted by poverty and deprivation, which are risk factors for several mental and physical illnesses.[8] Despite its importance for people's health experience and health-care needs, multimorbidity is rarely used in analyses of prospective cohorts, which instead tend to use occurrence of single adverse events (eg, death or incidence of cancer, acute myocardial infarction, or stroke) as their outcome.

In *The Lancet Public Health*, Mika Kivimäki and colleagues[9] pooled data from 16 prospective cohort studies to assess the association between elevated BMI and cardiometabolic multimorbidity, defined here as having had two events that can be classified as ischaemic heart disease, stroke, or diabetes. The researchers noted that, compared with those with a healthy BMI (20·0–24·9 kg/m²), participants with BMIs of 25·0–29·9 kg/m² (overweight), 30·0–34·9 kg/m² (mildy obese), and higher than 35·0 kg/m² (severely obese) were 2·0 (95% CI 1·7–2·4), 4·5 (3·5–5·8), and 14·5 (10·1–21·0) times more likely, respectively, to have multiple incident events. When both single events and multiple events were included as outcomes in multinomial logistics regression, odds ratios for various overweight and obese categories were consistently larger for multimorbid outcomes than for single events—ie, compared with individuals with a healthy BMI, overweight and obese participants had an even higher risk of multiple cardiometabolic events than they did of one event. The researchers appropriately did several sub-analyses to assess whether and how much the findings depended on specific aspects and to show the limitations of the data used in the analysis—eg, whether weight and height were measured or self-reported, and whether cardiometabolic events were ascertained using health records or were self-reported.

The analysis by Kivimäki and colleagues represents a step towards a more realistic assessment of the health consequences of risk factors that affect multiple diseases, such as excess weight, and is especially important as more people survive from conditions such as diabetes,[10] acute myocardial infarction,[11] and stroke, and live with their long-term sequelae and complications. The analysis also highlighted some of the challenges in understanding how physiological, behavioural, and environmental risk factors are associated with multimorbidity.

At the most fundamental level, analyses of how multimorbidity affects functional health status and its management by health providers and services tend to use the prevalence and duration of multimorbidity, whereas prospective cohorts often use incidence of events for estimating hazard ratios. Using prospective cohorts in a way that is more consistent with health planning and policy evidence needs would necessitate choices about, and data for, when multimorbidity began, and how to treat the time between first and subsequent events. Kivimäki and colleagues use multinomial logistic regression to get around this specific methodological challenge, but the issue of how to reconcile an outcome whose most relevant feature is based on prevalence and duration, with a study design largely premised on time to (incident) event remains to be explored. Further, many prospective cohorts,

including those used by Kivimäki and colleagues, have limited data on the range of conditions that are commonly reported in patients with multimorbidity, including on mental health, musculoskeletal, and respiratory conditions or disabling sequelae of stroke, diabetes, acute myocardial infarction, or injuries, because such conditions are often diagnosed through repeated contact with health services with no clear incidence time. The potential routine health-care data and record linkage to capture the full medical history of patients provides an opportunity for the use of non-fatal outcomes but must overcome numerous bureaucratic obstacles, and even such data cannot capture those cases that go undiagnosed.

Future research should leverage the opportunities offered by administrative data, and attempt to resolve the definition and methodological challenges of including multimorbidity as an outcome of prospective cohorts. If such an approach succeeds, it will make prospective cohorts more relevant to people's health experiences and their need for care.

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