Excess Death Rates for Republican and Democratic Registered Voters in Florida and Ohio During the COVID-19 Pandemic

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IMPORTANCE There is evidence that Republican-leaning counties have had higher COVID-19 death rates than Democratic-leaning counties and similar evidence of an association between political party affiliation and attitudes regarding COVID-19 vaccination; further data on these rates may be useful.

OBJECTIVE To assess political party affiliation and mortality rates for individuals during the initial 22 months of the COVID-19 pandemic.

DESIGN, SETTING, AND PARTICIPANTS A cross-sectional comparison of excess mortality between registered Republican and Democratic voters between March 2020 and December 2021 adjusted for age and state of voter registration was conducted. Voter and mortality data from Florida and Ohio in 2017 linked to mortality records for January 1, 2018, to December 31, 2021, were used in data analysis.

EXPOSURES Political party affiliation.

MAIN OUTCOMES AND MEASURES Excess weekly deaths during the COVID-19 pandemic adjusted for age, county, party affiliation, and seasonality.

RESULTS Between January 1, 2018, and December 31, 2021, there were 538 159 individuals in Ohio and Florida who died at age 25 years or older in the study sample. The median age at death was 78 years (IQR, 71-89 years). Overall, the excess death rate for Republican voters was 2.8 percentage points, or 15%, higher than the excess death rate for Democratic voters (95% prediction interval [PI], 1.6-3.7 percentage points). After May 1, 2021, when vaccines were available to all adults, the excess death rate gap between Republican and Democratic voters widened from −0.9 percentage point (95% PI, −2.5 to 0.3 percentage points) to 7.7 percentage points (95% PI, 6.0-9.3 percentage points) in the adjusted analysis; the excess death rate among Republican voters was 43% higher than the excess death rate among Democratic voters. The gap in excess death rates between Republican and Democratic voters was larger in counties with lower vaccination rates and was primarily noted in voters residing in Ohio.

CONCLUSIONS AND RELEVANCE In this cross-sectional study, an association was observed between political party affiliation and excess deaths in Ohio and Florida after COVID-19 vaccines were available to all adults. These findings suggest that differences in vaccination attitudes and reported uptake between Republican and Democratic voters may have been factors in the severity and trajectory of the pandemic in the US.

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As of May 2023, there had been approximately 1.1 million deaths from COVID-19 in the US.1 There is evidence that Republican-leaning counties have had higher COVID-19 death rates than Democratic-leaning counties and similar evidence of an association between political party affiliation and attitudes regarding COVID-19 vaccination, social distancing, and other mitigation strategies based on political party affiliation.2-6

Prior studies7,8 have found that Republican-leaning counties have had higher COVID-19 death rates than Democratic-leaning counties. It is unknown whether this county-level association persists at the individual level and whether it may be subject to the ecologic fallacy.9 The ecologic fallacy is the incorrect assumption that associations observed at an aggregate level (eg, a county) will be the same at the individual level. Republican-leaning and Democratic-leaning counties differ in ways other than political party affiliation10,11 such as racial and ethnic composition, rurality, and educational levels, making it difficult to establish whether the differences in COVID-19 death rates are associated with political party affiliation or other differences in county-level characteristics. Research before the COVID-19 pandemic has also found evidence of higher death rates in Republican-leaning counties than Democratic-leaning counties.12

To assess the association between political party affiliation and excess mortality for individuals during the COVID-19 pandemic, we linked voter registration data in Florida and Ohio to mortality data at the individual level to calculate excess death rates for Republican and Democratic voters and compare excess death rates before and after vaccines became available to the full adult population.13,14 Because individual-level vaccination status was not included in the available data, we were able to assess excess death rates and vaccination rates only at the county level.

**Methods**

**Data Source**

The eMethods in Supplement 1 provides additional details of all the methods. We obtained detailed US weekly mortality data from January 1, 2018, to December 31, 2021, from Datavant, an organization that aggregates the Social Security Administration Death Master File with information from newspapers, funeral homes, and other sources to construct an individual-level database containing 10 325 730 deaths in the US to individuals aged 25 or older during this period. This data set, which includes deaths reported to Datavant through March 31, 2023, covers approximately 83.5% of the Centers for Disease Control and Prevention death count for individuals who died at age 25 or older during the period from January 1, 2018, to December 31, 2021. Because the Datavant mortality data do not contain state identifiers, we are unable to assess data completeness in our individual study states of Florida and Ohio. During the COVID-19 pandemic, Datavant mortality data have been used in other peer-reviewed15 and publicly available16 research on excess mortality. The Yale University Institutional Review Board exempted the study from review because the data were de-identified, and reporting adheres to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline.

We linked the mortality data at the individual level to 2017 Florida and Ohio voter registration files; these were the only states for which historical publicly available voter registration data were readily available. The linkage was performed from April 11 to 14, 2023. For each record, the linked data included week of death, age of deceased, county of residence, and 2017 political party affiliation. Political party affiliation in Ohio was defined by whether an individual voted in a party’s primary election within the preceding 2 calendar years; in Florida, political party affiliation was based on party registration. We excluded individuals whose political party affiliation was independent and those who were affiliated with third parties. Because COVID-19 deaths are most common at older ages,17 we included only death records for individuals who died at age 25 years or older.

We also obtained death counts for the study period from the National Center for Health Statistics18 and county-level vaccination rates from the Centers for Disease Control and Prevention.19 We selected May 1, 2021, as the date for the county-level vaccination rate—1 month after eligibility for vaccines opened to all adults in the study states—because it represented the approximate date when all adults would have had the opportunity to receive at least 1 dose of a COVID-19 vaccine if they so desired, taking into account the time that states required during April 2021 to schedule and administer vaccines to newly eligible adults seeking them. As a robustness check, we assessed the sensitivity of our findings using county-level vaccination rates on alternative dates before (March 1, 2021) and after (October 1, 2021) May 1, 2021.

**Statistical Analysis**

We aggregated weekly death counts from January 1, 2018, to December 31, 2021, at the county-by-party-by-age level. The age ranges used were 25 to 64, 65 to 74, 75 to 84, and 85 years old.
or older. The observed death counts included all the deaths from our mortality data that linked to Republican or Democratic voters who were registered in Florida and Ohio as of 2017.

To calculate the number of excess deaths, we estimated the number of deaths we would expect in the absence of the COVID-19 pandemic. First, we estimated expected weekly deaths at the county-by-party-by-age level by fitting a Poisson regression model to observed weekly death counts at the county-by-party-by-age-level for January 1, 2018, through December 31, 2019. We then predicted expected deaths over our full sample. Excess deaths were defined as the difference between observed and expected deaths for January 1, 2018, to December 31, 2021. As a check on the model, we used predictions from the model in the weeks before the onset of COVID-19 (January 1, 2018, to March 31, 2020) to estimate excess deaths during this period.

We calculated excess death rates (the primary outcome) as the ratio of observed deaths (the numerator) to expected deaths (the denominator). To obtain estimates of excess death rates at aggregated levels, we used a weighted average of estimated excess death rates in each of the underlying cells (eg, county-by-party-by-age), weighted by their expected death counts. We estimated Poisson 95% prediction intervals (PIs), simulating from the coefficient distribution and outcome distribution, with SEs clustered by county. We additionally adjusted estimated differences in excess death rates between Republican and Democratic voters—the primary estimate of interest—for differences in excess death rates by age group and state during the COVID-19 pandemic. Intuitively, this approach compared excess death rates between Democratic and Republican voters of the same age residing in the same states during the same week of the pandemic and then weighted those differences in excess death rates to either the weekly level, when plotting weekly differences in excess death rates, or to 3 broader time periods: (1) April 1, 2020, to December 31, 2021 (the part of the study period overlapping the COVID-19 pandemic); (2) April 1, 2020, to March 31, 2021 (the period during the pandemic before open vaccine eligibility for all adults); and (3) April 1, 2021, to December 31, 2021 (the period during the pandemic after open vaccine eligibility for all adults).

We also assessed county-level vaccination rates (as of May 1, 2021) and excess death rates by plotting average excess death rates for Republican and Democratic voters against the county-level vaccination rate during (1) the pre–COVID-19 pandemic period, (2) the period during the pandemic before open vaccine eligibility for all adults, and (3) the period during the pandemic after open vaccine eligibility for all adults.

In sensitivity analyses, we altered the Poisson model used to predict baseline death counts by including a linear time trend (and in one analysis allowing it to vary by state) and additional seasonality terms to capture higher frequency season-of-the-year trends. For transparency, we calculated differences in the excess death rates between Republican and Democratic voters with no adjustments (removing our state and age group adjustments) and, separately, with a model that included our primary adjustments (state and age group) and additional adjustments for county-by-age differences in excess death rates during the pandemic.

We performed all calculations using R, version 4.1.3 (R Foundation for Statistical Computing). Statistical analyses report 95% PIs using simulations from the coefficient distribution and outcome distribution, with SEs clustered by county. Significance testing was 2-sided, and a \( P < .05 \) was considered statistically significant.

**Results**

Our study included 538,159 deaths for individuals aged 25 years and older in Florida and Ohio between January 2018 and December 2021 linked to their 2017 voter data (eTable 1 in Supplement 1). The median age at death was 78 years (IQR, 71-89 years). The pattern of death counts in our linked data and in the National Center for Health Statistics data was similar (Figure 1).

Using these data, we found a 20.5 percentage-point (95% PI, 15.6-25.6 percentage points) increase in weekly death counts in Florida and Ohio in the March 2020 to December 2021 period relative to the expected death counts for those weeks (Figure 2A and Table). By comparison, for the time periods before the pandemic, we found only small fluctuations in excess death rates around 0.

Before the pandemic, excess death rates for Republican and Democratic voters were centered around 0 (Figure 2B). In the winter of 2021, both groups experienced sharp increases of similar magnitude in excess death rates. However, in the summer of 2021, after vaccines were available to all adults, the excess death rate among Republican voters began to increase relative to the excess death rate among Democratic voters; in the fall of 2021, the gap widened further. Between March 2020 and December 2021, excess death rates were 2.8 percentage points (15%) higher for Republican voters compared with Democratic voters (95% PI, 1.6-3.7 percentage points) (Table). After April 1, 2021, when all adults were eligible for vaccines in Florida and Ohio, this gap widened from −0.9 percentage point (95% PI, −2.5 to 0.3 percentage points) between March 2020 and March 2021, to 7.7 percentage points (95% PI, 6.0-9.3 percentage points) in the adjusted analysis, or a 43% difference (Table).

The estimates of differences in excess death rates between Republican and Democratic voters (adjusted for age, time, and state) were small until the summer of 2021, when excess death rates among Republican voters began to increase compared with excess death rates among Democratic voters (Figure 2C). The analyses stratified by age showed that Republican voters had significantly higher excess death rates compared with Democratic voters for 2 of the 4 age groups in the study, the differences for the age group 25 to 64 years were not significant (Figure 3; eFigure 1 in Supplement 1). Democratic voters had significantly higher excess death rates compared with Republican voters for the age group 65 to 74 years. The analyses stratified by state showed that differences in excess death rates between Republican and Democratic voters were primarily seen in voters residing in Ohio, with smaller, and generally nonsignificant, differences in weekly excess death rates between Republican and Democratic voters in...
Florida (eFigure 2 and eFigure 3 in Supplement 1). In analyses that pooled data from March 2020 to December 2021, Republican voters in Florida did not have a statistically significantly higher excess death rate than Democratic voters in Florida (Figure 3). Additional sensitivity analyses supported our main conclusions (eTable 2 in Supplement 1).

Before the COVID-19 pandemic, there was no association between county-level excess death rates, which hovered around 0, and the county-level vaccination rates (Figure 4A). During the pandemic, there was generally a negative association between county-level excess death rates and the share of the county population administered at least 1 dose of the vaccine as of May 1, 2021 (Figure 4B and C). In the period before open vaccine eligibility for adults (April 2020 to March 2021), the association between excess death rates and county-level vaccination rates was nearly identical for Republican and Democratic voters (Figure 4B). In the period after open vaccine eligibility (April to December 2021), there was a clear difference between Republican and Democratic voters, with higher excess death rates for Republicans in counties with lower overall vaccination rates (Figure 4C). Sensitivity analyses supported our main conclusions (eFigure 4 and eFigure 5 in Supplement 1).

## Discussion

During the initial years of the COVID-19 pandemic, political party affiliation in the US was associated with excess death rates in Florida and Ohio at the individual level. Republican voters had higher excess death rates than Democratic voters, as noted in a large mortality gap in the period after, but not before, all adults were eligible for vaccines in Florida and Ohio. With adjustments for differences in age and state of residence between Republican and Democratic voters, our findings suggest that, among individuals in the same age groups living in the same states, there were significant differences in excess death rates during the COVID-19 pandemic associated with political party affiliation. The results were robust to alterations in the methods used to estimate excess mortality as well as the statistical model used to estimate the difference in excess death rates between Republican and Democratic voters.
Figure 2. Excess Death Rates in Florida and Ohio, 2018-2021

A. Excess death rate

B. Excess death rates by registered party

C. Difference in excess death rates between Republican and Democratic voters

Weekly excess deaths for Florida and Ohio based on mortality records linked to voter registration files.

A. Overall excess death rates in Florida and Ohio.

B. Excess death rates by registered party.

C. The percentage-point difference between the registered parties, after adjusting for age and state-level differences; the smooth brown curve was fit with locally estimated scatterplot smoothing. A-C, Excess death rates were calculated for each week by comparing the observed deaths in that week with expected deaths based on a Poisson model. The 95% prediction intervals (shaded areas) were determined using simulations from the Poisson coefficient and outcome distribution, with SEs clustered at the county level.

Table. Heterogeneity in Excess Deaths in Florida and Ohio, 2020-2021

<table>
<thead>
<tr>
<th>Time</th>
<th>Overall death count in linked data, No.</th>
<th>Overall excess deaths, % (95% CI)</th>
<th>Republican excess deaths, % (95% CI)</th>
<th>Democrat excess deaths, % (95% CI)</th>
<th>Adjusted difference in excess deaths, percentage points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early years of COVID-19 pandemic²</td>
<td>258,470</td>
<td>20.5 (15.6 to 25.6)</td>
<td>22.1 (15.6 to 29.3)</td>
<td>18.5 (11.8 to 26.0)</td>
<td>2.8 (1.6 to 3.7)</td>
</tr>
<tr>
<td>Before open vaccine eligibility²</td>
<td>146,691</td>
<td>19.1 (14.3 to 24.2)</td>
<td>19.4 (13.0 to 26.4)</td>
<td>18.8 (12.1 to 26.4)</td>
<td>−0.9 (−2.5 to 0.3)</td>
</tr>
<tr>
<td>After open vaccine eligibility²</td>
<td>111,779</td>
<td>22.3 (17.3 to 27.6)</td>
<td>25.8 (19.0 to 33.2)</td>
<td>18.1 (11.3 to 25.6)</td>
<td>7.7 (6.0 to 9.3)</td>
</tr>
</tbody>
</table>

* Linked death counts do not match overall death counts during this period because not all US residents are registered to vote, and the mortality data set included approximately 83.5% of deaths in the US. Excess death rates were calculated by comparing observed deaths in a particular week to expected deaths based on a regression model. Additional details on the excess death methods and statistical analyses are provided in the eMethods in Supplement 1.

² From March 13, 2020, to December 31, 2021.
Our findings suggest that political party affiliation became a substantial factor only after COVID-19 vaccines were available to all adults in the US. Although the lack of individual-level vaccination status limited our ability to note further associations, the results suggest that well-documented differences in vaccination attitudes and reported uptake between Republican and Democratic voters24,25 may have been factors in the severity and trajectory of the pandemic. However, one alternative explanation is that political party affiliation is a proxy for other risk factors (beyond age, which we adjusted for) for excess mortality during the COVID-19 pandemic, such as rates of underlying medical conditions, race and ethnicity, socioeconomic status, or health insurance coverage,26-29 and these risk factors may be associated with differences in excess mortality by political party, even though we only observed differences in excess mortality after vaccines were available to all adults. It is also possible that specific risk factors for excess mortality interact with the emergence of COVID-19 variants (eg, Delta) or changes in vaccine-associated protection over time to be more consequential at different stages of the pandemic. Because data limitations prevented us from directly adjusting for these factors, their potential influence remains an important question for future research.

In addition to vaccines, nonpharmaceutical interventions, including facial masks and restrictions on large gatherings, have been reported to contribute to reductions in transmission of COVID-19 or its severe outcomes, including death, in experimental, quasi-experimental, and modeling studies.30-33 However, differences in support for these mea-
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