Journal of Rural Social Sciences

Volume 37
Issue 2 *Space, Place, and COVID-19*

Article 4

June 2022

Preventive Behaviors Along the Rural-Urban Continuum in Utah During the COVID-19 Pandemic

Jessica D. Ulrich-Schad
Utah State University, jessica.schad@usu.edu

Jennifer E. Givens
Utah State University, jennifer.givens@usu.edu

Mitchell Beacham
Utah State University, mitchell.beacham@aggiemail.usu.edu

Preventive Behaviors Along the Rural-Urban Continuum in Utah During the COVID-19 Pandemic

Cover Page Footnote

Please address all correspondence to Dr. Jessica Ulrich-Schad (jessica.schad@usu.edu).

Preventive Behaviors Along the Rural-Urban Continuum in Utah During the COVID-19 Pandemic

Jessica D. Ulrich-Schad
Jennifer E. Givens
Mitchell Beacham
Utah State University

ABSTRACT
Rural individuals and places face major vulnerabilities in relation to the COVID-19 pandemic, yet how and why rural residents adopted preventive behaviors as a result is not well understood. Using cross-sectional data from an online panel survey of Utahans along the rural-urban continuum collected in June of 2020, we find that, overall, rural Utahans were less likely than their more urban counterparts to adopt preventive behaviors. Those who perceived less risk, knew someone sick with COVID-19, thought former President Trump was doing a good job handling the pandemic, and had false optimism about the pandemic, along with those with less formal education and of a lower economic class, were also less likely to adjust some of their behaviors. Given that COVID-19 and its variants continue to spread, and because other viral outbreaks are likely, a better understanding of preventive behavior along the rural-urban continuum and what shapes it is essential for health-related policymaking including encouraging vaccine uptake.

KEYWORDS
COVID-19 pandemic, politics, preventive behavior, rural U.S., science

INTRODUCTION

Daily life in the United States (U.S.) has changed immensely since the global outbreak of the COVID-19 novel coronavirus in late 2019. Adjustments to daily behavior such as washing hands, social distancing, wearing face masks, and vaccinating have been shown to be effective in slowing the spread of the virus (Gandhi, Beyrer, and Goosby 2020; Lyu and Wehby 2020). However, despite the clear health risks (Paules,

Marston, and Fauci 2020), and one of the highest death rates in the world of 178.5 per 100,000 (Centers for Disease Control 2021), the pandemic, and associated preventive behaviors, have become highly politicized in the U.S. (Allcott et al. 2020; Green et al. 2020; Hamilton and Safford 2021; Hill, Gonzalez, and Davis 2020a). Republicans have generally perceived less risk from the pandemic and have been less likely to change their behavior (Calvillo et al. 2020; Hill et al. 2020a), and rural residents tend to vote Republican and support former President Trump more than urban residents (Goetz et al. 2018; Monnat and Brown 2017; Scala and Johnson 2017). Rural places were not initial hot spots for the virus, but from October 2020 to April 2021, nonmetro areas in the U.S. experienced higher prevalence of cumulative COVID-19 cases than metro areas (Pender 2021). Yet, over the course of the pandemic, little reliable and representative information has existed regarding how U.S. residents living in rural places were perceiving and reacting to it, particularly that which allowed for a comparison of associated factors along the rural-urban continuum.

While decidedly and increasingly interconnected (Lichter and Brown 2011), key differences do exist between rural and urban areas in the U.S. that are important to consider when examining how individuals have responded to the COVID-19 pandemic. For instance, studies have shown notable differences in politics, trust in government, views of local problems, economic disadvantage, and more (Ashwood 2018; Albrecht 2012; Flora et al. 2016; Goetz et al. 2018; Parker et. al. 2018; Ulrich-Schad and Duncan 2018). We need a better understanding of how these and other factors are associated with behavior and attitudes in relation to COVID-19 specifically. While case and mortality rates in the U.S. were in decline during the first half of 2021, COVID-19 is by no means eradicated, and new strains and hotspots are continually emerging in the U.S. and worldwide. Vaccine availability and uptake rates globally and within the U.S. are also highly varied, with rural places in the U.S. lagging compared to their urban counterparts (Murthy et al. 2021). This vaccination gap between rural and urban places is continuing to grow (Chapman 2021).

The data in this manuscript are based on a cross-sectional online panel survey of 634 adult residents of the state of Utah conducted from June 12 to June 29, 2020, just as the virus was trending upwards in the state mid-summer and state-level stay-at-home orders were lifted and mask mandates enacted. Residents living all across the state were asked about their attitudes and behavior concerning the pandemic, as well as how they saw various levels of government or policy actors as addressing

it. In this article, we seek to answer the following research questions: 1) In the midst of the COVID-19 pandemic, how did residents across the rural-urban continuum in Utah adjust their daily behavior, including mask wearing, in response? And, 2) What factors are related to behavior change in response to the COVID-19 pandemic in Utah? Specifically, we use multivariate ordered logistic regression models to examine how rurality of residence, perceived COVID-19 risks and impacts, attitudes towards the pandemic, and individual characteristics including education and political party played a role in Utahans' behaviors during the early days of the COVID-19 pandemic.

While there are limitations to focusing on only one Intermountain West state and in using self-reported, cross-sectional survey data to understand behavior change, examining the reactions of residents across the rural-urban continuum is important for informing future public health policy. Studies published thus far have not examined such differences using data that include these types of key variables. A resurgence of COVID-19 or other viral outbreaks are likely in the future and policies need to account for important differences by place and other factors in order to be effective.

CONTEXT AND LITERATURE REVIEW

The Pandemic and Related Policy in Utah

In this article we focus on understanding preventive behaviors used by state of Utah residents in relation to the COVID-19 pandemic. In comparison to other states, Utah has ranked high in confirmed cases (fourth among 56 states/territories/districts), but relatively low in COVID-related deaths (48th among 56), according to data published by the *New York Times* (2021). According to the Utah Department of Health, as of May 31, 2021 the state of Utah had 406,170 confirmed COVID-19 cases, 16,822 hospitalizations, and 2,302 deaths (Utah Department of Health 2021). The majority of cases, hospitalizations, and deaths have been concentrated in Salt Lake and Utah counties, the most populated in the state, yet rates were highest in rural San Juan County which overlaps with the Navajo Nation where the impacts were particularly devastating (Kovich 2020; Navajo Department of Health 2021). Like elsewhere in the country, meatpacking plants in the state, which are often in more rural places in the U.S., were also early hotspots for viral spread in the spring of 2020 (Associated Press 2020).

As awareness that the U.S. was not going to be immune from the virus began to spread across the U.S., on March 6, 2020, Gary R. Herbert,

Governor of the State of Utah, declared a “State of Emergency” in response (State of Utah 2021; Utah Division of Emergency Management 2021). This declaration was largely procedural, allowing the state to seek federal disaster relief funding. The move also granted the governor certain “emergency powers,” including the ability to suspend some services and to divert state resources to address pandemic-related costs. This set the stage for dozens of subsequent executive orders over the next several months. As the situation became more precarious, on March 27, the Governor issued the “Stay Safe, Stay Home” Directive, which was much less strict than the shelter in place orders seen in other states as it simply urged residents to leave home infrequently and stay six feet away from others outside the home, and banned private gatherings larger than 20. Just one month later, at the end of April, the Utah COVID-19 Public Health Risk Status was moved from Red (High Risk) to Orange (Moderate Risk), meaning the Governor’s recent directive was ended on May 1st.

Mask mandates at the state level shifted over time in Utah as COVID infections fluctuated (State of Utah 2021; Utah Division of Emergency Management 2021). Some local governments also enacted their own stricter mask mandates at various points during the pandemic. The first state level mandate in June 2020 required public transportation employees and riders to wear them. Shortly after, masks became a requirement in state buildings. In August 2020, the Department of Health announced that masks would be required in public schools and buses through the end of the year. This was subsequently extended through mid-May of 2021. Finally, as case numbers surged in the fall of 2020, Governor Herbert issued a State of Emergency which mandated statewide mask use in public. This was ended in April of 2021 by the newly elected governor Spencer Cox. Likely, in part, as a backlash to the state and local mandates, the Utah state legislature passed House Bill 1007 in May of 2021 which prohibits face covering requirements in the public education and higher education systems in the state.

Impacts of COVID-19 on the Rural U.S.

Research has documented that nonmetro counties in the U.S. have been hard hit by the pandemic in terms of case numbers (Pender 2021). While the virus first spread faster in more urban parts of the country, by fall of 2020, nonmetro counties had higher COVID-19 prevalence levels. Yet, to date, there has been a relative lack of social science research focused on more closely examining the impacts of the COVID-19 pandemic in rural parts of the U.S. (Mueller et al. 2021). This is troubling given the clear

vulnerabilities faced by many rural counties, including older populations, fewer physicians and hospitals, limited mental health services, more disability, and lower health insurance rates, for instance (Ulrich-Schad, Duncan, and Koci Forthcoming; Johnson 2020; Peters 2020). A recent study by Mueller et al. (2021), however, starts to document some of the impacts. Using data from a survey of rural North Americans conducted during the summer of 2020, they find that impacts have been severe, particularly in relation to employment, overall life satisfaction, mental health, and economic outlook. While providing useful information about the impacts on rural places in the western U.S., their study design does not allow for comparisons between urban and rural residents and focuses largely on economic impacts of the pandemic.

Ulrich-Schad, Givens, and Wengreen (2020) do assess differences in perceived impacts of the pandemic between rural, transitioning, and urban counties in Utah, finding few differences in perceived impacts based on the type of counties in which residents reside. An article by Brooks, Mueller, and Thiede (2021) examines rural-urban differences in impacts of COVID-19, but focuses specifically on the labor market, finding more severe impacts for urban adults, including greater unpaid labor, more missed work, and more difficulty searching for work when unemployed. Rural workers, however, were less likely to work remotely than their urban counterparts, even when socioeconomic status was accounted for. In a survey of immigrant Latinx farmworker and non-farmworker families in the U.S., Quandt et al. (2021) find that while both rural and urban workers experienced substantial economic effects from the pandemic, they were greater for urban families. However, rural workers were less protected in their workplaces and thus potentially more vulnerable to contracting the virus.

The economic type of rural county has mattered for COVID-19 impacts. Non-metro counties considered manufacturing-dependent and farming-dependent by the Economic Research Service (ERS) have so far experienced the highest cumulative COVID-19 case rates (Pender 2021). Non-metro manufacturing-dependent counties include many counties dependent upon the meatpacking industry, some of the first hot spots for the virus in rural America, while nonmetro recreation counties have had the lowest COVID-19 case rates.

Attitudes and Behavior Related to the Pandemic

There is an emerging body of literature documenting attitudes and behavior in relation to the pandemic - with some studies linking the two.

The vast majority, however, does not examine rural-urban differences. One area of focus has been on whether or not people feel threatened or risks in relation to COVID-19. Political ideology is one factor that is emerging in early research as important in understanding threat or risk perceptions in this context. For instance, Calvillo et al. (2020) and Allcott et al. (2020) find that conservatives or Republicans were less likely to perceive personal and societal vulnerability to the virus. Calvillo et al. (2020) found they were also more likely to think that the media was exaggerating the virus's impact and that the entire pandemic was part of a conspiracy. Research has also shown that Republicans have taken the threat of the virus much less seriously than Democrats and perceive less risk to it (de Bruin, Saw, and Golden 2020). Focused on support for various mitigation measures on a national level, Shao and Hao (2021) also find Democrats are more supportive of such steps and that COVID-19 concern is a strong motivator. Albrecht (2021) examines COVID-19 cases and deaths along the rural-urban continuum finding that place of residence is not the main contributing factor to COVID-19. Instead, places with a higher percentage of Trump voters tended to have the highest case rates. This likely reflects differences in perceived risks and thus mitigation behavior. Death from COVID-19, however, was more a function of disadvantage, with death rates highest in counties with lower education levels, higher poverty rates, and lower percentages of non-Hispanic white residents.

A form of optimism bias used in other contexts is sometimes referred to as "unrealistic optimism" (e.g., Gold and Brown 2009). Hamilton and Safford (2021) use the term "false optimism" in relation to the COVID-19 pandemic to refer to those who thought the worse of the pandemic was already behind us when the scientific consensus was that it was not. They found that while most of the New Hampshire residents they surveyed in July 2020 did think that the worst of the pandemic was yet to come (in line with most scientific experts at the time), 21 percent were falsely optimistic (e.g., thought the worst of the pandemic had passed), and 6 percent were in denial that COVID-19 was even a real problem. Republicans and those who frequently watch Fox News and listen to conservative talk radio were significantly more likely to think that the worst was behind us. They also found that false optimism and denial were correlated with lower support for mitigation steps (e.g., testing and tracing, limited travel or gatherings, social distancing, and mask wearing), which has important implications because of the relationship between adoption of these behaviors and the spread of the virus.

Given the important role that scientists' expert status often plays in how individuals, society, and institutions respond to science-related concerns (Safford, Whitmore, and Hamilton 2017), researchers have also started to examine views of science and scientists during the COVID-19 pandemic and to link it to pandemic-related behavior. Thus far, findings are in line with past studies that have documented the politicized nature of perceptions of science and scientific findings, including in relation to the Zika virus pandemic (Hamilton and Safford 2020a) and climate change (Hamilton, Hartter, and Saito 2015), for example. Past studies have found support for the Anti-Reflexivity Thesis, which contends that conservatives have less trust and support for certain types of science, particularly that which identifies environmental and public health impacts of economic production rather than new inventions or innovations for economic production, which they are more likely to support (McCright et al. 2013).

With regard to COVID-19 specifically, Hamilton and Safford (2020b) studied how much people trusted science agencies for information about the coronavirus. They found little change in responses to these questions in the surveys they conducted in both March and April of 2020, but they did find that there were much higher levels of trust in scientists than confidence in the federal government. Over 70 percent of respondents trusted scientists for information about the coronavirus at the time. A follow-up study with July 2020 data (Hamilton and Safford 2020c), found that the minor drop in trust was followed by a crash in trust of science agencies. While 77 percent trusted them in March, only 59 percent trusted them in July, with Democrats being significantly more likely to trust them. Evans and Hargittai (2020) also examined trust in science and health experts, finding Democrats have higher trust than Republicans. While the U.S. Centers for Disease Control (CDC) was favored over politicians to lead the U.S. response to the COVID-19 outbreak in the early days of the pandemic (McFadden et al. 2020), research has shown increasing public skepticism towards the CDC during the COVID-19 pandemic (Hamilton and Safford 2020a, 2020b, 2020c). Sanchez and Dunning (2021) examine anti-scientist bias, as measured by a "scientist thermometer" which measures feelings towards scientists, not how much they are trusted. They examined how warmth towards scientists relates to compliance with behaviors that can slow the spread of the coronavirus, finding that those who had more positive sentiments towards scientists were more likely to comply.

Some research has focused on how various levels of government have responded to the pandemic as well as perceptions of those

responses or ability to respond. Safford and Hamilton (2020b) examined how confident residents of New Hampshire were in the ability of the federal government to respond effectively to the pandemic, finding just under one-half were confident in the federal government's ability to respond. In their study of Utah residents, Ulrich-Schad et al. (2020) find that views on President Trump's handling of the coronavirus were much more polarized than views of Governor Herbert and local government officials. Utahans expressed the most disapproval for how Congress was responding to the pandemic. A study by Sherman and Schwartz (2021) in the state of Washington details some of the challenges related to public health and safety rural communities faced combatting the virus in the early months of the pandemic. Using multiple data sources, including secondary data and in-depth interviews with rural law enforcement staff and those held recently in rural jails, they find that local elected officials in rural places found themselves in difficult positions as they navigated governing populations that demanded both individual freedom and protection from crime. Ultimately, they find that the strategies local law enforcement used during the pandemic did little to protect rural populations from disease, and instead allowed individuals to make their own decisions in relation to protective measures from the coronavirus.

A number of studies have focused on understanding social distancing compliance. For instance, Hill et al. (2020a) find that states with more Trump voters were less compliant with stay-at-home orders. Religiosity was also an important factor in mobility during lock-downs, with more religious states (also more Republican) showing greater movement among residents (Hill, Gonzalez, and Burdette 2020b). Algara et al. (2021) find that women in general, and women within the Democratic Party, were more likely to use their scientific knowledge to make decisions about participating in social activities during the pandemic. Allcott et al. (2020) also find that Democrats are more likely than Republicans to self-report that they are social distancing. As opposed to focusing on individual behavior, Adolph et al. (2021) studied when states implemented state-level social distancing policies. They find the most important predictor to be political: states with Republican governors were slower to implement these policies in the early days of the pandemic in 2020 than states led by Democrat governors.

In sum, research has documented the importance of place of residence, risk perceptions, attitudes, and individual characteristics in understanding the current pandemic and other related science-based concerns. We thus use the survey data we collected on Utah residents in

the early days of the coronavirus pandemic to examine how residents across the rural-urban continuum adjusted their daily behavior at various stages of the pandemic, including mask wearing, and what factors may have played a role in their behavior.

METHODS

Survey

The COVID-19, Politics, and Science in Utah Survey was developed by researchers at Utah State University during the spring of 2020 in response to the emerging pandemic. A number of questions included in the survey were based on recent similar surveys conducted by researchers at the Carsey School of Public Policy at the University of New Hampshire (Hamilton and Safford 2020a; Hamilton and Safford 2020b; Safford and Hamilton 2020). Questions were also based on the U.S. Census Bureau Household Pulse Survey (https://www.census.gov/data/experimental-data-products/household-pulse-survey.html) and the Rural West Covid Project (https://www.covidruralwest.org/). General types of questions asked of respondents included: impacts and views of pandemic, behavior adjustments during the pandemic, views on political response to the pandemic, community and social response to the pandemic, use and trust of information sources, and general views on science and climate change.

Despite the potential for sampling error, nonresponse error, and greater estimated bias among other issues, a variety of social scientists are increasingly turning to non-probability online opt-in samples (e.g., Coppock and McClellan 2019; Wardropper et al. 2021) as a mode of data collection. Relatively low costs, fast turnaround times, convenience for respondents, increased accessibility for some populations, and interactivity are some of the noted benefits to this approach. Given the rapid pace of the COVID-19 pandemic, and the need to collect current data as efficiently as possible, this approach was ideal for our project. It should be noted, however, that our usage of a nonprobability sample means that the confidence intervals and p-value significance testing we employ should be interpreted with caution. As will be discussed shortly, we apply rake weights to at least partially address this shortcoming.

We purchased a panel of respondents from Qualtrics and respondents took the survey online voluntarily. The data in this manuscript are based on the responses from 634 adults in Utah who completed the survey. To take the survey, respondents had to be 18 years or older and live in Utah year-round or be a seasonal resident currently registered to vote in the state. The survey was conducted from June 12 to June 29,

2020, when cases were rising during the summer throughout the U.S. and in the midst of the first big spike in the state of Utah. Given this is a nonprobability sample and Qualtrics does not provide information on who the survey is sent to, we are unable to provide a response rate.

Table 1: Frequency Distribution for Variables Used to Apply Rake Weights, Survey of Utah Adults (2020)

Variable	Variable Categories	Unweighted Sample	Secondary Data/ Weighted Sample
Gender	Male	39.6	50.0
	Female	60.4	50.0
Age	18-34	31.1	36.8
	35-49	25.6	27.4
	50-64	20.4	20.0
	65+	23.0	15.8
Formal Education	High School or Less	17.4	32.2
	Tech/Some College	32.3	28.8
	College Graduate	33.9	28.9
	Graduate School/ Professional Degree	16.5	10.1
Party Registration	Democrat	18.2	9.4
	Republican	42.4	34.2
	Independent/Unaffiliated/Undeclared	37.0	55.2
	Other	2.4	1.2
Region	Northern	24.9	25.2
	Salt Lake	38.7	41.5
	Western	20.4	21.9
	Southwest	12.7	7.8
	Eastern	3.3	3.7

As shown in Table 1, our sample is somewhat biased towards female and Republican respondents. However, it is quite representative of our target population for age, education, and region. To ensure the data are more representative of Utah adults, we use iterative proportional fitting, or rake weights, by gender, age, education, party registration, and region of the state. Rake weighting, which uses variables for which the population distribution is known to iteratively adjust the weight for each case until the sample distribution matches with the population on the specified variables, performs well in comparison to more elaborate weighting options (Mercer, Lau, and Kennedy 2018). The data for gender, age, and education used to construct the weights are from the 2018 American Community Survey (ACS). The data for party registration in 2018 are from the State of Utah (https://voteinfo.utah.gov/current-voter-registration-statistics/) and we use

regions outlined by the Utah Department of Health and Human Services (https://hs.utah.gov/soc-contact).

Multivariate Analysis

Independent variables. We include a number of independent variables in our analysis given our theoretical interest in their relationship with behavior during the pandemic and as controls to represent place effects, COVID-19 impacts, attitudes related to the pandemic, and individual attributes. Table 2 includes the wording in the questionnaire for each of the independent variables, variable coding for the regression analysis, and frequency distributions.

For place effects, we include a subjective measure of *Rurality of residence* given our interest in how where someone lives is related to their behavior and attitudes during the pandemic. Rather than using USDA county-level typologies such as metro/nonmetro or rural-urban continuum codes, we use a respondent-derived category for a few reasons. First, counties in Utah are large and thus using reported residence at a smaller geographic scale provides greater variation for this variable and likely greater accuracy regarding resident experience. Some counties like Tooele for example are largely rural, but are classified as metropolitan because of their strong commuting ties with Salt Lake County (where Salt Lake City is located). Second, we also checked how respondents' classification of where they lived aligned with USDA metro/nonmetro codes, finding strong alignment. We found that 84.1 percent of those who considered themselves to live in a rural place were living in nonmetro counties according to the USDA. Similarly, 86.3 percent of those who classified their residence as urban or suburban were living in counties classified as metro by the USDA. We expect that rural residents of Utah will have made fewer adjustments to their daily life and be less likely to wear face coverings given national trends observed during the pandemic.

To assess respondents' perceived risks and impacts in relation to COVID-19 as other studies outlined above (e.g., Mueller et al. 2021; Calvillo et al. 2020), we include *Perceived risk, Overall well-being impact, Household job loss,* and *Know someone sick.* We expect those who perceived more risk and impacts to be more likely to make adjustments to daily life and wear masks. At the same time, we realize that those who may be most impacted (e.g., lower income, blue-collar workers) are likely less able to make certain types of changes given lower levels of flexibility in their work and other pursuits (e.g., transportation) (see Parker, Horowitz, and Minkin 2020).

We include four variables that assess attitudes in relation to the pandemic: *False optimism, Trust scientists, Trump response,* and *Trust CDC.* Hamilton and Safford (2021) found that a notable percentage (27 percent) of New Hampshire residents expressed false optimism about the pandemic, or unsupported belief that the pandemic had reached its apex or was never a major problem. We think that *False optimism* may have also been related to behavior during the pandemic in Utah, with those expressing higher levels being less likely to make adjustments to their daily behavior or wear masks. Work by Safford, Hamilton, and Whitmore (2017), has also indicated that trust in scientists and confidence in the federal government response were important to understand during the Zika pandemic. Subsequently, we think that those who have more trust in scientists would be more likely to adjust their behavior and wear masks, while those who think the federal government was responding too fast, would be less likely to make adjustments and wear masks. The federal government's response to pandemics has also been of interest in past studies (see Safford et al. 2017), but here we focus specifically on Trump, given much of the focus on what the federal government was doing to respond to the pandemic at the time of the survey was tied to him. Given the importance of the CDC during this pandemic in public perceptions about the response and how they have shifted (see Hamilton and Safford 2020a, 2020b, 2020c; McFadden et al. 2020), we include *Trust CDC*. We expect that those with higher levels of trust would be more likely to make daily behavior adjustments and wear masks.

Finally, for individual attributes, we include eight variables which existing literature has shown to be important in understanding or controlling for in many types of attitudes and behavior, including in relation to the COVID-19 pandemic (e.g., Algara et al. 2021; Johnson 2020; Quandt et al.): *Gender, Age, Education, Party, Religious, White, Hispanic/Latinx,* and *Class*. Given past research in general and in specifically in relation to the current pandemic, we expect female, younger, more educated, more liberal/Democrat, less religious, white, non-Hispanic/Latinx, and higher income individuals to have made more adjustments during the pandemic to their daily behavior and to wear face coverings more often in public places.[1] With regard to Hispanic/Latinx Utahans' in particular, they are less likely to be in the professional workforce (Harris 2019), which had more flexibility in where they did their work during the stay-at-home order advisory.

Table 2: Independent Variable Descriptions with Codes and Summary Statistics, Survey of Utah Adults (2020)

Variable Name (N)	Question Wording	Variable Coding (Weighted Percentage)
Place Effects		
Rurality of residence (N=634)	What is it like where you live?	1=urban (22.0%);2=suburban, mix, other (55.9%); 3=rural (22.1%)
COVID-19 Perceived Risks and Impacts		
Perceived risk (N=634)	How worried are you that you, or someone in your family, might become sick with the coronavirus (COVID-19) over the next year?	0=don't know (1.2%); 1=not at all (16.3%); 2=slightly (28.3%); 3=moderately (33.0%); 4=very (21.2%)
Overall well-being impact (N=634)	Since the pandemic started, in general, I feel like my overall well-being has:	1=improved (7.2%); 2=same, back and forth (66.7%); 3=worse (26.3%)
Household job loss (N=634)	Have you, or has anyone in your household, experienced a loss of employment income because of the coronavirus (COVID-19) pandemic?	0=no (66.5%); 1=yes (33.5%)
Know someone sick (N=634)	Do you, or does anyone in your household, personally know someone who has been sick with the coronavirus (COVID-19)?	0=no/don't know/unsure (70.7%); 1=yes (29.3%);
Attitudes Related to Pandemic		
False optimism (N=634)	Which of the following statements do you think is more accurate, concerning the coronavirus (COVID-19) in the United States?	Recoded: 0=realistic (worst yet to come, don't know) (62.4%); 1=false optimism/denial (worst behind us, not a problem) (32.6%)
Trust scientists (N=632)	Do you agree or disagree with the statement that "Scientists adjust their findings to get the answers they want?"	Recoded: 1=strongly agree (11.8%); 2= somewhat agree (27.9%); 3=neutral/don't know (28.1%); 4=somewhat disagree (18.3%); 5= strongly disagree (13.9%)
Trump Response (N=634)	Generally speaking, do you approve or disapprove of the way President Trump is handling the coronavirus (COVID-19) situation?	1=strongly approve (21.0%); 2= somewhat approve (24.7%); 3=neither, not sure, or don't know (16.6%); 4=somewhat disapprove (11.7%); 5= strongly disagree (26.2%)
Trust CDC (N=632)	As a source of information about the coronavirus (COVID-19), would you say that you trust, don't trust, or are unsure about science agencies such as the Centers for Disease Control	0=do not trust (16.7%); 1=unsure (24.7%); 3=trust (58.6%)

	(CDC) that study infectious diseases?	
Individual Attributes		
Gender (N=631)	Which of the following best describes your gender?	0=male (50%); 1=female (50.0%)
Age (N=634)	What is your current age?	Continuous (range=18-89)
Education (N=632)	What is the highest grade in school or level of education that you've completed and got credit for?	Recoded: 1=high school or less (32.2%); 2=some college/tech. school (28.8%); 3=college graduate (28.9%); 4=postgraduate (48.0%)
Party (N=634)	Are you registered as a Democrat, Independent, Republican, or something else?[2]	Recoded: 1=Democrat (8.7%); 2=Independent/Unaffiliated/Other/Not registered (57.8%); 3=Republican (33.5%)
Religious (N=634)	To what level, do you consider yourself to be religious?	Recoded: 1=Not religious/don't know (25.5%); 2=Slightly (18.6%); 3=Moderately (22.5%); 4=Very (33.5%)
Race (N=634)	What is your race? Please select all that apply.	Recoded: 0=non-white (9.7%); 1=white (full or partial) (90.3%)
Hispanic/Latinx (N=634)	Are you of Hispanic, Latino, or Spanish origin?	0=No (89.8%); 1=yes (10.2%)
Class (N=634)	People sometimes describe themselves as belonging to the working class, the middle class, or the upper or lower class. To which class do you belong?	1=lower (8.4%); 2=working (25.1%); 3=lower middle (37.6%); 4=upper middle (26.3%); 5=upper class (2.7%)

Dependent variables – Preventive behaviors during the pandemic. We use three dependent variables to examine Utahan' adoption of preventive behaviors during the COVID-19 pandemic in June of 2020, *Behavior during stay-at-home advisory, Behavior after stay-at-home advisory,* and *Current mask usage*. First, respondents were asked: "Did you change your daily routine in any way when staying at home was strongly advised (mid-March to mid-May) specifically because of the coronavirus (COVID-19)?" Response options included:

- No changes in my daily routine (1)
- Minor changes only, such as washing hands more often (2)
- Major changes, such as cancelling planned trips or going out less often (3)

Second, they were asked: "Now that staying at home is no longer strongly advised, how much has your daily routine changed compared to the situation before the coronavirus (COVID-19)?"

- No changes in my daily routine and/or they are back to my pre-COVID lifestyle (1)
- Minor changes only, such as washing hands more often (2)

- Major changes, such as cancelling planned trips or going out less often (3)

Finally, survey respondents were asked about face mask usage with this question: “What best describes your current or intended usage of a face mask (covering mouth and nose) when going out in public places (e.g., grocery store, restaurant, park, etc.)?”

- I never use a face mask in public places (1)
- I sometimes use a face mask in public places (2)
- I always use a face mask when out in public unless I am outside and can maintain social distance (3)
- I always use a face mask in public places (4)

We start by examining how daily behavior during and after the stay-at-home advisory and mask wearing vary along the rural-urban continuum in Utah. Given that each of our three dependent variables were measured using scales, we use ordered logistic regression models to examine how various factors, including respondents’ place of residence, played a role in their behavior in response to the emerging COVID-19 pandemic during the summer of 2020.[3] We tested the parallel lines assumption underlying ordered logistic regression, finding that one of our three (*Current mask usage*) dependent variables did fail, meaning there is a difference in the coefficients between models (e.g., the relationship between each pair of outcome groups is not the same). We subsequently test an alternative modeling strategy for this dependent variable (gotologit2).

FINDINGS

Utahans’ Preventive Behavior During the Pandemic

Table 3 provides data regarding how respondents answered questions measuring the three dependent variables overall and by residence type. For each, there were overall statistically significant, but small, differences in preventive behaviors by residence type. The key takeaway is that rural residents were less likely to use preventive behaviors. Notably, they were most likely to make no changes/never use each preventive behavior and the least likely to make major changes/always use masks.

While presenting some of the same data as shown in Table 3, Figure 1 visually highlights the differences between rural and other Utahans with regards to adopting no preventive behaviors. Notably, rural Utahans were significantly more likely to make no changes to their daily routine during the stay-at-home advisory and after the stay-at-home advisory ended, and this gap between rural and other residents grew as

Table 3: Weighted Percentage of Respondents Reporting Each Behavior During the COVID-19 Pandemic, by Residence Type, Survey of Utah Adults (2020)

Variable (N)	Level of Change/Use	Overall [CI]	Rural [CI]	Suburban [CI]	Urban [CI]
Behavior Change During Stay-at-Home Advisory (N=634)*	No Change	11.7 [8.9,15.2]	22.9 [15.2,32.9]	7.5 [4.9,11.5]	11.1 [6.0-19.7]
	Minor Change	23.1 [19.4,27.2]	26.2 [18.5,35.6]	21.0 [16.4,26.5]	25.1 [17.1,35.1]
	Major Change	65.2 [60.6,69.6]	50.9 [41.1,60.7]	71.5 [65.6,76.7]	63.8 [53.0,73.4]
Behavior Change After Stay-at-Home Advisory (N=634)*	No Change	18.0 [14.5,22.1]	34.3 [25.3,44.7]	14.5 [10.4,19.9]	10.6 [6.0,18.0]
	Minor Change	42.2 [37.5,47.0]	36.1 [27.4,45.9]	43.6 [37.5,49.8]	44.7 [33.9,56.0]
	Major Change	39.8 [35.3,44.5]	29.5 [21.5,39.0]	41.9 [36.0,48.1]	44.8 [34.1,55.9]
Current Mask Usage (N=634)*	Never Use	15.4 [11.9,19.6]	27.1 [18.9,37.2]	12.1 [8.0,17.7]	11.9 [6.1,22.0]
	Sometimes Use	32.3 [28.0,36.8]	37.1 [28.3,46.9]	32.1 [26.7,38.1]	27.7 [19.0,38.6]
	Always Use, Except Outside	21.0 [17.3,25.2]	12.4 [7.6,19.5]	21.7 [17.0,27.3]	27.7 [18.7,39.0]
	Always Use, Even Outside	31.4 [27.2,35.9]	23.4 [15.8,33.3]	34.1 [28.7,40.0]	32.6 [23.3,43.5]

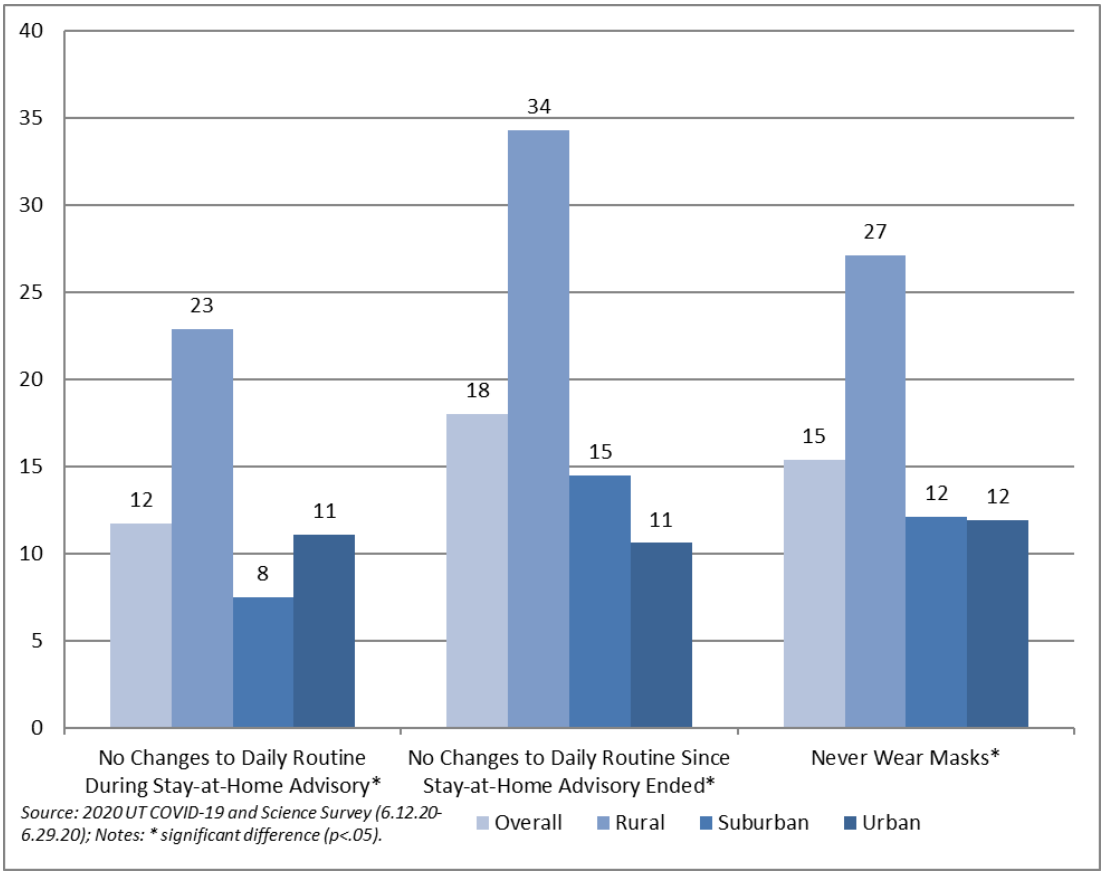
Note: * indicates an overall significant difference by residence type (p<.05); CI=95% confidence intervals.

the pandemic progressed. Rural Utahans were also significantly more likely to never wear masks in public.

Relationships between Preventive Behaviors and Other Factors

Tables 4 and 5 show the ordered logistic regressions of *Behavior during stay-at-home advisory* (1=no changes, 3=major changes)*, Behavior after stay-at-home advisory* (1=no changes, 3=major changes)*,* and *Current mask usage* (1=never wear, 4=always wear) on place effects, COVID-19 perceived risks and impacts, attitudes related to the pandemic, and individual respondent characteristics. Analysis of our data indicate that while *Rurality of residence* was not a significant predictor during the stay-at-home advisory, it was afterwards, and it was an important predictor of mask usage at the time (just under the p<.05 threshold of statistical significance, but under p<.10 at p=.065). Those who lived in more rural places were less likely to make changes and wear masks even when accounting for a variety of factors such as impacts, attitudes, and even political party.

Figure 1: Weighted Percentage of Respondents Using No Preventive Behaviors During the COVID-19 Pandemic, by Residence Type, Survey of Utah Adults (2020)



With regard to COVID-19 perceived risks and impacts, *Perceived risk* was the most consistent predictor of adopting preventive behaviors. Those who were more worried that they or their family might contract the virus were also significantly more likely to change their behavior during the stay-at-home advisory and after it, and to wear their masks. Those who felt their overall well-being was impacted were also more likely to have made changes to their daily life during April of last year. Those who had lost their job, or had someone in their household lose employment because of the pandemic, were significantly more likely to make changes to their everyday behavior in the early days of the pandemic, but not once the stay-at-home advisory was lifted.

In terms of pandemic-related attitudes, we find that *False optimism* and *Trump response* were most consistently related to adopting preventive behaviors. Those who were more realistic about the course of the pandemic were more likely to make changes after the advisory was

Table 4: Predictors of Behavior During and After Stay-At-Home Advisories, Coefficients from Weighted Ordered Logistic Regressions, Survey of Utah Adults (2020)

		Behavior During Stay-At-Home Advisory		**Behavior After Stay-At-Home Advisory**	
Variable Category	Independent Variables	Coef.	P-value	Coef.	P-value
Place Effects	Rurality of residence	-.216	.253	**-.426**	**.014**
COVID-19 Perceived Risks and Impacts	Perceived risk	**.556**	**.000**	**.722**	**.000**
	Overall well-being impact	**.808**	**.001**	.331	.103
	Household job loss	.263	.360	**.551**	**.026**
	Know someone sick	**.683**	**.006**	.390	.084
Attitudes Related to the Pandemic	False optimism	-.229	.356	**-.580**	**.012**
	Trust scientists	-.003	.977	.046	.629
	Trump response	**.238**	**.019**	**.229**	**.010**
	Trust CDC	.064	.692	.018	.913
Individual Attributes	Gender	.136	.620	**.516**	**.022**
	Age	-.010	.135	.006	.285
	Education	.033	.801	.205	.073
	Party (Democrat base)				
	Independent	.182	.571	.034	.910
	Republican	.378	.278	.207	.548
	Religious	.033	.743	.138	.146
	Race	.632	.174	.156	.687
	Ethnicity	-.608	.198	.335	.440
	Class	**.334**	**.029**	**.344**	**.002**
Model Statistics	F Statistic	**3.33**	**.000**	**9.30**	**.000**
	Estimation Sample	627		626	

Note: Those variables that are bolded meet the p<.05 threshold or better.

lifted and to wear masks in public places. Those with *False optimism* were less likely to do those behaviors. Also, those who approved of how former President Trump was handing the COVID-19 pandemic were less likely to make changes to their daily behavior during and after the stay-at-home advisory and wear masks. Those who trust scientific agencies like the CDC for information about the coronavirus were also more likely to be mask-wearers in public during the earlier days of the pandemic.

Finally, females were more likely to adjust their daily behavior after the advisory ended than males. Those with higher formal educational achievement were also more likely to make daily behavioral modifications after the advisory was lifted (p<.10), and they were more likely to wear

Table 5: Predictors of Mask Usage, Coefficients from Weighted Ordered Logistic Regression Using Partial Proportional Odds Models, Survey of Utah Adults (2020)

		Cutpoint 1		**Cutpoint 2**		**Cutpoint 3**	
Variable Category	Independent Variables	Coef.	P-value	Coef.	P-value	Coef.	P-value
Place Effects	*Rurality of residence*	-.301	.065	-.301	.065	-.301	.065
COVID-19 Perceived Risks and Impacts	Perceived risk	**.948**	**.000**	**.817**	**.000**	**.353**	**.003**
	Overall well-being impact	-.153	.691	-.022	.918	-.402	.078
	Household job loss	.390	.292	.382	.150	-.336	.206
	Know someone sick	-.023	.955	.061	.813	.405	.100
Attitudes Related to the Pandemic	False optimism	-.346	.365	**-.762**	**.003**	-.119	.681
	Trust scientists	.266	.196	-.083	.409	.129	.219
	Trump response	.135	.409	**.299**	**.001**	-.017	.854
	Trust CDC	**.568**	**.033**	**.520**	**.002**	.043	.807
Individual Attributes	*Gender*	.151	.492	.151	.492	.151	.492
	Age	.009	.123	.009	.123	.009	.123
	Education	**.327**	**.005**	**.327**	**.005**	**.327**	**.005**
	Party						
	Democrat	.000	.154	**.000**	**.006**	**.000**	**.009**
	Independent	.230	.719	-.577	.166	.330	.315
	Republican	.278	.693	-.753	.087	.063	.866
	Religious	**.308**	**.029**	.111	.289	-.136	.184
	Race	-.117	.742	-.117	.742	-.117	.742
	Ethnicity	.070	.827	.070	.827	.070	.827
	Class	.157	.383	.191	.135	-.117	.392
Model Statistics	F Statistic						4.74 (.000)
	Estimation Sample						627

Note: Those variables that are bolded meet the p<.05 threshold or better. The variables that meet the parallel lines assumption are italicized.

masks in public places. Those in higher perceived classes were more likely to adjust their behaviors during and after the stay-at-home advisories. Democrats and those more religious were also more likely to wear masks. Other individual attributes were not significant.

DISCUSSION

During April of 2020 when the coronavirus was largely spreading uncontrolled throughout many parts of the U.S., and Utah's Governor Herbert had declared a state of emergency and stay-at-home advisory, the majority of Utahans made adjustments to their everyday behavior to help protect themselves, their families, and their neighbors. However, those living in more rural places were much less likely to do so, perhaps in part a result of the leniency in the state-level directives and the lower COVID-19 rates in rural places at the time. We find that over the course of the pandemic, rurality became an increasingly important factor in determining behavior change in relation to the pandemic. While rural residents of Utah were more likely than their suburban and urban counterparts to make no or few behavior changes when the stay-at-home advisory was in place, gaps increased when the stay-at-home advisory was lifted - even when accounting for impacts of the pandemic and other often important factors like risk perceptions, views of science, political party, and age. Mask usage was relatively high among Utahans in public places last June. Only 15.4 percent were never wearing them – although the differences between rural versus suburban and urban places was stark and statistically significant, with 27.1 percent of rural residents reporting never wearing masks.

Perceiving less risk from the virus, believing former President Trump was doing a good job addressing the pandemic, having false optimism about the pandemic, having a lower level of formal education, and being from a lower perceived economic class were all somewhat consistent predictors (or near predictors) of being less likely to make daily behavior changes and/or wear masks in our multivariate models. Perceived risk to individual respondents and their families was a significant factor for all three dependent variables assessing respondents' behavior. As other research would suggest (Duong et al. 2021; Niepel et al. 2020), those who perceived more risks were also more likely make adjustments to their daily behavior during the stay-at-home advisory, after it, and to wear masks more often in public places. This finding suggests that better communication about the risks of such health concerns for some segments of the population may induce behavior change. We find that Utahans who approved of how former President Trump was handing the pandemic were less likely to change their daily behavior during and after the stay-at-home advisory. Shao and Hao (2021) also found that support of former President Trump, specifically their favoring him as the presidential candidate, was related to lower levels of support for mitigation

measures. Albrecht (2021) finds that in counties where more residents voted for Trump, COVID-19 case rates were higher, implying that fewer residents were using preventive behaviors or had greater risks to the disease. Thus, in this case, our research aligns with other emerging studies on COVID-19 related behavior.

While attitudes are not always predictors of behavior (Ajzen and Fishbein 2005), inspired by recent research from Hamilton and Safford (2021), we examined whether false optimism played a role in behavior change, finding it did matter after the stay-at-home advisory was lifted and in mask wearing. In the earlier days of the pandemic, Utahans' were likely less polarized and views were less set regarding what the future of the pandemic would look like. As the pandemic became increasingly polarized (Allcott et al. 2020; Green et al. 2020; Hamilton and Safford 2021; Hill et al. 2020a), false optimism played an increasingly important role in relation to behavior. Again, our findings suggest that more effective communication about the real risks of the virus to some segments of the population may lead to more realistic views about the reality of the pandemic. However, the proliferation of misinformation will make this challenging.

Education was also important in predicting behavior after the stay-at-home advisory and for mask wearing. As literature would suggest (Bourassa et al. 2020), those with more education were more likely to make such adjustments. This finding points to the importance of having an educated populace that understands the scientific process. Finally, and linked to education levels, perceived economic class was a significant predictor of making daily behavior changes both during and after the stay-at-home advisory. Higher class individuals were more likely to make such changes. This likely relates to the types of jobs that higher class individuals are more apt to have which are more likely to allow for teleworking (Parker et al. 2020).

While we did find that support for how former President Trump was handling the pandemic had a strong relationship with some preventive behaviors, a striking finding in our data is the limited statistical significance of political party in our ordinal logistic regression models. Other research focused on the coronavirus and understanding behavior and attitudes in relation to it have generally found that political party is an important predictor (e.g., Calvillo et al. 2020; Allcott et al. 2020; de Bruin et al. 2020; Hamilton and Safford 2021). Even when using alternate coding of the political party registration question (e.g., removing the not registered rather than including with the Independent/Unaffiliated) and other

partisanship measurements (e.g., political identity or party affiliation), we find no difference in our results. We expect that other variables may be accounting for political party, and even be alluding to why party matters. Specifically, there may be important differences between Republicans in Utah that supported former President Trump and those who did not. Future research could also examine more closely whether there is more false optimism for Republicans, and more trust in science and in the CDC for Democrats in Utah. Future research should continue to tease apart these factors in relation to this particular pandemic.

CONCLUSION

Over the course of the COVID-19 pandemic, there has been limited information available about how rural people and places in the U.S. are reacting and why. This article is building upon an emerging body of literature seeking to do so. This is incredibly important given the vulnerabilities of many rural people and places and the differences and connections between rural and urban parts of the U.S. Furthermore, we are now seeing a new vulnerability emerging with a widening gap between rural and urban places regarding vaccinations (Chapman 2021), which will be important to address in order to address the pandemic and issues of health equity. As the pandemic has progressed, rural places have not been immune to the spread of the virus and the behaviors we asked about in our survey matter with regard to the health and well-being of rural people and communities.

There are some limitations to the data we collected that we would like to mention. First, although we used rake weights to adjust our sample to make it more similar on some characteristics to our target population, this is a nonprobability sample that was collected through an online Qualtrics sample. While some have noted the benefits to using such online panels (see, for example, Wardropper et al. 2021), there are also important limitations to note, including the potential for limited representativeness of respondents, for example. We also focused only on the state of Utah, which is not representative of all of the rural U.S. Also, the data are cross-sectional, meaning that drawing conclusions about causality should be done with caution. We also asked respondents about preventive behavior from the past, meaning our measures could be susceptible to social desirability bias and/or respondents' may have difficulty accurately remembering how they behaved in the past.

Longitudinal work on the impacts of the COVID-19 pandemic in rural areas will be essential. We plan to continue our work in Utah by

conducting another similar survey during the summer of 2021 with both rural and urban residents. This survey will include many of the same questions, but will also gather data on new issues that have emerged such as vaccine hesitancy, mask shaming, etc. Given the variants of the coronavirus now circulating, the potential for new viruses to emerge, and the globalized nature of our society and economy, this type of longitudinal data will be essential in understanding not just how people are behaving and thinking at one point in time, but over the course of a pandemic. As we have seen during this pandemic, views and actions change as new information becomes available, politicians weigh in, and people's lives are affected (Hamilton and Safford 2020a, 2020b, 2020c).

ENDNOTES

[1] Given that about 60 percent of the population of Utah are members of The Church of Jesus Christ of Latter-day Saints (e.g., LDS or members of the Mormon Church) (Canham 2018), we also examined whether this status made any difference in our models. About 45 percent of our respondents were LDS, but including this in our ordinal logistic regression models did not change the findings and this variable was not a significant predictor of any of our dependent variables. We thus did not include it.

[2] In our models we tested various measurements of political party and different recoding of the party registration question used, finding no difference in our results when using them. For instance, there are questions on the survey that ask about political identity (e.g., level of conservativism or liberalism) and what party the respondent considers themselves to be (e.g., level of Republican, level of Independent, level of Democrat, Libertarian, and other).

[3] We ran the same variables using dichotomous versions of the dependent variables as logistic regression models and had very similar results.

ACKNOWLEDGMENTS

We appreciate the time that Utah residents took to take our survey and the feedback that we received from Dr. Larry Hamilton and Dr. Tom Safford on drafts of our questionnaire. We would also like to thank (at-the-time) undergraduate student Abby Palfreyman for her help in testing the survey and collecting data for the rake weighting.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

FUNDING

The authors would like to thank the Utah State University (USU) College of Humanities and Social Science (CHaSS) Mountain West Center for Regional Studies small grant program for the resources to conduct the survey and the USU CHaSS Faculty-Student Summer 2020 Mentorship grant program for the resources for undergraduate student mentorship opportunities in summer 2020 and 2021.

REFERENCES

Albrecht, Don. 2012. "A Comparison of Metro and Nonmetro Incomes in a Twenty-First Century Economy." *Journal of Rural Social Sciences* 27(1).

Albrecht, Don. 2021. "COVID-19 in Rural America: Impacts of Politics and Disadvantage." *Rural Sociology* 1-25. doi: 10.1111/ruso.12404.

Adolph, Christopher, Kenya Amano, Bree Bang-Jensen, Nancy Fullman, and John Wilkerson. 2021. "Pandemic Politics: Timing State-level Social Distancing Responses to COVID-19." *Journal of Health Politics, Policy and Law* 46(2) 211-233.

Algara, Carlos, Sam Fuller, Christopher Hare, and Sara Kazemian. 2021. “The Interactive Effects of Scientific Knowledge and Gender on COVID-19 Social Distancing Compliance.” *Social Science Quarterly* 102(1):7-16.

Allcott, Hunt, Levi Boxell, Jacob Conway, Matthew Gentzkow, Michael Thaler, and David Yang. 2020. "Polarization and Public Health: Partisan Differences in Social Distancing During the Coronavirus Pandemic." *Journal of Public Economics* 191:104254.

Ashwood, Loka. 2018. *For-profit Democracy: Why the Government is Losing the Trust of Rural America*. Yale University Press.

Ajzen, Icek, and Martin Fishbein. 2005. “The Influence of Attitudes on Behavior.” *The Handbook of Attitudes* 173:31–146.

Associated Press, The. 2020. “Report: Utah Meatpacking Plants Had 441 Virus Cases, 1 Death.” *The Associated Press,* October 9, 2020. Accessed June 10, 2021. (https://apnews.com/article/virus-outbreak-utah-archive-6d158f2bf888d9e227fdda3fbc049209).

Bourassa, Kyle J., David A. Sbarra, Avshalom Caspi, and Terrie E. Moffitt. 2020. "Social Distancing as a Health Behavior: County-level Movement in the United States During the COVID-19 Pandemic is Associated with Conventional Health Behaviors." *Annals of Behavioral Medicine* 54(8):548-556.

Brooks, Matthew M., J. Tom Mueller, and Brian C. Thiede. 2021. “Rural-urban Differences in the Labor Force Impacts of COVID-19 in the United States.” *Socius* 7:1-12.

Calvillo, Dustin P., Bryan J. Ross, Ryan JB Garcia, Thomas J. Smelter, and Abraham M. Rutchick. 2020. “Political Ideology Predicts Perceptions of the Threat of COVID-19 (and Susceptibility to Fake News About it).” *Social Psychological and Personality Science* 11(8):1119-1128.

Canham, Matt. 2018. “Salt Lake County is Now Minority Mormon, and the Impacts are Far Reaching.” *The Salt Lake Tribune*, December 9. Retrieved June 16, 2021 (https://www.sltrib.com/religion/2018/12/09/salt-lake-county-is-now/).

Centers for Disease Control. 2021. “COVID Data Tracker.” Retrieved June 7, 2021 (https://covid.cdc.gov/covid-data-tracker/#global-counts-rates).

Chapman, Heather. 2021. “One-third of Rural America Now Fully Vaccinated Against Coronavirus, but Rural-urban Gap Expanded Last Week.” Retrieved June 18, 2021 (http://irjci.blogspot.com/2021/06/one-third-of-rural-america-now-fully.html).

Coppock, Alexander, and Oliver A. McClellan. 2019. "Validating the Demographic, Political, Psychological, and Experimental Results Obtained From a New Source of Online Survey Respondents." *Research & Politics* 6(1).

de Bruin, Wändi Bruine, Htay-Wah Saw, and Dana P. Goldman. 2020. "Political Polarization in US Residents’ COVID-19 Risk Perceptions, Policy Preferences, and Protective Behaviors." *Journal of Risk and Uncertainty* 61(2):177-194.

Duong, Hue Trong, Hoa Thanh Nguyen, Soroya Julian McFarlane, and Long Thang Van Nguyen. 2021. "Risk Perception and COVID-19 Preventive Behaviors: Application of the Integrative Model of Behavioral Prediction." *The Social Science Journal* 1-14. doi: 10.1080/03623319.2021.1874176.

Evans, John H., and Eszter Hargittai. 2020. “Who Doesn’t Trust Fauci? The Public’s Belief in the Expertise and Shared Values of Scientists in the COVID-19 Pandemic.” *Socius* 6.

Flora, Cornelia Butler, Jan L. Flora, and Stephen P. Gasteyer. 2016. *Rural Communities: Legacy and Change* (Fifth Edition). New York: Routledge.

Gandhi, Monica, Chris Beyrer, and Eric Goosby. 2020. “Masks Do More Than Protect Others During COVID- 19: Reducing the Inoculum of SARS-CoV-2 to Protect the Wearer.” *Journal of General Internal Medicine* 35(10):3063-3066.

Goetz, Stephan J., Meri Davlasheridze, Yicheol Han, and David A. Fleming-Muñoz. 2018. “Explaining the 2016 Vote for President Trump Across U.S. Counties.” *Applied Economic Perspectives and Policy* 41(4):703-722.

Gold, Ron S., and Mark G. Brown. 2009. "Explaining the Effect of Event Valence on Unrealistic Optimism." *Psychology, Health & Medicine* 14(3):262-272.

Green, Jon, Jared Edgerton, Daniel Naftel, Kelsey Shoub, and Skyler J. Cranmer. 2020. "Elusive Consensus: Polarization in Elite Communication on the COVID-19 Pandemic." *Science Advances* 6(28).

Harris, Emily. 2019. “Race/Ethnicity in the Wasatch Front Labor Force: An Equal Employment Opportunity Analysis.” *Kem C. Gardner Policy Institute* (https://gardner.utah.edu/wp-content/uploads/RaceEthnicity-LaborForce.pdf?x71849).

Hamilton, Lawrence C., Joel Hartter, and Kei Saito. 2015. “Trust in Scientists on Climate Change and Vaccines.” *Sage Open* 5(3). doi:10.1177/2158244015602752.

Hamilton, Lawrence C., and Thomas G. Safford. 2020a. “Ideology Affects Trust in Science Agencies During a Pandemic.” *The Carsey School of Public Policy at the Scholars’ Repository* 391. (https://scholars.unh.edu/carsey/391).

Hamilton, Lawrence C., and Thomas G. Safford. 2020b. “Trusting Scientists More Than the Government: New Hampshire Perceptions of the Pandemic.” *The Carsey School of Public Policy at the Scholars’ Repository* 401. (https://carsey.unh.edu/publication/trusting-scientists-more-than-government).

Hamilton, Lawrence C., and Thomas G. Safford. 2020c. "Elite Cues and the Rapid Decline in Trust in Science Agencies on COVID-19." *Sociological Perspectives* 1-24.

Hamilton, Lawrence C., and Thomas G. Safford. 2021. "The Worst Is Behind Us: News Media Choice and False Optimism in the Summer of 2020.” *Academia Letters* 1001. (https://scholars.unh.edu/faculty_pubs/1001).

Hill, Terrence, Kelsey E. Gonzalez, and Andrew Davis. 2020a. “The Nastiest Question: Does Population Mobility Vary by State Political Ideology During the Novel Coronavirus (COVID-19) Pandemic?” *Sociological Perspective* 1-18.

Hill, Terrence D., Kelsey Gonzalez, and Amy M. Burdette. 2020b. “The Blood of Christ Compels Them: State Religiosity and State Population Mobility During the Coronavirus (COVID-19) Pandemic. *Journal of Religion and Health* 59: 2229-2240.

Johnson, Kenneth M. 2020. “Health Conditions and an Older Population Increase COVID-19 Risks in Rural America.” Carsey Research National Issue Brief #150.

Kovich, Heather. 2020. “Rural Matters: Coronavirus and the Navajo Nation.” *New England Journal of Medicine* 383:105-107.

Lichter, Daniel T., and David L. Brown. 2011. "Rural America in an Urban Society: Changing Spatial and Social Boundaries." *Annual Review of Sociology* 37:565-592.

Lyu, Wei, and George L. Wehby. 2020. “Community Use of Face Masks And COVID-19: Evidence from A Natural Experiment of State Mandates in the US.” *Health Affairs* 39(8):1419-1425.

McCright, Aaron M., Katherine Dentzman, Meghan Charters, and Thomas Dietz. 2013. “The Influence of Political Ideology on Trust in Science.” *Environmental Research Letters* 8(4):1–9. doi: 10.1088/1748-9326/8/4/044029.

McFadden, SarahAnn M., Amyn A. Malik, Obianuju G. Aguolu, Kathryn S. Willebrand, and Saad B. Omer. 2020. "Perceptions of the Adult US Population Regarding the Novel Coronavirus Outbreak." *PLOS ONE* 15(4).

Mercer, Andrew, Arnold Lau, and Courtney Kennedy. 2018. “For Weighting Online Opt-In Samples, What Matters Most?” *Pew Research Center,* January 26. Retrieved May 1, 2021. (https://www.pewresearch.org/methods/2018/01/26/for-weighting-online-opt-in-samples-what-matters-most/).

Monnat, Shannon M., and David L. Brown. 2017. “More than a Rural Revolt: Landscapes of Despair and the 2016 Presidential Election.” *Journal of Rural Studies* 55:227-236. doi: 10.1016/j.jrurstud.2017.08.010

Mueller, J. Tom, Kathryn McConnell, Paul Berne Burow, Katie Pofahl, Alexis A. Merdjanoff, and Justin Farrell. 2021. "Impacts of the COVID-19 Pandemic on Rural America." *Proceedings of the*

National Academy of Sciences 118(1). doi.org/10.1073/pnas.2019378118.

Murthy, Bhavini Patel, Natalie Sterrett, Daniel Weller, Elizabeth Zell, Laura Reynolds, Robin L. Toblin, Neil Murthy et al. 2021. "Disparities in COVID-19 Vaccination Coverage Between Urban and Rural Counties—United States, December 14, 2020–April 10, 2021." *Morbidity and Mortality Weekly Report* 70(20):759.

Navajo Department of Health. 2021. “Navajo Nation COVID-19 Situation Reports.” Retrieved June 9, 2021 (https://www.ndoh.navajo-nsn.gov/COVID-19/Data).

New York Times, The. 2021. “Coronavirus in the U.S.: Latest Map and Case Count.” Retrieved June 9, 2021 (https://www.nytimes.com/interactive/2021/us/covid-cases.html).

Niepel, Christoph, Dirk Kranz, Francesca Borgonovi, Valentin Emslander, and Samuel Greiff. 2020. "The Coronavirus (COVID-19) Fatality Risk Perception of US Adult Residents in March and April 2020." *British Journal of Health Psychology* 25(4): 883-888.

Parker, Kim, Juliana. M. Horowitz, Anna Brown, Richard Fry, D’vera Cohn, and Ruth Igielnik. 2018. “What Unites and Divides Urban, Suburban and Rural Communities.” *Pew Research Center*, May 22, 2018. Retrieved June 1, 2021 (file:///C:/Users/A02304542/Downloads/Pew-Research-Center-Community-Type-Full-Report-FINAL.pdf).

Parker, Kim, Juliana M. Horowitz, and Rachel Minkin. 2020. “How the Coronavirus Outbreak Has – and Hasn’t – Changed the Way Americans Work.” *Pew Research Center*, December 9, 2020. Retrieved June 17, 2021 (https://www.pewresearch.org/social-trends/2020/12/09/how-the-coronavirus-outbreak-has-and-hasnt-changed-the-way-americans-work/).

Paules, Catharine I., Hilary D. Marston, and Anthony S. Fauci. 2020. "Coronavirus Infections—More Than Just the Common Cold." *Jama* 323(8):707-708.

Pender, John. 2021. “The COVID-19 Pandemic and Rural America.” *Economic Research Service*, May 13, 2021. Retrieved June 15, 2021 (https://www.ers.usda.gov/covid-19/rural-america/).

Peters, David J. 2020. "Community Susceptibility and Resiliency to COVID-19 Across the Rural-Urban Continuum in the United States." *The Journal of Rural Health* 36(3):446-456. doi.org/10.1111/jrh.12477.

Quandt, Sara A., Natalie J. LaMonto, Dana C. Mora, Jennifer W. Talton, Paul J. Laurienti, and Thomas A. Arcury. 2021. "COVID-19 Pandemic Among Immigrant Latinx Farmworker and Non-farmworker Families: A Rural-urban Comparison of Economic, Educational, Healthcare, and Immigration Concerns." *NEW SOLUTIONS: A Journal of Environmental and Occupational Health Policy* 31(1):30-47.

Safford, Thomas G., Emily H. Whitmore, and Lawrence C. Hamilton. 2017. "The Zika Virus Threat: How Concerns About Scientists May Undermine Efforts to Combat the Pandemic." *University of New Hampshire Carsey School of Public Policy.* http://dx.doi.org/10.34051/p/2020.288.

Safford, Thomas G., and Lawrence C. Hamilton. 2020. "Views of a Fast-Moving Pandemic: A Survey of Granite Staters' Responses to COVID-19." *University of New Hampshire Carsey School of Public Policy,* April 6, 2020. (https://carsey.unh.edu/publication/Granite-Staters-Responses-COVID-19).

Sanchez, Carmen, and David Dunning. 2021. "The Anti-Scientists Bias: The Role of Feelings About Scientists in COVID-19 Attitudes and Behaviors." *Journal of Applied Social Psychology* 51(4):461-473.

Scala, Dante J., and Kenneth M. Johnson. 2017. "Political Polarization along the Rural-Urban Continuum? The Geography of the Presidential Vote, 2000-2016." *Annals of the American Academy of Political and Social Science* 672:162-184. https://doi.org/10.1177/0002716217712696

Shao, Wanyun, and Feng Hao. 2021. "Understanding American Public Support for COVID-19 Risk Mitigation: The Role of Political Orientation, Socio-demographic Characteristics, Personal Concern, and Experience, the United States, 2020." *International Journal of Public Health* 66.

Sherman, Jennifer, and Jennifer Schwartz. 2021. "The Fine Line: Rural Justice, Public Health and Safety, and the Coronavirus Pandemic." *American Behavioral Scientist* 1-22. https://doi.org/10.1177%2F00027642211003144

State of Utah. 2021. "State and Local Orders and Directives." Retrieved June 1, 2021 (https://coronavirus.utah.gov/special-orders/).

Ulrich-Schad, Jessica D., and Cynthia M. Duncan. 2018. "People and Places Left Behind: Work, Culture and Politics in the Rural United States." *The Journal of Peasant Studies* 45(1):59-79.

Ulrich-Schad, Jessica D., Cynthia M. Duncan, and Kristen Koci.

Forthcoming. “Poverty, Health and Healthcare in Rural Communities in the United States.” Chapter in *The Edinburgh Companion to the Politics of American Health,* edited by M. Halliwell and S. A. Jones. Oxford University Press.

Ulrich-Schad, Jessica, Jennifer Givens and Connor Wengreen 2020. “Rural Utahans during the COVID-19 Pandemic: Impacts, Behavior, and Views on Government Response and Science.” *Rural Connections: The Magazine of the Western Rural Development Center:* 9-12.

Utah Department of Health. 2021. “Overview of COVID-19 Surveillance.” Retrieved May 31, 2021 (https://coronavirus.utah.gov/case-counts/).

Utah Division of Emergency Management. 2021. “Utah COVID-19 Response.” Retrieved May 31, 2021 (https://storymaps.arcgis.com/collections/caf8b840306d4307a826ea7c19844464).

Wardropper, Chloe B., Ashley A. Dayer, Madeline S. Goebel, and Victoria Y. Martin. "Conducting Conservation Social Science Surveys Online." *Conservation Biology* 1-9. doi: 10.1111/cobi.13747.