

# Racial and Ethnic Diversity in the Boomers' Excess Mortality due to Substance Abuse in the US

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## Extended Abstract

### Introduction

Mortality related to drug and alcohol abuse are significant public health issues. Canada and the US are currently facing the worst drug crisis since record-keeping began, with more than a 10-fold increase in overdose mortality during the last ten years, reaching record levels year after year (NCHS 2018; PHAC 2018). On the other hand, alcohol-related mortality levels are even higher than those of fatal drug overdoses and have shown considerable increases for young and elderly populations in recent years (CIHI 2018; Crome and Rao 2018; Herttua et al. 2017; Tapper and Parikh 2018).

Most research into the contemporary increases in opioid and alcohol-related mortality aggregates death counts across wide age groups and examines trends over relatively short time periods (Case and Deaton 2017; Masters, Tilstra, and Simon 2018). As a result, overlooked in the scientific discourse are the large generational differences in excess mortality from behavioural-driven causes prior to the current crisis.

Previous research has identified a higher propensity for the boomer generation (born 1955 to 1965) to engage in risky behaviours compared to generations born before and afterward (Boeri, Sterk, and Elifson 2006; Crome and Rao 2018; Miech, Koester, and Dorsey-Holliman 2011; Puac-Polanco, Keyes, and Li 2016). In every stage of the life course this generation experienced elevated death rates from alcohol-related causes and were the generation most affected during the HIV/AIDS and crack-cocaine epidemics of the 1980s. The current opioid crisis is no exception. In 2005 death rates from drug overdoses were 1.8 times larger among those born in 1957 compared to those born 18 years later.

What is not known is whether these strong generational differences in behavioural-driven mortality are a feature common to all races and ethnic groups or are more heavily concentrated among some of them. The differences in the patterns of mortality by substance abuse by race and ethnicity over time (i.e. cohort-location of the highest susceptibility, the relative magnitude of the boomer disadvantage, and the spread to neighboring cohorts) could contribute with valuable information about the mechanisms that are modulating this generational disadvantage. In this analysis we propose to deepen the study of this phenomena by analyzing the interplay between this cohort susceptibility and race and ethnicity.

## **Data and Methods**

For this research project we will use data from the vital statistics system of the US, which account for important information about basic demographic variables, such as sex, single year of age, race-ethnicity, cause, and year of death. For this analysis we used four categories of race-ethnicity: Hispanic, Non-Hispanic Black, Non-Hispanic White, and Other.

Annual counts of population at risk from 1990 to 2016 by single year of age (0-100) and sex were taken from the Human Mortality Database (2018), and proportions by race and ethnic group between 1990 and 2016 were retrieved from the Bridged-Race Population Estimates (NCHS 2017).

The period under analysis spans two ICD revisions (9 through 10). For the selected categories of cause-of-death there were no signs of evident disruptions in the observed mortality patterns. Alcohol- and drug-related mortality categories were aggregated from different chapters of the ICD. Alcohol-related mortality includes accidents by alcohol intoxication, mental and behavioral disorders due to alcohol use, and long-term harm from liver cirrhosis. Drug-related mortality includes accidental overdoses and mental and behavioral disorders due to drug use.

The strategy of data analysis consists of two main steps: first, we identified the causes of death that contributed the most to the excess mortality of the baby boomer cohorts. Second, we analyzed the patterns of mortality over the age, period and cohort for the identified causes of death, by racial-ethnic group and sex.

The causes of death leading the boomers' excess mortality were identified by decomposing the Partial cohort mortality rate (PCMR) difference across cohorts, comparing the healthiest cohort born before the boomers and the most disadvantaged cohort among the boomers.

The changing patterns of mortality by cause of death over the age, period and cohort dimensions were analyzed with graphical and statistical tools. Lexis surfaces of smoothed rates of mortality change (Rau et al. 2018; Camarda 2012) allowed us to identify the presence of nonlinear age, period, and cohort effects on mortality, and Lexis plots of nonlinear cohort patterns (Acosta and van Raalte 2018) were used to compare several features of the cohort effects (i.e. location, magnitude, and spread), across different causes of death and populations. Detrended-cohort models (Carstensen 2007; Chauvel 2013) were used to assess the average intensity of the cohort differential, its consistency over time and its statistical significance. It is worth mentioning that age-period-cohort analysis have been extensively discussed in the literature given the linear dependence between the three temporal dimensions. This limitation makes impossible to find a unique solution that identifies the true partition of the linear trends of mortality change among age, period, and cohort contributions (Luo 2013; Bell and Jones 2013). In contrast, when the focus is on the divergence of effects from the linear trends, as is the case of the models used here, the estimates are unambiguously identifiable (Holford 1991; Keyes et al. 2010).

## **Preliminary results**

The leading causes of death contributing to the boomer excess mortality were similar for both sexes (See Fig. 1). Mortality caused by suicides, infections related to sex behavior and injection drug use, alcohol and drug abuse were responsible for 70-75% of the boomer excess mortality between ages 30y-o and 55y-o. The main differences by sex were drug overdoses and HIV-related

mortality, being the former considerably higher for females, and the later for males. We focused here in causes of death related with substance abuse, i.e. infections related to IV drug use (HIV and hepatitis C), and drug- and alcohol-related causes.

Figures 2a and 2b show examples of *Lexis surfaces of drug-related mortality rates* and of *rates of drug-related mortality change over age*, respectively, for the case of Hispanic males. These surfaces suggest a clear pattern of cohort effects on mortality caused by drugs. Throughout their life course, Hispanic boomers experienced higher risk of drug-related mortality compared with neighboring cohorts. Figure 2c shows the excess mortality, obtained as the difference between the observed mortality and an interpolated surface excluding the boomer cohorts. From this Lexis surface of excess mortality, it is possible to identify the dynamic over time of the Hispanic boomer higher susceptibility for drug-related mortality. The Lexis surfaces of mortality caused by drugs, alcohol abuse, HIV, and Hepatitis C showed similar patterns of mortality across all racial-ethnic groups (not shown here).

Figures 3 show the plots of nonlinear cohort effects by cause of death for males by racial-ethnic group. These plots depict three features of the cohort effects: 1) the location of the points indicates the cohorts with the highest relative risk of death during each year-calendar; 2) the magnitude of this relative risk compared with the mortality baseline (i.e. mortality interpolated without boomers), indicated by the intensity of the color; and the spread of the excess toward the neighboring cohorts, indicated by the point size. The ridges of the excess mortality by hepatitis C, drug-, and alcohol-related mortality are synchronic among the four racial-ethnic categories of males, with the highest susceptibility for those born around 1955. This result support the hypothesis of a high influence of injection drugs use on the contagion of hepatitis C among boomers. In contrast, HIV/AIDS-related mortality has been concentrated among those cohorts born between 5 to 10 years later. This pattern for HIV/AIDS suggests that the highest cohort susceptibility is not necessarily linked to injection drugs use.

Results of detrended cohort effects by cause of death, sex and racial-ethnic group (Figs. 4) are consistent with the ridges depicted in Figures 3. However, there are considerable differences in the statistical significance of cohort effects by racial-ethnic groups. Individuals within the racial-ethnic category “Other” show the cohort effects with the lowest statistical significance, compared to the other subpopulations under observation.

## **Preliminary Discussion**

The preliminary results suggest that the Boomers’ excess mortality related to substance abuse is not exclusive to specific periods or racial-ethnic groups, although there are important variations in the intensity of exacerbation for specific periods and specific demographic groups. Throughout several stages of the live cycle of the baby boomer cohorts, substance abuse driven mortality has been selective with different racial-ethnic groups.

Drug overdoses is a clear example. The crack epidemic was concentrated among disadvantaged Afro-American communities during the 1980s, and the ongoing opioid crisis was initially more harmful to Non-Hispanic-Whites (NHW). However, research has consistently shown that these drug epidemics have ravaged all societal groups even if they have been more selective with specific

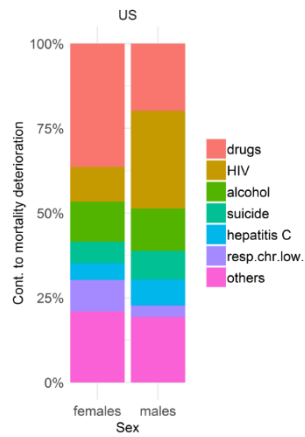
racial-ethnic groups (Agar 2003; Case and Deaton 2017; Miech, Koester, and Dorsey-Holliman 2011). For instance, the current increased susceptibility among NHW-males may be related to the fact that this demographic group has experienced the highest loss of privilege in recent times, and therefore, the highest mismatch between expectations and the perceived relative success. A considerable bulk of studies have also shown that racial discrimination was specially protective for minorities, since physicians systematically were more likely to prescribe opioids to NHW than to other racial-ethnic groups (Heins et al. 2006; Pletcher et al. 2008; Singhal, Tien, and Hsia 2016; Tamayo-Sarver et al. 2003; Terrell et al. 2010).

According to the theoretical framework of cohort effects on mortality from a sociological perspective (Keyes et al. 2010) the higher susceptibility of boomer cohorts to drug- and alcohol-related mortality could be explained by two main mechanisms: birth cohort effects and generational identity (Alwin and McCammon 2007). Birth cohort effects are related to the uniqueness of the sociohistorical context that members of a cohort simultaneously shared during their life cycle, and the distinctive aspects of the cohort itself (e.g. size, education level, etc.), which leave permanent traces throughout their lives (Easterlin 1987; Ryder 1965). Particularly, boomer cohorts experienced a significant contrast between their childhood during the post-war economic boom, and their young adulthood within a large cohort competing for resources during a phase of economic contraction. This imbalance between expectations during childhood and the harsh reality encountered during young adulthood resulted in higher prevalence of mental distress and frustration throughout the life course, as well as a considerable weakening of the family as traditional institution. As result, Boomers would be more susceptible to higher levels of mortality by substance abuse, among other behavioral causes (Easterlin 1987; Macunovich 2002).

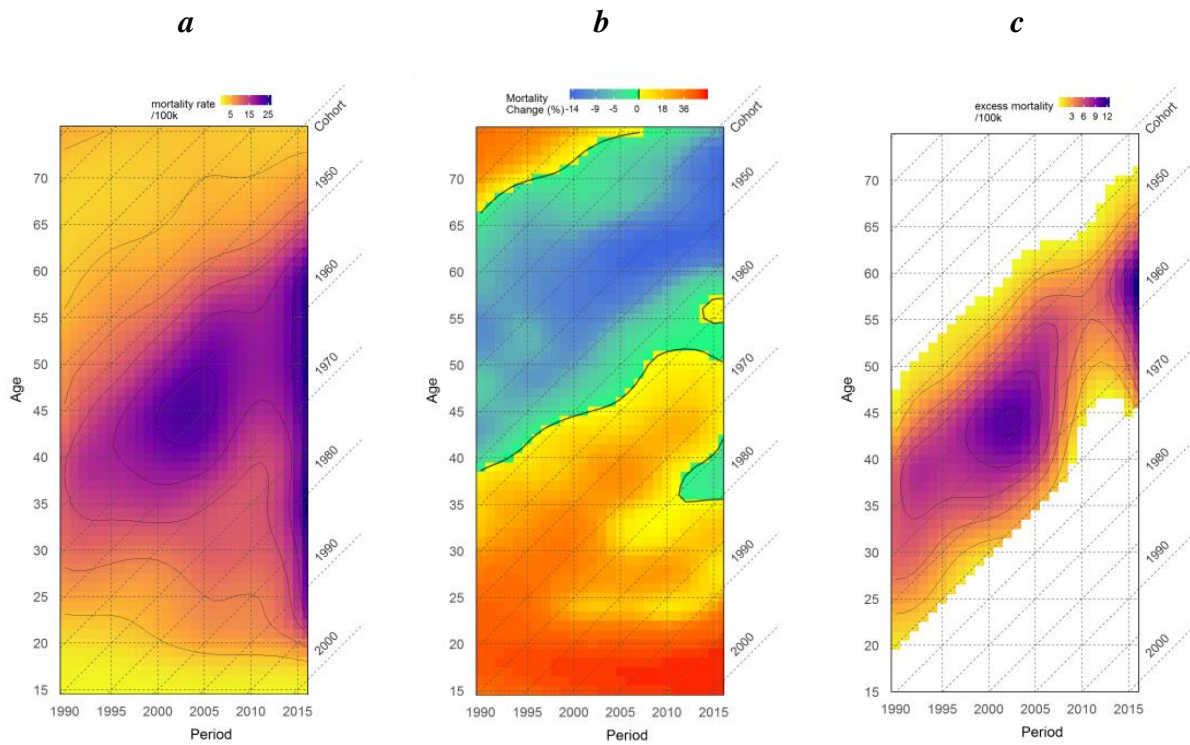
Concerning the generational identity concept (Mannheim 1952), the young social movements during the 1960s and 1970s, as well as the sexual and drug revolution encompassed in the countercultural movements, forged a shared generational identity among Boomers in most western societies with a distinctive signature of attitudes, beliefs, and behaviours. The enormous generational rift experienced by young boomers, their formative experiences, and peer influences during the early stages of life had a considerable influence on the norms and behaviors related to sexual risk behaviors and substance abuse (Boeri, Sterk, and Elifson 2006; Crome and Rao 2018; Alwin, McCammon, and Hofer 2014; Stewart and Torges 2014; Johnston 1991; Keyes et al. 2011; Miech, Koester, and Dorsey-Holliman 2011).

Therefore, among Boomers there was a confluence of cohort-based factors such as loss of relative income and social capital, higher levels of mental distress, and a generational identity encouraging attitudes toward substance use. These cohort-based conditions have been incentives to substance abuse and have exacerbated its negative consequences.

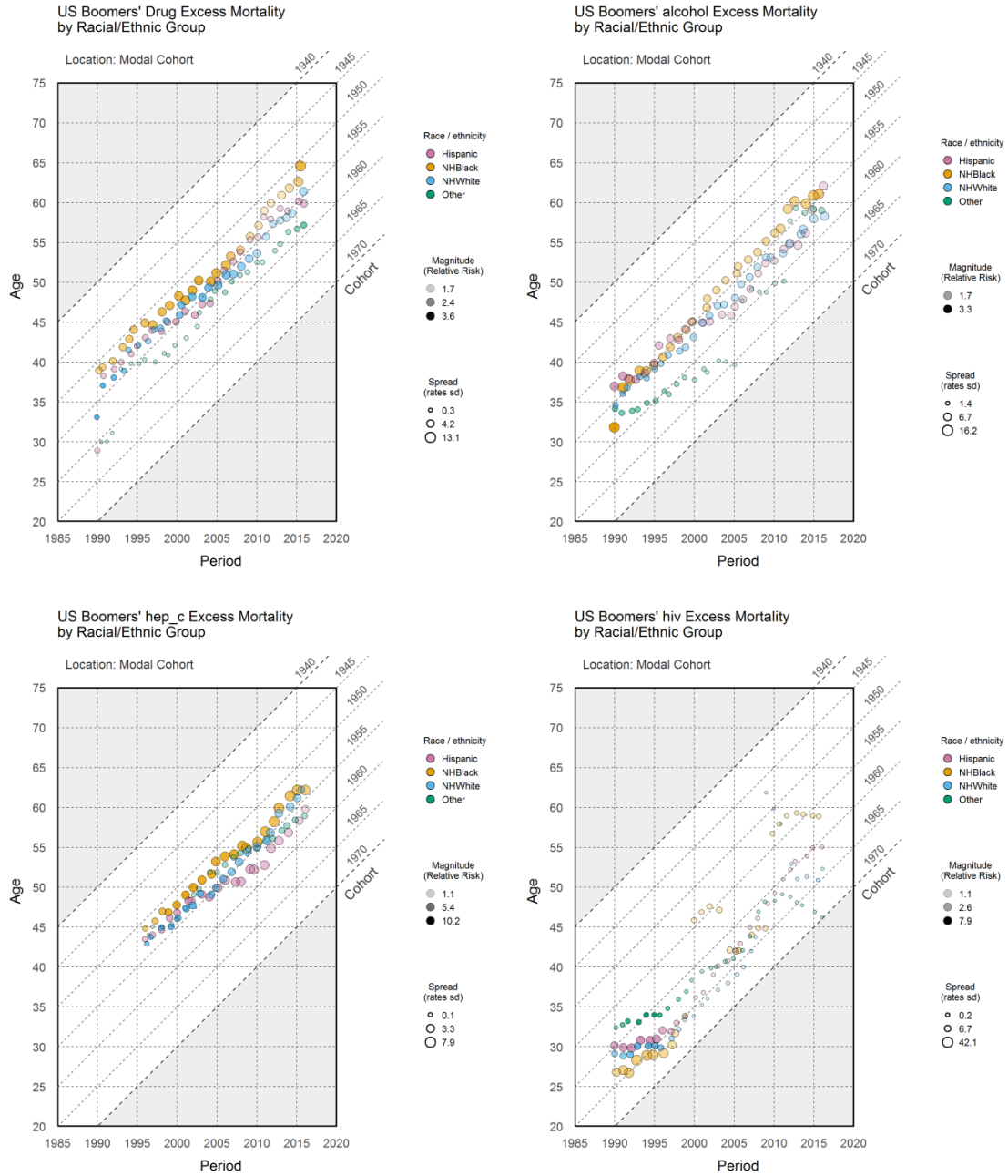
We intended to complement this analysis with educational level information, that has shown in previous research to be an important determinant in the variations of substance abuse mortality (Ho 2017; Mäkelä, Herttua, and Martikainen 2015). The inclusion of this dimension of the socioeconomic status of the cohort members will allow us to have more insights about the mechanisms by which race-ethnicity mediate to protect or to increase the vulnerability of boomers.



**Figure 1.** Cause-specific contribution to changes in the Total Cohort Mortality Rate (TCMR)

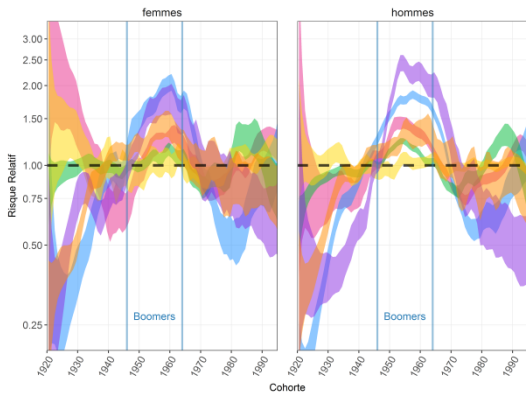


**Figures 2.** Lexis surfaces of mortality rates (a), rates of mortality change over age (b), and excess mortality (c) for Hispanic males. **Note:** Figure 2b should be read vertically, as  $age_x$  over  $age_{x-1}$

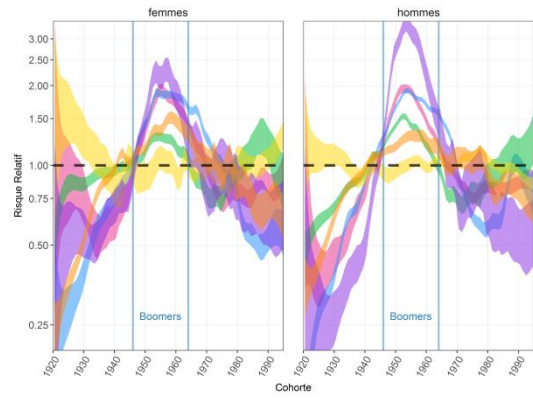


**Figures 3.** Nonlinear cohort effect features over time for males by cause of death and racial-ethnic group

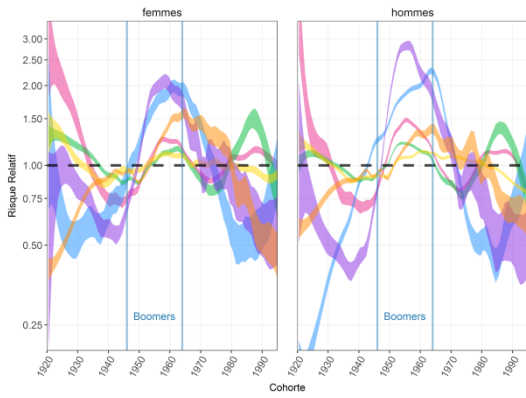
### Hispanic



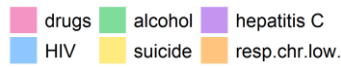
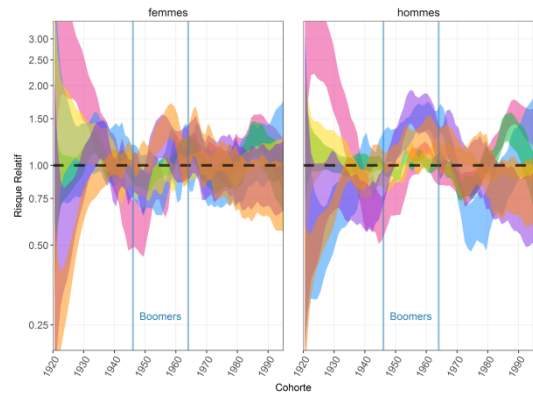
### NH-Black



### NH-White



### Other



*Figures 6. Detrended-Cohort effects by cause-of-death, sex, and racial-ethnic group*

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