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The Impact of State Paid Sick Leave Policies on Weekday Workplace Mobility During the COVID-19 Pandemic

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Abstract:

Objectives. To evaluate whether the Families First Coronavirus Response Act (FFCRA) modified the association between pre-existing state paid sick leave (PSL) and weekday workplace mobility between February 15 and July 7, 2020.

Study Design: Longitudinal, observational study.

Methods. The 50 U.S. states and Washington, D.C. were divided into exposure groups based on the presence or absence of pre-existing state PSL policies. Derived from Google COVID-19 Community Mobility Reports, the outcome was measured as the daily percent change in weekday workplace mobility. Mixed-effects, interrupted time series regression was performed to evaluate weekday workplace mobility after the implementation of the FFCRA on April 1st, 2020.

Results. States with pre-existing PSL policies exhibited a greater drop in mobility following the passage of the FFCRA (**β**=-8.86,95%CI:-11.6,-6.10,*P*< 001). This remained significant after adjusting for state-level health, economic, and sociodemographic indicators (**β**=-3.13,95%CI:-5.92,-0.34,*P*=.039).

Conclusions. Pre-existing PSL policies **were associated with** a significant decline in weekday workplace mobility after the FFCRA, which may have influenced local health outcomes. The presence of pre-existing state policies may differentially influence the impact of federal legislation enacted during emergencies.

Keywords: COVID-19; Paid Sick Leave; Physical Distancing; Workplace Mobility; Health Policy

INTRODUCTION

The COVID-19 pandemic necessitates systemic policies to reduce its spread. Despite the deployment of COVID-19 vaccines, the ability to quarantine after exposure remains critical to minimize the potential for "breakthrough cases" and risk of infection for those who are unvaccinated[1]. One policy to facilitate self-quarantine is paid sick leave (PSL), which allows employees to take compensated time off from work to recover from illness or injury. PSL has previously been associated with a three-fold increase in protection of workers' jobs, income, and health while recovering from illness[2]. PSL is especially crucial during outbreaks of communicable diseases as it can help mitigate "presenteeism," whereby employees go to work even if they are sick [3]. This is particularly important for COVID-19 since individuals can present a range of symptoms.

While previous studies have shown the efficacy of PSL in reducing absenteeism, these studies have focused on European countries with robust PSL schemes[4]. The United States (U.S.) is one of only two Organisation for Economic Co-operation and Development countries that does not have a nationwide PSL policy, resulting in a patchwork system that varies between states [2,5]. **Additionally, previous studies on PSL and absenteeism in the U.S. have focused on specific states or localities rather than taking a national approach [6,7].** Within each state, access to PSL is associated with many factors, including industry type, race, ethnicity, gender, sexual orientation, income level, immigration status, company size, full-or-part time status, and experience level. As a result, up to 40% of American private sector workers, including 69% of the lowest quartile of wage earners, are not afforded PSL[8]. This was partially rectified with the Families First Coronavirus Response (FFCRA) and Coronavirus Aid, Relief and Economic Security Acts, which provided emergency, two-week PSL on April 1st, 2020 [9] .

This federally-legislated PSL played an important role in slowing the spread of COVID-19 in the workplace by allowing for self-quarantine from work environments [9–11]. However, exemptions for certain employee categories (e.g., health care workers and emergency responders) and businesses with more than 500 employees blunted its coverage to potentially as few as 47% of private-sector workers [10]. Thus, the presence of pre-existing state PSL may have influenced how this emergency federal legislation impacted key outcomes such as travel to-and-from the workplace (i.e., weekday workplace mobility), which could be considered a proxy for workplace presenteeism and absenteeism [11,12]. As a result, it is critical to identify the differential impacts of the FFCRA on states that had pre-existing state PSL to elucidate what fundamental level of local preparedness is required to maximize the impact of federal legislation. The purpose of this study was to explore the impact of pre-existing state PSL on weekday workplace mobility surrounding the passage of the FFCRA (i.e., February through July 2020). It was hypothesized that states that had pre-existing state PSL would experience a greater drop in weekday workplace mobility compared to states that did not.

METHODS

Data collection

Four data sets were integrated for each of the 50 states and Washington, DC. The primary exposure of interest (i.e., presence or absence of pre-existing state PSL) was coded as either "yes" or "no" based on data from the Kaiser Family Foundation [5]. The primary outcome of interest (i.e., weekday workplace mobility) was collected from Google COVID-19 Community Mobility Reports [13]. Within these reports, weekday workplace mobility was calculated as the percent change in mobility between the date of interest and a pre-pandemic baseline. This baseline was computed as the median mobility between January 3 and February 6, 2020 on the

same day of the week (e.g., Monday, Tuesday) as the date of interest. Economic covariates (e.g., wage policies, worker protection policies, right-to-organize policies) and epidemiological metrics (e.g., COVID-19 cases and deaths per state) were from the Oxfam Index and the *New York Times* COVID-19 database, respectively. Other sociodemographic factors (e.g., median household income, state gross domestic product [GDP], commuting patterns, presidential election results between 2004 and 2016) were from the American Community Survey and the Federal Election Commission [14–17].

Statistical analysis

A mixed-effects, interrupted time series regression model with nested random effects for state and month characterized the relationship between the presence of pre-existing state PSL and daily percent change in weekday workplace mobility. The initial model only adjusted for temporality relative to the implementation of the FFCRA on April 1st, 2020 (i.e., days pre-FFCRA, instantaneous FFCRA, and days post-FFCRA). Additional bivariate analyses were performed to identify which covariates were significantly associated with weekday workplace mobility. Highly correlated terms were evaluated by investigators to determine which should be retained for further analysis. A multivariable model was subsequently constructed with the same structure as the unadjusted model and all significant terms from the bivariate analysis. Data were aggregated with Python (version 3.8) and analyzed in R (version 4.0.3) using the RStudio Integrated Development Environment (version 1.3.1093).

RESULTS

Immediately after FFCRA implementation on April 1st, 2020, Washington DC and the 12 states with pre-existing state PSL experienced an 8.86 percentage point greater decrease in weekday workplace mobility ($\boldsymbol{\beta}$ = -8.86, 95% CI: -11.6, -6.10, P<.001) compared to the 39 states

that do not have pre-existing state PSL (Fig. 1). **The substantial drop in weekday workplace mobility prior to the FFCRA coincided with state-mandated stay-at-home orders.** Health indicators associated with a greater decrease in mobility included new cases per 100,000 (**β** = -0.03, 95% CI: -0.04, -0.03, *P*<.001) and new deaths per 100,000 (**β** = -0.43, 95% CI: -0.51, -0.35, *P*<.001). Many travel metrics were associated with weekday workplace mobility, although directionality varied. For example, while average commute time was inversely associated with weekday workplace mobility (**β** per minute = -1.04, 95% CI: -1.22, -0.86, *P*<.001), percent commuting via carpool was associated with an increase in weekday workplace mobility (**β** = 1.73, 95% CI: 0.63, 2.83, *P*=.003). The bulk of economic indicators were also associated with weekday workplace mobility, including 2017 median household income (**β** per $10,000 USD = -2.47, 95% CI: -3.64, -1.29, *P*<.001) and unemployment rate (**β** = -0.31, 95% CI: -0.40, -0.20, *P*<.001). In addition, states with a dominant labor sector in "education and health services" had a greater drop in weekday workplace mobility compared to states with a dominant labor sector in "trade, transportation, and utilities" (**β** = -4.90, 95% CI: -9.39, -0.42, *P*=.044). Several demographic indicators were also associated with weekday workplace mobility, albeit in various directions. For example, while a higher percentage of men was associated with an increase in weekday workplace mobility (**β** = 2.83, 95% CI: 1.11, 4.55, *P*=.002), a higher percentage of Asian individuals was associated with a greater decrease in weekday workplace mobility (**β** = -0.31, 95% CI: -0.58, -0.05, *P*=.024). In terms of policies, states that provided paid *family* leave had a greater drop in weekday workplace mobility compared to states that did not (**β** = -10.6, 95% CI: -14.8, -7.02, *P*<.001). Finally, a higher state population per square mile was associated with a greater drop in weekday workplace mobility (**β** per 1,000 persons = -2.04, 95% CI: -2.84, -1.23, *P*<.001). See Supplementary Table 1 for a comprehensive list of covariates.

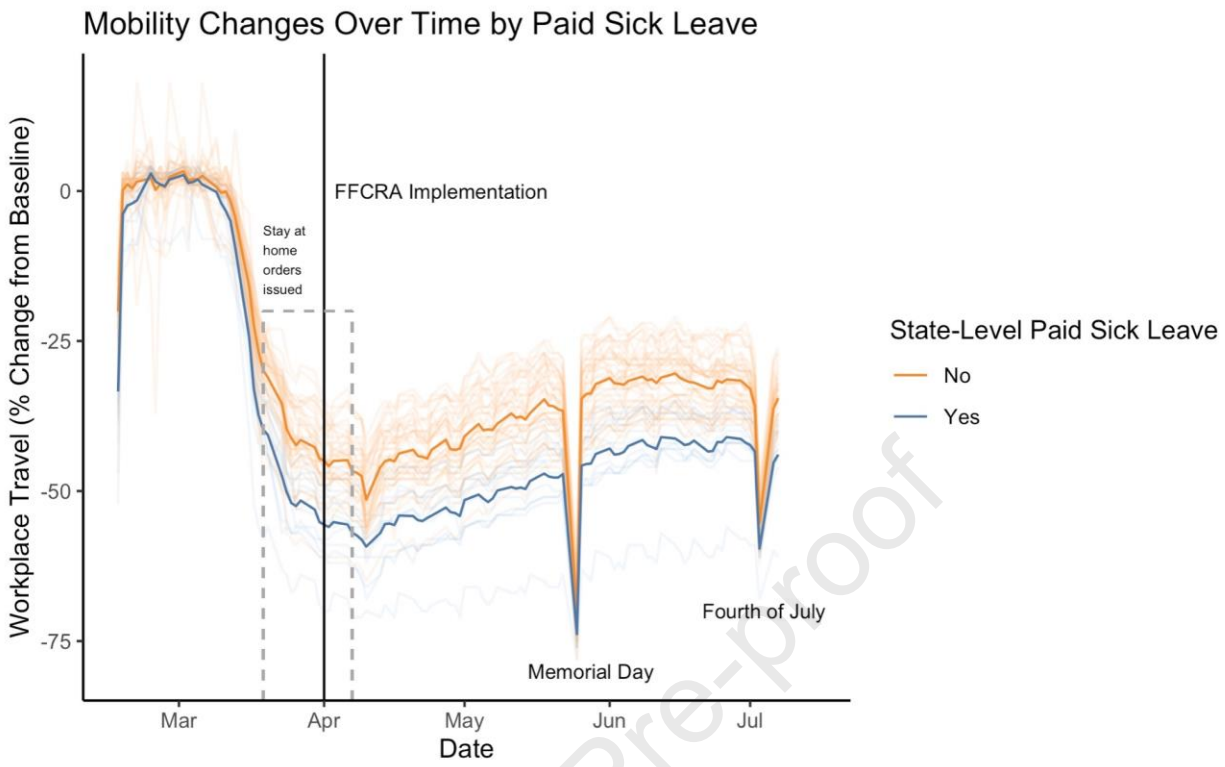

Fig 1. Changes in workplace travel over time by state-level paid sick leave. The black line on April 1, 2020 denotes the implementation of the Families First Coronavirus Response Act (FFCRA). **The gray dashed lines signify the period in which stay-at-home orders were enacted by states.** Twelve states (Arizona, California, Connecticut, the District of Columbia, Massachusetts, Maryland, New Jersey, New York, Oregon, Rhode Island, Vermont, and Washington) had pre-existing paid sick leave policies mandated by the state, whereas the remaining 39 did not. **The prominent blue and orange lines denote group-level daily averages, while the lighter lines are for each individual state.** The most substantial drops occurred on two federal U.S. holidays: Memorial Day (May 25th, 2020) and Independence Day (July 4th, 2020)

After adjustment, the association between pre-existing state PSL and weekday workplace mobility remained statistically significant (**β** = -3.13, 95% CI: -5.92, -0.34, *P*=.039; Table 1). Other variables that retained their significance and associated with a decrease in weekday workplace mobility included new cases per 100,000 (**β** = -0.03, 95% CI: -0.04, -0.03, *P*<.001), average commute time (**β** per minute = -0.59, 95% CI: -0.94, -0.24, *P*=.004), unemployment rate (**β** = -0.35, 95% CI: -0.45, -0.26 *P*<.001), and state population per square mile (**β** per 1,000 persons = -1.12, 95% CI: -2.04, -0.20, *P*=.027). Variables that retained their significance and were associated with an increase in weekday workplace mobility included poverty rate (**β** = 0.50,

95% CI: 0.07, 0.94, *P*=.035) and "manufacturing" as a dominator labor sector relative to "trade, transportation, and utilities" (**β** = 7.34, 95% CI: 0.59, 14.1, *P*=.045).

Table 1. Multivariable Mixed Effects Model: Paid Sick Leave vs. Weekday Workplace Mobility

Coefficient	β (95% CI)	P-Value [a]
Paid Sick Leave (Reference: No)		
Yes	-3.13 (-5.92, -0.34)	.039
Temporal Components		
Pre-Policy Effect	-1.87 (-1.91, -1.82)	< .001
Instantaneous Effect	21.0 (5.64, 36.3)	.053
Post-Policy Effect	1.94 (1.89, 1.99)	< .001
Health Metrics		
New Cases per 100,000	-0.03 (-0.04, -0.03)	< .001
Travel Metrics		
Average Commute Time (Minutes)	-0.59 (-0.94, -0.24)	.004
Average Commute Time on Public Transit (Minutes)	-0.03 (-0.15, 0.09)	.630
Economic Metrics		
Unemployment Rate (%)	-0.35 (-0.45, -0.26)	< .001
2017 Median Household Income ($10,000 USD)	0.19 (-0.91, 1.28)	.742
Labour Overall Index Score	-0.03 (-0.08, 0.03)	.339
MIT Living Wage (%)	0.36 (-0.75, 1.47)	.534
Annual State GDP for 2019 (Trillion USD)	-1.39 (-4.15, 1.37)	.334
Poverty Rate (%)	0.50 (0.07, 0.94)	.035
Dominator Labor Sector (Reference: Trade, Transportation, and Utilities)		
Education and Health Services	1.38 (-2.01, 4.77)	.433
Government	0.14 (-1.80, 2.07)	.891
Leisure and Hospitality	2.20 (-3.68, 8.08)	.471
Manufacturing	7.34 (0.59, 14.1)	.045
Professional and Business Services	1.01 (-4.47, 6.48)	.722
Demographic Metrics		
Black (%)	0.02 (-0.11, 0.14)	.784
Hispanic (%)	-0.01 (-0.11, 0.10)	.879
Asian (%)	0.01 (-0.30, 0.32)	.933
Politics and Policy		
Paid Family Leave (Reference: No)		
Yes	3.49 (-1.83, 8.81)	.212
Required Pay Reporting (Reference: No)		
Yes	0.22 (-4.93, 5.37)	.934
Split Shift Pay 2019 (Reference: No)		
Yes	-4.85 (-12.4, 2.74)	.224
Advanced Shift Notice 2019 (Reference: No)		
Yes	6.62 (-2.54, 15.8)	.171
Job Protected Leave for Non-FMLA Workers 1 Year on Job (Reference: No)		
Pregnant Workers Only	-1.20 (-4.37, 1.97)	.466
Yes	-3.47 (-7.15, 0.23)	.080
Job Protected Leave Longer than Federal FMLA (Reference: No)		
Pregnant Workers Only	1.23 (-1.96, 4.42)	.458
Yes	2.35 (-3.43, 8.13)	.434
Election Results Coding (Reference: Split)		
All Democrat	-1.28 (-4.63, 2.07)	.462
Mostly Democrat	-5.64 (-9.12, -2.17)	.004
Mostly Republican	-1.06 (-4.52, 2.41)	.556
All Republican	-0.81 (-3.40, 1.78)	.545
Other		
State Population (1,000 Square Miles)	-1.12 (-2.04, -0.20)	.027

[a] Values derived from a mixed-effects model with a nested random effect for state and date. The outcome of interest is percent change in weekday workplace mobility as determined from Google COVID-19 Community Mobility Reports.

DISCUSSION

This study is the first to comprehensively evaluate the impact of pre-existing state PSL on weekday workplace mobility in the U.S. during the COVID-19 pandemic. The presence of pre-existing state PSL was significantly associated with a drop in weekday workplace mobility in the early phase of the pandemic in both unadjusted and adjusted models. These results suggest a complex interplay between pre-existing labor workforce protections and emergency public health interventions targeted for the workforce.

Increasingly, states are held responsible for managing and administering social services, leading to highly variable policies [18]. The presence of pre-existing state PSL acted as a "classifier" that could differentiate how the FFCRA impacted state weekday workplace mobility. **As one of the first major nationwide COVID-19 policies, the impact of any single part of the FFCRA was unprecedented, and the time period between the announcement of the legislation and its implementation was relatively short. Coupled with the diverse array of state-level policies that were enacted during this time, it is likely that anticipatory behavior did not substantially influence the observed association between pre-existing state PSL and weekday workplace mobility.**

Given the ubiquity of COVID-19, this nationwide, ecological evaluation may suggest that federal emergency aid packages have a stronger impact in localities with the pre-existing infrastructure to support such policies. This study also contributes to the literature characterizing the impact of the FFCRA and its emergency PSL on various health and behavioral outcomes. A prior study, which relied on cellular data in place of Google COVID-19 Community Mobility Reports, also found that the FFCRA significantly decreased the time spent away from home. However, the FFCRA's impact on *workplace* mobility—as is the focus of this study— could not be determined [12].

As COVID-19 variants of concern continue to emerge, the lack of consistent PSL policies across the U.S. leaves employees vulnerable, especially those considered "essential workers" or in positions that require in-person work [19]. This disproportionately impacts Black, Indigenous, People of Color as well as the socioeconomically disadvantaged—the same groups that are both at higher risk for COVID-19 and disenfranchised by current labor laws [20]. To protect such individuals, there is a need for permanent structural changes in labor protection laws at the federal level, which could leverage pre-existing state policies to identify best practices and potential pitfalls [21]. **Our work also supports similar conclusions regarding PSL schemes in Europe: different levels of labor protection laws correspond to different levels of PSL-supported work absences, underscoring the need for strong, long-term policy support for PSL in both the U.S. and Europe [22].** Furthermore, systematic changes to labor protection laws could contribute in the long-term to improving preparedness in emergency situations, as well as overall social and health equity.

As a social determinant of health, PSL has ramifications for one's health, well-being, and quality of life [23,24]. PSL makes an employee 60% more likely to receive an influenza vaccination and engage with medical and cancer screenings without forfeiting their income or jobs [3]. An additional study found that people without PSL were three times as likely to delay needed treatment due to concerns about the immediate costs of the treatment and related costs of wage loss. This relationship does not change when controlling for health status, education level, and income level [25]**.** The impact of PSL also applies to immediate family members, as parents who had PSL were more likely to take time off to care for children when needed. Furthermore, low-income children were less likely to have parents who had PSL [26]. The effects of this social determinant for an individual also extend to the community at large; one study estimated that,

due to a lack of PSL, 7 million people were additionally infected as a result of "presenteeism" in the workplace during the H1N1 pandemic [27]. A separate study estimated that Connecticut's PSL law resulted in a 14.8% reduction in the spread of illness in 2013 [6]. Taken together, these findings suggest that PSL plays a pivotal role in the well-being of both the individual with PSL, as well as their immediate colleagues and family.

While the present study is the first to examine the impact of pre-existing state PSL on weekday workplace mobility during the COVID-19 pandemic, it has some limitations. First, publicly available covariate data were compiled across multiple sources and was measured at different points in time. Future work should attempt to standardize the time frame of analysis **so that steps can be made towards establishing causality**. Second, analysis was limited to the early stages of the COVID-19 pandemic, presenting future opportunities to examine the long-term impacts of pre-existing state PSL on workplace mobility. **However, given the substantial drop in mobility that occurred in March 2020, it may be valuable for future work to explore this time period in-depth. The substantial drop that occurs within this time period is likely not associated with paid sick leave; rather, it corresponds to the mandatory stay-at-home orders, nonessential business closures, and declarations of emergencies that occurred within states during this time period. We chose the date of FFCRA implementation (April 1st) as our point of interest in part because it occurred after a majority of these state-level announcements took place, and we hypothesize that this may have biased our findings towards the null. Further quantification of the impact of stay-at-home orders and nonessential business closures on weekday workplace mobility is outside the scope of the present work.**

Third, given the ecological nature of the study, future work is necessary to quantify the direct, person-level impact of pre-existing state PSL on workplace mobility. Fourth, Google COVID-19 Community Mobility Reports may not be representative of all populations (e.g., those without access to a cellular device). **One limitation of these data is that they are not nationally representative, as there are discrepancies across age, income bracket, and urban/rural divides for who owns a smartphone [28]. However, given that in recent decades, U.S. public health policy has tilted towards states and that states have been at the forefront of the implementation of the American COVID-19 response, a state-by-state comparison of Google Mobility data allows for insight into each state's pandemic response and how it compares with others [18,29,30]. Due to the overwhelming heterogeneity of the U.S., state-by-state observations are crucial to understanding the larger national picture.** Fifth, the calculation of daily changes relative to a baseline in January and February 2020 (as opposed to a full year) may result in some seasonal biases. This may bias results away from the null, as individuals may be less likely to take off work during January and February compared to the following months. **It should also be noted that states with and without pre-existing state PSL policies are spread across the U.S. Per U.S. Census Region, of the states without PSL, 31% are in the Midwest, 8% are in the Northeast, 38% are in the South, and 23% are in the West [5,31]. Of the states with PSL, 50% are in the Northeast, 17% are in the South, and 33% are in the West[5,31]. The geographic heterogeneity likely counteracts seasonal effects that may come from clusters of adjacent states. It is also important to note that the Google Mobility data analyzed were specifically with respect to how much time people spent in their workplace settings; depending on the type of work, this movement is expected to be less prone to seasonal influence than other types of movement (i.e., for recreation).** Finally,

this study is limited to PSL, and evaluation of additional economic policies—such as medical leave for family members, flexible work hours, remote work policies, and flexibility in shift work—could offer more nuanced perspectives.

PSL is fundamental to preserving the health of the workforce, particularly during times of crisis. The results presented here suggest that pre-existing state policies may enhance the effectiveness of emergency legislation, although long-term, systemic labor protection laws remain crucial. Successful implementation of such laws requires an equity-based approach that considers addressing disparities in access to labor benefits, thoughtful outreach strategies through clear and consistent communication to all labor force members, and rigorous oversight and enforcement from state and federal labor departments and boards to both ensure compliance by employers and maximize the potential for success [21].

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