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RESEARCH ARTICLE

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State Medicaid and private telemedicine coverage requirements and telemedicine use, 2013–2019

Brandy J. Lipton PhD[1,2] | Michael F. Pesko PhD[3,4]

[1]Department of Health, Society, and Behavior, Program in Public Health, University of California Irvine, Irvine, California, USA

[2]Center for Health Economics & Policy Studies, San Diego State University, San Diego, California, USA

[3]Andrew Young School of Policy Studies, Georgia State University, Atlanta, Georgia, USA

[4]Institute of Labor Economics (IZA), Bonn, Germany

Correspondence
Brandy J. Lipton, Department of Health, Society, and Behavior, University of California, Irvine, 856 Medical Sciences Quad, Room 3531, Irvine, CA 92697, USA.
Email: blipton@uci.edu

Abstract

Objective: To examine the association between state Medicaid and private telemedicine coverage requirements and telemedicine use. A secondary objective was to examine whether these policies were associated with health care access.

Data Sources and Study Setting: We used nationally representative survey data from the 2013–2019 Association of American Medical Colleges Consumer Survey of Health Care Access. The sample included Medicaid-enrolled (4492) and privately insured (15,581) adults under age 65.

Study Design: The study design was a quasi-experimental two-way-fixed-effects difference-in-differences analysis that took advantage of state-level changes in telemedicine coverage requirements during the study period. Separate analyses were conducted for the Medicaid and private requirements. The primary outcome was the past-year use of live video communication. Secondary outcomes included same-day appointment, always able to get needed care, and having enough options for where to go to receive care.

Data Collection/Extraction Methods: N/A.

Principal Findings: Medicaid telemedicine coverage requirements were associated with a 6.01 percentage-point increase in the use of live video communication (95% CI, 1.62 to 10.41) and an 11.12 percentage-point increase in always being able to access needed care (95% CI, 3.34 to 18.90). While generally robust to various sensitivity analyses, these findings were somewhat sensitive to included study years. Private coverage requirements were not significantly associated with any of the outcomes considered.

Conclusions: Medicaid telemedicine coverage during 2013–2019 was associated with significant and meaningful increases in telemedicine use and health care access. We did not detect any significant associations for private telemedicine coverage policies. Many states added or expanded telemedicine coverage policies during the COVID-19 pandemic, but states will face decisions about whether to maintain these enhanced policies now that the public health emergency is ending. Understanding the role of state policies in promoting telemedicine use may help inform policymaking efforts going forward.

What is known on this topic

- Most existing studies have not found an association between private telemedicine coverage laws and telemedicine use, though evidence is somewhat mixed.
- To our knowledge, only one other national study has examined the impacts of state Medicaid telemedicine policies on telemedicine use and did not find an effect.
- There is some evidence that private telemedicine coverage laws are associated with reductions in hospitalizations and mortality.

What this study adds

- This study adds to the evidence base on the association between state telemedicine coverage requirements and the use of telemedicine by using nationally representative data for a recent period.
- This study is among the first to examine the association between state Medicaid telemedicine coverage requirements and measures of health care access.
- Medicaid telemedicine coverage requirements were associated with increases in telemedicine use and always being able to access care, but private requirements were not associated with any of the outcomes examined.

1 | INTRODUCTION

Telemedicine has the potential to reduce health care barriers and advance health equity by providing convenient, remote access to medical diagnosis and treatment. Despite substantial promise, telemedicine visits accounted for only 0.12% of commercially insured visits prior to 2020.[1] Similar patterns have been observed in Medicare[2] and Medicaid.[3] Historically, rates of telemedicine use have also been lower among people who are older,[1] have limited English proficiency,[4] reside in rural areas,[1,5–7] and have lower incomes.[1]

Telemedicine coverage requirements for Medicaid and private insurers are mandated at the state level, and many states have implemented or expanded coverage over the past decade. In the pre-pandemic period, most policies mandated coverage of services delivered via live video communication but did not require coverage of other telehealth modes (e.g., audio only). Private telemedicine coverage policies generally required coverage of a broad set of services, though some state policies were more limited. Additionally, insurers were not typically required to pay the same reimbursement rate ("payment parity") or use the same cost-sharing arrangements for telemedicine and in-person services.[8] The majority of state Medicaid policies required coverage of primary care services delivered via telemedicine (36 states), and nearly all required coverage of behavioral health (47 states).[9]

Evidence on the association between state-level telemedicine coverage policies and telemedicine use is mixed.[5,10–12] Studies have found no association between state telemedicine coverage policies and reported[10] or claims-based measures of primary care telemedicine use,[5] though mental health telemedicine services were found to increase faster in states with a private coverage law in place.[5] On the contrary, one study found a positive and significant association between private telemedicine coverage requirements and outpatient telehealth visits[11] and another study found an association with increased telehealth adoption among hospitals.[12] Studies have also documented associations between private telemedicine coverage policies and reductions in hospitalizations[13] and mortality.[14] Fewer studies have examined the impacts of state Medicaid telemedicine coverage policies,[10] and to our knowledge, no rigorous, national studies to date have examined the association between these policies and health care access.

In this study, we provide new evidence on the association between state Medicaid and private telemedicine coverage requirements and telemedicine use during 2013–2019. We also examine measures of health care access, providing some of the first evidence on the link between state Medicaid telemedicine policies and these outcomes using nationally representative survey data. States are currently facing decisions about whether to maintain enhanced pandemic-era policies now that the public health emergency is ending. Understanding the role of state policies in promoting telemedicine use in the pre-pandemic period may help inform policymaking efforts going forward as patterns of care seeking continue to shift away from pandemic extremes.

2 | METHODS

2.1 | Data sources, outcomes, and policy variables

We used the 2013–2019 Consumer Survey of Health Care Access, a nationally representative, repeated cross-sectional online survey conducted twice annually by the Association of American Medical Colleges (AAMC).[15] The survey interviews more than 5500 adult respondents each year and includes detailed information on demographic characteristics and health care access and use. The survey uses stratified sampling based on age and health insurance status. Each biannual survey wave consists of a core sample of adults who reported needing health care in the past 12 months, and every other wave includes an oversample of rural, Black, Hispanic, and low-income

adults. Survey responses are accepted until all strata minimum sample sizes have been met and declined thereafter. This sampling strategy does not allow for calculation of a final response rate, and AAMC does not publish analyses of response rates or non-response bias.

The main outcome of interest was a binary indicator for past-year use of live video communication. The survey question used to construct this outcome was: "In the last 12 months, did you talk with a health provider by video (e.g., Skype)?" While the survey also asked about other telehealth modes (e.g., phone and text), we did not include these responses in our definition of telemedicine use since it was extremely rare for state policies to include them in the pre-pandemic period. Appendix Table S1 summarizes weighted rates of telemedicine use for the full adult population by demographic characteristics (age, sex, income, health insurance status, and rurality). Young adults ages 18–24 and adults ages 65 and older had lower rates of reported telemedicine use than adults of other ages, as did adults with lower incomes, those living in rural areas, and adults who had Medicaid or were uninsured. These patterns were generally consistent with research using claims-based measures of telemedicine use.[1,16] Secondary health care access outcomes included binary indicators for having a same-day appointment during the most recent medical visit, always being able to get needed care vs. sometimes or never during the past year, and having enough options for where to go to get health care.

The primary exposure variables were state-level binary indicators for (1) Medicaid fee-for-service telemedicine coverage requirements, and (2) Private telemedicine coverage requirements. We considered a state as having a telemedicine coverage policy in place if it required coverage of any services delivered via telemedicine. While many policies required coverage of a broad set of services, some were more limited (e.g., only requiring coverage of behavioral health services). In a sensitivity analysis, we excluded states that added more limited telemedicine coverage policies during our study period to assess whether results were different for policies requiring broader service coverage. Telemedicine coverage policies, as defined in our main analysis, differ from payment parity laws, which require insurers to pay the same reimbursement for telemedicine and in-person services. While less common before the COVID-19 pandemic, several states implemented a private parity law during our study period, and we assessed the impacts of these policies in an extension to our main analysis. Unfortunately, state Medicaid policies often had unclear language regarding reimbursement prior to the pandemic, and therefore it was not possible to reliably identify states with Medicaid payment parity in our analysis.[9] Our primary source for information about Medicaid and private telemedicine coverage policies was the Center for Connected Health Policy.[17] Private telemedicine coverage laws were also available in published research.[11,14] Information on private payment parity laws came from a variety of sources, including the Center for Connected Health Policy, the Commonwealth Fund, and the authors' review of state legislation.

Figure 1 summarizes state-level Medicaid (Panel A) and private (Panel B) telemedicine coverage requirements during our study period. During our analysis period, seven states and the District of Columbia added a Medicaid requirement (Figure 1, Panel A). The remaining 43 state Medicaid programs had a telemedicine coverage requirement throughout our entire study period. Analogously, 22 states and the District of Columbia added a private telemedicine coverage law during our study period, including 3 states and the District of Columbia that added a policy in 2013. Of the remaining 28 states, 15 states had a private telemedicine coverage law throughout our entire study period, and the remaining 13 states did not have a private telemedicine coverage law (Figure 1, Panel B). There were 7 states that added a private payment parity law during our study period, including Arkansas, Colorado, Delaware, Hawaii, Minnesota, Missouri, and Utah.

2.2 | Approach and statistical analysis

We estimated the association between telemedicine coverage requirements and outcomes using a two-way-fixed-effects difference-in-differences approach that took advantage of state-level policy changes during our study period. We conducted separate analyses for the Medicaid and private telemedicine coverage policies, regressing each outcome on either the Medicaid or private telemedicine coverage indicator and individual characteristics including sex, age group, race and ethnicity, marital status, educational attainment, number of minor children residing in the household, employment status, and rurality. Models also included state indicators to account for time-invariant state-level characteristics that could be correlated with both telemedicine coverage policies and outcomes and year indicators to account for national outcome trends during the study period. In a sensitivity analysis, we included time-varying state controls, including the state-by-year unemployment rate, Medicaid managed care penetration rate, and an indicator for expanding Medicaid under the Affordable Care Act. Analyses included observations from all 50 states and the District of Columbia, and the error term was clustered at the state level.[18] All models were weighted using post-survey weights available from the Association of American Medical Colleges to approximate the characteristics of the U.S. population, and models were estimated using linear probability models.[19]

We restricted our analysis to the affected populations by using respondents' self-reported health insurance coverage. Health insurance status was as of the last time an individual needed medical care. We restricted the sample to nonelderly adults since most adults ages 65 and older have access to Medicare coverage and may also have different medical needs, experiences with technology, and propensities to use telemedicine.[1,16] For similar reasons, we excluded adults under age 65 who reported having Medicare coverage. More details on the model, covariates, and sample definition are provided in the appendix.

Our final analysis samples included 4942 Medicaid-enrolled adults, including 405 unweighted observations in states that added a Medicaid telemedicine coverage policy, and 15,581 privately insured adults, including 4572 unweighted observations in states that added a private telemedicine coverage policy. We excluded 233 Medicaid-enrolled adults (4.5%) and 747 privately insured adults (4.6%) who otherwise met our sample criteria but were missing information on telemedicine use or any of the demographic controls in our regression model. Statistical significance was a two-tailed α strictly less than 0.05 unless otherwise noted in the text.

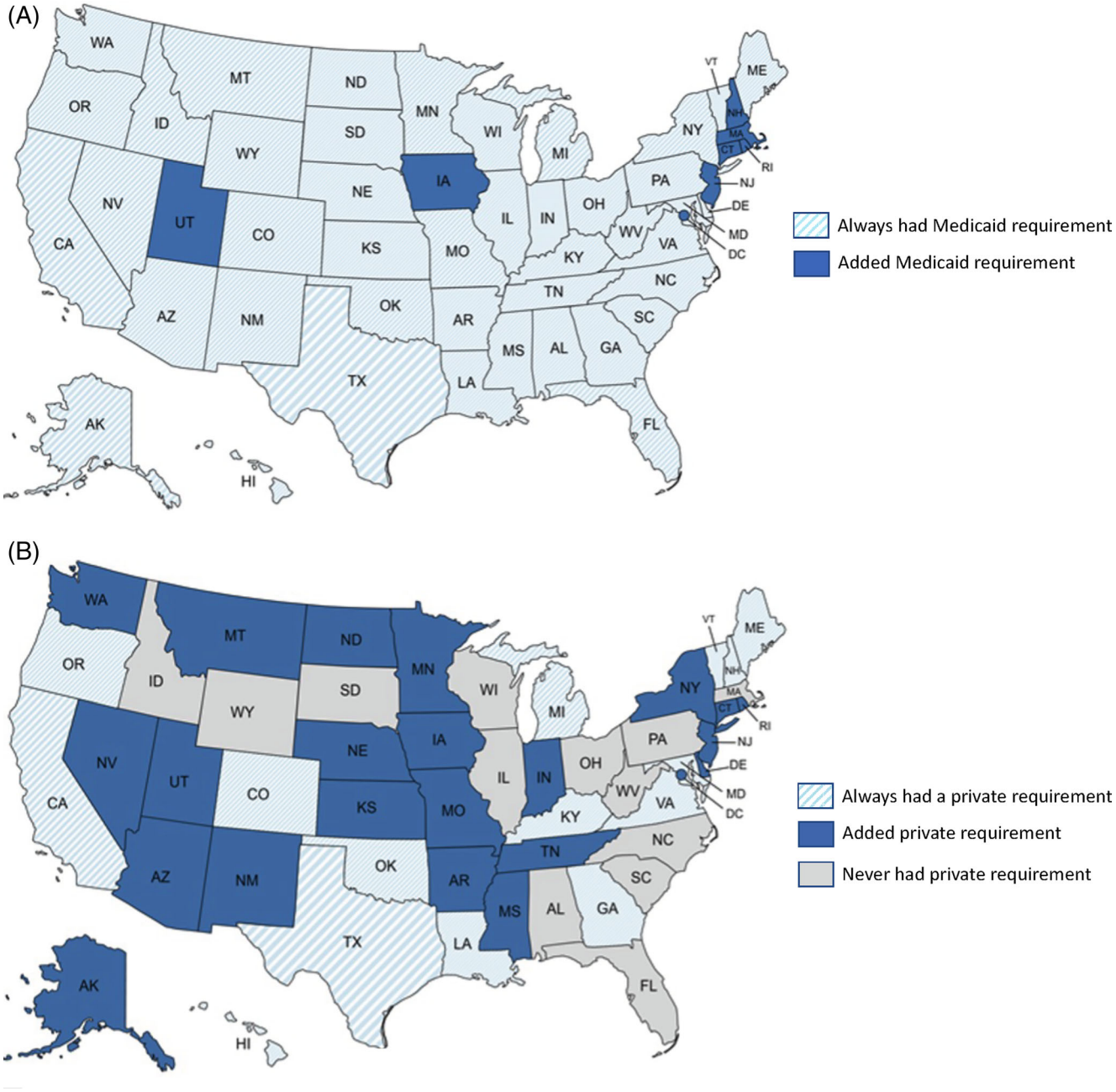

FIGURE 1 State telemedicine coverage requirements, 2013–2019. Panel A: Medicaid telemedicine coverage requirements. Panel B: Private telemedicine coverage requirements. *Source*: Authors' analysis of data from the Center for Connected Health Policy. [Color figure can be viewed at wileyonlinelibrary.com]

2.3 | Test of main model assumptions, sensitivity analysis, and extensions

We conducted several tests of the robustness of our main results, focusing on our primary telemedicine use outcome. First, we assessed unadjusted trends in telemedicine use for states that did and did not change their telemedicine coverage policies during our study period. To more formally test the parallel trends assumption, we then estimated an event study analysis by augmenting our main regression model with indicators for the leads and lags of the policy changes. These models allowed us to assess preexisting outcome trends and the evolution of post-implementation effects. Differential outcome trends that preceded policy changes would cast doubt on the validity of our regression estimates.

Second, recent evidence suggests that two-way-fixed-effects difference-in-differences estimates may be biased when policy adoption is staggered and policy effects evolve over time.[20,21] We used a two-stage approach that corrected for this potential bias as a

TABLE 1 Sample descriptive statistics, 2013–2019 AAMC Consumer Survey.

Characteristic (%)	Sample	
	Medicaid ($n = 4942$)	Private ($n = 15,581$)
Male	35.18	49.00
Age group		
18–24	16.37	13.05
25–34	24.84	22.94
35–44	19.96	22.67
45–54	21.72	22.06
55–64	17.12	19.27
Race and ethnicity		
Hispanic	21.79	16.89
Non-Hispanic White	54.36	62.42
Non-Hispanic Black	16.82	11.09
Non-Hispanic AANHPI/AIAN	3.67	7.72
Non-Hispanic Other Races	3.36	1.88
Married	37.02	62.79
Education		
High school degree or less education	51.26	24.73
Some college education	35.72	30.80
College degree or more education	13.02	44.48
Number of minor children in household		
None	50.94	49.03
One	23.24	23.87
Two	15.25	19.62
Three or more	10.57	7.48
Employed	47.62	80.95
Rurality		
Urban	38.19	37.94
Suburban	37.39	46.43
Rural	24.42	15.63
Used live video communication, past year	8.64	17.60

Note: Estimates are weighted percents from the 2013–2019 Consumer Survey. AANHPI/AIAN, Asian American, Native Hawaiian, Pacific Islander, American Indian, and Alaska Native.

comparison to our main results.[22] Third, we examined whether our results were sensitive to the inclusion of time-varying state-level variables, including the unemployment rate, an indicator for expanding Medicaid under the Affordable Care Act, and the Medicaid managed care penetration rate. Fourth, we excluded Medicaid and private telemedicine coverage policy changes where coverage was restricted to behavioral health services. Fifth, in an extension to our main analysis, we examined the impacts of state private payment parity laws by modifying our main analysis to include separate indicators for telemedicine coverage policies with and without payment parity. Sixth, we examined the impacts of state Medicaid and private telemedicine coverage requirements by rurality, given evidence of urban–rural disparities in telemedicine use and access to care.[1,6] Finally, we tested the sensitivity of the results to replacing linear probability models with logit models, omitting the post-survey weights, and excluding each survey year in turn. These sensitivity tests are discussed below and described in more depth in the appendix.

3 | RESULTS

3.1 | Sample descriptive statistics

Table 1 provides weighted descriptive statistics for the study samples. Among the Medicaid-enrolled sample, about 35% were male, 22% were Hispanic, 54% were non-Hispanic White, 17% were non-Hispanic Black, 51% had a high school degree or less education, 48% were employed, and 24% resided in a rural area. Among the privately insured sample, about 49% were male, 17% were Hispanic, 62% were non-Hispanic White, 11% were non-Hispanic Black, 25% had a high school degree or less education, 81% were employed, and 16% resided in a rural area. About 9% and 18% of the Medicaid-enrolled and privately insured samples, respectively, reported using live video communication in the past year.

3.2 | Regression results

Table 2 presents regression-adjusted estimates of the association between Medicaid telemedicine coverage requirements and past-year use of live video communication among our Medicaid-enrolled sample. Adding a Medicaid telemedicine coverage policy was associated with a statistically significant 6.01 percentage-point increase in telemedicine use (95% CI, 1.62 to 10.41). We also found that male sex, non-Hispanic Black race, and being employed were significantly associated with higher rates of telemedicine use, while older age and less education were significantly associated with lower rates of use. Urban and suburban residents were not significantly more likely than rural residents to report past-year use of live video communication. These results were consistent with unadjusted trends in telemedicine use shown in Appendix Figure S1. States that had a Medicaid telemedicine coverage requirement throughout our study period initially had substantially higher rates of telemedicine use than those that added a policy, with rates converging later in the study period. However, telemedicine use increased most dramatically during 2017–2018 in states that added a policy, before declining somewhat in 2019 (Appendix Figure S1).

Table 3 presents analogous regression results for our privately insured sample. Adding a private telemedicine coverage policy was

TABLE 2 Association between state Medicaid telemedicine coverage requirements and use of live video communication, 2013–2019 AAMC Consumer Survey.

Live video communication (%): 8.64	Estimate	95% CI	*p*-value
Telemedicine coverage requirement	6.01	1.62–10.41	0.008
Male	4.06	0.77–7.36	0.017
Age group			
18–24 [REF]	—	—	—
25–34	2.59	−1.81 to 6.99	0.24
35–44	−1.70	−5.24 to 1.84	0.34
45–54	−3.36	−8.01 to 1.29	0.15
55–64	−5.94	−9.05 to −2.82	<0.001
Race and ethnicity			
Non-Hispanic White [REF]	—	—	—
Hispanic	2.18	−1.12 to 5.47	0.19
Non-Hispanic Black	4.95	1.80–8.11	0.003
Non-Hispanic AANHPI/AIAN	8.29	1.73–14.85	0.014
Non-Hispanic Other Races	2.80	−4.08 to 9.67	0.42
Married	1.70	−0.84 to 4.25	0.19
Education			
High school degree or less education	−2.09	−4.77 to 0.58	0.12
Some college education	−5.88	−8.67 to −3.09	<0.001
College degree or more education [REF]	—	—	—
Number of minor children in household			
None [REF]	—	—	—
One	0.74	−2.94 to 4.42	0.69
Two	−1.22	−4.20 to 1.75	0.41
Three or more	−0.21	−3.98 to 3.57	0.91
Employed	6.26	3.78–8.74	<0.001
Rurality			
Urban	0.81	−2.16 to 3.78	0.59
Suburban	1.00	−1.72 to 3.72	0.46
Rural [REF]	—	—	—

Note: The table presents difference-in-differences regression estimates of the association between Medicaid telemedicine coverage requirements and past-year use of live video communication from the 2013–2019 Consumer Survey. Estimates are in terms of percentage points. Regressions controlled for individual characteristics, state, and year fixed effects. Regressions used post-survey weights and errors were clustered at the state level. AANHPI/AIAN, Asian American, Native Hawaiian, Pacific Islander, American Indian, and Alaska Native.

associated with a 0.27 percentage point increase in past-year use of live video communication that was not statistically significant at conventional levels (95% CI, −2.45 to 2.98). Similar to our analysis of Medicaid enrollees, we found that male sex and being employed were significantly positively associated with telemedicine use, and older age and less education were significantly negatively associated with use. By contrast, we also found that the presence of minor children and urban area residence were significantly positively associated with telemedicine use, and no significant association between race and ethnicity and use among the privately insured sample. These findings were consistent with unadjusted trends in telemedicine use shown in Appendix Figure S2. Telemedicine use increased and then decreased during the study period in all state groups, including those that always had a private telemedicine coverage law in place, those that never had a law in place, and those that added a law during the study period. States that always had a private telemedicine coverage law had slightly higher rates in each period relative to those that never had a law during the study period, but there was not a clear increase in states that added a law relative to the other state groups.

When examining health care access, Medicaid coverage requirements were associated with a significant 11.12 percentage-point increase in always being able to access needed care (95% CI, 3.34 to 18.90) (Table 4). We estimated positive associations between Medicaid telemedicine coverage and having a same-day appointment and enough options for where to go to receive care, but these estimates were imprecise and neither was statistically significant at conventional

TABLE 3 Association between state private telemedicine coverage requirements and use of live video communication, 2013–2019 AAMC Consumer Survey.

Live video communication (%): 17.60	Estimate	95% CI	*p*-value
Telemedicine coverage requirement	0.27	−2.45 to 2.98	0.84
Male	8.67	6.90–10.43	<0.001
Age group			
18–24 [REF]	—	—	—
25–34	7.77	4.99–10.54	<0.001
35–44	1.91	−0.41 to 4.23	0.11
45–54	−9.24	−12.12 to −6.36	<0.001
55–64	−10.06	−12.62 to −7.50	<0.001
Race and ethnicity			
Non-Hispanic White [REF]	—	—	—
Hispanic	−1.49	−5.06 to 2.08	0.41
Non-Hispanic Black	2.02	−1.90 to 5.94	0.31
Non-Hispanic AANHPI/AIAN	−2.05	−6.70 to 2.61	0.38
Non-Hispanic Other Races	−5.66	10.49 to −0.83	0.02
Married	0.32	−1.65 to 2.28	0.75
Education			
High school degree or less education	0.68	2.87–4.22	0.70
Some college education	−2.77	−4.70 to −0.84	0.006
College degree or more education [REF]	—	—	—
Number of minor children in household			
None [REF]	—	—	—
One	5.71	3.58–7.84	<0.001
Two	9.95	6.88–13.03	<0.001
Three or more	7.74	3.91–11.57	<0.001
Employed	5.31	3.53–7.09	<0.001
Rurality			
Urban	12.65	10.88–14.41	<0.001
Suburban	−0.56	−2.16 to 1.05	0.49
Rural [REF]	—	—	—

Note: The table presents difference-in-differences regression estimates of the association between private telemedicine coverage requirements and past-year use of live video communication from the 2013–2019 Consumer Survey. Estimates are in terms of percentage points. Regressions controlled for individual characteristics, state, and year fixed effects. Regressions used post-survey weights and errors were clustered at the state level. AANHPI/AIAN = Asian American, Native Hawaiian, Pacific Islander, American Indian, and Alaska Native.

levels. None of the associations between the private telemedicine coverage requirements and health care access outcomes were statistically significant (Table 4).

3.3 | Extensions

Appendix Table S2 shows the results of our analysis of state private telemedicine coverage policies with and without a payment parity requirement. Similar to our main estimates that grouped all private telemedicine coverage policies together, we did not find evidence of a significant association between either type of private telemedicine law and telemedicine use.

Appendix Figure S3 shows regression-adjusted estimates for the Medicaid-enrolled and privately insured samples by rurality (urban/suburban and rural). Among the Medicaid-enrolled sample, we estimated that Medicaid telemedicine coverage requirements were associated with telemedicine use increases of 7.17 (95% CI, 1.52 to 12.82) and 2.60 percentage points (95% CI, −6.33 to 11.53) in urban/suburban and rural areas, respectively. While only the estimate for urban/suburban areas was statistically significant at conventional levels, the difference between the urban/suburban and rural estimates was not significant. Among the privately insured sample, we estimated that private telemedicine coverage requirements were associated with changes in telemedicine use of 0.66 (95% CI, −7.00 to 8.32) and −1.85 percentage points (95% CI, −6.26 to 2.56) in urban/

TABLE 4 Association between state telemedicine coverage policies and health care access outcomes, 2013–2019 AAMC Consumer Survey.

	Estimate	95% CI	*p*-value
Panel A: Medicaid			
Outcome			
Same day appointment	10.42	−11.63 to 32.49	0.35
Always received needed care	11.12	3.34–18.90	0.006
Enough options for where to go to get health care	12.66	−10.37 to 35.69	0.28
Panel B: Private			
Outcome			
Same day appointment	2.04	−1.96 to 6.03	0.31
Always received needed care	0.60	−2.10 to 3.31	0.66
Enough options for where to go to get health care	−1.20	−5.58 to 3.17	0.58

Note: The table presents difference-in-differences regression estimates of the association between telemedicine coverage requirements and health care access measures from the 2013–2019 Consumer Survey. Estimates are in terms of percentage points. Regressions controlled for individual characteristics, state, and year fixed effects. Regressions used post-survey weights and errors were clustered at the state level.

suburban and rural areas, respectively. Neither of these estimates was significant at conventional levels, and the estimates were also not significantly different from one another.

3.4 | Sensitivity analyses

Appendix Table S3 shows the results of our event study analysis. Panels A and B provide the regression results for the Medicaid and private telemedicine coverage requirements, respectively. Each panel represents the results of a separate, single regression. As shown, the estimates for the pre-policy-implementation coefficients were not significant at conventional levels in either the Medicaid or private-insurance analysis. These results therefore did not suggest evidence of differential preexisting trends.

In the post-implementation period, we estimated positive associations between Medicaid telemedicine coverage requirements and past-year use of live video communication in each period, with the estimates for the first and second years being significant at the 10% level (Appendix Table S3, Panel A). The estimate for the first year following implementation suggested a 9.1 percentage point increase (95% CI, −0.81 to 18.90), while the estimates for the second and third years were similar in magnitude and about 4–5 percentage points each. While the 95% confidence intervals for the post-period estimates were overlapping, this pattern of results suggests that Medicaid telemedicine coverage policies may have larger initial impacts that may be more modest in subsequent years. Consistent with our main results, estimates for the association between private telemedicine coverage requirements and past-year use of live video communication were smaller in magnitude and also not statistically significant at conventional levels for any of the post-policy-implementation indicators (Appendix Table S3, Panel B).

Appendix Table S4 shows the results of several sensitivity analyses that vary the estimating procedure, control variables, and sample. Each estimate is from a separate regression and represents the coefficient on the telemedicine coverage requirement indicator, as noted in the table. In general, the results for the Medicaid telemedicine coverage requirements were similar in magnitude and remained statistically significant when we used the two-stage estimator to correct for staggered policy implementation (Appendix Table S4, first column), included the time-varying state-level policy variables (second column), replicated our main analysis without the post-survey weights (third column), and estimated logit models instead of linear probability models (fourth column). Results were also consistent but somewhat larger for Medicaid telemedicine coverage when we excluded states with more limited service coverage (Appendix Table S4, fifth column). The results for the private telemedicine coverage requirements remained small in magnitude and statistically insignificant across these different specifications. Appendix Table S5 replicates our main Medicaid analysis but omits each survey year in turn. Estimates ranged from 3.6 to 8.7 percentage points and generally remained statistically significant when omitting each single data year, with the exception of excluding 2018 (3.6 percentage point increase, $p = 0.14$). We also tested the sensitivity of the results to omitting data for both 2017 and 2018 given the substantial increase in telemedicine use during this period and subsequent drop in 2019 among states that implemented a Medicaid policy (Appendix Figure S1), which resulted in a smaller estimate that was not significant at conventional levels (1.9 percentage points, $p = 0.20$).

4 | DISCUSSION

Telemedicine has emerged as a critical tool to lessen disruptions to health care access while reducing the spread of infection over the course of the COVID-19 pandemic. Recent estimates suggest that telemedicine use increased from less than 1% to about 13% of all outpatient visits after the onset of the pandemic in 2020.[23] While

telemedicine use has declined more recently, it remains higher than pre-pandemic levels.[23,24] This increase in adoption is likely to lead to long-term changes in the way that providers and patients interact.

State-level policies implemented in 22 states to increase access to telemedicine during the pandemic may have played a role in the rapid rise in telemedicine visits during 2020 and 2021.[25,26] While all state Medicaid programs covered some telemedicine services by the end of 2019, many states expanded these benefits by covering additional telemedicine services, reducing cost sharing, and requiring payment parity between telemedicine and in-person services.[9] States also implemented many new private coverage requirements during the pandemic. Most related to our analysis, 4 states newly added a private telemedicine coverage law and 10 states newly added a private payment parity law by March 2021.[25] Many state policies are set to expire when the public health emergency ends in May 2023. Moreover, state Medicaid programs can add and remove optional benefits such as coverage of telemedicine services at any time. Therefore, it is critical to understand the extent to which these policies promote telemedicine use.

We found that Medicaid telemedicine coverage during 2013–2019 was associated with significant and meaningful increases in reported telemedicine use (6.0 percentage point increase) and always being able to access needed care (11.1 percentage point increase). Medicaid enrollees report greater unmet health care needs and lower health care utilization on average than the privately insured despite lower levels of cost sharing for most services.[27] Some of these disparities may be attributable to greater access barriers among Medicaid-enrolled populations, such as lower access to transportation, greater difficulty in taking time off from work, and higher rates of functional limitation and disability.[28] Access to covered telemedicine services could alleviate some of these barriers by eliminating the need to travel to see a provider, which may explain in part the larger response to telemedicine coverage among Medicaid enrollees relative to the privately insured in our study. Nonetheless, it is important to note that we observed a smaller sample of Medicaid enrollees than privately insured adults, and correspondingly confidence intervals for our estimates of increased telemedicine use and health care access in the Medicaid analysis were wide. For example, the 95% confidence interval for our estimate of the association between Medicaid telemedicine coverage policies and telemedicine use suggested increases of between 1.6 and 10.4 percentage points. Self-reported rates of telemedicine use in our analysis were also substantially higher than most claims-based measures,[1–3] though we found that telemedicine use followed expected patterns across demographic groups. Further, our results were somewhat sensitive to included study years, with the exclusion of data for 2017 and 2018 substantially dampening our estimate of the impacts of Medicaid telemedicine coverage policies. Despite these limitations, this research contributes new evidence on the effectiveness of Medicaid telemedicine coverage, as few national studies have examined these policies.[10] Future research using administrative data sources with larger sample sizes, objective measures of telemedicine use, and covering the peri-pandemic period would further advance our understanding.

Despite having more observations and state-level policy changes in our analysis of private coverage requirements, we did not detect a significant association between private telemedicine coverage laws and telemedicine use. Our main analysis examined all private laws, but results were similar when we excluded states with more restrictive policies and also when we examined states that required payment parity for telemedicine and in-person services. This latter finding was consistent with a recent analysis of private payment parity laws among a privately insured community health center patient population, which found no association between payment parity and telemedicine use in 2019 or 2020 but a significant and positive association in 2021.[26] Given that a number of states adopted a new payment parity law during the pandemic, more research is needed to understand the conditions under which these laws are effective in increasing telemedicine use, in addition to their spending and cost-effectiveness implications.

Our finding that private telemedicine coverage policies were not associated with telemedicine use in the pre-pandemic period was also consistent with a previous study using AAMC's Consumer Survey data for 2013–2016.[10] By contrast, we found a significant association between telemedicine coverage policies and telemedicine use among Medicaid enrollees. This is likely because we were able to take advantage of additional state policy changes, longer post-implementation periods, and a larger sample of Medicaid-enrolled adults given the expanded 2013–2019 study period. In addition, we limited our analytical samples to nonelderly adults with the relevant insurance types who were more likely to be affected by the coverage policies we examined. The exclusion of adults ages 65 and older may be an important distinction between our study and previous related research, given the substantially lower rates of telemedicine use among older adults.[1,10]

4.1 | Limitations

This study had several limitations. First, live video communication use was self-reported and therefore subject to inaccuracies. It is also possible that respondents included other telehealth modes such as telephone and text in their responses, even though these modes were asked about separately. Rates of telemedicine use in our study were similar to a past study using the same data source,[10] but substantially higher than in most analyses of administrative data.[1–3] We found that telemedicine use followed expected patterns by age, income, rurality, and health insurance group, though we cannot rule out the possibility that inaccurate reporting biased our main regression estimates. Second, smaller sample sizes for states with policy changes in our analysis of Medicaid telemedicine coverage and private payment parity policies resulted in wide confidence intervals. In addition, while we estimated significant associations between Medicaid telemedicine coverage policies and telemedicine use in most sensitivity analyses, results were much smaller in magnitude and no longer significant when we excluded data for 2017 and 2018. However, point estimates from all sensitivity analyses were within the 95% confidence interval for our main estimate. Third, similar to other state health insurance

mandates, self-insured firms are exempt from private telemedicine coverage laws, and Medicaid managed care plans do not have to adhere to fee-for-service policies, which may have dampened estimates. Fourth, as in other observational studies, our analysis could not rule out unobserved confounding factors as a source of bias. In addition, while a recent study found that weighted demographic characteristics for the AAMC's Consumer Survey were similar to those of the National Health Interview Survey,[29] a gold standard national survey, the AAMC does not report response rates or provide an analysis of non-response bias.

5 | CONCLUSION

The use of telemedicine markedly increased during the early stages of the COVID-19 pandemic.[23,30,31] This growth was facilitated by some health insurers expanding coverage to include telemedicine services,[9,32,33] some health insurers setting parity in reimbursement and cost-sharing rates for telehealth and in-person services,[25] and many state Medicaid programs adding new services (e.g., primary care) and modalities (e.g., telephone-only, text-based communication) to their existing coverage.[9] While our study focused on the pre-pandemic period, understanding the role of state policies outside of the pandemic context may help inform future policymaking efforts as telemedicine visit rates decrease from peak levels and concerns about the spread of infection become less likely to overpower preferences for in-person care.[24] While our research suggested that Medicaid telemedicine coverage requirements were positively associated with telemedicine use, we found no association for private telemedicine coverage laws. Recent research also suggests that telemedicine use disparities by race and ethnicity and urbanicity persisted during the pandemic.[34] Complementary policies such as broadband improvements, more generous reimbursement, provider education, and Congress requiring that self-insured plans cover telehealth services may support the effectiveness of coverage mandates and aid in maintaining some of the recent gains in telemedicine adoption.

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ORCID

Brandy J. Lipton https://orcid.org/0000-0002-8387-6758
Michael F. Pesko https://orcid.org/0000-0002-9247-9703

REFERENCES

1. Poeran J, Cho LD, Wilson L, et al. Pre-existing disparities and potential implications for the rapid expansion of telemedicine in response to the coronavirus disease 2019 pandemic. *Med Care*. 2021;59(8):694-698.
2. Mehrotra A, Jena AB, Busch AB, Souza J, Uscher-Pines L, Landon BE. Utilization of telemedicine among rural Medicare beneficiaries. *JAMA*. 2016;315(18):2015-2016.
3. Douglas MD, Xu J, Heggs A, Wrenn G, Mack DH, Rust G. Assessing telemedicine utilization by using Medicaid claims data. *Psychiatr Serv*. 2017;68(2):173-178.
4. Rodriguez JA, Saadi A, Schwamm LH, Bates DW, Samal L. Disparities In telehealth use among California patients with limited English proficiency. *Health Aff (Millwood)*. 2021;40(3):487-495.
5. Barnett ML, Ray KN, Souza J, Mehrotra A. Trends in telemedicine use in a large commercially insured population, 2005-2017. *JAMA*. 2018;320(20):2147-2149.
6. Drake C, Zhang Y, Chaiyachati KH, Polsky D. The limitations of poor broadband internet access for telemedicine use in rural America: an observational study. *Ann Intern Med*. 2019;171(5):382-384.
7. Struminger BB, Arora S. Leveraging telehealth to improve health care access in rural America: it takes more than bandwidth. *Ann Intern Med*. 2019;171(5):376-377.
8. Yang T. Health Policy Brief: Telehealth Parity Laws. Health Affairs; 2016. https://www.healthaffairs.org/do/10.1377/hpb20160815.244795/
9. Chu RC, Peters C, De Lew N, Sommers BD. *State Medicaid Telehealth Policies before and during the COVID-19 Public Health Emergency*. U.S. Department of Health and Human Services; 2021. https://www.aspe.hhs.gov/sites/default/files/2021-07/medicaid-telehealth-brief.pdf
10. Park J, Erikson C, Han X, Iyer P. Are state telehealth policies associated with the use of telehealth services among underserved populations? *Health Aff (Millwood)*. 2018;37(12):2060-2068.
11. Harvey JB, Valenta S, Simpson K, Lyles M, McElligott J. Utilization of outpatient telehealth services in parity and nonparity states 2010-2015. *Telemed e-Health*. 2019;25(2):132-136.
12. Adler-Milstein J, Kvedar J, Bates DW. Telehealth among US hospitals: several factors, including state reimbursement and licensure policies, influence adoption. *Health Aff (Millwood)*. 2014;33(2):207-215.
13. Grecu AM, Sharma G. The effect of telehealth insurance mandates on health-care utilization and outcomes. *Appl Econ*. 2019;51(56):5972-5985.
14. Chen J, Dills AK. Does telemedicine save lives? Evidence on the effect of telemedicine parity laws on mortality rates. *Southern Econ J*. 2022:1-26. doi:10.1002/soej.12562
15. Association of American Medical Colleges. Workforce Resources. 2022 https://www.aamc.org/about-us/mission-areas/health-care/workforce-studies/resources#:~:text=Significantly%2C%20the%20AAMC%20Consumer%20Survey,communications%20on%20access%20to%20care
16. Reed ME, Huang J, Graetz I, et al. Patient characteristics associated with choosing a telemedicine vs office visit with the same primary care clinicians. *JAMA Netw Open*. 2020;3(6):e205873.
17. Center for Connected Health Policy. *State Telehealth Medicaid Fee-for-Service Policy, A Historical Analysis of Telehealth 2013–2019*. The National Telehealth Policy Resource Center; 2020.
18. Bertrand M, Duflo E, Mullainathan S. How much should we trust differences-in-differences estimates? *Quart J Econ*. 2004;119(1):249-275.
19. Greene WH. Estimation of limited dependent variable models by ordinary least squares and the method of moments. *J Econ*. 1983;21(2):195-212.
20. Goodman-Bacon A. Difference-in-differences with variation in treatment timing. *J Econ*. 2021;225(2):254-277.
21. Callaway B, Sant'Anna PHC. Difference-in-differences with multiple time periods. *J Econ*. 2021;225(2):200-230.
22. Gardner J. Two-stage differences in differences. Working Paper 2021 https://jrgcmu.github.io/2sdd2.pdf
23. Justin Lo MR, Amin K, Cox C. *Outpatient Telehealth Use Soared Early in the COVID-19 Pandemic but has Since Receded*. Peterson-Kaiser Family Foundation; 2022 https://www.healthsystemtracker.org/brief/outpatient-telehealth-use-soared-early-in-the-covid-19-pandemic-but-has-since-receded/

24. Trilliant Health. *Trends Shaping the Health Economy*. Trilliant Health; 2022. https://www.trillianthealth.com/hubfs/U_TH_Annual%20Report_2022%20FINAL.pdf?hsCtaTracking=4d2e01e6-60a1-4161-892a-ca961794fa47%7C966d9f0e-dd96-44b5-ae61-7e89d6958cbe
25. Volk J, Palanker D, O'Brien M, Goe CL. *States' Actions to Expand Telemedicine Access During COVID-19 and Future Policy Considerations*. Commonwealth Fund; 2021 https://www.commonwealthfund.org/publications/issue-briefs/2021/jun/states-actions-expand-telemedicine-access-covid-19
26. Erickson C, Herring J, Park YH, Luo W, Burke G. Association between state payment parity policies and telehealth usage at community health centers during COVID-19. *J Am Inf Assoc*. 2022;29(10):1715-1721.
27. Ponce N, Babey S, Becker T, Scheitler AJ. *Measuring Up? Access to Care in Medi-cal Compared to Other Types of Health Insurance (2018)*. California Health Care Foundation; 2021 https://www.chcf.org/publication/measuring-up-access-care-medi-cal-compared-other-types-health-insurance-2018/
28. Centers for Medicare and Medicaid Services [CMS]. *Health Care Experiences of Adults with Disabilities Enrolled in Medicaid Only: Findings from a 2014-2015 Nationwide Survey of Medicaid Beneficiaries. Analytic Brief*. CMS; 2017 https://www.medicaid.gov/medicaid/quality-of-care/downloads/performance-measurement/namcahpsdisabilitybrief.pdf
29. Fish J, Turpin RE, Williams ND, Boekeloo BO. Sexual identity differences in access to and satisfaction with health care: findings from nationally representative data. *Am J Epidemiol*. 2021;190(7):1281-1293.
30. Koonin LM et al. *Trends in the Use of Telehealth during the Emergence of the COVID-19 Pandemic—United States, January-March 2020*. MMWR Morb Mortal Wkly Rep. Centers for Disease Control and Prevention; 2020 https://www.cdc.gov/mmwr/volumes/69/wr/mm6943a3.htm
31. Friedman AB, Gervasi S, Song H, et al. Telemedicine catches on: changes in the utilization of telemedicine services during the COVID-19 pandemic. *Am J Manag Care*. 2022;28(1):e1-e6.
32. Kaiser Family Foundation. *State COVID-19 Data and Policy Actions*. Kaiser Family Foundation; 2022. https://www.kff.org/report-section/state-covid-19-data-and-policy-actions-policy-actions/#policyactions.
33. Park S, Langellier BA, Burke RE. Telehealth benefits offered by Medicare advantage plans in 2020. *Med Care*. 2021;59(1):53-57.
34. Hsiao V, Chandereng T, Lankton RL, et al. Disparities in telemedicine access: a cross-sectional study of a newly established infrastructure during the COVID-19 pandemic. *Appl Clin Inf*. 2021;12(03):445-458.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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