Subnational COVID-19 Politics and Policy

Who Stays at Home? The Politics of Social Distancing in Brazil, Mexico, and the United States during the COVID-19 Pandemic

Paul F. Testa
Richard Snyder
Eva Rios
Brown University

Eduardo Moncada
Barnard College

Agustina Giraudy
American University

Cyril Bennouna
Brown University

Abstract

Context: Reductions in population mobility can mitigate virus transmission and, in turn, disease-related mortality. But do social distancing policies in response to COVID-19 actually change population behavior and, if so, what political, socioeconomic, and epidemiological factors condition this policy effect?

Methods: We leverage subnational variation in the stringency and timing of state-issued social distancing policies to test their effects on population mobility from March to December 2020 across 109 states in Brazil, Mexico, and the United States. We also explore how conventional explanations of compliance, including political trust, socioeconomic resources, health risks, and partisanship, modify these policy effects.

Findings: In Brazil and the U.S., mandatory stay-at-home orders and workplace closures jointly reduced mobility, especially early in the pandemic. In Mexico, where federal government intervention created greater policy uniformity across states, workplace closures produced the most consistent reduction in mobility. Conventional explanations of compliance perform well in the U.S. but not in Brazil and Mexico, with the exception of socioeconomic resources.

Conclusions: In addition to new directions for future research on the politics of compliance, the article offers insights for policymakers about which public health measures are likely to elicit compliance. Our finding that the efficacy of workplace closures at reducing population mobility increases with levels of socioeconomic development suggests that cash transfers, economic stimulus packages, and other policies that mitigate the financial burdens of the pandemic may help reduce population mobility by decreasing the costs of staying at home.

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COVID-19 threatens public health, economic growth, and social stability across the world. In response to these challenges, governments have enacted a range of social distancing policies to encourage citizens to stay home, thereby limiting transmission of the virus and reducing mortality. Research on the effectiveness of these policies finds that they can reduce mobility and slow transmission (Andersen 2020; Friedson et al. 2020; Sears et al. 2020), while also revealing considerable variation across policies (Abouk and Heydari 2020; Gupta et al. 2020; Hadjidemetriou et al. 2020), places (Lopez-Calva 2020a; Santamaria et al. 2020), and time (Abouk and Heydari 2020; Li et al. 2021).

In this article, we explore how social distancing policies shaped population mobility at the state level inside the three largest federations of the Americas—Brazil, Mexico, and the United States—from the beginning of March to the end of December 2020. We first situate our study among existing theories of why citizens comply with government authority, both generally and specifically with regard to public health measures during the COVID-19 pandemic. Next, we build on these theories by proposing a new typology of mobility behavior in public health emergencies that gets beyond the conventional distinction between compliance and non-compliance with coercive social distancing policies. This step, in turn, allows us to detect patterns of voluntary distancing that have gone largely unobserved and untheorized in research on COVID-19. Together, these moves provide a stronger foundation for assessing the effects of social distancing policies and a framework for understanding the influence of political, socioeconomic, and epidemiological conditions on these policy effects.

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We show the value of the framework through empirical analyses of subnational data on mobility, policy, the timing and severity of the pandemic, and socioeconomic and political factors in Brazil, Mexico, and the U.S. This combination of subnational and cross-national comparisons offers four key advantages. First, it allows us to focus on outcomes at the state level, where most social distancing policies in these federal countries are actually made. Second, unlike many prior studies that are limited to the effects of a single policy on population mobility, typically stay-at-home orders, we assess the effects of eight different policies routinely implemented by states across the three countries. Third, our comparative design lets us test whether theories of compliance, many of which were developed in the context of the U.S., travel to other countries. Finally, because all three countries were led by populist presidents who were skeptical of the gravity of the pandemic, scientific expertise, and the potential of coercive social distancing policies to reduce virus transmission, our comparative design allows us to assess the influence that populist leaders on both the political left (Mexico) and right (Brazil and the U.S.) had on compliance with state-level measures that aimed to reduce mobility.

We find that during the first 10 months of the pandemic much of the decreased mobility observed across Brazil and the U.S. resulted jointly from mandatory stay-at-home orders and workplace closures. These reductions are most evident during the early stages of the pandemic. In Mexico, by contrast, where federal government intervention created greater uniformity in state-level policies, workplace closures produced the most consistent reduction in mobility. Moreover, we find that factors which previous research predicts will influence compliance, specifically political trust, socioeconomic resources, health risks, and partisanship, appear to operate as theorized in the U.S. but less so in Brazil and Mexico. Together, these findings offer insights for policymakers about which policies are more likely to elicit compliance, as well as directions for future comparative research on the politics of compliance with public health measures.

I. The Politics of Compliance

Previous research on compliance with government authority converges in the shared finding that the threat and use of coercive force are largely ineffective as sustainable ways to elicit obedience (Levi 1989; Tyler 1997, 2003). For example, studies show that neither the assuredness nor the level of punishment can account for a host of illicit behaviors (Gasmick and Green 1980; Maccoun 1993; Paternoster 1989; Ross 1982). To explain variation in compliance, research points instead to individual-level attitudinal and cognitive factors, building on the idea that governments require a substantial share of their populations to carry out "quasi-voluntary compliance" (Levi 1989).[1] Individual-level predictors of compliance include factors that influence the legitimacy of government, such as whether citizens view government as *trustworthy*—that is, prioritizing the public interest, delivering expected goods and services, and punishing non-compliance—and also *fair*—that is, acting neutrally, treating citizens with dignity, and adhering to due process (Dubé et al. 2013; Levi, Tyler, and Sacks 2009; Tyler 2000, 2006).

Although research focused specifically on compliance with public health measures confirms the importance of trust in government emphasized by the broader literature (Bargain and Aminjonov 2020; Chan et al. 2020), it also identifies additional factors affecting compliance, including access to information (Zimmerman et al. 2005), levels of civic duty (Barrios et al. 2021), ethnic diversity (Egorov et al. 2020), and perceived health risks (Brewer et al. 2007;

[1] Compliance is "quasi-voluntary" because the threat of coercion is understood as a necessary background condition (Levi 1989).

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Champion and Skinner 2008; Galasso et al. 2020; Rosentock 1974). Moreover, studies of social distancing policies during the COVID-19 pandemic highlight the importance of socioeconomic conditions, especially wealth, finding that compliance with lockdowns and quarantines is greater in higher-income areas (Bennett 2020; Bodas and Peleg 2020; López-Calva 2020; Wright et al. 2020). Finally, studies of the U.S. observe a relationship between partisanship and mobility, with reductions in mobility tending to be greater in Democratic-leaning counties and states (Allcott et al. 2020; Grossman et al. 2020; Hsiehchen et al. 2020).[2] Section V below assesses how well these various theories of compliance are able to explain population mobility during the COVID-19 pandemic in Brazil, Mexico and the U.S.

II. A Typology of Population Mobility during Public Health Emergencies

Scholarship on compliance in political science and public health draws a distinction between behavioral change in response to government policies and behavioral change that occurs in the absence of policies. Whereas initial research on population mobility during the COVID-19 pandemic focused on compliance with stay-at-home orders (Chan et al. 2020; Oliver et al. 2020; Sears et al. 2020), recent studies have increasingly noted significant reductions in mobility that occur without mandated social distancing (Shoji et al. 2020 on Japan; Andersen 2020 and Grossman et al. 2020 on the U.S.). Accurately describing the range of contrasting mobility behaviors thus requires getting beyond a unidimensional focus on compliance versus non-compliance by broadening the compass to include *voluntary* changes in mobility that occur in the

[2] The subnational focus of much research on compliance with public health measures highlights the importance of stipulating explicitly and clearly the scale, especially the level of government, at which the theory is expected to hold. Otherwise, scholars run the risk of "theory stretching"—that is, the inappropriate application of a theory from one level of analysis to another level (Giraudy, Moncada, and Snyder 2019).

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absence of mandated social distancing. Our typology differentiates among four kinds of mobility based on (1) whether or not mandatory social distancing policies are in place and (2) changes in the amount of time individuals spend at their residences. This latter, time dimension of the typology makes it easier to draw on passively generated mobile phone data to describe and classify population mobility. Not only are these data readily available at the subnational level in the three selected countries, but they are also the primary data sources in most studies of social distancing during the pandemic.

[FIGURE 1 HERE]

As seen in Figure 1, the label *voluntary distancing* describes increases in time spent at residences that occur without mandatory distancing. An increase in the amount of time spent at residences under mandatory distancing policies is labeled *compliance*. In turn, a decrease in time spent at residences under mandatory social distancing is *non-compliance*. Lastly, a decrease in time spent at residences without mandatory social distancing is *voluntary mobility*. The next section uses the typology and cell phone data from all 109 states inside Brazil, Mexico, and the U.S. to describe and analyze patterns of mobility.

III. Subnational Variation in Population Mobility in Brazil, Mexico, and the U.S.

The conventional national-level focus in comparative politics makes it harder to see variation in humanly important phenomena inside countries (Giraudy, Moncada, and Snyder 2019). This is especially true for COVID-19, where the pandemic, policy, and behavior have varied markedly across states. Scaling down to the state level not only makes it easier to observe and describe this subnational variation in policy and mobility, it also provides a stronger foundation for understanding compliance at the level of government where social distancing policies were actually made in Brazil, Mexico, and the U.S.[3]

To measure mobility after the onset of the pandemic, we rely on Google's COVID-19 Mobility Reports from the beginning of March through late December 2020. Google provides anonymized daily data aggregated to the state level on trends in mobility based on the behavior of Google users who enabled their Location History setting. Data on mobility exist for time spent in six locations: retail and recreation, grocery and pharmacy, parks, transit stations, workplaces, and residences. For each location, Google calculates the percentage change in mobility on each day relative to a baseline value constructed from the median value of that same day of the week during the pre-pandemic period from January 3, 2020, to February 6, 2020. We focus on changes in time spent at residences because it is the best indicator of whether social distancing policies succeed in getting citizens to stay home, using a seven-day rolling average of the Google mobility measure to isolate underlying trends in behavior and remove periodic variation across weekdays.

To measure COVID-19 policies in Brazil and Mexico, we draw on data collected by the University of Miami's COVID-19 Observatory, which tracks the adoption by state governments of multiple policies over time. Although these data do not reflect policies implemented by municipalities (e.g., a stay-at-home order implemented by a city's mayor), they do include federal policies.[4] We focus on eight policies most directly related to social distancing: stay-at-home orders; workplace closures; suspension of public transit; restrictions on internal travel;

[3] Elsewhere (Bennouna et al., n.d.), we explore how political factors such as partisanship and intergovernmental rivalries, combined with the wide discretion and authority of state governments to choose, design, and implement specific policies, produce contrasting social distancing measures at the state level in federal countries.
[4] To the extent that social distancing policies are implemented at the municipal level but not reflected in state-level indicators, our measurement approach will likely produce conservative estimates of the true policy effect.

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school closures; restrictions on gatherings; cancellations of public events; and public information campaigns, specifically, public warnings from government officials and coordinated traditional and social media campaigns within states. To measure social distancing policies in the U.S., we draw on data tracking these same eight policies collected by Hale et al. (2020) as part of the Oxford COVID-19 Government Response Tracker. Each indicator ranges from 0 (no policy) to 1 (policy fully implemented), with incremental values indicating policies that are either recommended but not required, required but partially implemented, or required but limited in geographic scope.[5]

Figure 2 shows how patterns of mobility vary with the adoption of social distancing policies over the course of the pandemic. Whereas Appendixes A2 and A3 present comprehensive data on mobility and social distancing policies for all 109 states across Brazil, Mexico, and the United States, Figure 2 focuses only on illustrative cases within each country. Each row corresponds to a country. For each country, we selected three states, the two with the high (right panel) and low (left panel) changes in mobility and a third (center panel) that shows illustrative variation in policy, mobility, or both. For each state, the shaded grey areas at the top of each panel, and the corresponding left-side y-axis, draw from Google's mobility data and show the seven-day rolling average of percentage change (0–30) from baseline in time spent at residences. The black lines, and the corresponding right-side y-axis, show the seven-day rolling average of new COVID-19 cases per 100,000 residents in each state. Below these trends, the colored lines reflect periods when each social distancing policy was in effect. The width of the line corresponds to the degree of implementation: thick lines correspond to mandatory, state-

[5] See Appendix A1 for a detailed discussion of the specific coding of individual policies.

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wide orders, whereas lighter, thinner lines reflect periods when the policy was recommended but either not required, required but partially implemented, or required but geographically limited.

[FIGURE 2 HERE]

Figure 2 illustrates the following points: First, voluntary distancing is feasible, as evident in the Brazilian cases. Peak reductions in population mobility occur in the states of Mato Grasso do Sul and Tocantins during periods when relatively few social distancing policies were in place and reported cases of COVID-19 were low. Second, Figure 2 highlights the advantages of a subnational approach that unbundles state-level social distancing policies. An analysis focused solely on a single policy, such as stay-at-home orders, would have difficulty explaining the large decreases in mobility observed in Santa Catarina compared to Mato Grosso do Sul and Tocantins. What would appear from the standpoint of a focus on stay-at-home orders as an unexplained spike in voluntary distancing instead reflects evidence of *compliance* with other, stringent social distancing policies, including suspended public transit, restricted internal travel, and cancelled public events. Third, Figure 2 presents initial evidence of the collective efficacy of these policies. Peak reductions in mobility in the Mexican and U.S. states provide evidence of compliance, because they correspond to periods when the bulk of social distancing policies were first adopted. Still, Figure 2 also suggests that the effects of policies vary across contexts and time. Some of this variation may reflect differences across states in the status of the pandemic: New Jersey and Wisconsin adopted a similar set of policies in the early stages of the pandemic, but reductions in mobility were greater in New Jersey, which also experienced an early spike in COVID-19. While we would expect the status of the pandemic to influence mobility behavior, the relationship is far from a one-to-one correspondence. This is especially evident in Mexico, where policies are fairly uniform and the incidence of COVID-19 is relatively low across all three selected states, yet the mobility behavior observed in Quintana Roo diverges markedly from that in Durango and Michoacán. Figure 2 thus provides initial evidence that factors beyond policies influence population mobility, both directly (by shaping voluntary behavior in the absence of mandatory social distancing measures) and indirectly (by moderating the likelihood of compliance with mandatory measures). Finally, Figure 2 suggests that while policies adopted during the early stages of the pandemic contributed to reduced mobility, their effectiveness declined over time. We explore these insights more formally in the following sections, turning first to the question of which specific policies have the strongest effect on mobility and then considering how these effects vary under different political, epidemiological, and socioeconomic conditions.

IV. Which Social Distancing Policies Have the Most Effect on Mobility?

Because of the unparalleled human consequences of the COVID-19 pandemic, policymakers and the public have a clear interest in knowing the effectiveness of specific social distancing measures. In situations where some states adopt a particular policy, whereas others do not, researchers often turn to difference-in-differences (DD) designs to estimate the effects of a policy (Angrist and Pischke 2008; Wing, Simon, and Bello-Gomez 2018). The canonical DD analysis involves a comparison between two groups—the "treated" states that adopt the policy and the "control" states that do not—at two points in time: before and after adoption. Under an assumption of parallel trends, where outcomes in the treated states would have followed a parallel path to outcomes in control states, the observed difference between the change in outcomes among the treated and control states provides an estimate of the effect of adopting a policy:

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$$\boldsymbol{\tau} = \left(\overline{\boldsymbol{y}^{\boldsymbol{Post}}_{\boldsymbol{Treat}}} - \overline{\boldsymbol{y}^{\boldsymbol{Pre}}_{\boldsymbol{Treat}}}\right) - \left(\overline{\boldsymbol{y}^{\boldsymbol{Post}}_{\boldsymbol{Control}}} - \overline{\boldsymbol{y}^{\boldsymbol{Pre}}_{\boldsymbol{Control}}}\right) \qquad (1)$$

When the timing of policy adoption varies, as it does among social distancing policies across states in Brazil, Mexico and the U.S., researchers estimate a generalized difference-in-difference model (Bertrand, Duflo, and Mullainathan 2004):

$$\boldsymbol{y_{it} = \alpha_i + \lambda_t + \beta_{DD} D_{it} + X'_{it}\beta + e_{it}} \qquad (2)$$

where α_i and λ_t are fixed effects for unit and time respectively controlling for variation attributable to all time-invariant differences across units, such as differences in the wealth, infrastructure, and demographics of states, and unit-invariant differences across time, such as general differences in days of the week or months of the year; X_{it} is a matrix of time-varying covariates; and D_{it} is an indicator that takes a value of 1 after a state has adopted a policy and 0 otherwise. When states adopt policies at different times, the coefficient $\boldsymbol{\beta_{DD}}$ in this two-way fixed effects regression reflects a weighted average of all possible 2x2 DD estimators (Goodman-Bacon 2018). However, as the previous section suggests, assessing the effects of social distancing policies on mobility poses challenges even for this generalized model: Policies are not implemented in isolation, and states often adopt multiple policies at the same time. Moreover, states differ not only in the timing of policy adoption but also in the degree of policy implementation. Measures to reduce mobility that were issued initially as recommendations can subsequently be made mandatory, as occurred with stay-at-home orders in Mexico, and stringent initial requirements can be relaxed later, as happened in the U.S.

Because of these empirical challenges, we first estimate as a baseline the following two-way fixed effects regression with standard errors clustered by state:

$$\boldsymbol{y_{it} = \alpha_i + \lambda_t + \beta(\alpha_i \times d_t) + Z'_{it}\beta_{Policy} + X'_{it}\beta + e_{it}} \qquad (3)$$

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$\boldsymbol{Z'}_{it}$ contains the full set of eight social distancing policies coded to reflect the full variation in their degree of implementation, where 0 represents no policy, 1 represents a full, state-wide requirement, and intermediate values correspond to policies that are recommended but not required, or implemented in a partial or geographically-targeted manner; $\boldsymbol{\beta}(\boldsymbol{\alpha}_i \times \boldsymbol{d}_t)$ provides state-specific linear time trends; and $\boldsymbol{X'}_{it}$ controls for the seven-day average of new COVID-19 cases in the state, mean deviated and standardized to facilitate interpretation and comparisons.[6] Next, we estimate this model on subsets of the data, corresponding to early periods of policy adoption, middle periods of policy relaxation, and later periods of both policy relaxation and readoption. Because the pandemic progressed at different rates in Brazil, Mexico, and the U.S., we take a data-driven approach to delineating these periods separately for each country. Where possible, we match periods to defining actions taken by a country's federal government. For example, in Mexico, we use May 18, 2020—the beginning of President López Obrador's phased reopening plan—as the dividing point between the early and middle stages of the pandemic. In the absence of formal, unified declarations from the government, we rely instead on turning points in national trends in new COVID-19 cases to divide periods. In Mexico, we mark the end of the middle period of the pandemic on November 19, when the seven-day national average of new COVID-19 cases, which had been declining since reaching a peak on August 1, began to trend upward again. In Brazil, we take July 29, 2020, when the national seven-day average of COVID-19 began to trend downward, to mark the end of the early period, and November 6, 2020, when cases began another steady upward trend, to define the end of the middle period. Similarly, in the U.S., we mark the end of the early period on May 28, 2020, when new cases started trending upward, and the end of the middle period on September 12, 2020, when the

[6] Appendix A4 presents results exploring alternative specifications and codings of policy variables.

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national trend in cases began to rise again. For all three countries, the analysis ends on December 23 to help guard against bias in the results stemming from changes in mobility driven by the year-end holidays. Our results are robust to alternative definitions of stages of the pandemic, and we report several plausible alternative approaches in Appendix A4.

Figure 3 presents the coefficient estimates and confidence intervals for these regression analyses. To help contextualize the policy estimates in the epidemiological context, we first consider the impact of COVID-19 rates on mobility. As expected, higher rates of new COVID-19 cases are associated with greater increases in time spent at residences, although with some variation in the magnitude of this relationship across countries and time periods.[7] Taking the estimates from the full sample, a one standard deviation increase in the seven-day average of new COVID-19 cases per 100,000 residents is associated with a 0.68 percentage-point increase in time spent at residences in Brazil, a 0.63 percentage-point increase in Mexico, and a 1.29 percentage-point increase in the U.S.

[FIGURE 3 HERE]

Turning first to the policies that appear to have an effect across countries, we see that over the full sample, workplace closures are associated with compliance—that is, increased time spent at residences under mandatory social distancing measures—in all three countries and that stay-at-home orders are associated with compliance in Brazil and the U.S. but not in Mexico. In Brazil and the U.S., the effects of these two policies appear concentrated during the early stages of the pandemic.[8] In Mexico, the effect of workplace closures on mobility is most evident during the middle period. Restrictions on gatherings are also significant predictors of reductions in

[7] Why this relationship varies in size and significance across countries and time periods, while beyond the scope of this article, is an interesting avenue for future research.
[8] The last statewide stay-at-home order in Brazil ended on July 11, in the state of Ceará.

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mobility for the full time period in the U.S. and during the middle period in Mexico. School closures are associated with decreased mobility during the early period in Mexico and the middle period in the U.S., which brackets the traditional end and beginning of the school year in the latter. Surprisingly, the coefficient for restrictions on internal travel—recommendations or prohibitions on travel between cities or states—is negative and marginally significant ($p<0.10$) in the U.S. during the middle period, suggesting such restrictions are associated with *less* time spent at residences. While it is possible that travel restrictions imposed during traditional vacation months and in the context of general moves toward reopening may induce non-compliance, we caution against drawing strong conclusions from a single finding in one country and period. Finally, in the later periods of the pandemic, only the cancellation of public events appears to have any effect on mobility, and this effect is both marginally significant and occurs only in Mexico. Such null findings may reflect the declining effectiveness of policies over time, but they may also stem from the smaller set of observations for this time period. Overall, the results presented in Figure 3 point to workplace closures and stay-at-home orders as consistent drivers of behavioral change, with some evidence that other policies, such as school closures and restrictions on gatherings, also influence mobility.[9]

V. Do Existing Theories of Compliance Explain Mobility Behavior?

The analysis has focused thus far on the effect of social distancing policies on behavior. This section shifts the focus to factors that may explain variation in the effectiveness of these policies. Drawing on existing theories of compliance with government authority as well as recent research on compliance with public health measures, we explore whether workplace closures—the one

[9] Appendix A5 presents additional results on the robustness of these findings to alternative specifications and identification strategies.

policy that we found decreased mobility across all three countries—are more effective when residents trust political institutions (Levi 1988; Levi, Sacks, and Tyler 2009; Tyler 1988, 2003; Sunshine and Tyler 2003), have the socioeconomic resources to afford the costs of staying at home (Bodas and Peleg 2020; Wright et al. 2020), perceive health risks to be higher (Brewer et al. 2007; Champion and Skinner 2008; Galasso et al. 2020; Rosentock 1974), and have differing partisan affiliations (Ajzenman et al. 2020; Allcott et al. 2020; Calvo and Ventura 2021; Cornelson and Miloucheva 2020; Grossman et al. 2020).

We operationalize these propositions as follows: To capture levels of *political trust*, we use six items from LAPOP's 2019 surveys in Brazil, Mexico, and the U.S. that measure respondents' trust in their country's system of government, executive, legislature, political parties, media, and elections. We scale these items using a principal components analysis with varimax rotation to create a single measure of general trust in a country's political institutions and employ a multilevel regression with post-stratification to produce state-level estimates of generalized political trust (Ghitza and Gelman 2013; Hanretty 2020). We expect compliance with social distancing measures will be higher in states where populations, on average, have higher political trust and thus are more likely to view government efforts to limit mobility as legitimate and aligned with the public good. To measure *socioeconomic resources*, we use the state-level Human Development Index (HDI), which measures degree of development on the dimensions of education, health, and standard of living. We expect that the higher the level of HDI, the more compliance with policies, because wealthier and more educated populations will likely be better able to work from home (Bennett 2020; López-Calva 2020b) and more equipped to stockpile food and other essential items, further reducing the costs of distancing. For the same reasons, when measures aimed at reducing mobility are absent, we expect higher levels of HDI

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to correspond with greater voluntary distancing. To operationalize *health risk*, we use the seven-day rolling average of COVID-19 cases in each state, with the assumption that when this figure is high, citizens will likely perceive greater risks. Finally, we use the vote share for each country's president in the past election as a measure of the likely receptivity of a state's population to *presidential partisan cues*. Because each president downplayed the severity of the pandemic on numerous occasions, we expect that social distancing policies will be less effective in states where the presidents were more popular, as measured by their vote share in the past election. To extend the analysis of partisanship, we also consider how populist presidential messaging in the form of specific speeches dismissing the severity of the pandemic and, in some instances, explicitly urging citizens to disregard state-level social distancing orders, affected mobility (Ajzenman et al. 2020; Calvo and Ventura 2021). We expect presidential messaging to correspond with increased mobility in states where the president enjoyed higher levels of popularity.

Because many of our measures of these theoretically relevant variables are time-invariant, for each country, we replace the state-fixed effects from our previous models with a state-varying random intercept and estimate a series of four models interacting the proposed moderator with the measure of workplace closures. Each model maintains the state-specific linear trends and controls for the other policy indicators as well as other potentially relevant moderators of behavior.[10] Because these are complicated models with multiple interactions, we present the full model estimates in the Online Appendix, focusing here on the predicted values from selected comparisons from our models. This illustration of the marginal effects of our

[10] The Online Appendix reports models controlling for additional economic, political, and demographic covariates. The addition of controls does not alter our substantive interpretation of the direction and degree of moderating effects.

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models provides insights into both the left-hand and right-hand sides of our typology. That is, our models enable us to observe how political, socioeconomic, and epidemiological factors shape, on the one hand, compliance and non-compliance by moderating the effect of workplace closure orders and, on the other hand, voluntary distancing and voluntary mobility in the absence of such orders.

As seen in Figure 4, each row presents the results for a particular moderator of compliance: political trust (4A), socioeconomic resources (4B), health risk (4C), and partisanship (4D), with each column corresponding to a country: Brazil (left), Mexico (middle) and the U.S. (right). The solid black lines in each panel represent predicted values for a state where a workplace closure order was in effect. Thus, the solid black lines show the effect on *compliance* (measured by time spent at residences) of going from one standard deviation below the mean of a moderator to one standard deviation above the mean, holding all other predictors in the model constant at their conditional means. Meanwhile, the gray dashed lines show the change in *voluntary distancing*, that is, the amount of time spent at residences when no workplace closure orders are in effect. Vertical gaps between the two lines represent the general effect of workplace closures: Time spent at residences tends to be higher when workplace closures are in effect than when they are not. Changes in the relative slope of the two lines, in turn, represent each moderator's effects on compliance and voluntary distancing.

[FIGURE 4 HERE]

The results for the U.S. are largely consistent with predictions based on existing theories. When a workplace closure order is present, reductions in mobility tend to be about 1.7 percentage-points higher in high-trust states than in low-trust states. Similarly, higher levels of socioeconomic resources appear to increase compliance with workplace closure orders but have little association

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with mobility in the absence of such orders. The effects of health risk appear to operate independently from policy, because whether or not a workplace closure exists, going from a low rate of COVID-19 cases to a high rate is associated with about a 3.1 percentage-point increase in time spent at residences. Finally, partisanship appears to influence both compliance and voluntary distancing: In a state where President Donald J. Trump received a below-average share of the 2016 vote, the gap in predicted mobility between a state with a workplace closure order and one without it (6.8 percentage points) is nearly twice as large as the gap among states with and without this policy where President Trump did well (3.5 percentage points). For reasons of space, we report separately, in Appendix A7, the results of our analysis of the effects of presidential speeches on mobility. Across multiple specifications and speeches, we find no evidence that populist presidential messaging in Mexico and the U.S. produced changes in population mobility. In Brazil, our state-level results, together with municipal-level findings by Ajzenman et al. (2020), suggest that presidential discourse dismissing the severity of the pandemic may have impacted mobility, at least during the early months of the pandemic. This finding should be interpreted cautiously given the noise and uncertainty generated by the large amount of often conflicting messages about the threats posed by COVID-19, not only across levels of government but even across agencies within the same federal government, during the early stages of the pandemic. We therefore encourage future research using multiple methods to explore further the relationship between populism and compliance.

While theories of compliance appear able to explain patterns of mobility in the U.S., the evidence that such theories work in Brazil and Mexico is less clear. In Brazil and Mexico, as in the U.S., socioeconomic resources are associated with more compliance with workplace closures. Regarding political trust, in Mexico there is suggestive evidence, at best, that, as in the

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U.S., it increases compliance with workplace closures, whereas in Brazil we find little evidence that trust matters for compliance.[11] Health risks have a weak effect on mobility in Brazil, whereas in Mexico increased risk is associated with more time spent at residences only in the absence of workplace closure orders. As for partisanship, in Brazil moving from low to high levels of support for President Jair Bolsonaro is associated with less time spent at residences, especially in the absence of workplace closures, whereas in Mexico greater support for President Andrés Manuel López Obrador is associated with the opposite, that is, with increases in time spent at residences. This suggests that the effects of partisan cues on mobility may vary depending on whether they come from the political left or right.

Table 1 summarizes our findings within the broader context of previous research on compliance, identifying the theories and explanations that we tested in Figure 4. There are limits to the inferences we can draw from state-level data, and our results are by no means definitive tests of any theory. Still, while we find that state-level workplace closure orders seem to have a significant effect on reducing population mobility across the three countries, the effects of the main determinants of compliance identified by existing theories vary widely, suggesting a need for stronger and more nuanced theories of comparative compliance that can better account for differences across national and subnational contexts.

[TABLE 1 HERE]

Summary and Suggestions for Future Research

COVID-19 poses unprecedented challenges to governments across the world. To mitigate the spread of disease, governments have adopted various recommended and mandated policies to

[11] As shown in the Appendix, however, political trust appears to be a strong moderator of compliance with stay-at-home orders in Brazil (as well as the U.S., but not Mexico).

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curb population mobility. Our work offers new insights and guidance for scholars and practitioners interested in the effectiveness of these measures.

The comparative subnational analysis of 109 states in Brazil, Mexico, and the United States over 10 months highlights the advantages of unpacking policies across geographic and temporal contexts. Social distancing policies are crafted and implemented as bundles of measures, and therefore studying one policy in isolation does not capture the full picture. The focus on stay-at-home orders in much previous research underestimates the value of other policies, such as workplace and school closures, in reducing mobility. Further, we find that the effect of these policies tends to be stronger during the early stages of the pandemic, especially in the U.S. and Brazil, where cases of COVID-19 rose more rapidly than in Mexico.

By proposing and applying a new typology of mobility behavior grounded in theories of compliance with government authority, we gain a stronger understanding of the complex relationships among policy, politics, and mobility. Increased time spent at residences is a choice that individuals make under varied circumstances, including social distancing measures that may be optional and recommended or, alternatively, mandatory and required. When mandatory policies are implemented, the decision to spend more time at residences is about complying with the law or not. When these policies are absent or merely recommended, individual decisions about whether to reduce mobility and spend more time at home are considered voluntary and will likely be driven by the political, socioeconomic, and epidemiological factors that we have explored.

Our study of the factors affecting population mobility has implications both for policymakers and scholars. For example, the tendency for compliance with workplace closure orders to increase with levels of socioeconomic development suggests that efforts to mitigate the financial burdens of the pandemic through cash transfers and economic stimulus packages can help reduce population mobility by decreasing the costs of compliance. The divergent findings for political trust, health risks and partisanship across Brazil, Mexico, and the U.S., in turn, suggest important areas for further research. Such research will certainly benefit from more and better data. Measures available at multiple scales and levels of government will allow scholars to test important questions beyond the scope of this article, such as how population mobility during the pandemic is affected by variation in enforcement across municipalities or by differences in the content and frequency of information presented by media and public health campaigns.

Understanding who stays at home during a pandemic requires not just more and better data, but also stronger theory that can account more effectively for the contrasting consequences of social distancing policies both inside and across countries. Why does political trust influence compliance with workplace closure orders more in the United States than in Mexico or Brazil? Why are the effects of health risks on mobility behavior stronger in Brazil and the United States than in Mexico? Why is support for populist presidents who downplay the gravity of the pandemic associated with less mobility reduction for presidents on the political right yet with more mobility reduction for a president on the political left? Answering questions such as these will require greater attention to the meaning and measurements of concepts like political trust; the specifics of how workplace closures and stay-at-home orders are implemented across levels of government; and the nature of the varied subnational political, socioeconomic, and epidemiological contexts in which these and other public health measures are taken.

■■■

Paul F. Testa is an assistant professor in the Department of Political Science at Brown University. His research focuses on how interactions with the criminal justice system shape political behavior. His work has appeared in *American Journal of Political Science*, *Journal of Politics*, *Political Behavior*, and *Public Research Quarterly*. He is an affiliate with the Taubman Center for American Politics and Policy and an advisor to the Policy Lab at Brown University.

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Richard Snyder is a professor of political science at Brown University. His publications include *Politics after Neoliberalism: Reregulation in Mexico* (2001); *Passion, Craft and Method in Comparative Politics* (2007, with Gerardo L. Munck); and *Inside Countries: Subnational Research in Comparative Politics* (2019, with Agustina Giraudy and Eduardo Moncada). Internationally, Snyder's research has been published in journals and books in Argentina, Chile, China, Colombia, France, Iran, Mexico, Peru, South Korea, and Spain and has been translated into Chinese, French, Korean, Persian, Spanish and Turkish.
Richard_Snyder@brown.edu

Eva Rios is a PhD candidate in the Department of Political Science at Brown University. Her research focuses on criminal governance and Evangelical movements in urban peripheries with a particular emphasis on Brazil.

Eduardo Moncada is an assistant professor in the Department of Political Science at Barnard College, Columbia University. His research focuses on the political economy of crime and violence. He is the author *of Cities, Business and the Politics of Urban Violence in Latin America* (Stanford University Press, 2016), co-editor of *Inside Countries: Subnational Research in Comparative Politics* (Cambridge University Press, 2019), and author of *Resisting Extortion: Victims, Criminals, and States in Latin America* (Cambridge University Press, 2021). His work has appeared in *Comparative Politics*, *Perspectives on Politics*, and *Studies in Comparative International Development*, among others.

Agustina Giraudy is an associate professor at American University. Her publications include *Democrats and Autocrats: Pathways of Subnational Undemocratic Regime Continuity within Democratic Countries* (2015) and *Inside Countries: Sunbnational Research in Comparative Politics* (2019, with Eduardo Moncada and Richard Snyder). Her articles have appeared or are forthcoming in the *Journal of Politics*, *Journal of Politics in Latin America*, *Studies in Comparative International Development*, *Latin American Politics and Society*, *Latin American Research Review*, *Journal of Democracy* (en Español), *Perspectives on Politics*, *Publius*, *Regional and Federal Studies*, *Bulletin of Latin American Research*, and *Revista de Ciencia Política* (Chile), among others.

Cyril Bennouna is a PhD candidate in the Department of Political Science at Brown University. His research focuses on migration, citizenship, and public health, especially in contexts of political crisis and forced displacement. He has conducted research on topics such as the integration and psychosocial well-being of refugees, community and interpersonal violence in complex emergencies, and discrimination in health care settings. His work has appeared in *Social Science and Medicine*, *PLOS One*, *Disasters*, *Frontiers in Psychiatry*, and *Conflict and Health*, among other journals.

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Table 1 The Effects on Mobility Behavior in Brazil, Mexico, and the U.S. of Variables Identified in Previous Research on Compliance

Explanatory variable	**Indicator**	**Brazil**	**Mexico**	**United States**	**Previous Research**
Political trust	Trust in the political system, executive, legislature, political parties, mass media, elections	Null effect on mobility reduction	Marginal positive effect on mobility reduction with policy	Positive effect on mobility reduction with policy	Levi 1988; Tyler 1988; 2003; Sunshine and Tyler 2003; Levi, Sacks and Tyler 2009; Bargain and Aminjonov 2020
Socioeconomic resources	Level of health, education, and economic development (HDI)	Positive effect on mobility reduction with policy	Positive effect on mobility reduction with policy	Positive effect on mobility reduction with policy	Rothstein and Talbott 2007; Bernheim et al. 2015; Bennett 2020; Bodas and Peleg 2020; López-Calva 2020; Wright et al. 2020
Health risk	New COVID-19 cases	Positive effect on mobility reduction with and without policy	Positive effect on mobility reduction without policy	Positive effect on mobility reduction with and without policy	Rosentock 1974; Brewer et al. 2007; Champion and Skinner 2008; Chan et al. 2020; Galasso et al. 2020
Partisanship	Presidential vote share	Negative effect on mobility reduction with and without policy Bolsonaro's COVID-19 speeches associated with increased mobility	Positive effect on mobility reduction with and without policy López Obrador's COVID-19 speeches have no effect on mobility	Negative effect on mobility reduction with policy Trump's COVID-19 speeches have no effect on mobility	Ajzenman et al. 2020; Allcott et al. 2020; Calvo and Ventura 2021; Grossman et al. 2020; Hsiehchen et al. 2020

Notes: Policy refers to *workplace closure orders*. Although we test here the principal determinants of compliance theorized in the political science and public health literatures, these vast literatures offer additional explanations that we do not consider because of data and space limitations, including exposure to misinformation (Zimmerman et al. 2005), threat of state sanctioning (Becker 1968), ethnic diversity (Egorov et al. 2020), and social and civic capital (Barrios et al. 2020; Brodeu et al. 2020).

Figure 1 A typology of mobility behavior during public health emergencies.

Time Spent at Residence		**Mandated Social Distancing**: No	**Mandated Social Distancing**: Yes
	Increased	I. Voluntary Distancing	II. Compliance
	Decreased	III. Voluntary Mobility	IV. Non-compliance

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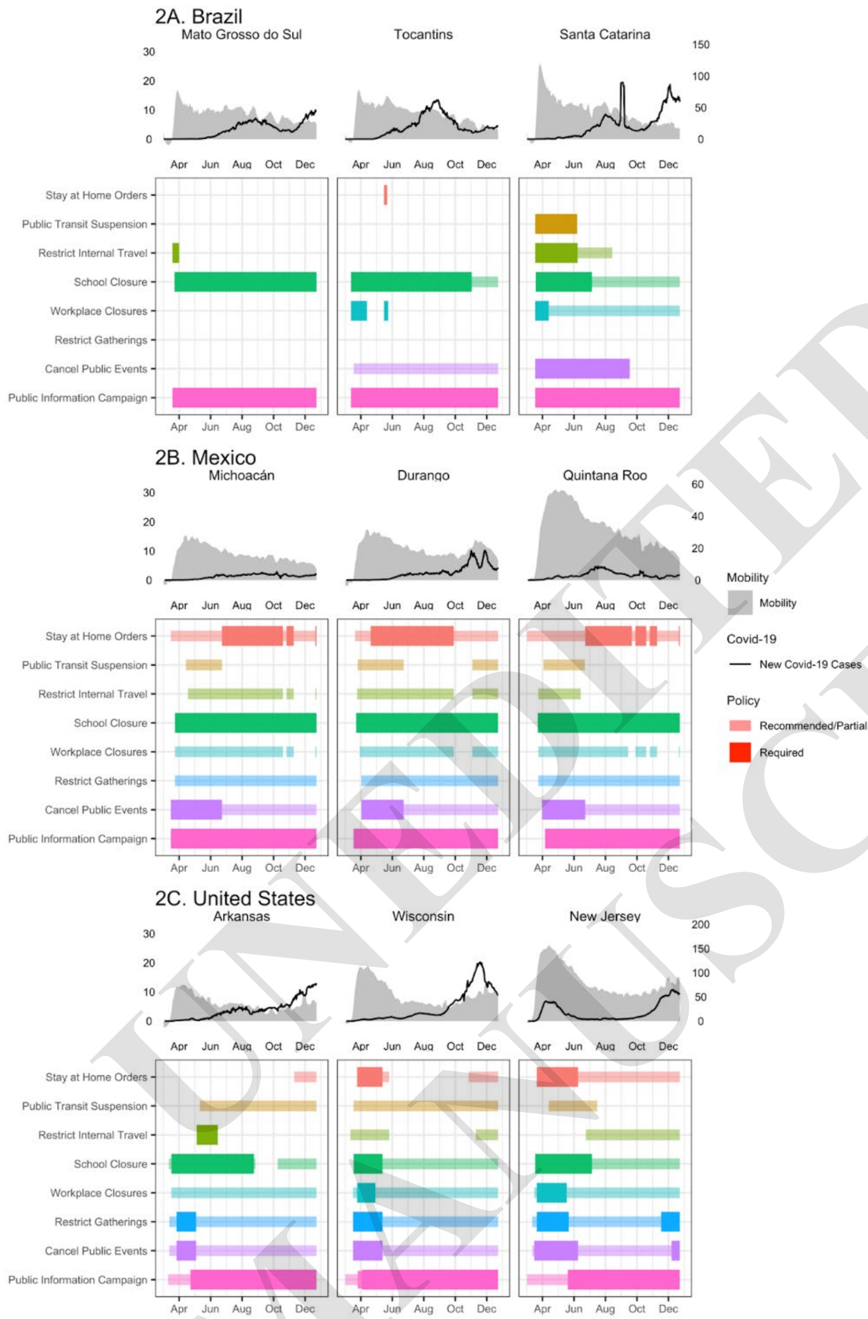
Figure 2 Policy responses to COVID-19 in select Brazilian, Mexican and U.S. states.



Notes: Figure shows trends in mobility (shaded grey regions), COVID-19 cases (black lines), and policy (colored bars) for selected states in Brazil, Mexico, and the U.S. The width of the colored bars corresponds to variation in the level of policy of implementation: Thick lines correspond to mandatory, state-wide orders, whereas lighter, thinner lines reflect periods when the policy was recommended but either not required, required but partially implemented, or required but geographically limited.

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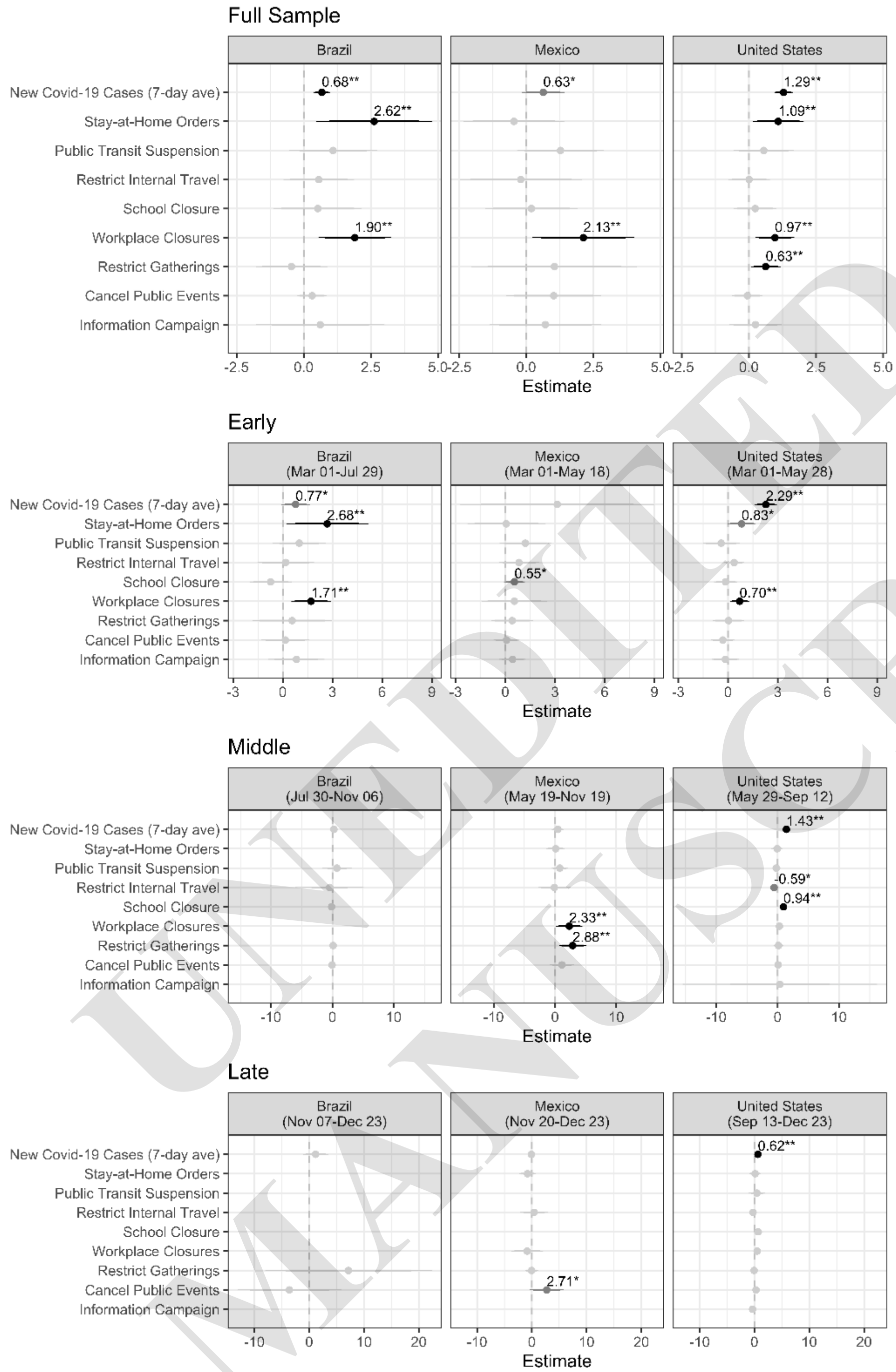
Figure 3. State-level social distancing policies and population mobility in Brazil, Mexico, and the U.S.



Notes: Each panel contains the coefficients with 90% and 95% confidence intervals, for models fit to the full set of data (first row), and two-month subsets of the data corresponding roughly to the early (second row), middle (third row), and late (fourth row) stages of the pandemic. Coefficient estimates with p-values < 0.05 are presented in black. Marginally significant estimates with p-values < 0.10 are in dark grey, and non-significant coefficients are in light grey.

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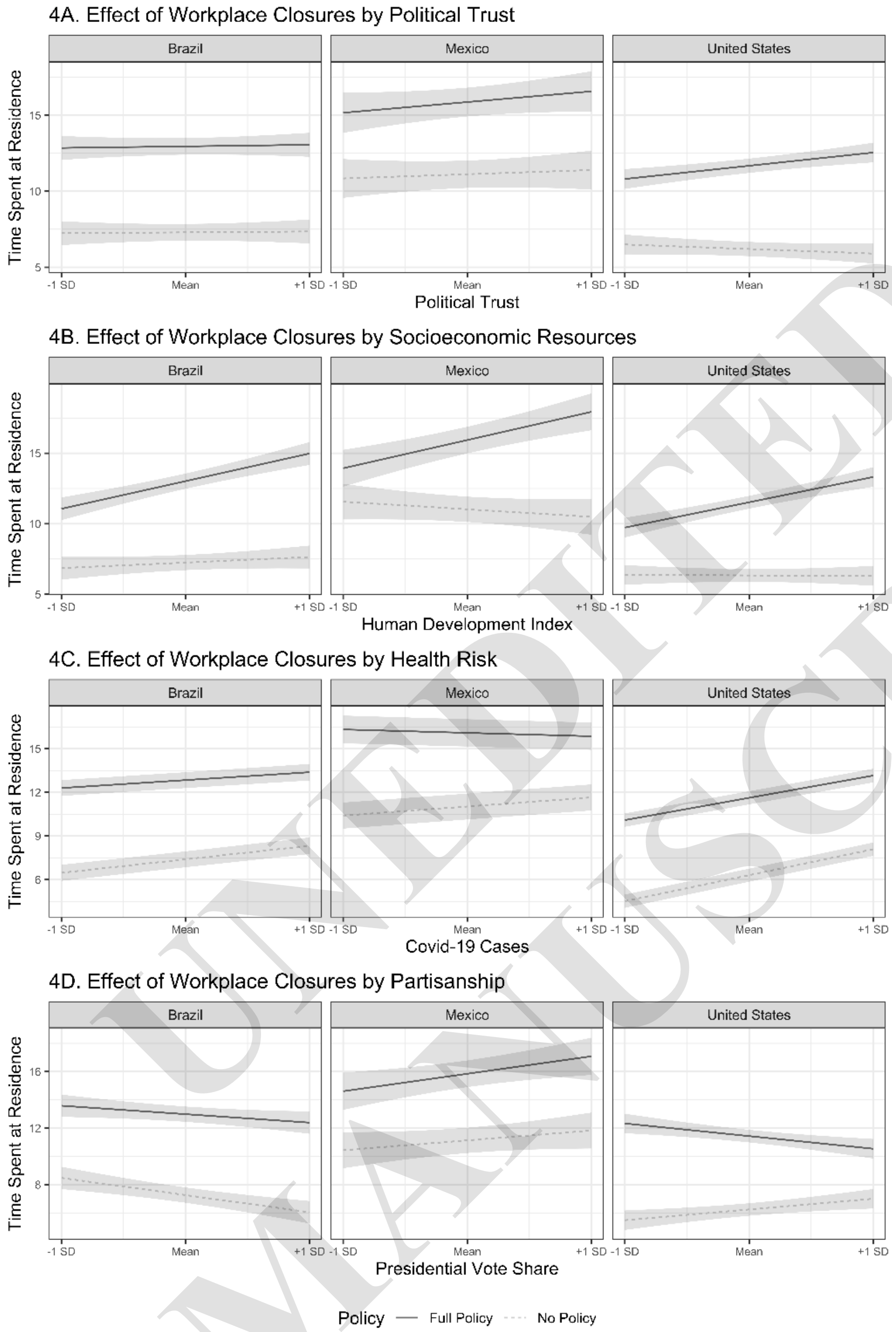
Figure 4 Assessing potential moderators of compliance and mobility in Brazil, Mexico and the U.S.



Notes: Each panel reports the predicted change in mobility going from one standard deviation below the mean of a moderator to one standard deviation above the moderator's mean, when a workplace closure is present (black line) or absent (dashed grey line).