Everything's bigger in Texas: Politics, demographics, population density, and Covid-19 outcomes

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The purpose of this study is to examine the relationship between political ideology, demographics (religiosity, education, median age, median household income, poverty rate, and ethnicity) and population density, and three Covid-19 outcomes (number of cases, number of deaths, vaccination rates) across Texas' 254 counties. First, when it comes to the number of cases, ethnicity was negatively associated, whereas median age and median household income were positively associated. Second, political ideology, median household income, and ethnicity were all negatively associated with the number of deaths, while median age was positively associated. Third, as it relates to vaccination rates, population density was negatively associated, and political ideology and median household income were positively associated. These findings provide further understanding of what factors influenced the outcomes of the Covid-19 pandemic across the state of Texas. Lastly, this study's findings demonstrate the importance of taking into consideration the target audience when employing social marketing tactics along with providing direction for those responsible for creating public health messages that will benefit society.

Keywords: political ideology, demographics, population density, social marketing, Covid-19

INTRODUCTION

On March 4, 2020, the Texas Department of State Health Services reported the first positive case of Covid-19 in the state (Texas Health and Human Services, 2020). During the pandemic, the state of Texas (both at the local and state level) implemented a variety of preventative measures (e.g., restrictions on public gatherings, mask mandates, school closures, etc.) to help reduce the spread of Covid-19 (National Governors Association, 2020; Worthy et al., 2021). In addition to reducing the spread of the novel virus, the vaccine quickly became a point of emphasis as counties across the state of Texas attempted to encourage their residents to receive the vaccine.

However, even with preventative measures put in place, there are differences across Texas' 254 counties as it relates to the number of cases, number of deaths, and vaccination rates. For instance, Loving, Maverick, and Hall were among the counties with the highest number of cases and deaths, whereas Glasscock, King, and Hartley were among the counties with the fewest. Furthermore, vaccination rates were higher in the Hudspeth, Cameron, and El Paso counties than in the King, Gaines, and Newton counties. These differences demonstrate that not every county was as successful when it came to controlling the spread of the novel virus or encouraging residents to receive the vaccine.

Just as Nike, Apple, and Walmart utilize marketing to entice and motivate consumers to purchase a new pair of basketball shoes, iPhone, or groceries, those working in the healthcare industry also employ marketing efforts for various reasons. Specifically, when it comes to healthcare, social marketing plays an important role. Social marketing is a specific type of marketing that involves activities aimed at "changing or maintaining people's behavior for the benefit of individuals and society as a whole" (Melovic et al., 2020). In the case of the Covid-19 pandemic, public health officials and social marketers utilized social marketing tactics to help reduce the spread of Covid-19 and encourage people to receive the vaccine. In fact, social marketing efforts were evident in various cities and counties across the state of Texas. For instance, the city of Amarillo, Texas introduced the "All in Amarillo" campaign that focused on encouraging residents to social distance (e.g., standing three to six feet apart, canceling activities, and avoiding public spaces) to help reduce the spread of Covid-19 (City of Amarillo, 2020). Furthermore, Harris County spent $1 million on the "Stay Smart, Do Your Part" campaign that was aimed at encouraging residents to receive the vaccine through "radio spots, billboards, social media, and print ads" (Trovall, 2021).

Like marketers working in the business world, social marketers must employ market segmentation tactics to help determine and understand who they are trying to reach (e.g., target audience). Market segmentation involves dividing a market into groups based on four categories of segmentation variables including psychographics (i.e., political beliefs, personality, motivations, etc.), demographics (i.e., education, age, income, etc.), geographic (i.e., population density, urban or rural, region, etc.), and behavior (i.e., benefit expectations, loyalty, usage rate, etc.). In addition to helping marketers identify their target audience, market segmentation can help provide insight on how to reach their target audience. For instance, social marketing efforts aimed at low-income college students will differ from those used to reach financially secure middle-aged adults.

The present study examines the impact of political ideology, demographics, and population density on three Covid-19 related outcomes including number of cases, number of deaths, and vaccination rates across Texas' 254 counties. The findings add to prior research that aimed to provide a further understanding of the factors that influenced the outcomes of the Covid-19 pandemic (Bollyky et al., 2023; Singu et al., 2020). Furthermore, this study contributes to research that has examined social marketing along with its role as it relates to Covid-19 (Cho et al., 2022; Evans & French, 2021). Specifically, the findings provide further

support that if social marketing efforts aimed at encouraging participation in preventative measures to help reduce the spread of Covid-19 along with receiving the vaccine were to be successful, the target audience must be considered. Thus, the findings provide practical implications and direction for those working in healthcare or public health and social marketers who are tasked with creating public health messages that will benefit society.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Social Marketing and Public Health

Social marketing is a subset of marketing that utilizes proven concepts and techniques (e.g., marketing mix, market research, etc.) that are commonly used in commercial business with the intent of influencing people's behavior for the good of society (Andreasen, 1995; Chin & Mansori, 2018; Kotler & Zaltman, 1971). For instance, social marketers employ a wide variety of communication strategies to reach their target audience through mass media (i.e., radio, television, newspapers, and magazines) along with mediated (through a healthcare provider) and interpersonal communication (Evans, 2006). In addition to traditional forms of communication and marketing, social marketers also take advantage of social media's influential power and the digital space to help address public health issues.

As it relates to the Covid-19 pandemic, prior research has examined the role of social marketing with regard to the spread of the Covid-19 virus (Cho et al., 2022; Lee, 2020). In addition to the spread of Covid-19, previous studies have also considered social marketing when it comes to Covid-19 vaccine hesitancy, intentions, and misconceptions (Coffie et al., 2022; Evans & French, 2021; Twum et al., 2021) along with promotional efforts to increase vaccine uptake (French et al., 2020).

Political Ideology and Public Health

According to Campbell et al. (1960), political ideology (e.g., conservative or liberal) refers to a set of beliefs that represent the general political worldview of an individual. From a healthcare and public health perspective, prior research has provided evidence that political beliefs impact lifestyle choices and behavior (Kannan & Veazie, 2018) along with being a determinant of health (Mishori, 2019). During 2020, Covid-19 quickly became a highly contentious and debated political topic, with political partisanship serving as a driving force behind an individual's response to the pandemic (Shao & Hao, 2020). According to Everett et al. (2020), conservatives and liberals view the relationship between an individual and society differently. Conservatives are more likely to embrace the belief that individuals are responsible for their own actions (Everett et al., 2020); whereas liberals believe that, an individual's outcomes are based on more than just internal factors (Clarkson et al. 2015).

Previous studies have indicated that conservatives perceived the virus as less of a threat (Gadarian et al., 2020; Kerr et al., 2021; Kiviniemi et al., 2022). Furthermore, conservatives are less likely to engage in preventative actions that could limit the threat of Covid-19 (Allcott et al. 2020; Clements, 2020; Gadarian et al., 2021; Latkin et al., 2021; Rosenfeld, 2020) including wearing masks (Kerr et al., 2021), social distancing (Barrios & Hochberg, 2020; Cai et al., 2021), and staying home (Gao & Radford, 2021; Painter & Qui, 2021). Lastly, conservatives also demonstrate greater hesitancy and negative attitudes towards the Covid-19 vaccine (Fridman et al., 2021; Hornsey et al., 2020). Thus, the following is hypothesized:

H1: Counties with a higher percentage of votes for the Democratic presidential candidate will experience (a) lower number of cases, (b) lower number of deaths, and (c) higher vaccination rates.

Demographics and Public Health

Religiosity

Religiosity is defined as the "various dimensions associated with religious beliefs and involvement" (Bergan & McConatha, 2001). Prior research has examined the impact that religiosity has on various aspects of health and well-being. For instance, during times of uncertainty, individuals turn toward religion for support, solace, and comfort (Wen et al., 2020). In fact, roughly "three-in-ten Americans (28%) report stronger personal faith because of the pandemic" (Pew Research Center, 2021). Furthermore, when faith is important, individuals demonstrate reduced compliance regarding fear appeals due to the idea of support that faith provides (Wu & Cutright, 2018). In the case of Covid-19, previous studies have demonstrated that religious individuals are more likely to defy and ignore recommendations to prevent the spread of the virus (Dein et al., 2020; Drążkowski & Trepanowski, 2021; Kranz et al., 2023; Milligan et al., 2022) including wearing masks (Adida et al., 2021), social distancing (Linke, & Jankowski, 2022), sheltering-in-place (DeFranza et al., 2021), and getting tested (Linke & Jankowski, 2020). Lastly, an increase in religiosity is associated with a decrease in Covid-19 vaccine acceptance and willingness (Callaghan et al., 2021; Milligan et al., 2022; Olagoke et al., 2020). Thus, the following is hypothesized:

H2: Counties with a higher degree of religiosity will experience (a) higher number of cases, (b) higher number of deaths, and (c) lower vaccination rates.

Educational Level

Education establishes an ability to understand complex issues and plays a critical role when people are trying to make sense of information. A benefit of education can be the increased ability to discern accurate information and disregard inaccurate information. Furthermore, education affects various parts of an individual's life including employment opportunities, financial security, skills improvement (e.g., communication, critical thinking, etc.), and health (UOTP Marketing, 2022). When it comes to Covid-19, prior research has found a positive association between education and self-protective behavior (Papageorge et al., 2021). Specifically, previous studies have demonstrated that individuals with higher levels of education are more likely to engage in preventative measures such as wearing masks and social distancing (Kim & Crimmins, 2020). Lastly, those with more education demonstrate a greater willingness to receive the Covid-19 vaccine (Luningham et al., 2023; Miller et al., 2022). Thus, the following is hypothesized:

H3: Counties with a higher percentage of the population that has not received a high school degree will experience (a) higher number of cases, (b) higher number of deaths, and (c) lower vaccination rates.

Median Age

As an individual gets older, their health generally begins to decline and worsen. Additionally, older individuals may also suffer from a weakened immune system, making it

more difficult to "protect against infections" (Weyand & Goronzy, 2016). In the case of older individuals (i.e., over the age of 65), the Covid-19 pandemic presented its fair share of challenges. Prior research has found that older individuals were more likely to abide by preventative measures such as wearing masks (Haischer et al., 2020; Rahimi et al., 2020) and social distancing (Masters et al., 2020). However, a weakened immune system along with comorbidities (e.g., cardiovascular disease, diabetes, etc.) resulted in older individuals being more susceptible to contracting Covid-19 along with a higher risk of experiencing complications or death from the virus (Mueller et al., 2020; Whiteman et al., 2021). Lastly, previous studies have found that older individuals were more willing to receive the vaccine (Kelly et al., 2021; Nikolovski et al., 2021). Furthermore, in the United States, ensuring access to the Covid-19 vaccine for older individuals became a priority at the federal, state, and local level (Texas Health and Human Services, 2020; Whiteman, et al., 2021). This included prioritizing the vaccination of individuals living in nursing and assisted living facilities. Thus, the following is hypothesized:

H4: Counties with a higher median age will experience (a) higher number of cases, (b) higher number of deaths, and (c) higher vaccination rates.

Median Household Income (MHI) and Poverty Rate

Median household income and the poverty rate are used as indicators of socioeconomic status (SES) for both individuals and society. Despite being interconnected, median household income and the poverty rate should be treated as separate social determinants regarding health and well-being (Singh et al., 2019). The relationship between health, and median household income and the poverty rate, has received a fair amount of attention from researchers, with findings suggesting that these two factors affect several aspects of health and health-related behaviors. As it relates to Covid-19, prior research has found that those with lower incomes and those living in poverty are less likely to engage in social distancing (Garnier et al., 2020; Jay et al., 2020; Weill et al., 2020) or receive the Covid-19 vaccine (Allen et al., 2021; Morales et al., 2022; Ruiz & Bell, 2021). Thus, the following is hypothesized:

H5: Counties with a higher median household income will experience (a) lower number of cases, (b) lower number of deaths, and (c) higher vaccination rates.

H6: Counties with a higher poverty rate will experience (a) higher number of cases, (b) higher number of deaths, and (c) lower vaccination rates.

Ethnicity

Ethnicity has been found to have an impact on one's behavioral, physical, and mental health. This impact extends to Covid-19, as previous studies have found that certain ethnic minorities (e.g., African American, Hispanic, and Asian) were "more likely to report wearing a mask" (Hearne & Nino, 2021). However, those who belonged to an ethnic minority faced challenges such as being more likely to be employed as an essential or frontline worker (Gonzalez et al., 2021) and having to be more reliant on public transportation (Lopez et al., 2021), thus resulting in a higher likelihood of contracting Covid-19. Furthermore, comorbidities (e.g., diabetes, heart disease, etc.) that are associated with a higher likelihood of complications from the virus (Savoia et al., 2021) along with less access to resources that support health (Freeman Anderson 2017; Gaskin et al. 2012; Ko & Ponce 2013; Lopez et al.,

2021) help to explain why some "ethnic minority groups experienced severe Covid-19 associated outcomes" at a disproportionate level (Acosta et al., 2021). Lastly, prior research has found that ethnic minorities were less willing to receive the Covid-19 vaccine (Adzrago et al., 2022; Kricorian & Tuner, 2021). Furthermore, areas with a larger proportion of ethnic minorities often indicated a lower number of healthcare facilities and vaccine sites, thereby producing less opportunity to receive the Covid-19 vaccine (Anderson & Ray-Warren 2022; Ojinnaka et al., 2021; Savoia et al. 2021). Thus, the following is hypothesized:

H7: Counties with a higher rate of ethnic homogeneity (i.e., percentage of the population reporting their ethnicity as non-Hispanic white) will experience (a) lower number of cases, (b) lower number of deaths, and (c) higher vaccination rates.

Population Density and Public Health

The U.S. Census Bureau defines population density as the "number of people per square mile of land area" and provides a comparison of "settlement intensity across geographic areas" (Cohen, 2015). From a health perspective, previous studies have found that high population density aids in the transmission of disease and helps to further epidemics (Li et al., 2018).

In the case of Covid-19, there was little information on how to prevent the spread of the virus during the early part of the pandemic (Wong & Li, 2020). As the pandemic progressed, social distancing became a widely recommended preventative measure to reduce further spreading of the Covid-19 virus (MacIntyre & Wang, 2020). However, while engaging in social distancing is relatively easy to accomplish in lower populated areas, it becomes more difficult to distance from others in areas that are more densely populated (Rocklöv, & Sjödin, 2020). In fact, Sy et al. (2021) found that the crowding of people into densely populated areas increased the likelihood of transmission and spread of Covid-19. Additionally, the healthcare capacity in urban areas (which are usually more densely populated) became overwhelmed (Karim & Chen, 2021), which may have affected a resident's ability to get the medical help they needed during the pandemic. Lastly, prior research has found that urban areas experienced more of an uneven distribution of vaccination sites, thereby decreasing access to the Covid-19 vaccine (Anderson & Ray-Warren, 2022). Thus, the following is hypothesized:

H8: Counties with a higher rate of population density will experience (a) higher number of cases, (b) higher number of deaths, and (c) lower vaccination rates.

METHODOLOGY

The sample consisted of all 254 counties in the state of Texas, thus no counties were omitted for missing or incomplete data. For this study, three separate Ordinary Least Squares (OLS) regressions were analyzed using SPSS. Specifically, eight independent variables (political ideology, religiosity, education, median age, median household income, poverty rate, ethnicity, and population density) were regressed on three dependent variables (number of cases, number of deaths, and vaccination rates). Specifically, with regard to the three dependent variables, while they may be viewed as independent measures, they are necessarily interconnected. For instance, there was an overlap between these three Covid-19 outcomes with both cases and deaths continuing to occur after the introduction of vaccines around December of 2020. Thus, those vaccinated and unvaccinated alike could be infected, and likewise, either could die. Lastly, the data for this study was collected from publicly available

sources and reflects the values through mid-April of 2022.

RESULTS

As indicated in Table 1 (Appendix), the first regression (DV = number of cases) yielded a model with an R = .321 and R-square = .103. Of the eight independent variables, three were found to be significant at the p = .05 level. First, median age was a positive and significant predictor (t = 2.481, p = .014). Thus, H4a was supported and indicated that counties with an older population experienced more cases. Second, median household income was a positive and significant predictor (t = 3.247; p = .001). Thus, there is no support for H5a. This result may be explained by counties with a population that is more affluent ignoring the recommended preventative measures because a higher income typically implies better health insurance, which can lead people to worry less about health issues. Third, ethnicity was a negative and significant predictor (t = -2.084; p = .038). Thus, H7a was supported and indicated that counties with more ethnic homogeneity (i.e., higher percentage of the population reporting as non-Hispanic white) experienced fewer cases.

As indicated in Table 2 (Appendix), the second regression (DV = number of deaths) produced a model with an R = .598 and R-squared =.357. Of the eight independent variables, four were found to be significant at the p = .05 level. First, political ideology was a negative and significant predictor (t = -4.197; p = < .001). Thus, supporting H1b and indicating that counties with a higher percentage of votes for the Democratic candidate in the presidential election experienced fewer deaths. Second, median age was a positive and significant predictor (t = 2.148; p = .030). Thus, H4b was supported and demonstrated that counties with an older population experienced more deaths. Third, median household income was a negative and significant predictor (t = -4.870; p = <.001). Thus, supporting H5b and indicating that counties with a more affluent population experienced fewer deaths. Fourth, ethnicity was a negative and significant predictor (t = -2.619; p = .009). Thus, H7b was supported and demonstrated that counties with more ethnic homogeneity experienced fewer deaths.

As indicated in Table 3 (Appendix), the third regression (DV = vaccination rates) yielded a model with an R = .768 and R-squared = .590. This was the best fit of the three models, and perhaps in terms of implications for social marketers and those working in public health, may have yielded the most meaningful results. Of the eight independent variables, three were found to be significant at the p = .05 level. First, political ideology was a positive and significant predictor (t = 9.257; p = <.001). Thus, supporting H1c and indicating that counties with a higher percentage of votes for the Democratic candidate in the presidential election experienced higher vaccination rates. While the number of cases and deaths were newsworthy items, vaccination rates were the most contentious, often splitting along political party lines. Second, median household income was a positive and significant predictor (t = 3.889; p = <.001). Thus, H5c was supported and demonstrated that counties with a more affluent population experienced higher vaccination rates. The results also indicate that beliefs about the Covid-19 vaccine split along income lines. Third, population density was a negative and significant predictor (t = -2.799; p = .006). Thus, this supports H8c and indicates that counties that were more densely populated experienced lower vaccination rates. This independent variable is complicated in that numerous other factors (e.g., politics, religion, etc.) may play a role in more densely populated counties having lower vaccination rates. For instance, those living in more dense counties may deal with a lack of healthcare facilities that are within proximity, face travel problems (e.g., limited parking, traffic, or access to public transportation), or lack the ability to book and wait for a vaccination appointment.

Lastly, a correlation analysis was performed to check for possible multicollinearity among the independent variables. As indicated in Table 4 (Appendix), the only correlation of interest was the one between median household income and the poverty rate (r = .79). In some circumstances, this would cause alarm and possibly require eliminating one of the two independent variables that are so highly correlated. However, in this instance, as indicated in similar public health studies (Singh et al., 2019), while median household income and the poverty rate are both measures of incomes in each county, they are still very different and should be treated as separate constructs. For example, median household income only examines the middle value among all households, which may or may not be distributed in a classic inverted U-shape. Furthermore, if the distribution is skewed one way or the other without affecting the median, it is possible to have a high or low poverty rate. Thus, while the two measures are indeed highly correlated, both were included because of their relevance to the study and because prior research has done so as well.

DISCUSSION

Implications

The Covid-19 pandemic was an unusual point in modern history that lasted for roughly three years and provided a unique experience for society, outside of those who were alive during the pandemic in 1918. While not easily generalized to other public health crises because Covid-19 is the only pandemic in more than 100 years, the findings do provide practical implications for those working in healthcare and public health along with social marketers. Whether it is local primary care physicians to those who work for notable health organizations (e.g., WHO, CDC, etc.) along with social marketers, it is important to understand one's audience (e.g., age, where they live, political beliefs, etc.) when putting together public health messages. For instance, the Respiratory Syncytial Virus (RSV) is more likely to affect young children and older adults. Therefore, those responsible for efforts aimed at reducing the spread of RSV need to put together messages that will reach the intended audience (e.g., doctors, parents, older adults, etc.) and motivate them to engage in actions (e.g., vaccination, good hygiene, etc.) that will prevent the spread of RSV. Thus, the findings provide practitioners with insight into how to utilize social marketing tactics when creating public health messages to ensure that people remain safe and healthy.

Limitations and Future Research

While the data for each of Texas' 254 counties was complete and not just a sampling, it is not possible to generalize the findings about Texas across the remaining 49 states. For instance, Wyoming is very remote, has low population densities, and the largest city has only 65,000 residents, which is a modest suburb in the Dallas-Fort Worth metro area. Other states, particularly smaller states such as Rhode Island, Delaware, and Connecticut, each with large metro areas, may track very differently from Texas. Lastly, the state of Illinois has one major city/metro area in the northeastern part of the state and rural/smaller cities throughout the rest of the state, thus resulting in a distinctively dichotomized state.

Within Texas, it would have been interesting to look at the data on either side of the divide created by Interstate 35 (I-35). For instance, the state becomes "redder" as one goes west, up until El Paso, where it turns blue. On the other hand, along and east of I-35 are some of Texas' biggest cities and metro areas including Dallas, Fort Worth, Austin, San Antonio, and Houston. In fact, most of the state's population resides within the "Golden Triangle" which can be drawn by connecting these cities. Lastly, these metro areas tend to be "bluer"

than most Texas counties, implying that this part of the state is likely very different from the large part of the state that is west of I-35.

While this study's independent variables have indisputably been shown to be relevant and justified for inclusion in this analysis, it is also possible that other variables not included in this study could help explain the three dependent variables. For instance, no attempt was made to account for the variability in the message to social distance, receive the vaccine, etc., across the counties in Texas. Such variation would have been difficult to control for, given that residents receive their news/media from a variety of sources including over-the-air television, cable, satellite, the internet, and social media.

Lastly, the analysis is limited to data collected county-by-county through mid-April of 2022. Thus, in the aftermath of the worst part of the Covid-19 pandemic, it is possible that the results could be different. Therefore, future research could examine Covid-19 outcomes based on more longitudinal data.

CONCLUSION

Texas is one of the most diverse states in the United States. As the findings indicate, these diverse aspects help to indicate how–and possibly why–Texas' 254 counties varied when it came to the number of cases and deaths along with vaccination rates. Thus, providing a further understanding of the Covid-19 pandemic and the factors that influenced the outcomes of it. Lastly, by virtue of these findings, additional insight is provided that demonstrates when implementing social marketing tactics, those in charge of creating public health messages must understand and take into consideration the target audience.

REFERENCES

Acosta, A. M., Garg, S., Pham, H., Whitaker, M., Anglin, O., O'Halloran, A., ... & Havers, F. P. (2021). Racial and ethnic disparities in rates of COVID-19–associated hospitalization, intensive care unit admission, and in-hospital death in the United States from March 2020 to February 2021. *JAMA Network Open*, *4*(10), e2130479-e2130479.

Adida, C., Cottiero, C., Falabella, L., Gotti, I., Ijaz, S. S., Phillips, G., & Seese, M. (2021, April 20). Taking the Cloth: How Religious Appeals Increase Compliance with COVID-19 Prevention Measures.

Adzrago, D., Sulley, S., Ormiston, C. K., Mamudu, L., & Williams, F. (2022). Differences in the Perceived Likelihood of Receiving COVID-19 Vaccine. *International Journal of Environmental Research and Public Health*, *19*(21), 13723.

Allcott, H., Boxell, L., Conway, J., Gentzkow, M., Thaler, M., & Yang, D. (2020). Polarization and public health: Partisan differences in social distancing during the coronavirus pandemic. *Journal of Public Economics*, *191*, 104254.

Allen, J. D., Abuelezam, N. N., Rose, R., & Fontenot, H. B. (2021). Factors associated with the intention to obtain a COVID-19 vaccine among a racially/ethnically diverse sample of women in the USA. *Translational Behavioral Medicine*, *11*(3), 785-792.

Anderson, K. F., & Ray-Warren, D. (2022). Racial-ethnic residential clustering and early COVID-19 vaccine allocations in five urban Texas counties. *Journal of Health and Social Behavior*, *63*(4), 472-490.

Andreasen A. R. (1995), *Marketing Social Change.* San Francisco: Jossey-Bass.

Barrios, J. M., & Hochberg, Y. (2020). Risk perception through the lens of politics in the time of the COVID-19 pandemic (No. w27008). National Bureau of Economic Research.

Bergan, A., & McConatha, J. T. (2001). Religiosity and life satisfaction. *Activities, Adaptation & Aging*, *24*(3), 23-34.

Bollyky, T. J., Castro, E., Aravkin, A. Y., Bhangdia, K., Dalos, J., Hulland, E. N., ... & Dieleman, J. L. (2023). Assessing COVID-19 pandemic policies and behaviours and their economic and educational trade-offs across US states from Jan 1, 2020, to July 31, 2022: an observational analysis. *The Lancet*, *401*(10385), 1341-1360.

Cai, S., Wang, X., Zhou, X., Hyman, M. R., & Yang, Z. (2021). Political and community logics jointly affect 'social distancing 'compliance. *Sustainable Cities and Society*, *74*, 103200.

Callaghan, T., Moghtaderi, A., Lueck, J. A., Hotez, P., Strych, U., Dor, A., Franklin Fowler, E., & Motta, M. (2021). Correlates and disparities of intention to vaccinate against COVID-19. *Social Science & Medicine (1982)*, *272*, 113638.

Campbell, A., Converse, P. E., Miller, W. E., Stokes, D. E. (1960). *The American Voter.* University of Chicago Press.

Chin, J. H., & Mansori, S. (2018). Social marketing and public health: A literature review. *Journal of Marketing Management and Consumer Behavior*, *2*(2), 48-66.

Cho, H., Guo, Y., & Torelli, C. (2022). Collectivism fosters preventive behaviors to contain the spread of COVID-19: Implications for social marketing in public health. *Psychology & Marketing*, *39*(4), 694-700.

City of Amarillo. (2020, March 30). *Mayor Issues Stay-at-Home Directive | Amarillo News | City of Amarillo, TX.* Amarillo.gov. Retrieved December 29, 2023, from https://www.amarillo.gov/Home/Components/News/News/910/16

Clarkson, J. J., Chambers, J. R., Hirt, E. R., Otto, A. S., Kardes, F. R., & Leone, C. (2015). The self-control consequences of political ideology. *Proceedings of the National Academy of Sciences*, *112*(27), 8250-8253.

Clements, J. M. (2020). Knowledge and behaviors toward COVID-19 among US residents during the early days of the pandemic: cross-sectional online questionnaire. *JMIR Public Health and Surveillance*, *6*(2), e19161.

Coffie, I. S., Nkukpornu, A., Kankam, W. A., & Ocloo, C. E. (2022). Using social marketing to demystify the myths surrounding COVID-19 vaccination: the mediating role of important others. *Social Marketing Quarterly*, *28*(2), 169-183.

Cohen, D. (2015, March 4). *Understanding Population Density*. U.S. Census Bureau. Retrieved December 31, 2023, from https://www.census.gov/newsroom/blogs/random-samplings/2015/03/understanding-population-density.html

DeFranza, D., Lindow, M., Harrison, K., Mishra, A., & Mishra, H. (2021). Religion and reactance to COVID-19 mitigation guidelines. *American Psychologist*, *76*(5), 744.

Dein, S., Loewenthal, K., Lewis, C. A., & Pargament, K. I. (2020). COVID-19, mental health and religion: An agenda for future research. *Mental Health, Religion & Culture*, *23*(1), 1-9.

Drążkowski, D., & Trepanowski, R. (2021). I do not need to wash my hands because I will go to Heaven anyway: A study on belief in God and the afterlife, death anxiety, and COVID-19 protective behaviors. *PsyArXiv Preprints; COVID*, *19*(10.31234).

Evans, W. D. (2006). How social marketing works in health care. *Bmj*, *332*(7551), 1207-1210.

Evans, W. D., & French, J. (2021). Demand creation for COVID-19 vaccination: overcoming vaccine hesitancy through social marketing. *Vaccines*, *9*(4), 319.

Everett, J. A. C., Clark, C. J., Meindl, P., Luguri, J. B., Earp, B. D., Graham, J., Ditto, P. H., & Shariff, A. F. (2021). Political differences in free will belief are associated with differences in moralization. *Journal of Personality and Social Psychology*, *120*(2), 461.

Freeman Anderson, K. (2017). Racial residential segregation and the distribution of health-related organizations in urban neighborhoods. *Social Problems*, *64*(2), 256-276.

French, J., Deshpande, S., Evans, W., & Obregon, R. (2020). Key guidelines in developing a pre-emptive COVID-19 vaccination uptake promotion strategy. *International Journal of Environmental Research and Public Health*, *17*(16), 5893.

Fridman, A., Gershon, R., & Gneezy, A. (2021). COVID-19 and vaccine hesitancy: A longitudinal study. *PloS One*, *16*(4), e0250123.

Gadarian, S. K., Goodman, S. W., & Pepinsky, T. B. (2021). Partisanship, health behavior, and policy attitudes in the early stages of the COVID-19 pandemic. *Plos One*, *16*(4), e0249596.

Gao, J., & Radford, B. J. (2021). Death by political party: The relationship between COVID-19 deaths and political party affiliation in the United States. *World Medical & Health Policy*, *13*(2), 224-249.

Garnier, R., Benetka, J. R., Kraemer, J., & Bansal, S. (2020). Socio-economic disparities in social distancing during the COVID-19 pandemic in the United States. *MedRxiv*.

Gaskin, D. J., Dinwiddie, G. Y., Chan, K. S., & McCleary, R. R. (2012). Residential segregation and the availability of primary care physicians. *Health Services Research*, *47*(6), 2353-2376.

Gonzalez, C. J., Aristega Almeida, B., Corpuz, G. S., Mora, H. A., Aladesuru, O., Shapiro, M. F., & Sterling, M. R. (2021). Challenges with social distancing during the COVID-19 pandemic among Hispanics in New York City: A qualitative study. *BMC Public Health*, *21*(1), 1-8.

Haischer, M. H., Beilfuss, R., Hart, M. R., Opielinski, L., Wrucke, D., Zirgaitis, G., Uhrich, T. D., & Hunter, S. K. (2020). Who is wearing a mask? Gender-, age-, and location-related differences during the COVID-19 pandemic. *PloS One*, *15*(10), e0240785.

Hearne, B. N., & Niño, M. D. (2021). Understanding how race, ethnicity, and gender shape mask-wearing adherence during the COVID-19 pandemic: evidence from the COVID impact survey. *Journal of Racial and Ethnic Health Disparities*, 1-8.

Hornsey, M. J., Finlayson, M., Chatwood, G., & Begeny, C. T. (2020). Donald Trump and vaccination: The effect of political identity, conspiracist ideation and presidential tweets on vaccine hesitancy. *Journal of Experimental Social Psychology*, *88*, 103947.

Jay, J., Bor, J., Nsoesie, E. O., Lipson, S. K., Jones, D. K., Galea, S., & Raifman, J. (2020). Neighbourhood income and physical distancing during the COVID-19 pandemic in the United States. *Nature Human Behaviour*, *4*(12), 1294-1302.

Kannan, V. D., & Veazie, P. J. (2018). Political orientation, political environment, and health behaviors in the United States. *Preventive Medicine*, *114*, 95-101.

Karim, S. A., & Chen, H. F. (2021). Deaths from COVID-19 in rural, micropolitan, and metropolitan areas: a county-level comparison. *The Journal of Rural Health*, *37*(1), 124-132.

Kelly, B. J., Southwell, B. G., McCormack, L. A., Bann, C. M., MacDonald, P. D., Frasier, A. M., Brewer, N. T., & Squiers, L. B. (2021). Predictors of willingness to get a COVID-19 vaccine in the US. *BMC Infectious Diseases*, *21*(1), 1-7.

Kerr, J., Panagopoulos, C., & Van Der Linden, S. (2021). Political polarization on COVID-19 pandemic response in the United States. *Personality and Individual Differences*, *179*, 110892.

Kim, J. K., & Crimmins, E. M. (2020). How does age affect personal and social reactions to COVID-19: Results from the national Understanding America Study. *PloS One*, *15*(11), e0241950.

Kiviniemi, M. T., Orom, H., Hay, J. L., & Waters, E. A. (2022). Prevention is political: political party affiliation predicts perceived risk and prevention behaviors for COVID-19. *BMC Public Health*, *22*(1), 298.

Ko, M., & Ponce, N. A. (2013). Community Residential Segregation and the Local Supply of Federally Qualified Health Centers. *Health Services Research*, *48*(1), 253-270.

Kotler, P., & Zaltman, G. (1971). Social marketing: an approach to planned social change. *Journal of Marketing*, *35*(3), 3-12.

Kranz, D., Niepel, C., Botes, E., & Greiff, S. (2023). Religiosity predicts unreasonable coping with COVID-19. *Psychology of Religion and Spirituality*, *15*(1), 1.

Kricorian, K., & Turner, K. (2021). COVID-19 vaccine acceptance and beliefs among Black and Hispanic Americans. *PloS One*, *16*(8), e0256122.

Latkin, C. A., Dayton, L., Moran, M., Strickland, J. C., & Collins, K. (2022). Behavioral and psychosocial factors associated with COVID-19 skepticism in the United States. *Current Psychology*, *41*(11), 7918-7926.

Lee, N. R. (2020). Reducing the spread of COVID-19: A social marketing perspective. *Social Marketing Quarterly*, *26*(3), 259-265.

Li, R., Richmond, P., & Roehner, B. M. (2018). Effect of population density on epidemics. *Physica A: Statistical Mechanics and its Applications*, *510*, 713-724.

Linke, M., & Jankowski, K. S. (2022). Religiosity and the spread of COVID-19: A multinational comparison. *Journal of Religion and Health*, *61*(2), 1641-1656.

Lopez, L., Hart, L. H., & Katz, M. H. (2021). Racial and ethnic health disparities related to COVID-19. *Jama*, *325*(8), 719-720.

Luningham, J. M., Akpan, I. N., Taskin, T., Alkhatib, S., Vishwanatha, J. K., & Thompson, E. L. (2023). Demographic and Psychosocial Correlates of COVID-19 Vaccination Status among a Statewide Sample in Texas. *Vaccines*, *11*(4), 848.

MacIntyre, C. R., & Wang, Q. (2020). Physical distancing, face masks, and eye protection for prevention of COVID-19. *The Lancet*, *395*(10242), 1950-1951.

Masters, N. B., Shih, S. F., Bukoff, A., Akel, K. B., Kobayashi, L. C., Miller, A. L., Lu., Y., & Wagner, A. L. (2020). Social distancing in response to the novel coronavirus (COVID-19) in the United States. *PloS One*, *15*(9), e0239025.

Melovic, B., Jaksic Stojanovic, A., Vulic, T. B., Dudic, B., & Benova, E. (2020). The impact of online media on parents' attitudes toward vaccination of children—social marketing and public health. *International Journal of Environmental Research and Public Health*, *17*(16), 5816.

Miller, J. D., Ackerman, M. S., Laspra, B., Polino, C., & Huffaker, J. S. (2022). Public attitude toward Covid-19 vaccination: The influence of education, partisanship, biological literacy, and coronavirus understanding. *The FASEB Journal*, *36*(7).

Milligan, M. A., Hoyt, D. L., Gold, A. K., Hiserodt, M., & Otto, M. W. (2022). COVID-19 vaccine acceptance: Influential roles of political party and religiosity. *Psychology, Health & Medicine*, *27*(9), 1907-1917.

Mishori, R. (2019). The social determinants of health? Time to focus on the political determinants of health!. *Medical Care*, *57*(7), 491-493.

Morales, D. X., Beltran, T. F., & Morales, S. A. (2022). Gender, socioeconomic status, and COVID-19 vaccine hesitancy in the US: an intersectionality approach. *Sociology of Health & Illness*, *44*(6), 953-971.

Mueller, A. L., McNamara, M. S., & Sinclair, D. A. (2020). Why does COVID-19 disproportionately affect older people?. *Aging (Albany NY)*, *12*(10), 9959.

National Governors Association. (2020, March 9). *Texas - Coronavirus State Actions*. National Governors Association. Retrieved December 29, 2023, from https://www.nga.org/coronavirus-state-actions/texas/

Nikolovski, J., Koldijk, M., Weverling, G. J., Spertus, J., Turakhia, M., Saxon, L., ... & Navar, A. M. (2021). Factors indicating intention to vaccinate with a COVID-19 vaccine among older US adults. *PloS One*, *16*(5), e0251963.

Ojinnaka, C. O., Adepoju, O. E., Burgess, A. V., & Woodard, L. (2021). Factors associated with COVID-related mortality: the case of Texas. *Journal of Racial and Ethnic Health Disparities*, *8*, 1505-1510.

Olagoke, A. A., Olagoke, O. O., & Hughes, A. M. (2020). Psychological pathways linking public trust during the coronavirus pandemic to mental and physical well-being. *Frontiers in Psychology*, *11*, 570216.

Painter, M., & Qiu, T. (2020). Political beliefs affect compliance with covid-19 social distancing orders. *Covid Economics*, *4*(April), 103-23.

Papageorge, N. W., Zahn, M. V., Belot, M., Van den Broek-Altenburg, E., Choi, S., Jamison, J. C., & Tripodi, E. (2021). Socio-demographic factors associated with self-protecting behavior during the Covid-19 pandemic. *Journal of Population Economics*, *34*, 691-738.

Pew Research Center. (2021, January 27). *How COVID-19 Has Strengthened Religious Faith*. Pew Research Center. Retrieved December 31, 2023, from https://www.pewresearch.org/religion/2021/01/27/more-americans-than-people-in-other-advanced-economies-say-covid-19-has-strengthened-religious-faith/

Rahimi, Z., Mohammadi, M. J., Araban, M., Shirali, G. A., & Cheraghian, B. (2022). Socioeconomic correlates of face mask use among pedestrians during the COVID-19 pandemic: An ecological study. *Frontiers in Public Health*, *10*, 921494.

Rocklöv, J., & Sjödin, H. (2020). High population densities catalyse the spread of COVID-19. *Journal of Travel Medicine*, *27*(3), taaa038.

Rosenfeld, D. L. (2020). Political ideology and the outbreak of COVID-19 in the United States. *PsyArXiv Preprints*.

Ruiz, J. B., & Bell, R. A. (2021). Predictors of intention to vaccinate against COVID-19: Results of a nationwide survey. *Vaccine*, *39*(7), 1080-1086.

Savoia, E., Piltch-Loeb, R., Goldberg, B., Miller-Idriss, C., Hughes, B., Montrond, A., Kayyem, J., & Testa, M. A. (2021). Predictors of COVID-19 vaccine hesitancy: socio-demographics, co-morbidity, and past experience of racial discrimination. *Vaccines*, *9*(7), 767.

Shao, W., & Hao, F. (2020). Confidence in political leaders can slant risk perceptions of COVID–19 in a highly polarized environment. *Social Science & Medicine*, *261*, 113235.

Singh, A., Peres, M. A., & Watt, R. G. (2019). The relationship between income and oral health: a critical review. *Journal of Dental Research*, *98*(8), 853-860.

Singu, S., Acharya, A., Challagundla, K., & Byrareddy, S. N. (2020). Impact of social determinants of health on the emerging COVID-19 pandemic in the United States. *Frontiers in Public Health*, *8*, 406.

Sy, K. T. L., White, L. F., & Nichols, B. E. (2021). Population density and basic reproductive number of COVID-19 across United States counties. *PloS One*, *16*(4), e0249271.

Texas Health and Human Services. (2020, March 10). *DSHS Announces First Case of COVID-19 in Texas | Texas DSHS*. Texas Department of State Health Services (DSHS). Retrieved December 29, 2023, from https://www.dshs.texas.gov/news-alerts/dshs-announces-first-case-covid-19-texas

Texas Health and Human Services. (2022, March 10). *People 65 and Older or With Certain Medical Conditions in Next Phase for COVID-19 Vaccine | Texas DSHS*. Texas Department of State Health Services (DSHS). Retrieved December 29, 2023, from https://www.dshs.texas.gov/news-alerts/people-65-older-or-certain-medical-conditions-next-phase-covid-19-vaccine

Trovall, E., Salhotra, P., Ortiz, P., Brooks, K., & Schulze, T. (2021, February 4). *Harris County Pushes COVID-19 Vaccine Safety Campaign to Address Community Mistrust – Houston Public Media*. Houston Public Media. Retrieved December 29, 2023, from https://www.houstonpublicmedia.org/articles/news/health-science/coronavirus/2021/02/04/390669/harris-county-pushes-covid-19-vaccine-safety-campaign-as-community-mistrust-threatens-herd-immunity/

Twum, K. K., Ofori, D., Agyapong, G. K. Q., & Yalley, A. A. (2021). Intention to vaccinate against COVID-19: a social marketing perspective using the theory of planned behaviour and health belief model. *Journal of Social Marketing*, *11*(4), 549-574.

UOTP Marketing. (2022, October 26). *15 Benefits of Education That Can Impact Your Future*. University of the Potomac. Retrieved December 29, 2023, from https://potomac.edu/benefits-of-education/

Weill, J. A., Stigler, M., Deschenes, O., & Springborn, M. R. (2020). Social distancing responses to COVID-19 emergency declarations strongly differentiated by income. *Proceedings of the National Academy of Sciences*, *117*(33), 19658-19660.

Weyand, C. M., & Goronzy, J. J. (2016). Aging of the immune system. Mechanisms and therapeutic targets. *Annals of the American Thoracic Society*, *13*(Supplement 5), S422-S428.

Whiteman, A., Wang, A., McCain, K., Gunnels, B., Toblin, R., Lee, J. T., ... & Barbour, K. E. (2021). Demographic and social factors associated with COVID-19 vaccination initiation among adults aged≥ 65 years—United States, December 14, 2020–April 10, 2021. Morbidity and Mortality Weekly Report, 70(19), 725.

Wen, L., Wilson, S., Boorstein, M., Hernández, A. R., & Rozsa, L. (2020, April 5). *Coronavirus creates conflict for churches, where gatherings can be dangerous but also provide solace*. The Washington Post. Retrieved February 28, 2024, from https://www.washingtonpost.com/national/coronavirus-church-services-outbreak/2020/04/05/7f5b63cc-7773-11ea-90ad-819caa48d39f_story.html

Wong, D. W., & Li, Y. (2020). Spreading of COVID-19: Density matters. *Plos One*, *15*(12), e0242398.

Worthy, A., Noel, R., Svitek, P., Martínez, S., Aguilar, J., & Schulze, T. (2021, August 20). *How We Got Here: A Timeline of Gov. Greg Abbott's COVID Policies – Houston Public Media*. Houston Public Media. Retrieved December 29, 2023, from https://www.houstonpublicmedia.org/articles/news/politics/2021/08/20/406474/how-we-got-here-a-timeline-of-gov-greg-abbotts-covid-policies/

Wu, E. C., & Cutright, K. M. (2018). In God's hands: How reminders of God dampen the effectiveness of fear appeals. *Journal of Marketing Research*, *55*(1), 119-131.

APPENDIX

Table 1 OLS #1 DV = Cases Per Thousand

	Unstand. **β**	Std. Error	Stand. **β**	t	p-value
Political Ideology	-.647	.904	-.079	-.716	.475
Religiosity	-.369	.228	-.100	-1.616	.107
Education	1.269	1.366	.091	.929	.354
Median Age	3.616	1.457	.193	2.481	.014
Median Household Income	.003	.001	.364	3.247	.001
Poverty Rate	3.040	3.158	.116	.963	.337
Ethnicity	-1.509	.724	-.275	-2.084	.038
Population Density	-.018	.026	-.054	-.698	.486
Constant	-36.584	125.607		-.291	.771

R = .321; R-square = .103; Adj. R-square = .074; Std Err. of Est. = 111.529; df = 253; F = 3.515; $p < .001$

Table 2 OLS #2 DV = Deaths Per Thousand

	Unstand. **β**	Std. Error	Stand. **β**	t	p-value
Political Ideology	-.047	.011	-.392	-4.197	<.001
Religiosity	-.004	.003	-.069	-1.324	.187
Education	-.011	.017	-.055	-.660	.510
Median Age	.040	.018	.144	2.184	.030
Median Household Income	-.0001	.00001	-.462	-4.870	<.001
Poverty Rate	.015	.039	.039	.386	.700
Ethnicity	-.024	.009	-.293	-2.619	.009
Population Density	-.00003	.0003	-.005	-.082	.934
Constant	9.248	1.558		5.934	<.001

R = .598; R-square = .357; Adj. R-square = .336; Std Err. of Est. = 1.384; df = 253; F=17.004; $p < .001$

Table 3 OLS #3 DV = Vaccination Rates

	Unstand. **β**	Std. Error	Stand. **β**	t	p-value
Political Ideology	.985	.106	.691	9.257	<.001
Religiosity	-.031	.027	-.048	-1.138	.256
Education	.252	.161	.103	1.565	.119
Median Age	.299	.172	.092	1.746	.082
Median Household Income	.0005	.0001	.295	3.889	<.001
Poverty Rate	.679	.372	.149	1.826	.069
Ethnicity	-.107	.085	-.112	-1.258	.210
Population Density	-.009	.003	-.145	-2.799	.006
Constant	-13.026	14.785		-.881	.379

R = .768; R-square = .590; Adj. R-square = .577; Std Err. of Est. = 13.128; df = 253; F = 44.123; $p < .001$

Table 4 Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11
Number of Cases	1										
Number of Deaths	.22	1									
Vaccination Rate	.12	-.10	1								
Political Ideology	.06	-.22	.73	1							
Religiosity	-.10	.02	-.12	-.11	1						
Education	.10	.20	.31	.28	.05	1					
Median Age	.01	.17	-.29	-.41	-.01	-.32	1				
MHI	.16	-.52	.03	-.06	-.08	-.42	-.06	1			
Poverty Rate	-.07	.34	.27	.36	.07	.50	-.13	-.79	1		
Ethnicity	-.13	-.02	-.57	-.68	-.03	-.69	.59	.21	-.43	1	
Population Density	-.002	-.31	.25	.49	-.08	-.13	-.22	.29	-.12	-.16	1