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Cancer Screening after the Adoption of Paid-Sick-Leave Mandates

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Abstract

BACKGROUND—By the end of 2022, nearly 20 million workers in the United States have gained paid-sick-leave coverage from mandates that require employers to provide benefits to qualified workers, including paid time off for the use of preventive services. Although the lack of paid-sick-leave coverage may hinder access to preventive care, current evidence is insufficient to draw meaningful conclusions about its relationship to cancer screening.

METHODS—We examined the association between paid-sick-leave mandates and screening for breast and colorectal cancers by comparing changes in 12- and 24-month rates of colorectal-cancer screening and mammography between workers residing in metropolitan statistical areas (MSAs) that have been affected by paid-sick-leave mandates (exposed MSAs) and workers residing in unexposed MSAs. The comparisons were conducted with the use of administrative medical-claims data for approximately 2 million private-sector employees from 2012 through 2019.

RESULTS—Paid-sick-leave mandates were present in 61 MSAs in our sample. Screening rates were similar in the exposed and unexposed MSAs before mandate adoption. In the adjusted analysis, cancer-screening rates were higher among workers residing in exposed MSAs than among those in unexposed MSAs by 1.31 percentage points (95% confidence interval [CI], 0.28 to 2.34) for 12-month colorectal cancer screening, 1.56 percentage points (95% CI, 0.33 to

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2.79) for 24-month colorectal cancer screening, 1.22 percentage points (95% CI, −0.20 to 2.64) for 12-month mammography, and 2.07 percentage points (95% CI, 0.15 to 3.99) for 24-month mammography.

CONCLUSIONS—In a sample of private-sector workers in the United States, cancer-screening rates were higher among those residing in MSAs exposed to paid-sick-leave mandates than among those residing in unexposed MSAs. Our results suggest that a lack of paid-sick-leave coverage presents a barrier to cancer screening. (Funded by the National Cancer Institute.)

Cancer screening is effective in increasing early cancer detection and extending survival.[1,2] Yet, despite a provision in the Affordable Care Act (ACA) that eliminated most cost-sharing for cancer screening, fewer than 70% of U.S. adults receive recommended screening for two of the most common types of cancer: breast and colorectal.[3] Barriers to access, such as work commitments, time constraints, and the prospect of lost wages, are frequently cited as contributing factors to the underuse of preventive care, which has prompted researchers to hypothesize that the provision of paid-sick-leave coverage that includes paid time off for the use of preventive services could improve adherence to cancer-screening guidelines.[4–6]

The United States is one of only two developed countries with no federal mandate guaranteeing access to paid sick leave for workers.[7] The Healthy Families Act of 2004 was the first attempt to pass federal paid-sick-leave legislation, but despite being introduced several times since, the bill has yet to become law. Consequently, nearly 30% of the nation's workforce lacks paid-sick-leave coverage, and coverage rates are lower for low-income workers, women, and underserved racial and ethnic groups.[8] In the absence of a federal policy, 17 states (including Washington, D.C.), 4 counties, and 18 cities have mandated the provision of paid sick leave to qualified workers. By the end of 2022, nearly 20 million workers were scheduled to receive paid-sick-leave coverage as a result.[9] However, 18 states have passed preemption laws prohibiting municipalities from adopting paid-sick-leave mandates, a fact that underscores the contentious nature of the current policy landscape for paid sick leave.[10]

Although the lack of paid-sick-leave coverage may hinder access to preventive care, current evidence is insufficient to draw meaningful conclusions about its relationship to cancer screening. The few studies that have examined this relationship have generally reported positive associations.[11–14] However, these studies typically compare workers who have paid-sick-leave coverage with those who do not and are thus likely confounded by selection bias. For example, workers who are particularly health conscious — and hence more likely to adhere to screening guidelines — may take jobs that provide paid-sick-leave coverage. In this case, the estimated association between paid sick leave and cancer screening will be inflated, because it captures both the causal effect of paid sick leave on screening rates and the higher proclivity for health-conscious persons to undergo screening.

The current study aimed to overcome issues related to selection bias by means of a quasi-experimental research design that leveraged plausibly exogenous changes in paid-sick-leave coverage after the adoption of employer mandates that allow paid work absences for the use of preventive services. More than 60 metropolitan statistical areas (MSAs) across the United States were affected by such mandates during our study period.

METHODS

DATA AND STUDY POPULATION

We obtained administrative data from the Merative MarketScan Research Databases capturing person-specific health care utilization and insurance enrollment information from a selection of large, private-sector employers and private health insurance plans from 2012 through 2019 (see Section S1 of the Supplementary Appendix, available with the full text of this article at NEJM.org).[15] From these data, we collected information on mammography and colorectal-cancer screening, sex, age, and MSA of residence. (The MarketScan database does not include information about racial and ethnic groups.) This study was deemed to be exempt from review by the institutional review board at Tulane University.

Screening mammogram recommendations during our study period differed across organizations that issue guidelines. The U.S. Preventive Services Task Force recommended biennial screening for women 50 to 74 years of age and that women 40 to 49 years of age use their own discretion on whether to begin screening.[16] Alternatively, the American Cancer Society recommended annual screening for women 40 years of age or older through 2014[17]; then in 2015, the American Cancer Society updated their guidelines to recommend that women 40 to 44 use their own discretion on whether to begin annual screening, followed by annual screening for women between 45 and 54 years of age and annual or biennial screening for those 55 years of age or older.[18] For our analysis of mammography rates, we restricted the sample to women between 40 and 64 years of age to capture all ages at which mammography was recommended during our sample period and avoid ages at which Medicare coverage was predominant. For our analysis of colorectal-cancer screening rates, we restricted the sample to adults between 45 and 64 years of age, because the American Cancer Society guidelines changed in 2018 such that during the later years of our study period, persons at average risk for colorectal cancer were recommended to begin screening at 45 years of age.[19]

We further restricted our samples to workers with continuous plan enrollment for either 12 or 24 months, depending on the outcome, which resulted in an analytic sample of approximately 2.5 million person-specific records per year for our colorectal-cancer screening sample and 1.3 million person-specific records per year for our mammography sample. We aggregated our samples at the level of MSA-by-state (henceforth referred to simply as MSA; MSAs crossing state boundaries were treated as separate units) and created a balanced panel of observations across MSAs and calendar years of the sample data. We combined the MarketScan data with the MSA-by-year–level data (obtained from the American Community Survey) on racial- and ethnic-group composition, educational attainment, share of the population that is uninsured, state-level unemployment rates, and share of the population living in poverty and created an indicator for whether a state had expanded Medicaid under the ACA.[20]

PAID-SICK-LEAVE COVERAGE

Because the level of geography available to us in the MarketScan database was the MSA, we calculated exposure to paid-sick-leave mandates as the share of the population in an MSA that was exposed to a state, county, or city mandate in each year. The measure took the value of 0 for MSAs with no such exposure and a value ranging from greater than 0 to 1 when an MSA became exposed to a mandate, as determined on the basis of the estimated share of the population in an MSA that fell within the jurisdiction of the mandate. For example, if a mandate affected 50% of the population in an MSA, then the value would be 0.5. A list of paid-sick-leave mandates and additional details on measuring exposure are provided in Table S2 and Section S3, respectively.

OUTCOMES

We examined 12- and 24-month rates of colorectal-cancer screening (including colonoscopy, CT colonography, flexible sigmoidoscopy, fecal immunochemical test, double-contrast barium enema, guaiac fecal occult blood testing, and DNA analysis of stool) and mammography, which we determined using the Healthcare Common Procedure Coding System (codes are listed in Table S3). We chose to focus on 12- and 24-month screening rates for three reasons. First, mammography guidelines included both annual and biennial screening recommendations depending on age.[16–18] Second, because workers must accrue sick-leave benefits over time, any observation of an association between paid-sick-leave mandates and cancer screening is likely to be delayed. Third, we attempted to maintain consistency with previous studies that have used similar time horizons.[6,21–23]

STATISTICAL ANALYSIS

We used propensity-score matching and inverse probability of treatment weighting to create a weighted sample of MSAs with no exposure to paid-sick-leave mandates and with baseline covariates that were similar to those in the exposed MSAs.[24] We then fitted a series of difference-in-differences models that compared changes in colorectal-cancer screening and mammography use between workers residing in exposed MSAs and those residing in unexposed MSAs, with the models weighted according to the product of the propensity scores and the number of workers in the sample who resided in each MSA.[25–27] Coefficient estimates from these models can be interpreted as the mean difference in cancer-screening rates between exposed and unexposed MSAs in the postmandate period as compared with the premandate period. We fitted unadjusted models that included only our measure of exposure to paid-sick-leave mandates along with indicator variables for year and MSA and adjusted models that controlled for time-varying covariates at the MSA level, including age, sex, racial and ethnic-group composition, educational attainment, share of the population that is uninsured, state-level unemployment, share of the population living in poverty, and an indicator for ACA Medicaid expansion. We fitted all models using ordinary least-squares regression. We report bootstrapped standard errors that are robust to heteroskedasticity and within-state correlation and 95% confidence intervals that have not been adjusted for multiplicity.[28] Additional details regarding the propensity-score matching technique, regression models, and treatment of the standard errors are provided in Section S3.

We evaluated the assumptions of our research design and assessed the validity of our results in several analyses, including event-study models to test for differential trends in outcomes between exposed and unexposed MSAs before the adoption of paid-sick-leave mandates. We also evaluated potential bias arising from a two-way fixed-effects estimation with staggered implementation of paid-sick-leave mandates through a Goodman-Bacon decomposition and then compensated for any such bias by estimating models that used an approach developed by Callaway and Sant'Anna.[29,30] In our case, this potential for bias stems from the fact that, along with comparisons between exposed and unexposed MSAs, the two-way fixed-effects estimation technique also compares MSAs exposed to mandates early in our study period with MSAs exposed later in our study period. This latter comparison can introduce bias that would threaten the validity of the difference-in-differences design. The Callaway and Sant'Anna estimator eliminates this problematic comparison. Detailed descriptions and results from these analyses are provided in Section S4. All statistical analyses were conducted with the use of Stata/SE software, version 17.0 (StataCorp).

RESULTS

DESCRIPTIVE STATISTICS

Screening rates and characteristics of the sample, MSAs, and states at baseline are shown in Table 1. We defined the baseline period to include the years 2012 through 2014, before the adoption of any paid-sick-leave mandate in our sample. During the baseline period, on average, 16% of those living in exposed MSAs (61 in sample) and in unexposed MSAs (236 in sample) received colorectal-cancer screening in the past 12 months, and approximately 27% did so in the past 24 months. Screening mammography rates were slightly higher in the unexposed MSAs than in the exposed MSAs. On average, 49% of women underwent mammography in the past 12 months in unexposed MSAs, as compared with 48% of women in exposed MSAs. Approximately 65% of women underwent mammography in the past 24 months in unexposed MSAs before mandate adoption, as compared with 63% of women in exposed MSAs. Screening rates in our study samples were similar to the national estimates and, with few exceptions, sample characteristics including age and sex and MSA-level characteristics were also largely similar in the exposed and unexposed MSAs during the baseline period.[3,22]

EVENT-STUDY AND DIFFERENCE-IN-DIFFERENCES ESTIMATES

Differences in cancer-screening rates between exposed and unexposed MSAs over time are shown in Figure 1. Rates were trending similarly in the exposed and unexposed MSAs in the premandate period, a finding that supports the validity of our research design. For each outcome, screening rates began to rise in the exposed MSAs relative to the unexposed MSAs after mandate adoption and generally continued to rise for the first 2 to 3 years after adoption, a pattern that was consistent with a feature of most paid-sick-leave mandates that require accrual of benefits over an extended period.

Unadjusted and adjusted difference-in-differences estimates of the association between paid-sick-leave mandates and cancer screening rates are provided in Table 2. In the unadjusted model, the likelihood of undergoing colorectal-cancer screening in the past 12 months among workers residing in MSAs exposed to paid-sick-leave mandates was 1.54 percentage points (95% confidence interval [CI], 0.51 to 2.57) higher than that among those in unexposed MSAs, and in the adjusted model, the likelihood was 1.31 percentage points (95% CI, 0.28 to 2.34) higher in the exposed MSAs. With a premandate 12-month rate of colorectal-cancer screening of 16% (Table 1), these associations translate into relative increases of 9.4% ([1.5/16] × 100 = 9.4) in the unadjusted model and 8.1% ([1.3/16] × 100 = 8.1) in the adjusted model. In the unadjusted model, the 24-month rate of colorectal-cancer screening in the exposed MSAs was 2.06 percentage points (95% CI, 0.68 to 3.44) higher than that in the unexposed MSAs (a 7.8% relative increase from the premandate rate), and in the adjusted model, the rate was 1.56 percentage points (95% CI, 0.33 to 2.79) higher in the exposed MSAs (a 5.9% relative increase from the premandate rate).

In the unadjusted model, the 12-month rate of screening mammography in the exposed MSAs was 1.90 percentage points (95% CI, 0.03 to 3.76) higher than that in the unexposed MSAs (a 4.0% relative increase from the premandate rate), and in the adjusted model, the rate was 1.22 percentage points (95% CI, −0.20 to 2.64) higher in the exposed MSAs (a 2.5% relative increase from the premandate level). In the unadjusted model, the 24-month rate of screening mammography was 3.02 percentage points (95% CI, 0.42 to 5.62) higher in the exposed MSAs than in the unexposed MSAs (a 4.7% relative increase from the premandate rate), and in the adjusted model, the rate was 2.07 percentage points (95% CI, 0.15 to 4.00) higher in the exposed MSAs (a 3.3% relative increase from the premandate rate).

Estimates from models mitigating bias related to staggered treatment timing are provided in Section S4 and are largely similar to our standard estimates shown in Table 2. Estimates from samples with alternative age ranges, alternative weighting schemes, and an alternative definition of mandate exposure are presented in Section S5.

DISCUSSION

We used administrative claims data from several large employers and health insurance plans covering approximately 2 million workers per year along with a quasi-experimental research design to estimate the association between paid-sick-leave mandates for employers and screenings for colorectal and breast cancers. Paid-sick-leave mandates were associated with increased screening among age-eligible workers residing in the MSAs we studied. Our estimates suggest that, in a given year, an additional 242,633 and 298,625 workers completed colorectal-cancer screening over the previous 12 and 24 months, respectively, and an additional 142,605 and 249,559 workers completed screening mammography over the previous 12 and 24 months, respectively, after mandate adoption. However, because our data lacked information regarding paid-sick-leave coverage, our research strategy returned estimates of the association between paid-sick-leave mandates and cancer screening that were averaged across all workers in our sample, many of whom would have already had paid-sick-leave coverage in the absence of a mandate. Therefore, our estimates probably understate the association between paid-sick-leave mandates and cancer screening among those gaining coverage. Calculations of additional screening and a discussion on scaling our effect estimates by coverage gains are provided in Section S3.

Our estimates of the association between paid-sick-leave coverage and cancer screening were generally smaller than the estimates in previous studies, a finding that is likely due to our ability to mitigate confounding from self-selection bias. For example, a recent review of studies assessing the association between paid-sick-leave coverage and health service use concluded that paid sick leave improved the odds of undergoing mammography by 54%.[6] However, single-state studies using quasi-experimental research designs similar to ours have reported smaller positive associations between paid-sick-leave coverage and cancer screenings.[23,31]

Populations that disproportionately lack paid-sick-leave coverage and would thus directly benefit from a mandate, such as underserved racial and ethnic and low-income populations, are also those that have traditionally had lower cancer-screening rates and worse downstream outcomes.[3,32–36] Moreover, several studies have emphasized the influence of structural inequities and external barriers that affect cancer screening and outcomes across the cancer continuum.[32,37,38] Our findings suggest that expanded paid-sick-leave coverage represents a potentially effective policy strategy for advancing health equity in cancer prevention and control.

Our study had several limitations. First, our data included only health insurance claims for the privately insured; therefore, we lacked insight into workers covered by public insurance or those who were uninsured. However, according to estimates from the National Health Interview Survey, from 2012 through 2014, approximately 30% of privately insured workers lacked paid-sick-leave coverage, which implies that mandates can have sizable effects among our sample of privately insured workers. Second, our data contained information about the MSA in which a person resides but not the MSA in which a persons works. Because employer mandates apply to those working in affected jurisdictions, we were unable to accurately identify cases where workers living outside of an MSA commuted to the MSA for work or vice versa. Since the former is the more common scenario,[39] the likely effect of this limitation would be to attenuate our estimates of the association between paid-sick-leave mandates and cancer screening. Third, this was an observational study that relied on untestable assumptions. For example, we assumed that there would be no confounding from concurrently adopted policies with paid-sick-leave mandates but cannot exclude this possibility altogether. We found no systematic evidence that concurrent policy adoption was common among the municipalities in our sample. Furthermore, we conducted an analysis of changes in insurance coverage and cost sharing for cancer screening (copayments, coinsurance payments, and deductible payments), a potential indicator for concurrent policy change associated with adoption of paid-sick-leave mandates, and found no evidence of differential changes for MSAs with paid-sick-leave mandates as compared with those without mandates.

We estimated the association between paid-sick-leave coverage and screening for colorectal and breast cancers using a large-scale, quasi-experimental research design to moderate the influence of omitted-variable bias. We used administrative data to track cancer screening rather than relying on reports by the workers, which are subject to recall bias.[40,41] In addressing methodologic and data issues that have limited the reliability of previous studies, we found a positive association between paid-sick-leave coverage and cancer screening stemming from the adoption of employer mandates. Our results provide evidence for policymakers considering legislative or regulatory solutions to address insufficient screening adherence and highlight an understudied benefit of expanding paid-sick-leave coverage.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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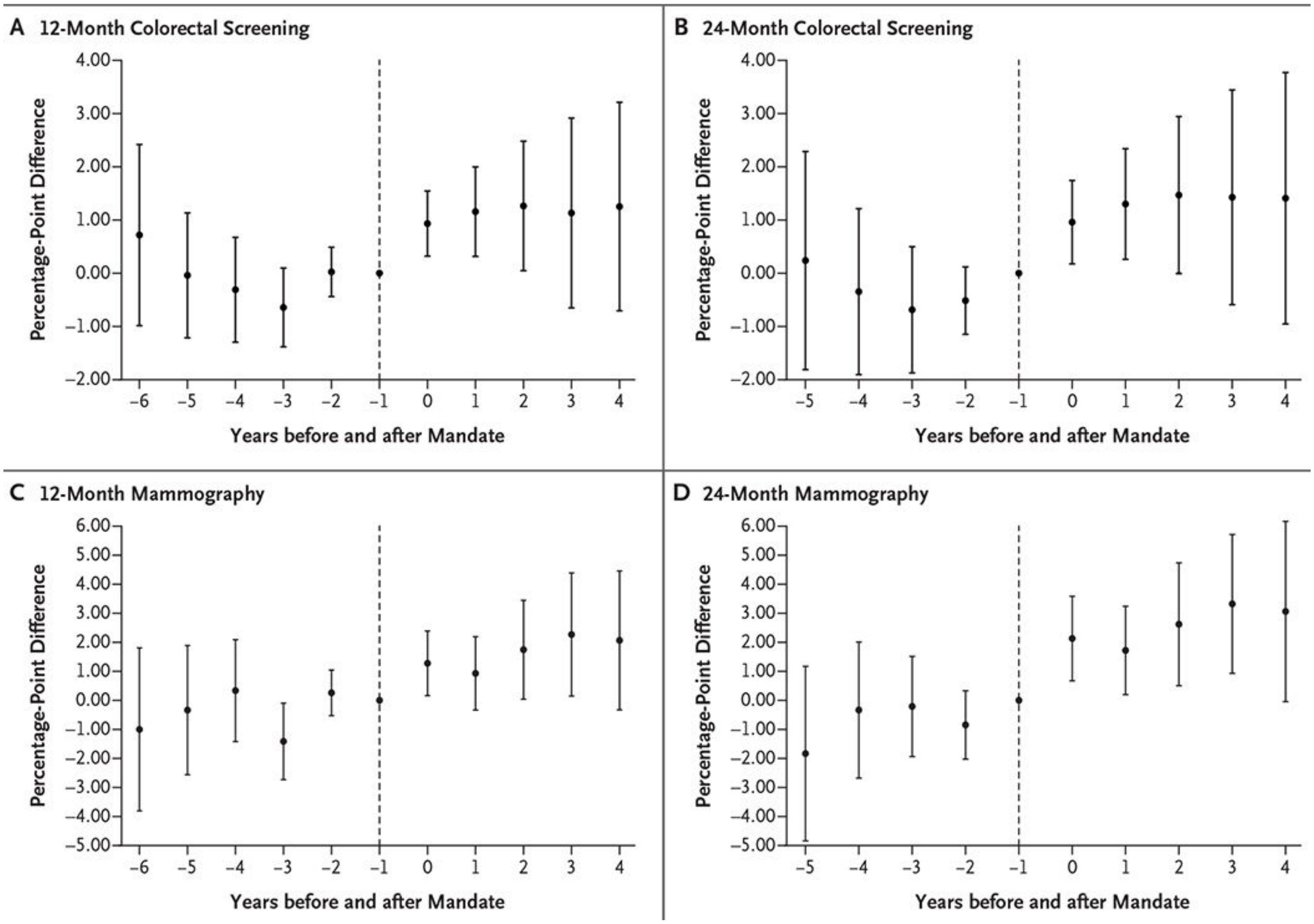

Figure 1. Differences in Cancer-Screening Rates between Exposed and Unexposed MSAs over Time.

Shown are differences in 12-month (Panel A) and 24-month (Panel B) rates of colorectal-cancer screening and 12-month (Panel C) and 24-month (Panel D) rates of mammography between exposed and unexposed metropolitan statistical areas (MSAs) over time. Estimates are from models that included an indicator for whether an MSA was exposed to a paid-sick-leave mandate during our study period, indicators for the years before or after mandate adoption, and interactions between these terms. Models also included controls for racial- and ethnic-group composition, educational attainment, share of the population that is uninsured, state-level unemployment, share of the population living in poverty, and an indicator for Medicaid expansion adoption. Data points indicate coefficient estimates and I bars the 95% confidence intervals of the differences in cancer-screening rates between exposed and unexposed MSAs in the years leading up to and after mandate adoption. The vertical dashed lines represent the year preceding mandate enactment, which serves as the reference year for the estimates in the panels. The unit of observation is the MSA-by-state-by-year.

Table 1.

Cancer-Screening Rates and Sample, MSA Population, and State Characteristics at Baseline.*

Characteristic	Colorectal-Cancer Screening Sample		Mammography Sample	
	Mandate Exposure	**No Mandate Exposure**	**Mandate Exposure**	**No Mandate Exposure**
Colorectal-cancer screening — %				
12-Mo rate	16.0	16.0	—	—
24-Mo rate	26.9	27.2	—	—
Mammography — %				
12-Mo rate	—	—	47.6	49.0
24-Mo rate	—	—	63.2	64.5
Sample characteristics				
Female — %	48.1	46.3	100	100
Mean age — yr	54.1	54.2	52.3	52.4
MSA population characteristics — %†				
Uninsured	13.1	12.1	13.2	12.5
Race or ethnic group				
American Indian or Alaskan Native	1.1	0.8	1.1	0.8
Asian or Pacific Islander	5.4	4.0	5.4	4.3
Non-Hispanic Black	5.3	5.4	5.3	5.6
Hispanic	24.9	22.1	24.9	18.9
Other race or ethnic group	2.7	2.7	2.7	2.8
Non-Hispanic White	60.7	65.1	60.7	67.6

Characteristic	Colorectal-Cancer Screening Sample		Mammography Sample	
	Mandate Exposure	No Mandate Exposure	Mandate Exposure	No Mandate Exposure
Education level				
Less than high school	32.2	29.1	32.2	29.0
High school	21.1	21.7	21.1	21.5
Bachelor's degree	12.6	13.5	12.6	13.8
Graduate degree	7.2	7.9	7.2	7.9
State characteristics — %				
Medicaid expansion‡	36.5	35.8	35.7	35.2
Unemployment rate	7.8	7.3	7.8	7.5
Poverty rate	14.2	14.0	14.2	14.3
MSA-by-state-years	183	708	183	708

*The baseline period includes years 2012 through 2014, and the unit of observation is the metropolitan statistical area (MSA)-by-state-by-year. We used propensity-score matching and inverse probability of treatment weighting to achieve covariate balance with respect to the baseline screening rates and characteristics. A detailed description of the weighting process and the results of a comparison of the descriptive statistics between the weighted and unweighted MSAs are provided in Section S3 of the Supplementary Appendix. MSA-by-state years is the number of MSA-by-states in our sample (297 [61 exposed MSAs and 236 unexposed MSAs) multiplied by the number of years in the baseline period (3 [2012 through 2014]).

†Data on uninsured status, race and ethnic group, and education level were obtained from the American Community Survey.

‡Percentages are the share of MSA-by-state-years (total number of years in the MSA-by-state) that were in Medicaid expansion states after expansion.

Table 2.

Estimates of the Association between Paid-Sick-Leave Mandates and Cancer Screening.*

Outcome	Observations	Unadjusted Models		Adjusted Models	
		Increase in Screening Rate Associated with Paid-Sick-Leave Mandate Exposure (95% CI)	Standard Error	Increase in Screening Rate Associated with Paid-Sick-Leave Mandate Exposure (95% CI)	Standard Error
	no.	***percentage points***		***percentage points***	
Colorectal-cancer screening					
12-Mo rate	2376	1.54 (0.51 to 2.57)	0.53	1.31 (0.28 to 2.34)	0.52
24-Mo rate	2079	2.06 (0.68 to 3.44)	0.71	1.56 (0.33 to 2.79)	0.63
Mammography					
12-Mo rate	2376	1.90 (0.03 to 3.76)	0.95	1.22 (−0.20 to 2.64)	0.72
24-Mo rate	2079	3.02 (0.42 to 5.62)	1.33	2.07 (0.15 to 3.99)	0.98

* Unadjusted models included indicator variables for each year and each MSA-by-state combination. Adjusted models added controls at the MSA-by-state-by-year level for racial- and ethnic-group composition, educational attainment, share of the population that is uninsured, state-level unemployment, share of the population living in poverty, and an indicator for Medicaid expansion adoption. The unit of observation is the MSA-by-state-by-year, and the standard errors and 95% confidence intervals were calculated with the use of a bootstrap procedure that is robust to heteroskedasticity and within-state correlation.