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Measuring the Death Toll from Non-Covid Causes

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Key Findings

Very few, if any, public policies of recent times have been more consequential and controversial than the near-unprecedented decision by governments in the U.S. - and around the world - to respond to the Covid pandemic by locking down businesses, stores, and schools and quarantining citizens through curfews, stay-at-home orders and outlawing social gatherings. And yet, to this day, one topic that has garnered shockingly little attention is the collateral damage during the pandemic, whether in non-Covid excess deaths, or lasting damage from lost school time for our children, or lasting loss of economic opportunity from lost jobs or work-from-home can morph into not working at all.

This study focuses on the first of these, examined historical data on death patterns by age category as reported in the nation's death certificates compiled by the Centers for Disease Control and Prevention. Our findings are summarized as follows.

1) "Non-Covid excess deaths" (above normal historical rates) totaled nearly 100,000 a year in 2020 and 2021. Our initial analysis of incomplete data on 2022 is that roughly another 100,000 Americans above pre-pandemic trends, over and above Covid's toll in 2022. This means that in the wake of Covid lockdowns, over 250,000 more Americans than the pre-Covid norms, have died with non-Covid causes of death.

2) Deaths among young adults – in the age group from 18-44 – were elevated 27 percent above historical trends, more than any other age group, far above the 18 percent jump in deaths among senior citizens. Unlike senior citizens, most of the excess deaths among young adults were from non-Covid causes, rather than from Covid. We estimate this number at 29,000 per year for 2020 and 2021, with this elevated mortality rate continuing at a similar rate into 2022.

3) Deaths from Non-Covid causes, in rank order of importance, were found in these categories: heart and lung disease, diabetes/obesity, drug and alcohol, homicide, and traffic accidents.

4) These are losses have financial implications, too. If we value a human life at $10 million each (as government cost-benefit analyses often do), the excess deaths can be understood as a cost of over $2.5 trillion through the end of 2022. Human capital costs will continue to mount each year, as long additional non-Covid excess deaths occur, and as the longer-term effect of school closings diminish the career opportunities and lifetime earnings potential of our children.

Were our public policy choices successful, saving lives from a virus that killed more than one million Americans? Would more have died had we pursued other policies? The "counterfactual" – the death toll if we pursued different policy choices - is unknowable, though we can make educated guesses. Many studies (Herby, Jonung, and Hanke 2022; Kerpen, Moore, and Mulligan 2022;) compare death rates from states and countries that imposed lockdowns versus those that had less draconian government orders and kept their businesses and schools open; these typically find that the lockdowns had a beneficial, though surprisingly small, effect in preventing deaths from Covid.

One thing we now know is that the policy strategies pursued, in an effort to reduce death rates from Covid, were accompanied by much higher death rates of younger Americans. Whether these deaths were caused by those policy choices, or by the pervasive fear that may have led to self-destructive personal choices, we owe these 250,000 non-Covid fatalities a thoughtful, thorough, and depoliticized response. This study points to a consequence that has garnered surprisingly little attention, namely an enormous number of excess deaths that were not caused by Covid. These deaths were therefore caused either by our policy responses to Covid or by the citizenry's fear-induced reactions to those policies. The facts presented here should not be viewed through a political lens. Excess deaths among young adults from overdose or homicide are no less tragic than early deaths from Covid among senior citizens. The million deaths *with* Covid (many or most of whom were deaths *from* Covid) have received relentless attention. The 250,000 excess non-Covid deaths – that skew considerably younger than the Covid death toll – should now be given the careful attention that we owe to these collateral victims, not of the disease but of our shared blunders during the pandemic.

Introduction

The Covid pandemic of 2020 and 2021 was the first time in modern times that governments took the extraordinary and untested measure of quarantining uninfected people.[1] Schools, businesses, and churches closed and some cities (and countries) even issued stay-at-home orders and curfews. Many jurisdictions prohibited public gatherings, while requiring "nonessential" workers to stay at home, masks for everyone, and social distancing. Massive new government programs were created that delivered record increases in personal income, effectively from newly-printed money, even while much real economic activity was shut down. Unsurprisingly, the former increased demand for goods and services, while the latter constricted supply, sowing seeds for the recent surge of inflation.

Studies already show how widespread disruption of everyday lives, preventing social interactions in favor of isolation in the home, harmed children's learning and development. One year of online learning (and two years in many jurisdictions) meant no learning at all for many, especially the poor, likely with lifelong consequences. Many of us also expressed concern that disrupting adult access to health care would degrade health and elevate mortality from addiction and other chronic conditions.[2] Nevertheless, early in the pandemic some experts mocked this perspective as a "pet theory about the fatal dangers of quarantine."[3] Little monitoring of longstanding health behaviors occurred. For example, even the recent *President's Budget for Fiscal Year 2023* includes just one paragraph on drug addiction – which now costs 30,000 to 40,000 more lives each year than before the pandemic.

This study updates our recent paper published in *Inquiry* documents mortality patterns in the U.S.[4] From April 2020 through the end of 2021, Americans died from non-Covid causes at an average annual rate of 97,000 in excess of previous trends for a cumulative total of 52 per 100,000 population through the end of 2021. Since then we have seen excess mortality continue into calendar year 2022 essentially unchanged from the 21 months covered in our study. There is a financial cost too. If we converted human capital to dollars, at a $10,000,000 average value of a statistical life, the non-Covid excess deaths through the end of 2022 cost over $2.5 trillion, a financial and human toll that continues to build to this day.

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1 Regarding pre-Covid-19 advice, see Inglesby et al., "Disease Mitigation Measures in the Control of Pandemic Influenza," *Biosecurity and Bioterrorism: BioDefense Strategy, Practice, and Science*, 4(4), 2006: 366-75.

2 See Arnott, Robert, Kalesnik, Vitali and Wu, Lillian. Collateral Damage from Covid. *Reason Foundation.* October 2021 and Mulligan, Casey B. "Deaths of Despair and the Incidence of Excess Mortality in 2020." NBER working paper #28303, December 2020.

3 Case, Anne and Deaton, Angus. "Trump's Pet Theory about the Fatal Dangers of Quaratine is Very Wrong." *Washington Post.* June 1, 2020.

4 Mulligan, Casey B. and Robert D. Arnott. "The Young were not Spared: What Death Certificates Reveal about Non-Covid Excess Deaths." *Inquiry*, December 2022. https://doi.org/10.1177/00469580221139016

While largely unharmed by Covid, mortality rates among working-age adults aged 18-44 increased *by 27 percent* above previous trends, more than any other age cohort, with non-Covid excess deaths accounting for most of this surging death toll. Mortality for middle-aged adults aged 45-64 rose a near-identical 26 percent from prior trends. This has received scant notice, even though both figures are considerably larger than the percentage jump in deaths for senior citizens (18 percent), where the Covid toll was largely concentrated. Drug overdoses, homicides, traffic fatalities, and alcohol-induced causes killed tens of thousands more young adults than they had in the past. Some have called these "deaths of despair," to which we might add "deaths of boredom." Suicides did not increase, though alcohol-related deaths and overdoses are clearly consequences of self-destructive behaviors. Deaths from various circulatory diseases and diabetes were also elevated, likely due to a combination of fear of hospitals and delayed early testing. Call these "deaths of fear."

When we dive into the details, by age cohort, we find interesting patterns. Our analysis of the data also finds that among the population below the age of 18 there were very few deaths from Covid and very few excess deaths (both well under one thousand per year, nationwide, hence showing on our table as zero). This doesn't mean that children were unharmed by Covid lockdowns. To the contrary. The damage to children from missed schooling will affect this cohort's long term earnings potential; lower long term earnings are also associated with higher death rates over time.
The non-Covid mortality was also elevated for ages 45-64 and the over-65 age group, almost all of these associated with chronic conditions such as circulatory disease, diabetes, obesity, or liver disease, rather than overdose, homicide or traffic accident. All of this suggests that large and sustained changes in living habits, designed to avoid a single virus, not only imposed large "economic" opportunity costs, but also human costs, including a shockingly large number of young and middle-aged lives.

With no evident end to the elevated mortality that began in the second quarter of 2020, it is imperative that we study and understand the causes of the excess deaths. Can they be connected to lapses in self-care of chronic conditions? If so, what about the pandemic economy precipitated the lapses? Are there specific law enforcement practices – or lack of same – that can be linked to elevated deaths by homicide, traffic accident, or drug poisoning? One step in this direction is a recent study finding that the monthly time series for deaths by drug induced causes rose, fell, rose again, and fell again along the same time path that federal "stimulus" and unemployment bonuses were paid.[5]

5 Mulligan, Casey B. "Lethal Unemployment Bonuses? Substitution and Income Effects on Substance Abuse, 2020-21." NBER working paper #29719, February 2022.

Excess Deaths by Age and Cause

Table 1 shows the results of excess deaths by age. Because the table entries are expressed at annual rates in thousands, the pandemic totals are likely already approaching three times the table entries, supported by preliminary 2022 data. We find the adult age groups to have roughly similar numbers of excess deaths from non-Covid causes (first column), which is remarkable given that normally deaths are comparatively rare in the younger age groups (baseline column). Excess non-Covid deaths markedly exceed Covid deaths for that group.[6] Overall, the excess deaths aged 18-44 amount to a 27 percent increase in the age group's mortality. By comparison, the mortality rate for the elderly was elevated "only" 18 percent, primarily by Covid.

The CDC tallies deaths *with* Covid; deaths *from* Covid are very difficult to disentangle, when most deaths have multiple contributing factors. This introduces two types of errors, which we explore in the penultimate section of this paper. In an abundance of caution, we seek to estimate the likely sources of understatement, and add it to the official CDC totals; reciprocally, we do not seek to estimate or subtract the Covid deaths where Covid was an incidental factor, not a cause of death. For this reason, we are reasonably confident that our tallies of non-Covid excess deaths are likely understated.

Table 1. Excess deaths, by age of death

Average annual rate April 2020 - December 2021

	Annual rate in 1000s				
	Excess,	Covid		Baseline	All excess, %
Age	Non-Covid	Official	Unmeasured	Level	of baseline
0-17	~0	~0	~0	35	~0
18-44	29	18	2	183	27%
45-64	33	96	9	545	25%
65+	35	319	31	2167	18%
Nursing home	NA	49	NA	NA	
Not nursing home	NA	270	NA	NA	
Total	**97**	**433**	**41**	**2930**	**20%**

Notes: Covid deaths are excluded from the first column. We use an expansive definition of unmeasured Covid for the purpose of conservatively assessing non-Covid causes.

6 Our paper estimates the number of deaths attributed to circulatory and metabolic causes that may have been unmeasured Covid. Undoubtably the opposite error also occurs – deaths attributed to Covid that were in fact due to other causes – but we do not quantify those in order to be conservative as to the number of excess non-Covid deaths.

Figure 1 highlights the non-Covid excess and baseline columns from Table 1, presented in two ways. The two series are shown on different scales, with the non-Covid excess on the left. As such, the figure shows how the non-Covid excess deaths occurred disproportionately among the young compared to ordinary deaths that are concentrated among the elderly.

Figure 1a. Annualized Covid and non-Covid Excess Deaths, in Thousands

Apr 2020 – Dec 2021

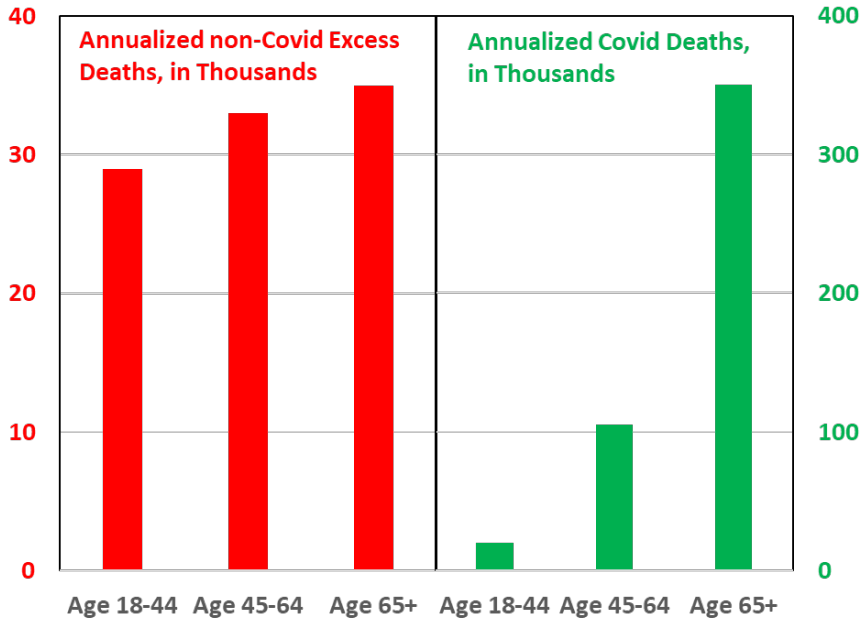


Figure 1b. Annualized Covid and non-Covid Excess Deaths, as % of Previous Baseline

Apr 2020 – Dec 2021

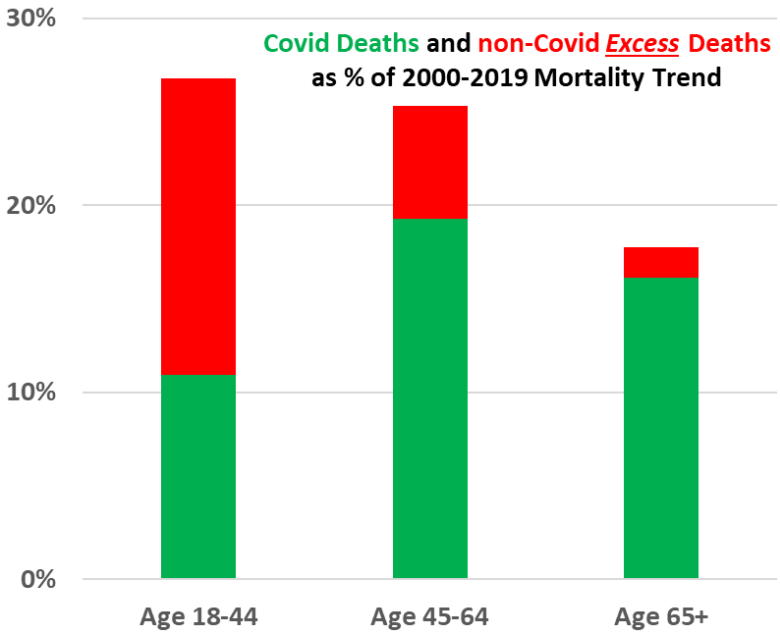


Table 2 shows the results by cause. Each entry is an excess above the sum of the previous baseline trend and our estimate of unreported Covid deaths. Excess deaths from circulatory diseases lead at 32,000 annually. Diseases associated with high blood pressure (hypertension) are especially important contributors to the circulatory total. While we do not display the data for subcategories, coronary heart disease (ICD codes I20-I25, especially heart attacks) was elevated a lesser percentage than circulatory diseases generally, although it was a major contributor to the additional deaths from circulatory diseases among ages 18-44. Deaths from coronary heart disease at home were elevated more than coronary heart disease deaths occurring away from home (most of which are hospital deaths, which may suggest a new and fatal tendency for many young adults to avoid hospital visits).

Table 2. Excess non-Covid deaths: top causes

Average annual rate April 2020 - December 2021, Ages 18+

	Annual rate in 1000s		Excess, % of baseline	Elderly % of excess
Underlying causes	Excess	Baseline		
Circulatory diseases	32	892	4%	66%
Diabetes or obesity	15	153	10%	60%
Drug-induced causes	12	93	13%	0%
Alcohol-induced causes	12	41	28%	16%
Homicide	5	19	27%	2%
Traffic accident	4	37	11%	-16%
All others	18	1660	1%	22%
Total	**97**	**2895**	**3%**	**36%**
Potentially unmeasured Covid excluded from above	41			74%

Notes: External cause averages are only through September 2021. The baseline includes prior trends and seasonals (see also Table 4). The single negative number on the table tells us that the elderly had 16 percent fewer.

Another 15,000 excess deaths were attributed to diabetes (especially Type II) and obesity. Drug poisoning (especially illicit fentanyl) and alcohol-induced causes contribute another 12,000 annual excess deaths each, beyond the already-alarming previous trends. For example, when we extrapolate the prior trend in drug overdoses, we should have "expected" drug overdoses to rise by 10,000 per year after 2019. So, only deaths above the horrific extrapolated pre-pandemic growth rates are counted as "excess deaths." Homicides and traffic accidents contribute another 9,000 excess deaths annually. All other causes contribute a total of 18,000 excess deaths. In total, *non-Covid* excess deaths in 2020-2021 were 97,000 annually beyond previous trends.

While about three-fourths of Covid deaths were among the elderly, nearly two-thirds of non-Covid excess deaths are among non-elderly adults. Table 2's final column how this especially true for the external causes of drugs, alcohol, homicide, and traffic accident. In fact, elderly deaths in traffic accidents were below prior trends during the pandemic, which means that traffic accident deaths among working-age adults were even more elevated than they might seem.

Due to the growing interest in the direct and indirect effects of the pandemic on public health, we prepared Tables 1 and 2 to show deaths relative to pre-pandemic trends. Table 3's "Trend" column shows how, for some causes, the previous trends themselves were alarming.[7] Each year that passed was adding 18,000 to the annual number of deaths from diabetes, obesity, drugs, or alcohol. The previous trend for drugs alone is about 10,000. If this trend is considered "normal," as we tacitly assume, then roughly 200,000 will die from drug overdoses in the year 2030 alone. Worse, these 200,000 deaths would – shockingly – be considered perfectly normal and on-trend. The current annual tally, over 107,000 in 2021 alone, already exceeds all US military deaths in the past sixty years! Staying on-trend doubles this toll in a mere decade.

Given these alarming pre-pandemic trends, we find it especially notable that non-Covid health outcomes are not closely monitored, even now. Should we not gauge whether public or private Covid policies were aggravating the "collateral damage" of non-Covid excess deaths? Should we not seek to learn lessons from the continuing surge in non-Covid excess deaths, to be better prepared for the next public health emergency?

Table 3. Non-Covid mortality changes decomposed into trend and excess

April 2020 - December 2021, Ages 18+

	Annual rate in 1000s		
Underlying causes	Trend	Excess	Sum
Circulatory diseases	-9	32	23
Diabetes or obesity	7	15	22
Drug-induced causes	10	12	22
Alcohol-induced causes	2	12	13
Homicide	0	5	5
Traffic accident	0	4	4
All other non-Covid	-7	18	11
Total	**3**	**97**	**100**

Notes: (1) The trend is the extrapolation of a quartic in time estimated Jan 1999 through Dec 2019. It is what would have been added to the annual rate on average between April 2020 and the end of 2021 if

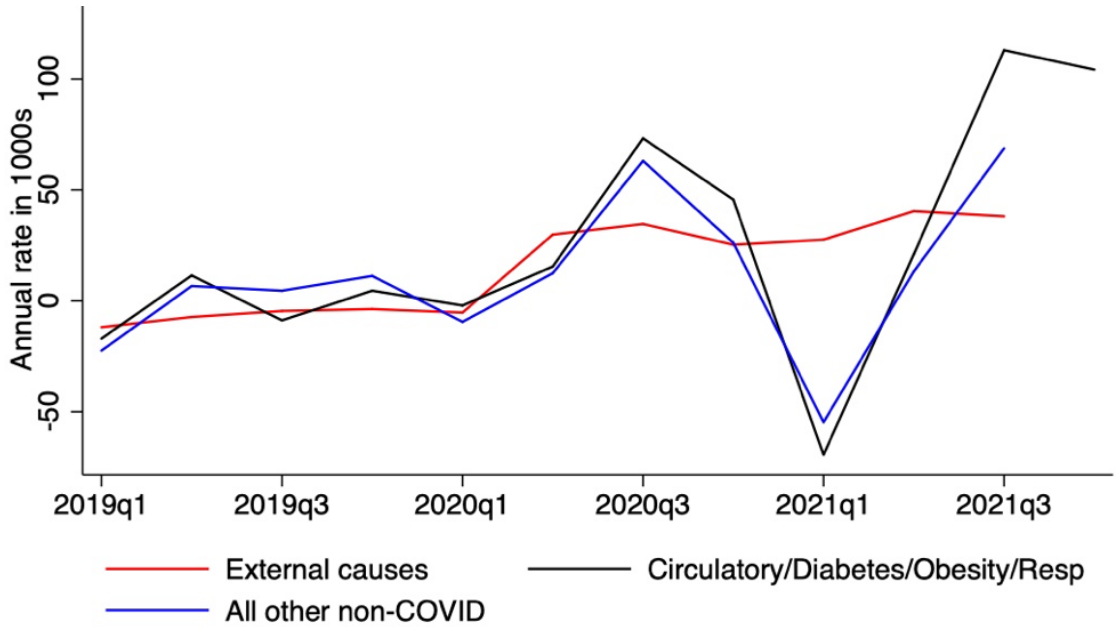
7 See our published paper for discussion and our methods for estimating trends and seasonals.

the previous trends had been followed, which is different from an annual trend rate because 21 months are covered. (2) Up to a seasonal adjustment, the sum of trend and excess is the average deaths during the pandemic minus average deaths pre-pandemic.

Figure 2 shows the results over time, aggregating the age groups and months into quarters. Causes are aggregated as either external (drugs, alcohol, homicide, and traffic accident), the other four causes we tracked individually, or all other non-Covid. Deaths from external causes jump immediately in 2020-Q2 and remain near or above that level for as long as we have data. From 2020-Q3 through the end of 2021, excess deaths from the four other causes are at least 23,000 at an annual rate, except for 2021-Q1 when excess deaths are negative.[8] The other series are noisy in part due to the challenge of getting an exact estimate for the strong seasonal for those types of deaths. Winters are hard on the elderly, but unevenly so, with a very large difference between the death toll in bad flu seasons relative to mild flu seasons. It is unsurprising that, with lockdowns and social distancing, the winter months at the beginning of both 2021 and 2022 delivered very mild flu seasons.

Figure 2. Excess non-Covid deaths

2019 Q1 - 2021 Q4, ages 18+



Notes: External causes are drugs, alcohol, homicide, and traffic accident. Excess is actual minus trend, which is estimated by age and cause group with 1999-2019 data and includes seasonal factors. Estimated unrecorded COVID deaths are excluded. Source: CDC Wonder

8 Other causes are less elevated in 2020-Q2 in part because we assume zero excess deaths from circulatory diseases, diabetes, and obesity in April 2020 in order to avoid counting unmeasured Covid deaths. The dip in 2021-Q2, which is not present for the 18-44 age group, may also be due to overestimating unmeasured Covid deaths in that quarter.

Were Covid Deaths Over or Under Counted

One obvious question that this study raises is whether the official "cause of death" data recorded on death certificates over or under counted deaths due to Covid. If a cancer or heart patient dies and tests positive for the Covid virus, the CDC will count this as a Covid death, whether or not Covid was the primary cause of death. For a time, it is likely that deaths from Covid were overstated because government policy provided more funding for families and hospitals if a death was classified as a Covid death.On the other hand, some deaths from Covid may have been misclassified as other causes if Covid tests were not administered or provided a false negative. Indeed, early in the pandemic, tests were not available. If a person dies from Covid and is not tested for the virus, the Covid death toll is understated. This may be a continuing issue, as deaths attributed to circulatory and metabolic causes surged concurrent with the Covid waves.

We sought to err on the side of caution as to the number of excess non-Covid deaths, we seek to adjust our estimates for this latter source of undercounted Covid deaths, and adding them to the official tally. But, we then chose not to estimate or subtract deaths that were with Covid but not because of Covid. With Covid deaths occurring at an average annual rate of more than 400 000 through the end of 2021, even a small amount of either type of mismeasurement could have a significant impact on non-Covid excess death estimates, especially for circulatory, diabetes, and obesity deaths, as they are common comorbidities with Covid. If, say, 5 Covid deaths were unrecorded for every 100 that were recorded, the unrecorded would artificially elevate excess death rates by 20 000 per year, which is a similar order of magnitude of the difference between actual and trend circulatory or diabetes/obesity deaths. The opposite holds true for those who died from other causes, but were recorded as Covid deaths solely because of a positive test for the virus.

Conclusions

This study points to severe negative emotional and physical health outcomes during the pandemic. No one can prove that these were a direct consequence of so-called lockdown policies. Over one million deaths were recorded in 2020-22, with a positive Covid test. We accept the common view that most of these deaths were likely caused or hastened by the virus. Our study finds that roughly 250,000 excess deaths occurred over this span, above normal trends, that were non-Covid. These non-Covid excess deaths are not yet subsiding in any material way. This is a public health crisis that garners little attention, even though it has cost more American lives than the entirety of World War II.

Younger Americans paid a very high and long-lasting price for a strategy to combat a virus that posed a considerable threat to older Americans but almost no threat to them, not just in non-Covid excess deaths, but also in the physical, emotional and educational progress of our children, especially among the poor. It is beyond the scope of this paper to speculate on better strategies for future public health crises, but a wide-ranging, open-minded and de-politicized dialogue on these topics is desperately needed.

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