Unravelling the associations between social isolation, loneliness, and mortality

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A paucity of social relationships has been reported to result in biological changes that can lead to disease and increased mortality.[1] However, observational studies of the relation between social isolation and mortality are beset with difficulties when attempting to assess cause and effect because of the substantial opportunity for reverse causation bias and the potential for confounding by associated factors, such as smoking. Regarding reverse causation, the crucial question is whether poor health causes less social interaction, rather than social isolation itself causing poor health. The issue with confounding is how much of any association between social isolation and mortality is due to factors related to isolation.

In *The Lancet Public Health*, Marko Elovainio and colleagues[2] report on the association between two measures—social isolation and loneliness—on subsequent mortality risk. They analysed data from a prospective cohort of 466 901 UK adults recruited into the UK Biobank and followed up for a mean of 6·5 years (SD 0·8). During that time, they reported 11 593 deaths, 6578 (57%) of which were from neoplasms. After adjusting for age, sex, and various factors known to increase mortality risk and associated with social isolation and loneliness, they reported a small excess risk of all-cause mortality among those classified as socially isolated (hazard ratio [HR] 1·26, 95% CI 1·20–1·33), but no excess risk in those classified as lonely (0·99, 0·93–1·06). The findings were generally similar for deaths from neoplasms or circulatory system disorders. The investigators concluded that most of the excess mortality in socially isolated individuals could be explained by health behaviours including smoking, socioeconomic factors, and self-rated health. For individuals reporting loneliness, self-rated health and psychological factors including symptoms of depression explained much of their excess mortality.

The findings regarding social isolation concur with most of the published work.[3] Elovainio and colleagues[2] assessed social isolation using a composite score based on questions about living alone, frequency of seeing family or friends, and engagement in regular social activities. The absence of an increase in mortality among individuals classified as lonely raises questions about whether some aspect of the variables used to define social isolation were themselves predictors of excess mortality, rather than the isolation itself. For example, the frequency with which an individual is able to see family and friends or engage in social activities might be strongly affected by their health. Although Elovainio and colleagues report that their findings were similar among those with no chronic illnesses self-reported at baseline, further restriction of the analysis to those who rated their health as good would have been important.[4]

The substantial attenuation of the risk estimates associated with social isolation after adjusting for various factors suggest that such associations might be due to residual confounding. Socially isolated individuals differ from those not isolated in many important ways, including being more socioeconomically deprived, more likely to smoke, and less likely to partake in physical activity.[5] In prospective studies, these factors can only be measured imperfectly and often at just one timepoint. Adjustment for imperfectly measured variables can result in a residual apparent increase in mortality risk.

The primary strength of Elovainio and colleagues' study[2] is the large sample size, which reduced the potential for chance findings and enabled additional analyses of dose–response and subgroup comparisons. A better understanding of the reasons underlying the association reported between social isolation and mortality could be gained by examining disease endpoints and uptake of treatment as well as focussing solely on mortality. Findings from some studies[6,7] have shown that adults living with a partner have a lower risk of ischaemic heart disease mortality than those without partners, but no difference in the risk of ischaemic heart disease events. Floud and colleagues[6] suggested the different relations could be attributed to partners being more likely to support lifestyle changes or compliance with treatment, thereby reducing mortality from ischaemic heart disease, but not incidence.

In Elovainio and colleagues' study,[2] a similar proportion of participants were classified as socially isolated (9%) as were classified as smokers (10%). However, the relative excess mortality in socially isolated individuals (HR 1·26)[2] was small compared with that

reported in smokers (HRs of about 3·00),[8–10] and there was no excess mortality among people who described themselves as lonely.[2] Most of the excess mortality in socially isolated and lonely individuals was explained by adjusting for factors such as socioeconomic status (percentage of excess risk mediated 35% for social isolation and 44% for loneliness), unhealthy behaviours such as smoking (34% and 41%), mental health (18% and 66%), and self-rated health (32% and 71%). In the absence of well-designed trials of interventions to decrease social isolation with mortality as an outcome, any suggestion of a causative role of social isolation itself must be made with caution. From a public health perspective, the findings from this study underscore the importance of policies to reduce smoking and social inequalities. Such policies will substantially benefit the whole population, including those who are socially isolated and lonely.

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