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Short Communication

Political partisanship and mobility restriction during the COVID-19 pandemic

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ABSTRACT

Objectives: Non-pharmaceutical interventions (NPIs) are effective in curbing the spread of severe acute respiratory syndrome coronavirus 2. All US states have adopted NPI policies, but the compliance to these measures and influence of sociopolitical factors on NPI adherence is unknown. NPI adherence may be approximated by personal mobility in a population that is tracked by anonymous mobile phone data.

Study design: This is a cross-sectional study of state-level mobility changes across the US.

Methods: State-level mobility was based on anonymous mobile phone data from multiple participating carriers collected by the University of Washington's Institute for Health Metrics and Evaluation (<http://www.healthdata.org>). Pearson's correlation coefficient was used to examine the strength and direction of the relationship between political affiliations and mobility restriction across states. Multivariable linear regression analyses were used to assess other factors that may impact personal travel.

Results: All states experienced a decline in personal mobility but had varying nadirs ranging from a 34% to a 69% reduction in mobility, which was not temporally related to the timing of state-level NPI measures. There was a statistically significant linear and negative correlation ($r = -0.79$) between the proportion of Republicans/leaning Republicans and NPI adherence across US states. The negative association between Republicans and NPI adherence was significant even when adjusting for urbanization, proportion of essential workers, population, Gini index, and poverty rates.

Conclusions: Political orientation affects risk perception, which may contribute to the unwillingness of some individuals to perceive the coronavirus disease 2019 pandemic as a risk and to comply with NPIs. Our results highlight the importance of sociopolitical factors in disease control and emphasize the importance of bipartisan efforts in fighting the pandemic. These results may have implications for the development, dissemination, and communication of public health policies.

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Non-pharmaceutical interventions (NPIs) including travel restrictions, social distancing, and avoidance of social gatherings are effective in reducing the spread of severe acute respiratory syndrome coronavirus 2.¹ All US states have adopted NPIs between March and April 2020, but compliance with NPIs is not broadly enforced and likely limited. Sociopolitical factors may influence compliance with NPIs, given that the timing of state-level NPI policies has been associated with political partisanship among state governments.² At the individual level, sociopolitical factors including race, sex, and political party affiliation are known to affect

the perception of risk and antisocial attitudes.^{3,4} As the perceived risk of the coronavirus disease 2019 (COVID-19) pandemic to individual health or to the public may influence the willingness of persons to adopt NPIs, we sought to evaluate the relationship between compliance to NPI measures and political party affiliations.

Mobile phone tracking has been used for contact tracing and ensuring that exposed individuals remain in quarantine during the COVID-19 pandemic.⁵ Given that mobile phone use penetration is very high across all US states, mobile phone data can also be used to track personal movements across the US population and may be used to infer adherence to NPI policies.⁶ In aggregate, a decline in mobility reflects decreased population travel outside the home or baseline location, which is in accordance with NPI policies that limit social interactions.

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We analyzed mobility data collected by the University of Washington's Institute for Health Metrics and Evaluation (<http://www.healthdata.org>) which show that all US states exhibited a decline in population mobility with a nadir reached between March 30 and April 9 (Fig. 1A). The date of the nadir in mobility changes, representing the time when adherence to NPI mandates was greatest, did not correlate with the timing of NPI mandates (Fig. 1B). In fact, for nearly every state, decreases in mobility were perceptible before any statewide mandate. In addition, the depth of the nadir was not uniform between states and ranged from a 34% to 69% reduction in mobility.

To assess the association between NPI adherence and party affiliation, we plotted the greatest percentage reduction in mobility, reflecting the greatest degree of compliance, against the proportion of individuals who identified as Republicans or leaning Republicans as per the most recent Gallup USA Poll in 2018. This revealed a significant and negative linear correlation between the two parameters (two-tailed $P < 0.001$) (Fig. 1C). A Pearson's correlation equal to -0.79 (95% confidence interval: -0.88 to -0.66) indicates that 62% of the variance in the greatest reduction in mobility among US states is explained by the proportion of Republicans and Republican-leaning persons. The slope of the best-fit regression line is -0.79 , indicating that for every 10% increase in the proportion of Republicans in a state, NPI compliance declines 8%. We also used party affiliation data from the 2014 Pew Religious Landscape Study that yielded similar results (Pearson coefficient = -0.82 , $P < 0.001$). Inversely, there was a positive correlation (Pearson coefficient = 0.77 , $P < 0.001$) between reductions in mobility with the number of Democrats/leaning Democrats across states. No associations were found between total deaths or daily infection rate on the date of the nadir and the greatest reductions in mobility across states.

Given that US President Donald Trump repeatedly expressed his opposition to NPIs during the early stages of the COVID-19 pandemic, we also assessed whether voter support for Trump during the 2016 US presidential election was also a determinant of NPI adherence. In a multivariable linear regression model including the proportion of President Trump voters and proportion of Republicans as predictor variables, we found that the percentage of Republicans (standardized coefficient = -0.51 , $P = 0.004$) and the percentage of voters for President Trump (standardized coefficient = -0.35 , $P = 0.046$) were both negatively associated with mobility restriction. The variance inflation factor of the linear regression was 4.45, suggesting a moderate degree of collinearity. Nonetheless, these results suggest that in addition to political affiliation, the voter strength of President Trump across states may impact compliance to NPI policies.

Differences in population mobility between states may also be related to urbanization, essential workers (which were exempt from some NPI measures), or the population size. Univariable linear regression analyses show that the percentage of the state population living in urban areas and the percentage of the state population that held essential jobs, but not the state population, are associated with mobility restriction (Table 1). However, in a multivariable linear regression model including the aforementioned variables, the proportion of Republicans in each state, and socio-economic factors, only the proportion of Republicans and urban percentage remained significantly associated with mobility restriction (Table 1). This is not unexpected as people in urban areas may need to travel less to access essential services. Of importance is that the proportion of Republicans remained strongly predictive independent of urbanization, suggesting ideological opposition to the recommended mobility guidelines.

Although socio-economic factors have been predicted to be associated with NPI adherence, we did not observe any statistically

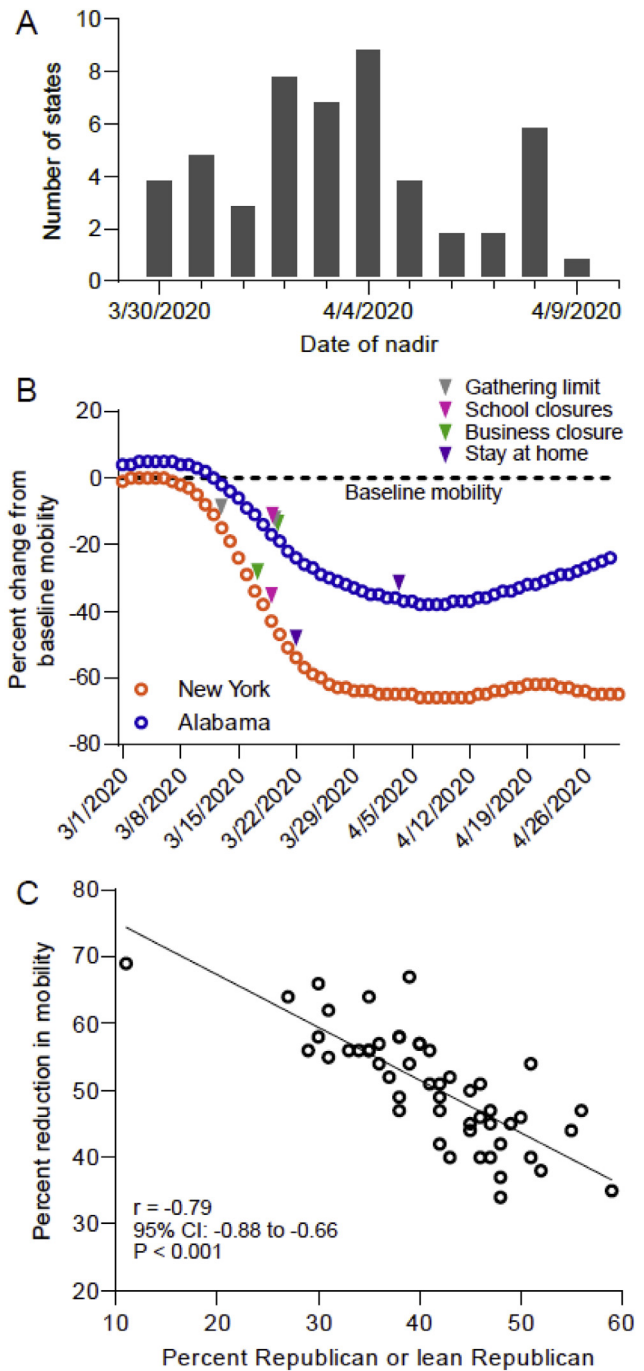


Fig. 1. Decreases in mobility and its association with political affiliations during the COVID-19 pandemic. (A) Distribution of dates when states reached their nadir in mobility restriction. (B) Plot of daily percentage change in mobility aggregated from cell phone data in New York and Alabama that demonstrates a nadir in response to the adoption of NPIs. Data from New York and Alabama are shown as they represent the two stages with the greatest and least percentage change in mobility. (C) The relationship between the proportion of individuals identifying as Republicans or leaning Republicans and the greatest percentage reduction in mobility across the 50 US states and the District of Columbia. COVID-19 = coronavirus disease 2019; NPI = non-pharmaceutical intervention; CI = confidence interval.

significant relationships between poverty rates or income disparity (Gini coefficient) and mobility restriction at the state level in univariable or multivariable regression analyses (Table 1). This suggests that socio-economic factors do not substantially explain variations in state-level differences in mobility restriction, but it

Table 1
Multivariable linear regression models of predictors of state-level mobility restriction.

| Predictor variables | Multivariable | | Univariable | |
|---------------------------------|--------------------------|---------|--------------------------|---------|
| | Standardized coefficient | P-value | Standardized coefficient | P-value |
| Percentage of Republicans | −0.775 | <0.001 | −0.817 | <0.001 |
| Urban percentage | 0.223 | 0.026 | 0.596 | <0.001 |
| Percentage of essential workers | −0.002 | 0.987 | −0.312 | 0.026 |
| Population | 0.089 | 0.337 | 0.266 | 0.060 |
| Gini index | −0.203 | 0.057 | 0.247 | 0.080 |
| Poverty rate | 0.034 | 0.726 | −0.046 | 0.749 |

does not exclude the possibility that socio-economic factors contribute to NPI adherence.

Our work indicates that political affiliation and possibly the actions of political leaders are determinants of NPI adherence in the US. These results cannot be explained by the adoption of state-specific NPI policies as states with the least reduction in mobility such as Mississippi and Alabama also had very restrictive policies including stay-at-home orders and closures of non-essential businesses. The linear relationship also indicates that regardless of the ruling party in each state, the degree of NPI compliance is intimately tied to the political alignment of the population. Although we attempted to control for confounder variables, additional factors may influence the difference in mobility restriction between states. For example, the percentage of urbanization may not wholly capture differences in transportation patterns between urban and rural areas and access to essential services. In addition, as our study assessed state-level data, concerns of an ecological fallacy are present as aggregated patterns of mobility do not indicate individual behavior. However, recent surveys of individuals from nationally representative samples demonstrate that individuals who identify as Republicans were less concerned with the personal and public health risks of COVID-19 and less likely to adopt NPI measures.^{7–9}

Perceptions of risk from environmental and other external hazards are known to differ between sexes and racial groups.¹⁰ The role of sociopolitical factors in attitudes toward risk has also been demonstrated by the fact that Republican affiliation and conservative values are associated with low-risk perception and a willingness to take risks.^{4,11} Such politically driven beliefs now extend to the COVID-19 pandemic as demonstrated by surveys conducted during the early stages of the pandemic in the US, indicating that Republicans perceived COVID-19 to be less lethal than seasonal influenza, believed the official COVID-19 death toll to be overstated, and were less willing to avoid social gatherings.⁷ Our study suggests that differences in risk perception linked to political affiliation rather than other socio-economic factors may account for a large degree of the variance in NPI adherence in the US.

These results underlie the importance of bipartisan efforts in combating the COVID-19 pandemic and suggest that public health awareness and education should be targeted and delivered by respected Republican officials based on the fact that individual beliefs including risk perception are shaped by homophily.¹² Other factors influence NPI compliance, but policies are unlikely to be effective without addressing entrenched sociopolitical divisions. This is a matter of urgency as US states have begun to relax restrictions that still require a high degree of participation and it remains difficult to capture and monitor compliance to other NPIs such as face mask wearing and avoiding close contact.

Methods

State-level mobility was based on anonymous mobile phone data from multiple participating carriers collected by the University

of Washington's Institute for Health Metrics and Evaluation (<http://www.healthdata.org>). Mobile phone geolocation reports were obtained from four sources: Google, Facebook, Descartes Labs, and SafeGraph. We abstracted daily changes in mobility for all 50 US states and the District of Columbia and determined the time of the nadir as the earliest date when the greatest reduction in mobility was achieved. Political affiliations per state were abstracted from the most recent Gallup USA Poll in 2018, which was conducted through phone interviews across the US. Pearson's correlation coefficient was used to examine the strength and direction of the relationship between political affiliations and mobility restriction across states. The percentage of the state population that was considered essential workers was determined from employment data from the US Bureau of Labor Statistics (2019 data). Essential occupations included those identified by the USA Department of Homeland Security's Cybersecurity and Infrastructure Security Agency advisory memorandum, which encompassed the law enforcement, public safety, health care/public health, food processing, agriculture, energy, waste management, water, public and social services, transportation, and communication workforce.

Author statements

Ethical approval

Not required. No institutional review board approval was required as all data were obtained from publicly available sources.

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Competing interests

None declared.

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