Medical Research Archives

ESMED
European Society of Medicine

OPEN ACCESS

Published: March 31, 2023

Citation: Sinclair RC and Melton RJ, 2023. Conservative Ideologies in Canada and the United States Predict Poorer Pandemic Outcomes, Medical Research Archives, [online] 11(3). https://doi.org/10.18103/mra.v11i3.3585

DOI
https://doi.org/10.18103/mra.v11i3.3585

ISSN: 2375-1924

RESEARCH ARTICLE

Conservative Ideologies in Canada and the United States Predict Poorer Pandemic Outcomes

Robert C. Sinclair
Sinclair & Associates Consulting Incorporated
R. Jeffrey Melton
Ocean Editors

Author's note: Order of authorship was randomly determined. We thank Bret Watson for his comments on this manuscript. Address correspondence to Robert C. Sinclair, Ph.D., President & CEO, Sinclair & Associates Consulting Incorporated, WB-104 Island, Sturgeon Falls, ON P2B 2W2, Canada, or R. Jeffrey Melton, Ph.D., Senior Editor, Ocean Editors, 726 W. Dixie St., Bloomington, IN, USA 47403. We may also be reached via email at: bob.sinclair76@gmail.com or melton.jeff@gmail.com

ABSTRACT

Purpose: We conducted studies in two Western, individualistic countries, Canada and the United States, to assess the impact of political ideology on governmental policies (e.g., implementation of mask mandates) and individual conduct (e.g., getting vaccinated) in response to the COVID-19 pandemic, as well as infection and death rates. We argue that conservative political ideology is associated with poorer handling of COVID-19.

Methods (Study 1): The relationship between whether or not a conservative majority held power in Canadian provinces and territories and COVID-19 infection and death rates in nursing homes and the general population, business insolvencies, implementation of mask mandates or travel bans, allowed religious gathering sizes, anti-mask and anti-lockdown protests, and vaccination rates was examined.

Results (Study 1): Infection and death rates in conservative provinces were higher and rose faster. Conservative provinces had higher infection and death rates in nursing homes, had more business insolvencies, took longer to introduce mask mandates and dropped them sooner, allowed larger religious gatherings, and took longer to introduce interprovincial travel bans (or had none). Residents of conservative provinces were more likely to engage in anti-mask and anti-lockdown protests, and less likely to have been vaccinated.

Methods (Study 2): Study 2 examined similar variables in the United States as a function of the percentage of states' votes for Donald Trump (the more conservative candidate) in the 2020 U.S. Presidential election.

Results (Study 2): Infection and death rates were higher in conservative states (those with a higher percentage of Trump voters) than more liberal states (those with a lower percentage of Trump voters). Conservative states also were less likely to mandate masks or did so later, were less likely to close businesses or issue stay at home orders, reopened schools for in-person learning sooner, and had lower vaccination rates; all of these differences were related to infection and death rates.

Conclusion: Our data suggest that conservative governments have had poorer responses to the pandemic than more liberal governments, and conservative individuals have lower vaccination rates than their more liberal counterparts, resulting in higher infection and death rates. Public health measures such as vaccinations and masking are essential for controlling infectious diseases, but their success depends fundamentally on the social behavior of governments and individuals.

Conservative Ideologies in Canada and the United States Predict Poorer Pandemic Outcomes

Although the COVID-19 pandemic is worldwide, its impact on different locales has varied enormously. Different nations vary in number of confirmed infections per million (IPM) and deaths per million (DPM) by a factor of more than 100, and even within nations, infection and death rates vary widely among states or provinces. Recently, Melton and Sinclair[1] showed that countries with collectivist cultures (i.e., cultures that prioritize group goals and interests over individual ones[2]) had significantly lower confirmed IPM and confirmed DPM rates than countries with individualistic cultures (i.e., those that prioritize individual goals and self-interest over the goals and interests of ingroups[2]), and were more likely to have governmental policies (e.g., early mask mandates or lockdowns) associated with stemming the spread of COVID and mortality from it. Furthermore, there were more and larger anti-mask, anti-physical distancing, and anti-lockdown protests in individualistic countries than in collectivistic countries.

Jonas et al. [3] demonstrated that collectivist cultures react less strongly than individualistic cultures to perceived threats to personal freedoms; that is, they exhibit less psychological reactance.[4,5] Resistance to mask mandates and physical distancing requirements in individualistic countries can be construed as a manifestation of their greater reactance. During a pandemic, failing to wear masks, ignoring physical distancing laws, and violating lockdowns leads to spread of the virus, and not surprisingly, Melton and Sinclair[1] found that countries with more anti-mask and anti-lockdown protesters—disproportionately individualistic countries—had more spikes in confirmed infection rates. Differences between collectivist and individualistic countries' government policies may have a similar ideological motivation rooted in an emphasis on individual freedom, even at the expense of collective health—or be prompted by a recognition of the likely resistance of their citizens.

Within nations, another, related dimension of values plausibly associated with conduct and policies related to COVID-19 infections and deaths is political ideology. A central tenet of conservative ideology in many nations is an emphasis on individual freedoms—which, unlike the liberal (in the North American sense of the term; i.e., more collectivist-like in nature) version of individualism, is not markedly qualified by concern for the impact on others of one's conduct.[6] Several researchers have suggested[7-9] that conservatives are more likely than non-conservatives to reduce the aversive state associated with reactance through denial and greater adherence to their political beliefs. Thus, just as reactance sparked by cultural individualism may lead to greater resistance to government-mandated public health measures in individualistic countries, reactance motivated by the context-free emphasis on individual freedoms found within conservative ideology may likewise lead to greater resistance among conservatives—including conservative government officials. We conducted studies in two Western, individualistic countries, Canada and the United States, to assess the impact of political conservatism on governmental policies (e.g., implementation of mask mandates) as well as individual conduct (e.g., protests against public health measures) in response to the COVID-19 pandemic, as well as infection and death rates.

Study 1

Canada as an Illustration of How Conservatives Failed the West During the Pandemic

In Study 1, we examined cross-provincial differences in individual conduct, government policy, and confirmed COVID-19 infection and death rates in Canada as an illustration of our thesis that ideological conservatism is linked to public health. Not only are anti-mask protests much more prevalent in individualistic countries such as Canada than in collectivist countries, but they also appear to be heavily populated by ideological conservatives.[10] Furthermore, rates of mask-wearing are significantly lower among individuals who identify with the Conservative Party than supporters of less conservative political parties in Canada.[11] Thus far, there has not been a comprehensive examination of the link between conservative political ideology and individual public health-related conduct, nor has there been any examination of its relationship to governmental public health policy.

In Canada, there is more variability in party affiliation and ideology than in the U.S. among parties that hold political power, with parties ranging from the Conservative Party on the right to the centrist Liberal Party to left-leaning political parties such as the New Democratic Party or the Green Party holding parliamentary seats at the provincial or federal level. Thus, Canada is a perfect country to illustrate the fact that conservative ideologies have had an adverse impact on responses to the pandemic. (For brevity's sake, we will refer to provinces led by conservative majorities at the beginning of the pandemic as "conservative provinces" and the

remaining provinces and territories with nonconservative-majority-led governments as "other governments.")

Predictions: The Effects of Political Ideology on Policy and Conduct

There is evidence suggesting that Canadian provinces with conservative governments are more concerned about short-term corporate profits, and less so about small businesses and the lives of their constituents, than provinces and territories with non-conservative governments.[12] For example, in Ontario, where increases in COVID-19 infections were predicted in December 2020, Premier Douglas Ford of the Progressive Conservative Party attempted to undermine his own public health officials' recommendations in order to benefit the corporate sector.[13] Essentially, Ford's government implemented a "lockdown" that closed all small businesses but allowed "Big Box" stores and other large corporate operations to remain open, although there is no scientific evidence that COVID-19 is more easily spread in small businesses. The "lockdown" also did not include any restrictions on travel to or from other provinces, or in and out of the "red zones" in Ontario that had the strictest lockdowns. Without such travel restrictions, there was no reason to believe that Ontario's policies would be especially effective in reducing COVID transmission. This kind of government policy—irresponsible in terms of public health and geared primarily toward serving corporate interests—is found in many countries with conservative governments, even those such as Brazil that are collectivist.[1]

In the present study, we evaluated the differences between conservative-majority and other governments in the provinces and territories in cumulative IPM and DPM rates at several intervals in late 2020 (prior to implementation of a vaccination program) and mid to late 2021 (following widespread eligibility of adults for vaccination). We predicted that there would be significantly higher IPM and DPM rates in provinces with conservative governments, and that these effects would increase over time, particularly once the vaccination program was in full swing.

Furthermore, we collected data on vaccination rates, infection and death rates in long-term care facilities, time to introduce mask mandates after the first case was reported in a province or territory, the number of people allowed at religious services, length of time to introduce travel bans between provinces, gathering sizes in public places (other than religious institutions), and closures of bars and restaurants. We also measured the dates on which all mask mandates were dropped. We expected the conservative-majority governments to perform significantly worse on all of these measures than the other provinces and territories.

Finally, we measured the number and size of anti-mask, anti-physical distancing, and anti-lockdown protests. Consistent with psychological reactance theory,[4] we expected more and larger protests to occur in conservative-majority provinces.

Methods

The provinces and territories were coded as either conservative-majority (n = 5) or other (n = 8) governments at the beginning of the pandemic when most preventive measures were put into place. (On Sept. 14, 2020, the Progressive Conservative Party won a majority (27 of 49 seats, vs. 22 of 49 prior to that time) in New Brunswick's provincial elections. Our results are similar regardless of how New Brunswick is categorized, but we decided to consider it a non-conservative-majority province because the conservatives had been in the minority for most of the year.) The cumulative numbers of confirmed COVID-19 infections and deaths for each province and territory were obtained from the *Statistics Canada COVID-19 Tracker Site* for various dates in late 2020, 2021, and early 2022.[14,15] These data were converted to IPM and DPM rates. Numbers of COVID-19 tests were recorded for each province and territory[14,5] and converted to TPMs (tests per million). PDs (population densities) were also obtained.[14,15] We used these variables as covariates in many of our analyses, but they never had any significant impact, so we simply report analyses without them included. Mixed-model *analyses of variance* (*ANOVA*s), with time as a within-subjects factor, were conducted on both IPM and DPM rates for September 1st, October 1st, November 1st, and December 1st, 2020, and May 1st, June 1st, July 1st and August 1st, 2021. (The interruption in the time series corresponded to the time between mid-December 2020 and mid-April 2021 during which vaccines were only available to people ages 50 and over.) A similar analysis was conducted on DPM rates at slightly different dates because of the delay between infection rates and death rates (approximately two weeks).

We obtained information on long-term care facility infections and deaths on December 11, 2020, from Statistics Canada[14,15] and, from government websites, time to introduce mask mandates after the first case was reported in a

province or territory, the number of people allowed at religious services, length of time to introduce travel bans (if any) between provinces, policies involved in closures of bars and restaurants, and gathering sizes in public places (other than religious institutions). We also obtained information on the number and size of protests opposing methods proven to prevent coronavirus transmission from various provincial and national media outlets. Finally, we measured the percentage of people in each province who had received at least one dose of a vaccine by March 13, 2022 and the dates on which all provinces and territories were effectively reopened as well as whether vaccine mandates were in effect for 1) healthcare workers and 2) public sector employees. No ethics approval was required given that these data appear on public databases.

Results

Vaccination Rates

Vaccination rates were measured on March 13, 2022. As predicted, residents of conservative provinces (M = 82.79%, s = 2.50) had a lower rate of having received at least one dose of vaccine than those in the other provinces and territories (M = 87.28%, s = 5.11), $F(1, 11) = 3.28$, $p < .05$ one-tailed, *partial* $\eta^2 = .23$. When the data were analyzed for provinces only, the effect was larger: Conservative provinces had a significantly lower rate of full vaccination (M = 78.86, s = 3.08) than the other provinces (M = 85.49, s = 3.61), $F(1, 8) = 9.75$, $p < .02$, *partial* $\eta^2 = .55$.

Infections per Million

Vaccinations were first introduced in mid-December of 2020 but were not available for people older than 50 years of age until mid-April of 2021. We conducted an interrupted time series analysis on IPM rates for September 1st, October 1st, November 1st, and December 1st, 2020 and May 1st, June 1st, July 1st, and August 1st, 2021. The interruption in the time series corresponded to the time between mid-December 2020 and mid-April 2021 when vaccination was occurring, but too few people had been vaccinated to assess the impact of the vaccination campaign. We predicted higher IPM rates, and greater increases in IPM rates over time, in the conservative provinces than in the other provinces and territories. A mixed-model *ANOVA* showed a main effect for time with IPM rates increasing over time, $F(1, 77) = 87.21$, $p < .001$, *partial* $\eta^2 = .89$, and, consistent with our predictions, a main effect for conservatism with the conservative provinces having higher IPM rates that the other provinces and territories, $F(1, 11) = 49.66$, $p < .001$, *partial* $\eta^2 = .82$. We also obtained the predicted time x conservatism interaction, $F(1, 77) = 37.32$, $p < .001$, *partial* $\eta^2 = .77$. The pattern of this interaction is presented in Table 1. As predicted, there was a far greater increase in IPM rates in the conservative provinces over the course of the study ($d' = 40541.14$) than in the other provinces and territories ($d' = 9216.00$).

Table 1. Interrupted Time Series Analysis on Infection per Million Rates as a Function of Level of Conservatism and Time

		Conservatism	*M*	*s*
Time	September 1, 2020	Conservative	3117.33	2517.78
		Other	346.71	368.58
	October 1, 2020	Conservative	3909.64	2955.82
		Other	564.84	598.30
	November 1, 2020	Conservative	6258.72	3736.01
		Other	779.47	930.88
	December 1, 2020	Conservative	11607.47	3898.36
		Other	1968.54	2328.26
	Interruption in the Time Series			
	May 1, 2021	Conservative	35835.70	6360.85

		Other	6287.97	8888.95
	June 1, 2021	Conservative	41458.22	6184.33
		Other	7804.19	9845.09
	July 1, 2021	Conservative	42992.00	5780.92
		Other	8776.84	9740.71
	August 1, 2021	Conservative	43658.47	5780.00
		Other	9562.71	10029.26

LSD tests indicated that all other-other comparisons that differed by 62.43 were significant at the $p < .05$ level, all conservative-conservative comparisons that differed by 78.96 were significant at the $p < .05$ level, and all conservative-other comparisons that differed by 71.18 were significant at the $p < .05$ level.

Deaths per Million

We conducted the same interrupted time series analysis on DPM rates. (Both the Northwest Territories and Prince Edward Island had no deaths during this time period and were given the dummy code of .0001 on the last date and prior to the computation of DPM rates.) A mixed-model *ANOVA* showed a main effect for time with DPM rates increasing over time, $F(1, 77) = 72.43$, $p < .001$, *partial* $\eta^2 = .87$, a main effect for conservatism with the conservative provinces having higher DPM rates that the other provinces and territories, $F(1, 11) = 17.71$, $p < .004$, *partial* $\eta^2 = .57$, and the predicted time x conservatism interaction $F(1, 77) = 41.96$, $p < .001$, *partial* $\eta^2 = .79$. with a far greater increase in the conservative provinces ($d' = 568.03$) than in the other provinces and territories ($d' = 83.85$), $F(1, 77) = 41.96$, $p < .001$, *partial* $\eta^2 = .79$. The pattern of this interaction is presented in Table 2.

Table 2. Interrupted Time Series Analysis on Death per Million Rates as a Function of Level of Conservatism and Time

		Conservatism	***M***	***s***
Time	September 1, 2020	Conservative	189.57	271.19
		Other	14.41	25.16
	October 1, 2020	Conservative	194.29	282.18
		Other	15.04	25.97
	November 1, 2020	Conservative	218.71	295.88
		Other	19.57	25.73
	December 1, 2020	Conservative	296.09	308.20
		Other	24.44	34.25
Interruption in the Time Series				
	May 1, 2021	Conservative	679.46	347.95
		Other	73.80	104.08
	June 1, 2021	Conservative	719.05	342.14
		Other	80.28	111.91
	July 1, 2021	Conservative	746.71	338.66
		Other	91.73	114.61
	August 1, 2021	Conservative	757.60	338.04
		Other	98.26	118.17

LSD tests indicated that all other-other comparisons that differed by 3.57 were significant at the $p < .05$ level, all conservative-conservative comparisons that differed by 4.51 were significant at the $p < .05$ level, and all conservative-other comparisons that differed by 3.51 were significant at the $p < .05$ level.

Additional Analyses

Government Policies

Mask Mandates. We calculated the number of days after the identification of the first case that mask mandates were introduced in each province and territory. We expected that conservative provinces would have taken longer. Although the results were in the predicted direction, with conservative provinces ($M = 235.60$, $s = 55.52$) taking longer than other provinces and territories ($M = 177.63$, $s = 99.08$), the difference was *ns*. We conducted a median split on this variable and categorized groups as slow or fast in terms of implementing mask mandates. As predicted, only one of the five conservative provinces was fast, whereas five of the other eight provinces or territories were fast, $\chi^2(1) = 3.86$, $p < .07$ 1-tailed.

Gathering Sizes. We were able to find data regarding the number of people allowed by government rules to gather together in a single group (June 2020). There were no effects.

Religious Gatherings. We coded the data for the number of people allowed to attend religious services as of November 2020. As predicted, more people were allowed to attend religious services in conservative ($M = 236.00$, $s = 169.50$) than non-conservative ($M = 34.17$, $s = 24.58$) provinces/territories, $F(1, 9) = 8.48$, $p < .02$, *partial* $\eta^2 = .49$. (We had no data for the Northwest Territories and Nunavut.) We recoded the data and categorized religious gatherings as small (≤ 250) or large (> 250). Three of the five conservative provinces allowed large gatherings, whereas none of the other provinces or territories did, $\chi^2 (1) = 4.95$, $p < .03$.

Restaurant & Bar Closures. We counted the number of days before restaurants and bars were closed. We expected conservative provincial governments to have kept these businesses open longer. There were no effects.

Travel Restrictions Between Provinces. We calculated the number of days after December 31, 2019, when restrictions on travel between provinces were imposed. As predicted, conservative provinces ($M = 281.20$, $s = 107.63$) took longer than other provinces or territories ($M = 117.13$, $s = 90.55$) to impose restrictions, or did not impose them at all, $F(1, 11) = 8.79$, $p < .02$, *partial* $\eta^2 = .44$.

We calculated the number of days during which interprovincial travel restrictions were imposed, measured from the day when restrictions were imposed to the day when the data for this variable were collected (December 17, 2020). There was a significant effect for ideology: Conservative provinces imposed travel restrictions for fewer days ($M = 25.00$, $s = 34.28$) than other provinces and territories, $M = 232.88$, $s = 94.54$, $F(1, 11) = 21.74$, $p < .001$, *partial* $\eta^2 = .66$.

Effects on Small Businesses. We computed the number of insolvencies per million people per province and territory, according to Statistics Canada, for 2019 to 2020 (Statistics Canada, 2020). An *ANOVA* showed that insolvency rates were higher in conservative provinces ($M = 180.12$, $s = 177.89$) than in the other provinces and territories ($M = 66.17$, $s = 43.19$), $F(1, 11) = 4.06$, $p < .04$, 1-tailed, *partial* $\eta^2 = .27$.

Public Compliance and Reactance. We coded the approximate number of protesters attending protests against mask mandates and physical distancing rules in all of the provinces and territories and converted this number to protesters per million people (PPM). We predicted that there would be significantly higher PPM rates in conservative provinces. Indeed, this was the case, with higher PPM rates ($M = 254.45$, $s = 102.56$) in conservative provinces than in other provinces and territories ($M = 34.57$, $s = 66.27$), $F(1, 11) = 22.47$, $p < .001$, *partial* $\eta^2 = .67$.

We coded data regarding the size of protests against mask mandates and physical distancing rules (i.e., PPM) dichotomously in each of the provinces and territories, grouping them into low vs. high opposition to mask mandates and physical distancing rules. As predicted, more conservative provinces had high ($n = 5$) rather than low ($n = 0$) opposition to mask mandates and physical distancing rules than was the case for other provinces or territories (*ns* = 0 and 8 for high and low, respectively), $\chi^2(1) = 13.00$, $p < .001$.

2021 – 2022 Analyses

Reopening Dates. Provinces and territories dropped all mask mandates and, effectively, reopened between March 1, 2022 and early April 2022 (except for Nunavut, which maintained its mask mandates beyond early April). We coded the data numerically, with March 1 assigned the value of 1 and April 8 assigned the value of 39, with Nunavut assigned 40. The

conservative provinces (M =10.00, s = 8.83) reopened significantly sooner than the other provinces and territories (M = 30.00, s = 3.77), $F(1, 11) = 12.24$, $p < .006$, *partial* $\eta^2 = .53$.

Vaccine Mandates for Healthcare Workers. We conducted an analysis on whether vaccine mandates were in place or not for healthcare workers as a function of level of conservatism. There was a significant effect, χ^2 (1) = 5.08, $p < .03$. None of the five conservative provinces had vaccine mandates for healthcare workers, whereas five of the eight other provinces and territories had vaccine mandates for healthcare workers.

Vaccine Mandates for Public Sector Employees. We conducted a similar analysis on whether vaccine mandates were in place for provincial workers. Again, there was a significant effect, χ^2 (1) = 3.61, $p < .03$ 1-tailed, with none of the five conservative provinces having vaccine mandates in effect, whereas four of the other provinces and territories had mandates in effect.

Discussion

Conservative provinces performed poorly throughout the entire pandemic relative to other provinces and territories. Thus, our argument that political ideology within an individualistic country relates to successful pandemic outcomes was supported. It is impressive that we found profound effects in light of our small sample size. However, we wished to see whether our effects generalized to another individualistic country, so we conducted a similar study of the U.S., which has the advantage of providing us with a much larger sample size (50 states and Washington, D.C.).

Study 2
The U.S. as an Illustration of How Conservatives Failed the West During the Pandemic

In addition to being even more individualistic than Canada,[16] the U.S. is also generally regarded as more conservative than Canada, with the U.S. Republican Party being slightly more conservative than the major conservative parties in Canada (the Conservative Party and the Bloc Quebeqois), the U.S. Democratic Party being slightly to the right of the largest Canadian party, the center-left Liberal Party, and more left-leaning Canadian parties such as the New Democratic Party receiving far more votes and legislative representation than any U.S. party on the left. Nonetheless, an ideological emphasis on individual "freedom" unqualified by concern for the impact on others of one's conduct[6] is more central to the Republican Party and its supporters than to the Democratic Party and its supporters, or most of those to the left of Democrats. Thus, we expected a similar pattern of results to hold as in Canada. We conducted a median split of the 50 U.S. states and Washington, D.C. (hereafter "D.C.") in terms of the percentage of voters who voted for Republican Donald Trump, the more conservative of the two major-party candidates (the other being Democrat Joe Biden), in the 2020 U.S. Presidential election. (For the sake of brevity, we will refer to these states as "Trump states" and "Biden states," even though in some of them neither candidate won a majority of votes.) We analyzed the cumulative IPM and DPM rates in the 50 states and D.C. at several intervals in late 2020 through early 2022, and predicted that states with the higher percentages of votes for Donald Trump would have higher IPM and DPM rates.

We also analyzed the dates of initial implementation of statewide mask mandates (if any), total length of time statewide mask mandates were in place, whether or not there were statewide mask mandates in schools (or in some cases statewide bans on mask mandates in schools), whether schooling was predominantly in-person or virtual as of September 2020, whether or not (and if so, for how long) businesses were ordered closed and residents ordered to stay at home due to the pandemic in 2020, and vaccination rates as a function of percentage of votes for Donald Trump, as well as whether or not these policy and behavioral variables were related to IPM and DPM rates. We predicted that, in comparison to Biden states, Trump states would implement statewide mask mandates later, if at all; would implement them for a shorter length of time; would be less likely to implement school mask mandates and more likely to ban school mask mandates; would be less likely to have business closures and stay at home orders ("lockdowns") for COVID-related reasons and would have them for less time if they did; would have students returning to in-person schooling sooner; and would have lower vaccination rates. Finally, we predicted that implementation of these public health measures, as well as vaccination rates, would be associated with lower COVID IPM and DPM rates.

It should be noted that the initial infection wave of the pandemic, in April and May 2020, followed a different pattern in the U.S. than in Canada that did not correspond to our overall predictions. As one might expect, the first wave of COVID hit major cities with a large amount of international traffic the hardest. In the U.S., the majority of such cities—New York, Boston, Seattle, Los Angeles, etc.—are cities with Democratic majorities in states where the Democratic

candidate, Joe Biden, received a plurality of the vote. Thus, initially, there were far more deaths in Biden states; once COVID had spread throughout the U.S., however, the pattern shifted toward the one we predicted. (Infection rate data for early in the pandemic in the U.S. represented vast undercounts of the actual infection rates, because the U.S. had a severe shortage of tests available until summer of 2020. If more accurate infection counts were available for the first wave of the pandemic, we suspect we would find the same pattern as there is for deaths.) Cumulative death counts reflected this initial discrepancy in where the initial COVID wave hit the hardest.

Methods

The percentage of people who voted for Donald Trump in each of the 50 states and D.C. was obtained from the U.S. Election Atlas,[17] and a median split was performed. Cumulative U.S. IPM and DPM rates were obtained from Worldometer[18] for several dates beginning on November 11, 2020, and ending on March 23, 2022. Dates for mask mandates for the 50 states were obtained from Wikipedia;[19] dates for D.C. were obtained from various news sites.[20-24] Data on mask mandates in schools were obtained from the Center For Dignity in Healthcare,[25] with the Wayback Machine[26] used to obtain data for specific dates. Data on "lockdowns" (business closures and stay at home orders) as well as in-person school reopening were obtained from Ballotpedia.[27] The percentages of the population fully vaccinated in each state and D.C. were obtained from the U.S. Covid Risk & Vaccine Tracker.[28] No ethics approval was required given that these data appear on public databases.

Results

Infections Per Million

As in Canada, vaccinations were first introduced in the U.S. in mid-December of 2020 but were not available for all adults until April of 2021. Thus, as we did with the Canadian data, we conducted an interrupted time series analysis that included several dates prior to the widespread administration of vaccines (Oct. 1, Nov. 11, and Dec. 1, 2020, and Jan. 12, 2021) and several dates after vaccines became widespread (June 20, Aug. 18, and Nov. 30 of 2021, and Feb. 15, 2022). A mixed-model *ANOVA* showed a main effect for voting pattern, with Trump states having higher IPM rates (M = 108319.60, s = 11911.11) than Biden states (M = 84050.40, s = 22412.71), $F(1, 49)$ = 23.58, $p < .001$, *partial* $\eta^2 = .33$, and the predicted time x voting pattern interaction, with the rate of increase in infection rates in the Trump states post-interruption in the time series exceeding that prior to the interruption in the time series (d-pre = 58,680.85; d-post = 147,923.70) by a greater amount than was the case in the Biden states (d-pre = 42,688.23; d-post = 129,349.23), $F(7, 343)$ = 12.15, $p < .001$, *partial* $\eta^2 = .20$. (Of course, we also found a main effect for time, $F(7, 343)$ = 1675.18, $p < .001$, *partial* $\eta^2 = .97$, as the IPM measures were cumulative. The same is true for DPM.) The pattern of this interaction is presented in Table 3. This effect is consistent with the evidence of lower vaccination rates in Trump states that is presented below.

Table 3. Interrupted Time Series Analysis on Infection per Million Rates as a Function of Level of Support for Trump versus Biden and Time

		Support	***M***	***s***
Time	October 1, 2020	Trump	23,322.77	7,703.31
		Biden	16,986.77	7,270.32
	November 11, 2020	Trump	39,714.12	11,945.26
		Biden	25,264.68	11,024.58
	December 1, 2020	Trump	53,918.04	16,216.93
		Biden	35,189.16	15,850.30
	January 12, 2021	Trump	82,003.62	15,583.96
		Biden	59,675.00	23,384.55
Interruption in the Time Series				
	June 20, 2021	Trump	111,183.15	13,506.49

		Biden	90,152.64	28,463.35
	August 18, 2021	Trump	125,825.39	13,798.70
		Biden	96,666.16	28,695.76
	October 22, 2021	Trump	160,373.58	14,615.00
		Biden	116,340.24	28,917.67
	February 15, 2022	Trump	259,106.85	23,949.69
		Biden	219,501.88	43,469.51

LSD tests indicated that means differing by 7,014.50 were significant at the $p < .05$ level.

Deaths Per Million

We conducted an interrupted time series analysis on DPM that included the same dates prior to and following the widespread administration of vaccines as for IPM. A mixed-model *ANOVA* found the predicted time x voting pattern interaction, with the rate of increase in death rates in the Trump states post-interruption in the time series exceeding that prior to the interruption in the time series (*d*-pre = 675.33; *d*-post = 1199.85) by a greater amount than in the Biden states (*d*-pre = 485.03; *d*-post = 794.84), $F(7, 343) = 15.80$, $p < .001$, *partial* $\eta^2 = .24$.

However, the main effect for voting pattern on DPM rates was not significant. There is a straightforward explanation for this pattern: The first wave of COVID hit the U.S. unevenly, causing many more deaths in densely populated urban areas with a great deal of international traffic; in the U.S., those cities, and the states in which they are located, are predominantly Democratic. Since subsequent waves occurred throughout the country, the Trump states eventually caught up with and surpassed the Biden states, particularly following the onset of mass vaccination. When we subtracted off the deaths from the first wave (which appeared to end at approximately the end of May, and thus we used DPM rates for June 1, 2020 in this analysis), the main effect became significant, with Trump states ($M = 1341.86$, $s = 327.62$) having significantly higher adjusted DPM rates than Biden states ($M = 979.41$, $s = 376.69$), $F(1, 49) = 13.43$, $p < .001$, *partial* $\eta^2 = .22$. The difference in this adjusted value was significant for all dates, and became greater over time: $F(7, 343) = 15.80$, $p < .001$, and *partial* $\eta^2 = .24$ for the interaction between time and voting pattern. The difference in rate of increase in deaths for the Trump vs. Biden states was greater after vaccines had become widespread than it was prior to that, although this difference in rates of increase was attenuated once the Omicron variant arrived. The pattern of our effects is presented in Table 4.

Table 4. Interrupted Time Series Analysis on Death per Million Rates as a Function of Level of Support for Trump versus Biden and Time

		Support	***M***	***s***
Time	October 1, 2020	Trump	412.67	265.37
		Biden	638.37	485.32
	November 11, 2020	Trump	584.85	282.13
		Biden	717.16	486.35
	December 1, 2020	Trump	708.81	305.02
		Biden	797.64	496.50
	January 12, 2021	Trump	1088.00	387.43
		Biden	1123.40	582.03
Interruption in the Time Series				
	June 20, 2021	Trump	1708.54	471.45

	Biden	1660.00	750.92
August 18, 2021	Trump	1801.62	494.01
	Biden	1711.60	754.31
October 22, 2021	Trump	2266.81	508.71
	Biden	1896.20	748.23
February 15, 2022	Trump	2908.39	608.76
	Biden	2454.84	854.54

LSD tests indicated than all means that differed by 125.48 differed at the $p < .05$ level.

Vaccination Rates

An *ANOVA* conducted on states' vaccination rates as of March 22, 2022 showed that Trump states had lower mean vaccination rates ($M = 57.07$, $s = 4.16$) than Biden states ($M = 71.22$, $s = 6.14$), $F(1, 49) = 93.54$, $p < .001$, *partial* $\eta^2 = .66$. The gap in vaccination rates was even wider when the 10 highest ($M = 54.81$, $s = 2.96$) and 10 lowest ($M = 76.13$, $s = 3.63$) Trump-voting states were compared, $F(1, 18) = 207.35$, $p < .001$, *partial* $\eta^2 = .92$.

As expected, vaccination rates were related to infection and death rates. A mixed-model *ANOVA* comparing IPM rates on June 20, August 18, and October 22 of 2021 and March 23 of 2022 in higher- and lower-vaccination rate states showed that states with vaccination rates above the median had lower IPM rates ($M = 134282.41$, $s = 32828.14$) than states with vaccination rates below the median ($M = 163999.79$, $s = 14376.17$), $F(1, 49) = 17.77$, $p < .001$, *partial* $\eta^2 = .27$. In addition to the expected main effect for time ($F(3, 147) = 654.93$, $p < .001$, *partial* $\eta^2 = .97$), there was a vaccination rate by time interaction, $F(3, 147) = 8.51$, $p < .001$, *partial* $\eta^2 = .15$. Essentially, as shown in Table 5, the differences between the higher- and lower-vaccination rate states in infection rates increased during the period when the Delta variant was dominant, but became somewhat smaller than that peak once the far more immune-evasive Omicron variant became dominant.

Table 5. Infection per Million Rates as a Function of Vaccination Rate

		Vaccination Rate	***M***	***s***
Time	June 20, 2021	Low	110224.27	13394.33
		High	91149.88	29239.80
	August 18, 2021	Low	123670.77	13845.33
		High	98345.36	30273.12
	October 22, 2021	Low	158200.12	15885.03
		High	118600.65	31508.76
	March 23, 2022	Low	263904.00	25163.68
		High	229033.76	43401.25

LSD tests indicated than all means that differed by 6276.90 differed at the $p < .05$ level.

A mixed-model *ANOVA* comparing DPM rates on June 20, August 18, and October 22 of 2021 and March 23 of 2022 in higher- and lower-vaccination rate states showed that states with vaccination rates above the median had lower DPM rates ($M = 1841.20$, $s = 753.35$) than states with vaccination rates below the median ($M = 2335.38$, $s = 462.33$), $F(1, 49) = 8.04$, $p < .01$, *partial* $\eta^2 = .14$. There was also the predicted time x vaccination rate interaction, $F(3, 147) = 36.71$, $p > .001$, *partial* $\eta^2 = .43$. These effects were more pronounced when the deaths for the first wave (i.e., the cumulative DPM rates as of June 1, 2020) were subtracted from the cumulative DPM rates. A mixed-model *ANOVA* comparing these adjusted DPM rates on June 20, August 18, and October 22

of 2021 and March 23 of 2022 in higher- and lower-vaccination rate states showed that states with vaccination rates above the median had much lower DPM rates (M = 1453.48, s = 507.24) than those with vaccination rates below the median (M = 2194.13, s = 418.46), $F(1, 49) = 32.46$, $p < .001$ *partial* $\eta^2 = .40$. There was also a significant time x vaccination rate interaction, $F(3, 147) = 36.71$, $p < .001$, *partial* $\eta^2 = .43$. As shown in Table 6, lower vaccination rate states' DPM rates grew more rapidly than higher vaccination rate states' DPM rates.

Table 6. Adjusted Death per Million Rates as a Function of Vaccination Rate

		Vaccination Rate	*M*	*s*
Time	June 20, 2021	Low	1672.39	386.72
		High	1163.08	462.70
	August 18, 2021	Low	1768.46	401.13
		High	1211.56	472.01
	October 22, 2021	Low	2218.65	457.18
		High	1411.76	516.01
	March 23, 2022	Low	3117.00	510.63
		High	2027.52	627.84

LSD tests indicated than all means that differed by 87.11 differed at the $p < .05$ level.

Mask Mandates

We coded states in terms of the number of days since December 31, 2019 when a mask mandate was implemented. There are nine states that never implemented statewide mask mandates, all of which we coded as "365" (1 year). All except Arizona (which has a Republican governor and had nearly 49% voting for Trump) were states above the median for percentage voting for Trump. Consistent with our predictions, an *ANOVA* comparing dates of mask mandate implementation of Trump and Biden states indicated that Trump states (M = 292.27, s = 82.41) took longer to implement mask mandates than Biden states (M = 158.84, s = 68.35) or did not implement them at all, $F(1, 49) = 39.44$, $p < .001$, *partial* $\eta^2 = .45$. Likewise, Trump states had fewer days in which a mask mandate was in effect (M = 151.58, s = 139.73) than Biden states (M = 436.24, s = 177.37), $F(1, 49) = 40.77$, $p < .001$, *partial* $\eta^2 = .45$.

Both the date of initiation of mask mandates and the total length of time a mandate was in effect were related to cumulative IPM rates as of March 23, 2022. An *ANOVA* showed that IPM rates were lower for states that implemented mask mandates earlier (M = 228447.89, s = 42090.92) than for states that implemented them later or not at all (M = 265908.12, s = 24460.48), $F(1, 49) = 14.94$, $p < .001$, *partial* $\eta^2 = .23$. Likewise, IPM rates were lower for states that had mask mandates in place longer (M = 228812.12, s = 43306.61) than for states that had mask mandates for shorter lengths of time or not at all (M = 264117.12, s = 25010.69), $F(1, 49) = 12.84$, $p < .001$, *partial* $\eta^2 = .21$.

The pattern of results was in the same direction, but not as strong, for cumulative DPM rates. An *ANOVA* showed that DPM rates were somewhat lower for states that implemented mask mandates earlier (M = 2663.08, s = 826.34) than for states that implemented them later or not at all (M = 3034.12, s = 742.44), $F(1, 49) = 2.84$, $p < .05$ 1-tailed, *partial* $\eta^2 = .06$. The total number of days for which states had mask mandates was not significantly related to cumulative DPM rates. However, when we excluded deaths for the first wave, when COVID was much more prevalent in some regions of the US than others (and in which most states did not have mask mandates), the effect became stronger. An *ANOVA* for the adjusted DPM rates (i.e., the DPM rates for March 23, 2022 minus those for June 1, 2020) showed that these rates were significantly lower for states that implemented mask mandates earlier (M = 2275.39, s = 741.15) than for states that implemented them later or not at all (M = 2902.80, s = 741.15), $F(1, 49) = 9.42$, $p < .005$, *partial* $\eta^2 = .16$. Similarly, adjusted DPM rates were significantly lower for states that had mask mandates in place for more (M = 2289.24, s = 759.32) rather than fewer (M = 2865.35, s =

722.20) days than the median, $F(1, 49) = 7.71$, $p < .01$, *partial* $\eta^2 = .14$. Those states that had statewide mask mandates for fewer than 100 days or not at all had the highest adjusted DPM rates of all ($M = 3142.21$, $s = 679.78$).

The results for statewide mask mandates for schools, which we obtained for Sept. 27, 2021 using the Wayback Machine[26] in conjunction with the Center for Dignity in Healthcare site,[25] were similar to those for statewide mask mandates for the general public. Because schools were simply closed for the vast majority of the first wave throughout the U.S.,[27] and thus school mask mandates were not relevant then, we analyzed these data with infections and deaths for the first wave of the pandemic subtracted from the total IPM and DPM rates. An *ANOVA* showed that adjusted IPM rates as of March 23, 2022 were lower in states that had implemented mask mandates in schools as of September 2021 ($M = 212394.18$, $s = 42432.20$) than in states that had not ($M = 245797.56$, $s = 33942.97$), $F(1, 49) = 9.27$, $p < .01$, *partial* $\eta^2 = .16$. Similarly, adjusted DPM rates were lower in states that had implemented mask mandates in schools as of September 2021 ($M = 2155.53$, $s = 639.95$) than in states that had not ($M = 2796.65$, $s = 776.47$), $F(1, 49) = 8.63$, $p < .01$, *partial* $\eta^2 = .15$.

Business Closures and Stay at Home Orders

We predicted that Biden states would be more likely to implement "lockdowns"—i.e., issue stay at home orders and close nonessential businesses to prevent the spread of COVID—during the initial wave of the pandemic than Trump states, and to do so for a longer period of time. Consistent with our predictions, Biden states ($M = 65.64$) had longer lockdowns than Trump states ($M = 27.62$), $F(1, 49) = 31.74$, $p < .001$, *partial* $\eta^2 = .39$. Seven of the latter states did not issue stay at home orders.

School Reopenings

All U.S. states and D.C. closed schools for most or all of the first wave of the pandemic in spring 2020. However, states differed widely in their pace of reopening schools during the 2020-2021 school year. States were coded in terms of whether schools were predominantly in-person as of Sept. 10, 2020, roughly equally mixed between in-person and virtual learning, or predominantly virtual. As predicted, a preponderance of in-person schooling was far more common in Trump states than Biden states (11 vs. 1), and a preponderance of online schooling was far more common in Biden states (18 vs. 6); there were 9 Trump states and 6 Biden states with roughly equal proportions. These differences were significant, $\chi^2(49) = 14.92$, $p < .001$.

Discussion

The U.S. data conceptually replicate the Canadian data. Confirmed IPM rates were higher in conservative states (i.e., those with a higher percentage of Trump voters) than more liberal states (i.e., those with a lower percentage of Trump voters), and DPM rates followed the same pattern, particularly when DPM rates at the end of the first wave (which was not geographically dispersed throughout the country to the same extent as later waves) were subtracted off. Additionally, political ideology predicted pandemic response measures: Trump states were less likely to mandate masks in general or for schools, and did so later than Biden states if they did; these differences were in turn related to IPM and DPM rates, with states that had early universal and/or school mask mandates having lower rates than those that enacted them later or not at all. Trump states were also less likely to close businesses or issue stay at home orders to reduce the spread of COVID or did so for shorter periods of time; they were more likely to re-open the majority of school districts for in-person schooling in Fall 2021 and less likely to have majority virtual learning; and they had markedly lower vaccination rates. The difference in vaccination rates was particularly pronounced between the top 10 and bottom 10 Trump-voting states. These differences in vaccination rates were related in the expected direction to differences in IPM and DPM rates.

General Discussion

Our data suggest that conservative provincial governments in Canada and governments of more conservative-leaning states in the U.S. have had a poorer response to the pandemic than the other governments. This has led to significantly higher IPM and DPM rates, and a significant interaction wherein the gap in rates has increased over time. Furthermore, in Canada, Ontario, Quebec, Manitoba, and Alberta had lockdowns that shuttered small businesses (aside from curbside pickup, or carry-out restaurant service), while allowing "Big Box" retailers to remain open, despite the lack of evidence that COVID is any less likely to be spread in the latter. Additionally, with the exception of the Atlantic provinces, there have been few restrictions on interprovincial/interstate travel in either the U.S. or Canada even during lockdowns. In the U.S., conservative states had shorter lockdowns than more liberal states or had none at all, reopened schools sooner, and either implemented statewide mask mandates (in public spaces or in schools) later

or not at all. Such policy decisions caused considerable damage to both small businesses and the general public through both direct economic damage and the worsening of the pandemic, leading to not only a greater number of avoidable deaths and severe illnesses but a greater number of workers temporarily or permanently unable to work due to long-term COVID-related illness (long COVID). However, certain business interests stood to benefit from "opening up"—the end of restrictions on travel, return to in-person schooling, etc.—even if it was premature. Moreover, previous research has shown an association between conservative ideology and a high level of reactance to perceived threats to personal freedoms,[7] as exemplified by a lower rate of mask-wearing among conservatives than their more politically left-leaning counterparts in Canada.[11] This ideological predilection towards insisting on personal liberties irrespective of their consequences for others is, of course, consistent with our finding that more and larger protests against lockdowns and mask mandates took place in conservative Canadian provinces. Such protests continued when vaccines came onto the scene and another perceived threat to personal liberty, vaccine mandates, were implemented in many contexts in the U.S. and even more so in Canada. Given this synergy between ideological predilections and the economic interests of corporations in certain sectors of the economy of promoting "opening up," it should come as no surprise that there has been a massive, well-funded campaign against public health measures such as mask and vaccine mandates, school and business closures or capacity restrictions, etc., by political conservatives, particularly those associated with specific vested corporate interests, such as oil magnate Charles Koch,[29] from the very beginning of the pandemic, and that the "truck convoys" opposing mask and vaccine mandates (and largely opposing masks and vaccines themselves) were largely funded[30,31] and organized[32] by the political right.

Given that our studies are correlational, we cannot definitively claim that the causal pathway involved in the relationships we found is political ideology -> state/provincial differences in public health policy and individual conduct -> differences in COVID outcomes. It is conceivable that higher death rates in conservative provinces and Trump states partially reflect poorer healthcare systems in the provinces with conservative governments and in Trump states. The evidence contradicts this explanation: We found that the ratio of confirmed infections to deaths did not significantly differ between conservative and non-conservative states and provinces (i.e., states with more deaths had proportionately more infections). However, there are various social psychological processes that have likely played a role in the differences in public health policy and social behavior we have identified between more conservative and more liberal governments and individuals. There is some indication that groupthink, a psychological phenomenon in which a group of people seek harmony and/or conform to the values or agenda of a leader in order to gain favor and, as a result, make poor decisions,[33] may have played a role in the decision-making of the Ontario government. In its initial lockdown and attempted reopening of the economy and schools, the Ford government brought consultants on board who appeared to support their respective political agendas for members of their teams. They ignored expert advice by the arm's-length Ontario COVID-19 Science Advisory Table led by University of Toronto epidemiologist Dr. Peter Juni, and relied instead on "yes men" who bowed to Ford's political agenda (personal communication, Peter Juni, with first author), resulting in premature reopening while transmission rates were still high that ignored, for instance, evidence that schoolchildren are COVID superspreaders.[34] Social or cognitive processes such as conformity due to social pressure[35] to wear or not wear masks[36] or get vaccinated, or the use of peers' conduct (e.g., not wearing masks in public indoor spaces) or what others say (even if they lack scientific training) as a source of information[37] about COVID's severity and the efficacy of masks or vaccines for preventing infection or severe disease, likely also played a major role in these differences. Moreover, we tend to surround ourselves with others who have views similar to our own[38] as well as prefer certain media outlets or other sources of information, and thus will tend to be exposed to some points of view (e.g., "Masks don't work" or "the Omicron variant is mild") more often than others. Views that we are exposed to often are both more readily available[39] in memory/familiar to us and more likely to be judged as true[40] than views to which we have less exposure, even if we lack evidence to support them.

As previously described, Melton and Sinclair[1] showed that, on average, collectivist countries have significantly lower IPM and DPM rates than individualistic countries—as well as a lower rate of protests against public health measures such as mask mandates and lockdowns, and earlier and stricter implementation of such measures. Both cultural individualism and political conservatism represent ideologies in which narrow individual interests and concern with individual

freedoms take precedence over group interests to a greater extent than is the case with collectivism and non-conservative political ideologies. Because the differences we have found between the conduct of more conservative and less conservative governments and citizens occurred in highly individualistic countries (Canada and the U.S.), in essence one might say that political conservatism represents simply a more extreme form of individualism in terms of emphasis on individual freedom to do as one pleases (often irrespective of consequences for others[6]) than those present in individualistic countries as a whole. The differences found in COVID infection and death rates on a worldwide basis—related to a significant extent to countries' degree of individualism and collectivism[1]—are significantly greater than those between North American states or provinces. For example, on May 30, 2022, Canada and the U.S. had DPM rates of 1068 and 3081, respectively, whereas Vietnam, Japan, Pakistan, and China had DPM rates of 435, 243, 133, and 4, respectively.[18] (Since these data were collected, China has dropped its zero-Covid policies, but as of the moment it still has a DPM rate of fewer than 100.) These stark differences were present before vaccines were introduced, and the vast majority of even the most highly-vaccinated individualistic countries have current DPM rates of far more than 1000. Thus, it is apparent that although vaccines are a powerful tool for limiting severe illness and death and have some role in preventing infections even in today's era of immune-resistant variants, and masks have been demonstrated to be an effective means of infection prevention,[41] differences in the extent and timing of behavioral interventions such as lockdowns and mask mandates, and in individuals' adherence to them, have played a far more important role in helping to quell the pandemic than vaccines have. Quelling the pandemic is not as much a product of medical interventions such as vaccines as it is a product of sociocultural factors that influence the extent to which medical or public health measures are used efficaciously. Certainly, more extensive public education about the importance of vaccination and mask-wearing and the not-rare probability of severe health outcomes from COVID-19 among people of all ages than I (second author) have seen here in the United States is warranted and would be helpful. However, cultural individualism and political conservatism are inherent properties of societies or social groups that foster resistance to any sort of social pressure, let alone mandates, to wear masks or get vaccinated, so it is likely that there are limits to how effective such extensive education can be. In light of that, it is useful to consider how modern societies brought water-borne diseases under control—although vaccination was helpful for some of them, arguably the most important measure for preventing infection with water-borne diseases has been the development of public infrastructure for removing pathogens from water supplies—cleaning up the water. Analogously, there is a growing body of research supporting the efficacy of measures to clean up public indoor air—improved air filtration[42,43] and ventilation[43] in public buildings, as well as the use of virus-killing ultraviolet lighting.[44] The advantage of such measures is that they operate quietly in the background, bringing down rates of airborne disease infection even when people do not wish to, or are unable to (e.g., while dining in a restaurant), wear a mask. Thus, investment in installation of air-cleaning technology may be the most important measure societies can take to reduce the incidence of airborne infectious diseases that has not yet been implemented on a widespread basis.

Bibliography

[1]Melton RJ, Sinclair RC. Culture and COVID-19: A Global Analysis of the Successes of Collectivist Countries and the Failures of Individualistic Countries. ResearchGate. 10.13140/RG.2.2.23727.20643. Published February 5, 2023.

[2]Hofstede GH. *Culture's Consequences, International Differences in Work-Related Values*. Beverly Hills: Sage; 1984.

[3]Jonas E, Graupmann V, Kayser DN, Zanna M, Traut-Mattausch E, Frey D. Culture, self, and the emergence of reactance: Is there a "universal" freedom? *Journal of Experimental Social Psychology*. 2009;45(5):1068-1080. doi:10.1016/j.jesp.2009.06.005

[4]Brehm JW. *A Theory of Psychological Reactance*. New York: Academic Press; 1966.

[5]Steindl C, Jonas E, Sittenthaler S, Traut-Mattausch E, Greenberg J. Understanding psychological reactance. *Zeitschrift für Psychologie*. 2015;223(4):205-214. doi:10.1027/2151-2604/a000222

[6]Tomasky M. There's a word for why we wear masks, and Liberals should say it. The New York Times. https://www.nytimes.com/2020/10/17/opinion/covid-masks-freedom-democrats.html. Published October 17, 2020. Accessed February 5, 2023.

[7]Thórisdóttir H, Jost JT. Motivated closed-mindedness mediates the effect of threat on political conservatism. *Political Psychology*. 2011;32(5):785-811. doi:10.1111/j.1467-9221.2011.00840.x

[8]Jost JT, Napier JL, Thorisdottir H, Gosling SD, Palfai TP, Ostafin B. Are needs to manage uncertainty and threat associated with political conservatism or ideological extremity? *Personality and Social Psychology Bulletin*. 2007;33(7):989-1007. doi:10.1177/0146167207301028

[9]Thorisdottir H, Jost JT, Liviatan I, Shrout PE. Psychological needs and values underlying left-right political orientation: Cross-national evidence from Eastern and Western Europe. *Public Opinion Quarterly*. 2007;71(2):175-203. doi:10.1093/poq/nfm008

[10]Montpetit J, MacFarlane J. Latest anti-mask protest in Montreal draws large crowds who say threat of covid-19 overstated | CBC news. CBCnews. https://www.cbc.ca/news/canada/montreal/anti-mask-protest-montreal-1.5722033. Published September 13, 2020. Accessed February 5, 2023.

[11]van der Linden C. Canada is not immune to the politics of coronavirus masks. The Conversation. https://theconversation.com/canada-is-not-immune-to-the-politics-of-coronavirus-masks-144110. Published December 22, 2022. Accessed February 5, 2023.

[12]Charlebois F. Quebec government documents expose its disastrous mishandling of initial pandemic response. World Socialist Web Site. https://www.wsws.org/en/articles/2020/12/30/queb-d30.html. Accessed February 5, 2023.

[13]Mallick H. Are businesses worth more than human lives? in Doug Ford's Ontario, the answer is yes. thestar.com. https://www.thestar.com/politics/political-opinion/2020/11/14/are-businesses-worth-more-than-human-lives-in-doug-fords-ontario-the-answer-is-yes.html. Published November 14, 2020. Accessed February 5, 2023.

[14]Government of Canada SC. Statistics Canada: Canada's National Statistical Agency. Statistics Canada: Canada's national statistical agency. https://www.statcan.gc.ca/eng/start. Published December 31, 2022. Accessed February 6, 2023.

[15]Canada PHAof. Covid-19 epidemiology update: Key updates. Canada.ca. https://health-infobase.canada.ca/covid-19/epidemiological-summary-covid-19-cases.html. Published January 26, 2023. Accessed February 5, 2023.

[16] Compare countries. Hofstede Insights. https://www.hofstede-insights.com/product/compare-countries/. Published June 22, 2021. Accessed February 12, 2023.

[17]Leip D. Dave Leip's Atlas of U.S. Presidential Elections. https://uselectionatlas.org/RESULTS. Accessed February 6, 2023.

[18]Coronavirus cases: Worldometer. https://www.worldometers.info/coronavirus/. Accessed February 5, 2023.

[19] Face masks during the COVID-19 pandemic in the United States. Wikipedia. https://en.wikipedia.org/wiki/Face_masks_during_the_COVID-19_pandemic_in_the_United_States. Published February 5, 2023. Accessed February 6, 2023.

[20]Staff NBCW. DC changes mask guidance consistent with new CDC guidelines. NBC4 Washington. https://www.nbcwashington.com/news/coronavirus/coronavirus-in-dc/dc-changes-mask-guidance-consistent-with-new-cdc-guidelines/2674660/. Published May 17, 2021. Accessed February 6, 2023.

[21]Staff NBCW. DC Reinstates Indoor Mask Mandate. NBC4 Washington. https://www.nbcwashington.com/news/coronavirus/dc-reinstates-indoor-mask-mandate-2/2915809/. Published December 21, 2021. Accessed February 6, 2023.

[22]Staff NBCW. DC to require masks indoors amid Covid Surge. NBC4 Washington. https://www.nbcwashington.com/news/coronavirus/dc-mask-mandate-indoors-despite-vaccination-status-dc-worker-vaccines/2750029/. Published July 30, 2021. Accessed February 6, 2023.

[23]Sullivan P. Washington, DC, to end vaccine, Mask Mandates. The Hill. https://thehill.com/homenews/state-watch/594133-washington-dc-to-end-vaccine-mask-mandates/. Published February 14, 2022. Accessed February 6, 2023.

[24]Swalec A, Segraves M. DC now requires face masks when leaving home, with few exceptions. NBC4 Washington. https://www.nbcwashington.com/news/local/dc-to-give-coronavirus-update-amid-highest-daily-case-total-in-7-weeks/2368471/. Published July 22, 2020. Accessed February 6, 2023.

[25]State-by-state school mask mandates. The National Center for Disability, Equity, and Intersectionality. https://centerfordignity.com/state-by-state-school-mask-mandates/. Published April 6, 2022. Accessed February 6, 2023.

[26]Wayback Machine. https://web.archive.org/. Accessed February 6, 2023.

[27] States that issued lockdown and stay-at-home orders in response to the coronavirus (COVID-19) pandemic, 2020. Ballotpedia. https://ballotpedia.org/States_that_issued_lockdown_and_stay-at-home_orders_in_response_to_the_coronavirus_(COVID-19)_pandemic,_2020. Accessed February 6, 2023.

[28]U.S. Covid Risk & Vaccine tracker. Covid Act Now. https://www.covidactnow.org/. Accessed February 6, 2023.

[29]Bragman W, Kotch A. How the Koch network hijacked the war on COVID. The Lever. https://www.levernews.com/how-the-koch-network-hijacked-the-war-on-covid/. Published January 7, 2022. Accessed February 6, 2023.

[30]Mier B, Norton B. From Canada to Brazil, rich right-wing elites are astroturfing 'trucker' protests. Geopolitical Economy Report. https://geopoliticaleconomy.com/2022/02/14/canada-brazil-trucker-protests-right-wing/. Published October 8, 2022. Accessed February 12, 2023.

[31]Stanley-Becker I. Koch-backed group fuels opposition to school mask mandates, leaked letter shows. The Washington Post. https://www.washingtonpost.com/politics/2021/10/01/masks-schools-koch-money/. Published October 2, 2021. Accessed February 13, 2023.

[32]Posted on January 27 2022. The 'freedom convoy' is nothing but a vehicle for the far right. Canadian Anti-Hate Network. https://www.antihate.ca/the_freedom_convoy_is_nothing_but_a_vehicle_for_the_far_right. Published February 9, 2023. Accessed February 12, 2023.

[33]Janis IL. *Victims of Groupthink: A Psychological Study of Foreign-Policy Decisions and Fiascoes*. Boston, Massachusetts: Houghton Mifflin; 1972.

[34]Kelly M. Largest COVID-19 contact tracing study to date finds children key to spread, evidence of superspreaders. Princeton University. https://www.princeton.edu/news/2020/09/30/largest-covid-19-contact-tracing-study-date-finds-children-key-spread-evidence. Published September 30, 2020. Accessed February 13, 2023.

[35]Asch SE. Opinions and social pressure. *Scientific American*. 1955;193(5):31-35. doi:10.1038/scientificamerican1155-31

[36]Woodcock A, Schultz PW. The role of conformity in mask-wearing during COVID-19. *PLOS ONE*. 2021;16(12). doi:10.1371/journal.pone.0261321

[37]Sherif M. A study of some social factors in perception. *Archives of Psychology (Columbia University)*. 1935;187(60).

[38] Bahns AJ, Crandall CS, Gillath O, Preacher KJ. Similarity in relationships as niche construction: Choice, stability, and influence within dyads in a free choice environment. *Journal of Personality and Social Psychology*. 2017;112(2):329-355. doi:10.1037/pspp0000088

[39]Tversky A, Kahneman D. Judgment under uncertainty: Heuristics and Biases. *Science*.

1974;185(4157):1124-1131. doi:10.1126/science.185.4157.1124

[40]Hasher L, Goldstein D, Toppino T. Frequency and the conference of referential validity. *Journal of Verbal Learning and Verbal Behavior*. 1977;16(1):107-112. doi:10.1016/s0022-5371(77)80012-1

[41] Cowger TL, Murray EJ, Clarke J, et al. Lifting universal masking in schools—COVID-19 incidence among students and staff. *New England Journal of Medicine*. 2022;387(21):1935-1946. doi:10.1056/nejmoa2211029

[42] Nazarenko Y. Air filtration and severe acute respiratory syndrome coronavirus 2. *Epidemiology and Health*. 2020. doi:10.4178/epih.e2020049

[43]Elsaid AM, Ahmed MS. Indoor Air Quality Strategies for air-conditioning and ventilation systems with the spread of the Global Coronavirus (COVID-19) epidemic: Improvements and recommendations. *Environmental Research*. 2021;199:111314. doi:10.1016/j.envres.2021.111314

[44]Buonanno M, Welch D, Shuryak I, Brenner DJ. Far-UVC Light (222 nm) efficiently and safely inactivates airborne human coronaviruses. *Scientific Reports*. 2020;10(1). doi:10.1038/s41598-020-67211-2