Trends in Mid-life Mortality in the UK and Canada: Is the US an Anomaly?

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Abstract (max 150 words)

Decreases in life expectancy (LE) in the U.S. have continued for a 2nd year, with increases in "deaths of despair" heavily implicated in both scholarly and popular explanations for these trends. Whether similar trends are occurring in different social and economic contexts is not known. The increases in mortality in the US have been focused in middle-aged Whites. LE may be leveling off in the UK and Canada, however little is known about the trends mid-life mortality or trends in "despair" deaths. This paper uses vital statistics to describe mortality trends in the UK and Canada from 2000-2016 by cause of death and age/gender subgroups to compare how trends in "despair" deaths vs. metabolic conditions compares across countries, especially in mid-life where mortality increases have been most noticeable in the U.S. These comparisons will provide insight and generate hypotheses for the social and biological mechanisms underlying these trends in mortality.

Introduction:

Recent stagnation of U.S. life expectancy and increased mortality in certain subgroups [1, 2] has raised the alarm among demographers, with much attention focused on how increases in "deaths of despair" due to social and economic conditions in the U.S. might be contributing to these trends [3, 4]. In the U.S., deaths due to drug and alcohol poisoning, suicide and chronic liver diseases have increased sharply since 1999. Opioids, in particular, have been responsible for a spike in the mortality rate of certain age groups. There is evidence that life expectancy may be

stalling or declining in England and Wales as well [5], suggesting these mortality dynamics could reflect a more general rather than US-specific phenomenon. To our knowledge, less is known about the trends in mortality in mid-life and for external causes in the UK and Canada and how these dynamics may be similar or different to what is happening in the US. Drug-related deaths in England have shown an increase in recent years, driven mostly by heroin deaths, with deaths from fentanyl also rising, albeit at much lower baseline rates compared to the US. There were 3,744 drug poisoning deaths involving both legal and illegal drugs in England and Wales registered in 2016 (65.1 deaths per million); the highest number since comparable statistics began in 1993, with people aged 40 to 49 years having the highest rate. Over half (54%) of all deaths related to drug poisoning in 2016 involved an opiate (mainly heroin and/or morphine) (UK Office of National Statistics, "Deaths related to drug poisonings in England and Wales, 2015 registrations"). Recent political trends in the UK including Brexit have led some to suggest that parallel economic dissatisfaction among voters in the UK may also be tied to trends in health [6]. Thus far the focus of research on mortality stagnation in the U.K has been on those over aged 65, with no explicit examination of trends in the mid-life categories most affected in the U.S. [5]. How mortality trends by subgroup are evolving in Canada is likewise unknown, though drug related deaths have also increased. In British Columbia, Canada, there were 1156 deaths due to drug overdose involving fentanyl in 2017, a 73% increase over the same period the previous year [7]. In Ontario, a 62% increase in the rate of fentanyl related deaths was observed between 2015 and 2016 [8].

Master's et al argue that apart from the period based opioid epidemic, recent trends in mid-life mortality in the U.S. may reflect a slowing down in declines in mortality from metabolic diseases at the cohort level rather than a true increase in "despair" related deaths overall [9]. If

that is true, we might expect to see similar trends for cardiovascular and metabolic mortality among other developed countries such as the UK who are also suffering from the long-term effects of the obesity epidemic.

Our paper will examine mortality trends in the UK and Canada for the first time to directly compare the trends by age and cause of death to the high-profile trends in the U.S., particularly among those in mid-life. We will disaggregate mortality trends by cause of death and age/gender subgroups to compare how trends in the contribution of external causes (overdose, suicide) vs. cardiovascular and metabolic conditions by age compares across countries, especially at middle-ages where mortality increases have been most noticeable in the U.S. Where available, we will examine trends by education and race/ethnicity for more direct comparison to the U.S. These comparisons will provide insight and generate hypotheses for the social and biological mechanisms underlying these trends in mortality.

Data:

Data for the UK come from the 21st Century Mortality dataset for England and Wales from 2001-2016, which includes all registered deaths. These data provide complete mortality data for the population by age and sex and cause of death. Supplementary analysis for the UK will use the ONS longitudinal study (LS), which contains linked census and mortality for a 1% sample of the population of England and Wales. These data will allow examination by subgroups that align with previous analysis in the U.S., which has been disaggregated by not only age and sex but race/ethnicity and level of education. We will pool the LS individual-level Census data for key sociodemographic variables from 1991, 2001, and 2011 and link to the most current mortality files. These data are available only to ONS approved and trained Accredited Researchers to be

accessed at their secure facility, for which the author has already been approved. Data from Canada will come from StatCan, which is publicly available and includes all registered deaths in Canada each year from 2001-2016 by sex and 5-year age-group.

Methods:

We will focus on mid-life for more direct comparison with results from the U.S, looking separately at ages 35-44, 45-54, 55-64 by sex. We categorize mortality by cause of death into 1) suicides 2) alcohol-related deaths 3) drug-related deaths and a combined 4) "deaths of despair" category. We also examine all-cause mortality and deaths by metabolic diseases for comparison [9]. We will estimate single year age-specific mortality rates by fitting Poisson rate models separately for each age group. For the ONS longitudinal study we will also calculate mortality rates over time for white separately for direct comparison to the results of Case and Deaton, as well by level of education.

Preliminary Results:

Figure 1 shows overall mortality rates from 2001-2015 for England and Wales by age group. We see some evidence of a leveling off of mortality declines and possible increases in mortality overall at these ages. **Figure 2** shows results for "Despair" deaths over the same time period. A relative increase can be seen across all age-groups, but the small absolute scale for these deaths should be noted. For comparison, Case and Deaton report a change in mortality from drug, alcohol and suicide in U.S. white men and women ages 50-54 from roughly 40 per 100,000 in 2001 to close to 80 per 100,000 in 2015 (Case and Deaton 2017, Figure 1.5), swamping the magnitude of the increases seen here.

Conclusions:

We currently have found evidence of a levelling off and possible increase in mid-life mortality in the UK from 2001-2015, and an increase in "despair" deaths, though at absolute levels far below the US. This suggests that some of the mortality dynamics witnessed in the U.S. might reflect more general phenomenon. Our results from individual-linked mortality data will provide a more apples-apples comparison to those of Case and Deaton by allowing calculation of mortality trends by race and education, something not possible with UK vital statistics. The extension of our analysis to Canada will also allow examination of a political and economic context that shares similarities and differences with both the US and UK and may shed light on how these different contexts play out in population health.

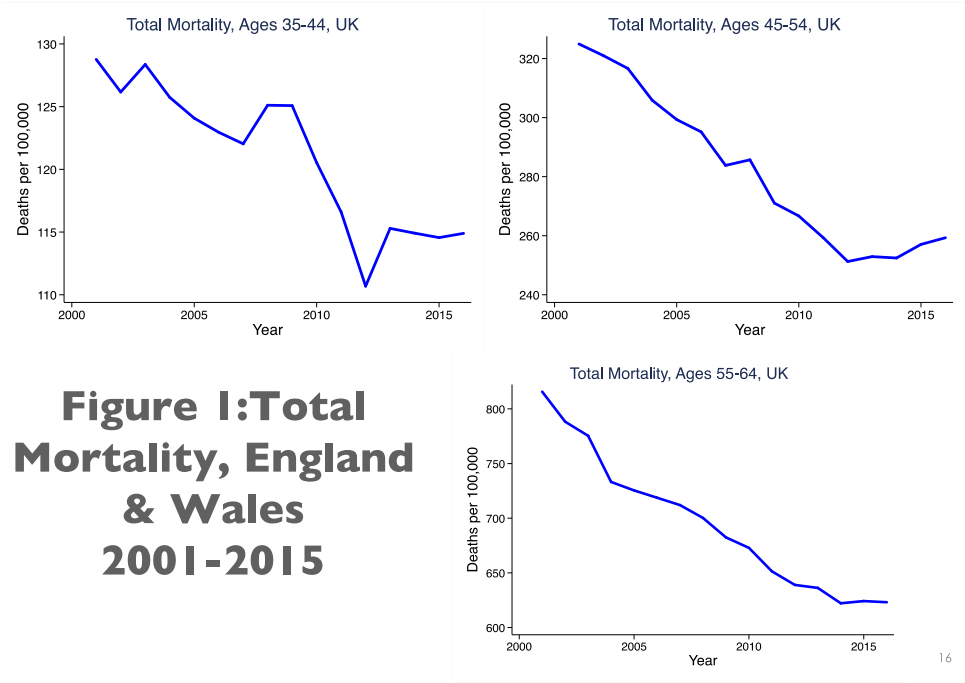

Figure 1:Total Mortality, England & Wales 2001-2015

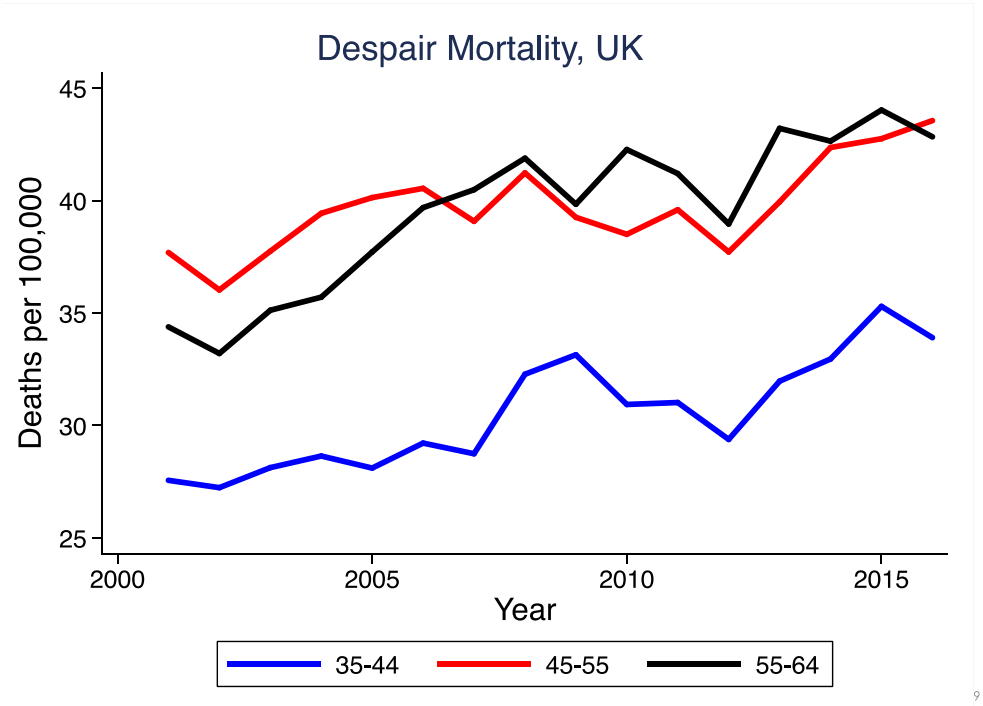

Figure 2

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