



**Inequality**

The IFS Deaton Review

# The contribution of adult experiences, multimorbidity and positive psychological well-being to social inequalities in health

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## Introduction

Case and Kraftman (2022) clearly summarise evidence relating inequalities based on individual characteristics, such as education and area-based deprivation measures, with all-cause and cause-specific mortality in the UK. The third section of their chapter focuses on how health inequalities develop and why they persist. The emphasis is on early life and childhood factors, such as the uterine environment, birth weight and childhood mental health, that drive later life health disparities. These are crucial issues, but they are very distant in the lifespan from most serious illnesses and death. The median age of death in the UK is now 82.5 years for men and 85.9 years for women. Just under 95% of deaths from all causes take place among people aged 50 and older. Thus, for the large majority of the population, death takes place decades after the factors highlighted by Case and Kraftman; so, in addition to the importance of early life experiences, experiences in the intermediate decades are critical. The largest contributors to socio-economic inequalities in premature death (deaths before the age of 75) are coronary heart disease, chronic obstructive pulmonary disease (COPD) and respiratory and digestive cancers. Analyses of all premature deaths in England between 2003 and 2018 estimate that these four conditions between them make up 46% of deaths attributable to socio-economic inequalities based on the index of multiple deprivation (Lewer et al., 2020). Over the same time period, greater inequalities were observed for deaths due to tuberculosis, opioid use and HIV, but the absolute number of deaths from these conditions was rather smaller.

The diseases that are the primary drivers of socio-economic inequalities in mortality are strongly related to lifestyle factors such as smoking, physical inactivity, dietary choice, poorly managed risk factors (e.g. hypertension) and obesity. As Mackenbach (2019) states, these causes are 'eminently avoidable' through better treatment and prevention. Nevertheless, inequalities persist when these factors are taken into account, though estimates of the variation in mortality not explained by lifestyle differ across studies. For example, a longitudinal analysis of the Lifepath project involving individual-level analysis of 48 independent prospective cohort studies, with more than 1.7 million adults followed for an average of 13.3 years, showed that low socio-economic status based on occupational position was associated with mortality independently of smoking, high alcohol intake, physical inactivity, hypertension, diabetes and obesity (Stringhini et al., 2017). The population attributable fraction was greatest for smoking, followed by physical inactivity and then socio-economic status. But a smaller study of the Whitehall II cohort found that socio-economic variations in mortality were largely explained by these behaviours (Stringhini et al., 2010). Another study using UK Biobank concluded that body mass index, blood pressure and smoking accounted for just over one-third of the effects of educational attainment on cardiovascular disease, implying that more than half of the protective effect of education was not explained (Carter et al., 2019).

Findings of this type have several implications, three of which are discussed in this commentary. First, we suggest that serious consideration should be paid to non-traditional adult risk factors that may complement early life factors in contributing to health inequalities. Unlike childhood factors that are fixed in early life, adult experiences are potentially malleable at later ages, so interventions may benefit the health of the current generations of young and middle-aged adults in the 21<sup>st</sup> century. Second, we address the issue of how socio-economic inequalities in childhood are translated into the health conditions that cause death in later life, focusing on the impact of early life exposures on the mental ill-health of young adults, and its impact on later multimorbidity. Finally, we touch on the relevance of positive psychological characteristics such as positive emotional well-being, optimism and purpose in life, arguing that these malleable factors have the potential partly to ameliorate the adverse effects of low socio-economic status in childhood and adult life.

## Adult psychosocial determinants of health inequalities

The fields of psychosocial epidemiology and behavioural medicine have identified a number of features of adult experience relevant to risk of long-term conditions and premature mortality. These include various types of social adversity such as major – but thankfully relatively infrequent – life events (divorce, bereavement), and longer-term challenges such as chronic work stress, family conflict and informal caregiving. A second group of relevant factors arise through disruption of social relationships, notably social isolation, loneliness and impoverished social support. The role of these factors is primarily studied with longitudinal observational studies, the limitations of which are well known (Matthay et al., 2020), supplemented by natural experiments and mechanistic biological research.

The sources of adult social adversity that have been studied most extensively by epidemiologists are related to experiences in the workplace, including work stress and long working hours. Labour market inequality is discussed in detail in other sections of the IFS Deaton Review. The focus on work in the context of health is partly because, for people in paid employment, work takes up a substantial proportion of waking life, and partly because of the potential for modifying the situation. Different concepts of work stress, notably the job strain (high demand/low control) model and the effort/reward imbalance model, have been used in multiple longitudinal population studies of health outcomes. The pooled hazard ratios from meta-analysis of studies involving more than 200,000 people from different work settings indicate that the relative risk of coronary heart disease is around 1.3 times higher for people in high strain compared with no strain work, and slightly less when ischaemic stroke is the outcome (Kivimaki and Steptoe, 2018). Longitudinal associations with diabetes, atrial fibrillation and depression have also been described, while job strain is not related to cancer or respiratory disease. There are indications that excessive effort/reward imbalance and long work hours are also prospectively associated with cardiovascular disease.

Work characterised by high demands and low control over how the work is carried out (little discretion over work pace and limited opportunities to develop skills) is more common in lower status jobs. A Danish study showed that components of the job strain model mediated the association of socio-economic position on risk of myocardial infarction (Andersen et al., 2004). A counterfactual analysis studied the hypothetical impact of improving job stress for lower status workers across Europe on cardiovascular disease mortality (Witvliet et al., 2020). It was estimated that if job strain in male manual workers was reduced to the levels recorded in non-manual workers, inequalities in cardiovascular mortality would be reduced by 6.3%–12.6% across different European regions, a very substantial benefit.

Other features of workplace experience may be protective. Jobs involving high demands coupled with high control are typically more cognitively stimulating than those where demands are low, or control is low. A longitudinal analysis of more than 107,000 participants in seven population cohorts assessed risk of dementia over 13–30 years in people working in stimulating jobs (Kivimaki et al., 2021). After adjustment for education and recognised behavioural and metabolic risk factors, dementia rates were lower in people who had done cognitively stimulating work earlier in their lives (adjusted hazard ratio 0.82, 95% confidence interval 0.68–0.98). Reverse causation (early cognitive deterioration reducing people's involvement in cognitively stimulating work) is a concern in this type of research (Floud et al., 2021), but is unlikely to be operate here because of the long follow-up periods, and the fact that associations persisted when dementia cases in the first 10 years of follow-up were excluded. It was also noted that the protective association with cognitively stimulating work was greater among people with higher educational attainment.

Outside the work domain, prominent adult adversities that potentially contribute to poor health include disruption of relationships. Marital dissolution through divorce or separation is related to increased risk for early mortality (Sbarra, Law and Portley, 2011). According to the American Community Survey, there is a pronounced social gradient in divorce, with higher rates among poor and working class couples compared with more affluent classes (Case and Deaton, 2020). Socio-economic status appears to play a large role in moderating the impact of divorce on mortality (Dupre, Beck and Meadows, 2009). However, the association with health and inequalities is complicated by selection factors and the effects of marital dissolution on socio-economic status. Separation and divorce often lead to substantial financial disruption and reductions in health that are correlated with changes in subjective social status (Sbarra and Whisman, 2021). Analyses of the Health and Retirement Study have shown that negative wealth shocks experienced by people in their 50s are associated with increased all-cause mortality over the next two decades (Pool et al., 2018).

Numerous studies also indicate that socio-economic position is inversely associated with the experience of minor but repetitive stressors in daily life. For example, an analysis of the daily diary substudy of the Midlife in the United States Study (MIDUS) found that people with lower education reported more frequent and severe daily stressors than the better educated; these differences accounted for educational disparities in psychological distress and physical health symptoms (Almeida et al., 2005). These minor stressors are not easy to quantify without using intensive repeat measures such as ecological momentary assessment. But they are likely to contribute to subjective distress, which could therefore be taken as a proxy for chronic or repeated low-level stress exposure. Distress is more straightforward to quantify with measures such as the General Health Questionnaire (GHQ), which incorporates items related to feeling under strain, inability to face up to and overcome difficulties, and loss of confidence in making decisions. An analysis of multiple years of the Health Survey for England related GHQ scores with mortality over an average follow-up of 8.2 years (Russ et al., 2012). After excluding people with cardiovascular disease or cancer at baseline, a 'dose-response' association between psychological distress and all-cause mortality was observed. The association survived adjustment for factors such as smoking, physical activity, alcohol consumption and blood pressure, and similar patterns were found for deaths from cardiovascular disease and external causes. This study did not evaluate whether the impact of distress was related to socio-economic status. But another analysis of the Health Survey for England tested specifically for interaction with status defined by occupational position (Lazzarino et al., 2013). The interaction was significant, with the association between distress and mortality being greater in more disadvantaged groups.

In addition to the stressors discussed above, dozens of studies have highlighted the relationship between social isolation and mortality. A meta-analysis of 70 studies involving 3,407,134 individuals found persistent associations with mortality across both subjective measures of isolation (feelings of loneliness such as isolation, disconnectedness and not belonging) and objective measures of social isolation (such as a pervasive lack of social contact or communication, a dearth of participation in social activities, the lack of close friends, and living alone) (Holt-Lunstad et al., 2015). There was an increased likelihood of mortality of 49%–83% for people who were isolated in analyses adjusted just for basic demographic characteristics (e.g. age and gender), with this association remaining at around a 26%–32% increased risk once behaviours such as physical activity and smoking as well as physical health status had been taken into account. Notably, both objective and subjective aspects of social isolation are socio-economically graded, with individuals from low socio-economic backgrounds or living in deprived areas at increased risk of isolation (Algren et al., 2020). Further, isolation (in particular subjective measures of social isolation such as loneliness) is associated with atypical physiological reactivity to stress, highlighting the interconnection between psychosocial risk factors for mortality discussed in this section (Brown, Gallagher and Creaven, 2018).

Lower socio-economic status in later adult life is also related to the acceleration of age-related decline in multiple organ systems and functions independently of ill-health. This was documented in an analysis of changes in multiple outcomes over an eight-year period in participants in the English Longitudinal Study of Ageing categorised on the basis of wealth (Steptoe and Zaninotto, 2020). Lower wealth predicted greater declines in physical capability (gait speed, grip strength), physiological function (lung function, biomarkers), cognitive function (memory, executive function), emotional well-being (enjoyment of life, depressive symptoms) and social function (organisational membership, volunteering). These associations were independent of age, gender, ethnicity, education and long-term health conditions. Direct associations with cellular ageing have also been described. For example, measures of multiple epigenetic clocks in a combined analysis of 18 cohorts indicated more rapid biological ageing among less-educated individuals (Fiorito et al., 2019). Studies of this kind suggest that exposures to many adversities in adult life are socially graded, and that vulnerability to adult stress is greater in disadvantaged groups. Adult experience may compound the links established in early life between social inequalities and health outcomes.

### **Bridging the gap from early life to later mortality: the role of multimorbidity**

Notwithstanding the relevance of adult social and psychological experience in health inequalities, early life disparities clearly play an important role. Case and Kraftman (2022) show how socio-economic inequalities in childhood health can be tracked into differences in mental health in adolescence and early adult life. But there is a pressing need to understand how mental health problems early in the life course promote serious non-communicable disease in later years. Depression and distress are elevated among people with a wide range of physical diseases including coronary heart disease, type 2 diabetes, chronic obstructive pulmonary disease, several neurological conditions and some cancers (Gold et al., 2020). Not surprisingly, distress can be a consequence of the presence of debilitating and potentially life-threatening disease, but in several medical conditions, depressive and other negative psychological symptoms precede the onset of physical ill-health. There is accumulating evidence from longitudinal observational population studies that depression, anxiety and distress are associated with future onset of coronary heart disease, type 2 diabetes, chronic lung disease and stroke, though evidence related to cancer remains equivocal (Scott et al., 2016). For example, a large-scale health record study involving nearly 6 million men and women in Denmark examined transitions over 15 year period from a

median baseline age of 32 years (Momen et al., 2020). Several mental health conditions at baseline such as mood disorders, substance abuse and eating disorders were related to increased risk of a range of physical illnesses over the follow-up period, including gastrointestinal, respiratory, cardiovascular and endocrine conditions. Similar findings have emerged in New Zealand, where individuals with mental disorders were at increased risk for developing serious physical illnesses over a 30-year study period (Richmond-Rakerd et al., 2021).

It is notable that these associations are evident across a range of physical health conditions, suggesting that mental health problems early in life may contribute to the development of later multimorbidity. This possibility is endorsed by an analysis of two of the British birth cohorts, the 1958 National Child Development Study and the 1970 British Cohort Study (Arias-de la Torre et al., 2021). Depressive symptoms assessed with the Malaise Inventory when participants were aged 23 or 26 were related to increased risk of physical multimorbidity when people were in their 30s and 40s. These associations were maintained after statistical adjustment of gender, ethnicity, marital status, alcohol consumption and smoking, highlighting the role of non-behavioural processes such as shared genetic and biological underpinnings (Gold et al., 2020). Associations were also independent of adult and childhood socio-economic status. However, multimorbidity shows a strong socio-economic gradient as defined by area deprivation in the UK while increasing with age, so is present in more than two-thirds of the population by the age of 70–75 years (Cassell et al., 2018).

A more explicit evaluation of the relevance of socio-economic status on links between early life mental health and later physical health has been conducted using large-scale analyses of more than 100,000 adults in Finland (Kivimaki et al., 2020). Similar findings were observed when socio-economic status was defined by area deprivation and education. Among lower status individuals, psychiatric disorders, substance abuse and self-harming early in life substantially increased risk of liver disease, anaemia, diabetes, chronic obstructive disease and coronary heart disease. No such trajectories were present in higher socio-economic status groups.

The increased availability of administrative electronic health records has been essential to understanding the evolution of physical illnesses among people with mental health difficulties early in life. But health records typically focus on severe mental health problems that have warranted specialist care. Understanding of socio-economic gradients also benefits from longitudinal cohort data in which subclinical levels of depressive symptoms and distress are recorded. Electronic health records also lack information about positive psychological characteristics that play an important role in understanding disparities, and these are best studied with population cohort studies.

## Socio-economic inequalities in protective psychological characteristics

Case and Kraftman (2022) rightly focus on mental ill-health as a key outcome of low socio-economic status relevant to disparities in the development of non-communicable disease and mortality. However, socio-economic inequalities in psychological well-being are not confined to negative states of depression, anxiety and distress. There is a growing scientific literature relating different components of positive well-being, including positive affect or feeling, eudemonic factors (such as purpose in life) and life satisfaction, with reduced mortality risk (Steptoe, Deaton and Stone, 2015; Steptoe, 2019). More than 60 longitudinal population studies have examined associations between positive well-being and mortality; although results vary across studies, meta-analyses suggest that positive states are protective (Martin-Maria et al., 2017; Rozanski et al., 2019). Importantly, the associations remain robust after adjusting

statistically for baseline health, clinical risk factors, and for depression and anxiety. This indicates that links between positive well-being in adult life and future health may be different from those related to depression and distress.

There are socio-economic gradients as defined by income, wealth or education in positive well-being, though relationships are complex, reciprocal, and depend on what aspects of well-being are being assessed (Deaton, 2008; Kahneman and Deaton, 2010). What remains to be clearly articulated is the extent to which links between positive well-being and health contribute to socio-economic gradients. Findings to date have been inconsistent, partly because sample sizes have limited the ability to investigate these interactions with confidence (Shiba et al., 2021).

An important reason for focusing on positive well-being is that it is malleable, so could potentially help to mitigate the impact of low socio-economic position. Activities that can improve well-being can broadly be categorised into two groups: interventions that specifically seek to increase happiness (e.g. by cultivating valued subjective experiences and building positive individual traits; 'positive psychology intervention') and interventions that seek to improve health more broadly but have secondary effects on happiness and life satisfaction.

In the former category, meta-analyses of positive psychology interventions including gratitude interventions, positive writing, mindfulness and appreciative inquiry have found increases in happiness, positive emotions and moods, hope, optimism, self-esteem, self-efficacy and resilience (Carr et al., 2021). These effects have been seen across a wide range of settings including workplaces, and healthcare settings, as well as amongst specific populations including people with physical health conditions and diagnosed mental health conditions. A commonly reported secondary effect is decreased stress, burnout, anxiety and depression, suggesting that although these interventions are targeted at well-being, they can simultaneously address symptoms of mental distress.

In the second category, there is evidence of increases in positive well-being from meta-analyses of activities including those involving prosociality (e.g. volunteering and other acts of kindness; Hui et al., 2020), nature engagement (e.g. gardening and sense of nature connectedness), arts and creativity (e.g. engaging in music, dance), physical activity (e.g. engagement in sports or moderate intensity exercise) and social engagement (e.g. group support and social activities) (Fancourt and Finn, 2019). Notably, some of these activities have also been associated with mortality – likely in part mediated via their positive psychological effects (Jenkinson et al., 2013). However, there is also a notable social gradient in engagement in such activities, with higher status individuals being more likely to participate. Although there are initial indications that benefits are found at least equally (and potentially more strongly) for individuals facing higher levels of individual or neighbourhood deprivation, much more work is needed to identify and address the barriers to participation faced by different socio-economic groups.

Partly in light of these findings, interventions involving formal referral to psychosocial interventions by health and social care professionals to improve health and well-being (such as 'social prescribing' or 'community referral' programmes) have been increasing (Drinkwater, Wildman and Moffatt, 2019). Whilst research in this area remains in its early stages, there are promising data suggesting that beneficial effects are replicated when a 'prescription' mechanism is applied (Wade et al., 2020). Such schemes are deliberately designed to help to address psychological, social or financial barriers to participation. However, more research is necessary to confirm whether social prescribing can in practice reduce socio-economic discrepancies in access to psychosocial interventions and whether any benefits are found across the socio-economic spectrum, including people who would not normally choose to engage.



## Conclusions

This commentary supplements the findings of Case and Kraftman (2022) by highlighting the contribution of non-traditional adult risk factors to health inequalities, morbidity and mortality. Some of the risk factors identified above are amenable to intervention. For example, to help address work stress, the Health and Safety Executive (2007) has proposed 'new management standards' focused on reducing demands, improving control, enhancing support, promoting positive working relationships, delineating different roles and managing change more effectively. To help tackle loneliness and isolation, individual interventions such as social and emotional skills training, social nudging, activity programmes and cognitive behavioural therapies are showing promise. But there is also work suggesting that broader societal measures are needed, including ensuring good transport links in remote areas, improving digital connectivity, protecting and enhancing green space, making residential areas more walkable, reducing experiences of discrimination, providing shared community spaces, and addressing poverty. For informal caregivers, individual interventions such as psycho-education, psychosocial support, sleep promotion and family meetings have shown some benefits, although there is also a recognised need to address underlying stressors including receiving adequate financial support.

For other risk factors such as divorce, bereavement and family conflict, targeted provision of further psychosocial support could help to buffer their adverse health effects by reducing associated distress and isolation among more socially deprived individuals. This is particularly relevant in light of the additional evidence presented here on the role of psychological stress, anxiety and depression in the onset and progression of physical diseases. Interventions such as social prescribing hold promise here. However, for such mechanisms of intervention to be effective, there is a need to ensure the following: (i) they are delivered equitably across geographical areas within countries and across socio-demographic groups to avoid an exacerbation of existing socio-economic inequalities; (ii) there is adequate investment not just in the mechanism of social prescribing but also in the quantity and diversity of community activities; and (iii) that prescriptions are made in parallel with careful considerations about individuals' broader medical and non-medical needs, taking into account individual choice. If these aims can be achieved, then social prescribing has the potential to play an important role as an alternative or auxiliary to conventional medical interventions, providing more person-centred care, helping to address determinants of the risk factors discussed above, and reducing stigma or shame associated with experiencing adversities or mental illness.

Overall, the non-traditional adult risk factors highlighted in this commentary may be concerning in terms of their potential impact on health. However, it is within our power as societies to ameliorate their adverse effects. Increasing work on the delivery and evaluation of interventions such as those described above has the potential to reduce the contribution of these risk factors to the global burden of disease.



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