Effects of Virginia's 2019 Medicaid Expansion on Health Insurance Coverage, Access to Care, and Health Status

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Wei Lyu, PhD[1] and George L. Wehby, PhD[2,3,4,5,6]

Abstract

Virginia expanded Medicaid under the Affordable Care Act beginning in January 2019, which substantially increased income eligibility up to 138% of the federal poverty level (FPL) for both childless adults and parents. In this study, we examined the effects of Virginia's Medicaid expansion in 2019 on health insurance coverage, access to care, and health status by employing a difference-in-differences and a synthetic control design. The study included data on health insurance from the 2016–2020 American Community Survey (ACS) and data on access to care and health status come from the 2016–2020 Behavioral Risk Factors Surveillance System (BRFSS). The samples from ACS and BRFSS were limited to non-elderly adults with income below 138% of the FPL. Separate models were estimated for individuals below 100% of FPL, and those within 100–138% of FPL. The Virginia Medicaid expansion was associated with a 9–11 percentage-point increase in Medicaid coverage rate and a 7–8 percentage-point increase in the insured rate among individuals below 100% FPL, in the first two years of expansion. There was a larger increase in Medicaid coverage among individuals within 100–138% of FPL which also led to a larger increase in the insured rate in 2020. Both income groups showed no changes in private coverage after the expansion in Virginia. We also found a decline in delaying necessary medical visits due to cost for individuals below 100% FPL in 2019 and for individuals within 100–138% FPL in 2020. There was overall no discernable change in health status outcomes. Virginia's 2019 Medicaid expansion substantially increased insurance coverage among poor adults with suggestive early evidence for improved access. The findings highlight the missed opportunity for other states that have not yet decided to expand their Medicaid programs to improve coverage and access among their low-income individuals.

Keywords

health insurance, Medicaid expansion, affordable care act

Highlights

What do we already know about this topic?

- The Affordable Care Act (ACA) Medicaid expansions beginning in 2014 have increased health insurance coverage and access to health care among low-income non-elderly adults but there is much less evidence for states that expanded after 2014 particularly recent expansions.

How does your research contribute to the field?

- This study investigated the effects of the Medicaid expansion in Virginia in 2019, which substantially increased income eligibility for both childless adults and parents, on health care coverage, access to care, and health status among low-income adults during its first 2 years of implementation using quasi-experimental research designs.

What are your research's implications towards theory, practice, or policy?

- Virginia's 2019 Medicaid expansion substantially increased insurance coverage among poor adults with suggestive early evidence for improved access which highlights the missed opportunity for other states that have not yet decided to expand their Medicaid programs to improve coverage and access among their low-income individuals.

Introduction

The Affordable Care Act (ACA) Medicaid expansions have covered over 18 million low-income adults and improved access to health care, as of December 2020.[1] Since the first expansions in 2014 with 26 states and Washington D.C., 14 additional states have expanded by December 2021.[2] There is clear evidence that the 2014 Medicaid expansions have increased coverage and access,[3-15] and growing evidence that these expansions also improved health status.[15-18] However, there is much less evidence for states that expanded after 2014 particularly recent expansions.

Virginia expanded Medicaid under the ACA beginning in January 2019, which substantially increased income eligibility up to 138% of the federal poverty level (FPL) for both childless adults and parents. Before that, childless adults were not eligible in Virginia, and parents were only eligible for up to 38% of FPL. Before the expansion, Virginia had one of the highest uninsured rates of non-elderly adults below 138% of FPL with over a quarter (27.6%) of this population without health insurance in 2018, exceeding the rest of the United States by 5 percentage points.[19] Furthermore, the expansion in Virginia affected a much larger proportion of parents than most other expansion states. Based on our calculations, the average pre-expansion income eligibility for parents in the other states that had expanded by 2019 was about 100% of FPL, which is nearly 2.5 times the Virginia pre-expansion eligibility for parents (38% FPL).[20] Because of the large proportion of the low-income population affected by the expansion, understanding the effects of the expansion in Virginia on coverage and access is especially important.

In this study, we investigated the effects of the Medicaid expansion in Virginia on health care coverage, access to care, and health status among low-income adults during its first year of implementation. After 5 years of the initial expansions and marketplace establishment, the public has gained more information about the ACA and coverage choices, which may affect enrollment decisions. Therefore, understanding the effects of recent Medicaid expansions also adds important and complementary knowledge to established evidence from the early expansions.[3,4,21,22]

Study Data and Methods

Data and Sample. We used individual-level data from two of the largest nationally representative surveys to examine the Virginian's 2019 Medicaid expansion effects on a variety of outcomes measuring health coverage, access to care, and health status. We selected a sample of non-elderly adults aged 18–64 years with income below 138% FPL as they are most likely to be impacted and compared the outcomes before and after the expansion in Virginia with a group of states that had not adopted the ACA Medicaid expansion.

The first data source was the American Community Survey (ACS) from 2016 through 2020 (most recent year currently available), which we used to study health coverage changes using individual-level data. The ACS is a nationally representative cross-sectional survey that samples nearly 1% of the US population from all 50 states and Washington D.C. every year. The ACS collects detailed information on the individual's current health insurance coverage and demographic and socioeconomic characteristics. Sampled individuals are legally obligated to answer all survey questions; 86%–96% completed the survey between 2016 and 2019, but the response declined to 71% in 2020 due to the COVID-19 pandemic. From the ACS, we included the following five binary measures of individuals' health insurance status and types: any insurance, Medicaid coverage, employer-sponsored coverage, independently purchased coverage, and any private coverage (either employer-sponsored or independently purchased coverage). In the main models, individuals who reported multiple sources of coverage were included under each insurance type that they reported. We did so because individuals could be enrolled in both Medicaid and private coverage if they were income eligible for Medicaid (except for health coverage from ACA marketplace). In sensitivity analyses, however, we excluded individuals with multiple sources of health insurance and observed similar results. A key strength of the ACS data is allowing us to examine different coverage types and measure household income to select samples by different income levels. However, ACS does not distinguish whether independently purchased plans were from the marketplace or not.[23]

The second dataset was the Behavioral Risk Factors Surveillance System (BRFSS) from 2016 through 2020

[1]Division of Health Systems Management and Policy, University of Memphis, Memphis, TN, USA
[2]Department of Health Management and Policy, University of Iowa, Iowa City, IA, USA
[3]Department of Economics, University of Iowa, Iowa City, IA, USA
[4]Department of Preventive & Community Dentistry, University of Iowa, Iowa City, IA, USA
[5]Public Policy Center, University of Iowa, Iowa City, IA, USA
[6]National Bureau of Economic Research, Cambridge, MA, USA

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Corresponding Author:
Wei Lyu, PhD, Division of Health Systems Management and Policy, The University of Memphis, 3825 Desoto Avenue, 124 Robison Hall, Memphis, TN 38152, USA.
Email: wlyu@memphis.edu

(most recent year currently available), which we included to examine changes in health care access and health status.[24] BRFSS is a nationally representative annual survey that collects individual-level data on multiple measures of healthcare access and information on socioeconomics and demographic characteristics for cross-sectional samples from all states. We included the following four binary measures of health care access: 1-having any type of health insurance coverage at the time of interview, 2- having a personal health provider, 3- avoiding medical care due to cost in the past 12 months, and 4- completing a routine medical checkup in the past 12 months. For health status, we evaluated the following four measures of health status: 1- a binary indictor for rating very good or excellent health, 2- a binary indictor for rating poor or fair health, 3- number of days in the past 30 days not in good physical health, and 4- number of days during the past thirty not in good mental health.

With the individual-level data from ACS and BRFSS, we estimated the expansion effects separately for individuals below 100% FPL, and those between 100% FPL and 138% FPL. Individuals with income between 100 and 138% FPL received subsidies for marketplace coverage before the Medicaid expansion, and nearly 30% of all non-elderly adults in Virginia in 2018 were eligible to receive a subsidy according to our analysis of the ACS data. However, after becoming eligible for Medicaid, individuals previously enrolled in the marketplace would most likely switch from marketplace coverage to Medicaid due to the loss of subsidies. Unlike the ACS, which reports detailed income data, BRFSS measures income based on the following categories: less than $10,000, $10,000 to less than $15,000, $15,000 to less than $20,000, $20,000 to less than $25,000, $25,000 to less than $35,000, $35,000 to less than $50,000, $50,000 to less than $75,000, and $75,000 or more. To select the BRFSS sample below 138% FPL (also considering number of adults and children in the households), we used midpoints of these income categories following previous studies.[7,17,21,25] In the sample with income below 100% FPL, we did not exclude those who were previously eligible for Medicaid (parents with income below 38% FPL) because of prior evidence of spillover effects (i.e., "welcome mat" effects) on coverage among previously income eligible individuals.[26] In sensitively analyses, we excluded parents with income that would have been previously eligible for coverage (below 38% FPL). We only did this check in ACS data since the income data from BRFSS are in categories and bottom coded.

In Appendix Table 1, we show descriptive statistics of the ACS analytical sample, separately for individuals with income below 100% and within 100–138% FPL. The ACS sample includes 439,785 individuals (without sampling weights) with income below 100% FPL and 205,944 within 100–138% FPL, of whom 19,507 and 8517 respectively are in Virginia. The descriptive statistics for the BRFSS sample are presented in Appendix Table 2. The unweighted sample of BRFSS includes 62,523 individuals (2452 from Virginia) with income below 100% FPL and 38,523 individuals (1674 from Virginia) within 100–138% FPL. Overall, the subgroups from Virginia and control states are similar on age, gender, and education; Virginia has a smaller proportion of racial/ethnic minority individuals comparing to control states.

Research Design and Statistical Analysis

We used a difference-in-differences design to estimate the effects of the expansion in Virginia in 2019 on health insurance coverage, access to health care, and health status. Specifically, we compared outcome changes after the expansion in Virginia with a group of control states which included 15 states that had not adopted the ACA Medicaid expansion as of December 2020, and four states (Delaware, New York, Massachusetts, and Vermont) plus Washington DC that had full or near full expansions before 2014, similar to previous studies.[3,4,17,25] Because of these prior expansions, these states were likely less affected by the 2014 ACA Medicaid expansion than states that expanded in 2014. For states that expanded in 2014, recent studies suggested growing effects on health status in 2018.[15,17] For this reason, we did not include states that expanded in 2014 or later as control states.

We estimated an event study regression specification, which allowed us to compare pre-expansion trends between Virginia and the control states as a check for the internal validity of the difference-in-difference design. The model was specified as follows

$$\text{Outcome}_{ist} = \alpha + \gamma_1 \text{Virginia}_s * \text{Y2016} + \gamma_2 \text{Virginia}_s * \text{Y2017} + \gamma_3 \text{Virginia}_s * \text{Y2019} + \gamma_4 \text{Virginia}_s * \text{Y2020} + \text{X}_{ist}\Gamma + \theta_s + \omega_t + \varepsilon_{ist} \quad (1)$$

Outcome_{ist} was one of the study outcomes described for individual i in state s in year t. Virginia_s was a binary indicator equal to 1 for respondents from Virginia, and 0 for respondents from the control states. $\text{Y2016}, \text{Y2017}, \text{Y2019}$, and Y2020 were indicators for whether the survey year is 2016, 2017, 2019, and 2020 (with 2018 as the reference year). X_{ist} was a vector of individual-level characteristics including age (which we included flexibly as 0/1 indicators for each age year in ACS and age categories in BRFSS), gender, race/ethnicity, education, employment status, and marital status. When using BRFSS data, the model also controlled for two additional variables related to BRFSS sampling: homeownership status, and whether the respondent was selected as a cell phone or landline user, as these are part of BRFSS sampling.[25,27] θ_s were state fixed effects capturing time-invariant differences between states, and ω_t were year fixed effects capturing shared trends between states. The effect of Virginia's 2019 Medicaid expansion was represented by γ_3. The underlying assumption of the difference-in-differences design is that outcomes would have changed

similarly in Virginia in 2019 as the control states in the absence of Medicaid expansion. This assumption can be partially tested by visually checking whether coverage trends in 2016-2018 were similar between Virginia and the control states. A more formal approach is to check the magnitude of the coefficients on pre-expansion periods (γ_1 and γ_2) and whether they are statistically significant.

We estimated the regression model described above using ordinary least squares (OLS) as the coefficients can be directly interpreted as the expansion effect. Regressions were weighted by sampling probability weights to account for non-response bias and yield representative estimates. Because the model only has one treatment state and a few study years, classical testing based on state-clustered standard errors will likely be biased downward leading to inaccurately smaller *P* values and over-rejection of the null hypothesis of no effects.[28-31] To address this problem, we use a randomization inference analysis (also known as permutation test) to test the statistical significance of the difference-in-difference estimates.[30,32] Specifically, we estimated the regression model by reassigning each of the 20 control states (one at a time) as a treatment state and using the remaining states (including Virginia) as control states (i.e., we obtained the event study regression estimates from 20 such regressions). Then, we calculated the *P*-value for each event study coefficient when Virginia was the treatment state as the proportion of the 20 estimates that were larger in absolute value than that coefficient.

Another recommended and commonly used approach to address this problem is to use a synthetic control method (SCM) which we also employed as an alternative design.[28,32,33] Unlike the difference-in-differences design that places an equal weight for all control states, SCM constructs a counterfactual control group for Virginia by estimating a set of weights for control states (19 states plus DC) that minimize differences in pre-trends between Virginia and the control states during 2016–2018 before Virginia expanded Medicaid. For each outcome, SCM projects a counterfactual for Virginia in 2019 using the outcome-specific generated weights, and the expansion effect is estimated by the difference in outcome means in 2019 between Virginia and its synthetically generated counterfactual. We followed the two commonly used approaches to select the SCM weights. The first approach constructs the synthetic group that minimizes year-by-year differences between Virginia and the control states in outcome changes from 2016 through 2018. A limitation of this approach, however, is that it does not directly include conceptually relevant covariates to predict outcome changes.[34] The second approach to generate weights minimizes differences between Virginia and the control states in the means of the outcome and selected covariates averaged over 2016–2018 (rather than year-by-year).[4,33] The covariates selected for SCM matching were the same covariates included in our difference-in-difference specification. Statistical inference of SCM estimates was based on placebo tests and generating a distribution of placebo effects, which is similar to the randomization inference analysis described above.[33] Specifically, we estimated the same SCM model on each control state assuming it was a treatment state to get a distribution of placebo effects. A *P*-value was derived based on the proportion of placebo effects (based on 20 tests in this SCM model) that were equal to or larger (in absolute value) than the effect estimates for Virginia. Because ACS and BRFSS are individual-level data, we aggregated the data from the analytical samples (separately for individuals below 100% FPL and 100–138% FPL) into state-level means of outcomes and covariates (noted above) using the survey sampling weights to conduct the analysis using the SCM.[4,33,35]

Results

Medicaid Expansion Effects on Insurance Coverage

Appendix Figures 1 and 2 show health insurance coverage rates from 2016 to 2020 separately for non-elderly adults below 100% FPL and 100–138% FPL in Virginia and control states using ACS data. These are descriptive figures showing the rates over time and do not adjust for any differences between states. In 2016–2018 (before Virginia's expansion), coverage trends were comparable between Virginia and control states for both income samples lending support to the research design. Beginning in 2019 and continuing in 2020, there was a sharp increase in Medicaid coverage and consequently in any coverage among individuals below 100% FPL in Virginia relative to control states (Appendix Figure 1). There was also a small decrease in independently purchased coverage but almost no change in employer-sponsored coverage after expansion compared to control states (Appendix Figure 2). For individuals within 100–138% FPL, there was a larger increase in Medicaid coverage in 2019 and 2020 in compared to individuals below 100% FPL. There was, however, little change in private coverage in this group.

Table 1 presents the difference-in-differences estimates of Virginia's 2019 Medicaid expansion effects on insurance coverage status and type using the ACS data (separately for individuals with income below 100% and 100–138% FPL) and the randomization inference test. The estimates echo the descriptive data in Appendix Figures 1 and 2. After the expansion, Medicaid coverage in Virginia significantly increased by 9 ($P < .001$) and 10 ($P = .05$) percentage points in 2019 and 2020, compared with control states. These prominent changes in Medicaid coverage resulted in an increase in the insured rate in Virginia by 7 and 8 percentage points in 2019 and 2020. The difference between Medicaid and any coverage gains is a small and statistically non-significant decline in private coverage (about 2–3 percentage points). Individuals with income between 100% and 138% FPL also had an increase in Medicaid coverage by 11 and 18 percentage points ($P = .05$) in 2019 and 2020. There was a smaller

Table 1. Difference-in-Differences Estimates of Virginia's 2019 Medicaid Expansion Effects on Health Insurance Coverage of Non-elderly Adults Below 100% FPL and within 100–138% FPL with using Randomization Inference, 2016–2020 Data from the American Community Survey.

	N	2016	2017	2019	2020
Household Income below 100% FPL					
Any insurance	439,785	−.015	−.014	.066***	.078*
		[.400]	[.300]	[.000]	[.050]
Medicaid coverage	439,785	−.027	−.017	.085*	.105***
		[.400]	[.450]	[.050]	[.000]
Any private coverage	439,785	.007	.018	−.017	−.029
		[.750]	[.150]	[.350]	[.200]
Employer sponsored coverage	439,785	.019	.024	.018	.021
		[.300]	[.200]	[.350]	[.350]
Independently purchased coverage	439,785	−.003	.002	−.029	−.055
		[.950]	[.950]	[.100]	[.100]
Household income within 100–138% FPL					
Any insurance	205,944	−.010	.028	.049	.099*
		[.700]	[.250]	[.150]	[.050]
Medicaid coverage	205,944	.010	.010	.110*	.185*
		[.800]	[.950]	[.050]	[.050]
Any private coverage	205,944	−.009	.022	−.034	−.020
		[.750]	[.500]	[.350]	[.600]
Employer sponsored coverage	205,944	−.024	−.010	−.037	.006
		[.350]	[.700]	[.350]	[.800]
Independently purchased coverage	205,944	.017	.031	.004	−.034
		[.450]	[.350]	[.950]	[.200]

Notes. The table reports the difference-in-differences estimates of Virginia's 2019 Medicaid expansion effects on health insurance coverage among non-elderly adults below 100% FPL and within 100–138% FPL. All regressions control for age, gender, race/ethnicity, education, employment status, marital status, state fixed effects and year fixed effects, and are weighted by ACS sampling weights. P-values based on the randomization inference are reported in brackets.
*significant at 5% level; **significant at 1% level; ***significant at .1% level.

and statistically non-significant decline in private coverage. The net change in insured rate for this income group was a statistically non-significant increase by 5 percentage points in 2019 ($P = .15$) and but a significant increase by 10 percentage points in 2020 ($P = .05$). The results using the classical state-clustered standard errors are reported in Appendix Table 3, and the main difference is that the standard errors under this approach are smaller, making the small differences in pre-trends statistically significant in multiple cases. In the sensitivity analyses that excluded individual with multiple types of health insurance (Appendix Table 4) and individuals with income that would have been previously eligible for Medicaid (Appendix Table 5), the results are overall similar to the main estimates.

In Figure 1, we show the SCM trends for Medicaid coverage, any private coverage, and any private coverage in Virginia in 2016–2020 and its synthetic control group constructed by the outcome means in each year of the pre-expansion period (2016–2018), separately for individuals with income below 100% FPL and 100–138% FPL. Details on synthetic control weights are presented in Appendix Table 6. The SCM estimates were very close to the difference-in-difference estimates. Specifically, for individuals with income below 100% FPL, the SCM estimates indicate that Medicaid coverage in Virginia increased by 8.8 ($P = .1$) and 12 ($P < .001$) percentage points in 2019 and 2020 after the expansion, which led to gains in the insured rate by 7 ($P = .05$) and 11 ($P < .001$) percentages points in 2019 and 2020, respectively. The SCM estimates for employer-sponsored and independently purchased coverage (Appendix Figure 3) were also consistent with the difference-in-differences model, suggesting little evidence that the Medicaid expansion in Virginia had an impact on private coverage. Finally, SCM estimates from matching the synthetic control group on means of covariates and outcomes during pre-expansion years were also similar overall but there were differences in outcome trends between the synthetic control group and Virginia before Virginia expanded Medicaid (Appendix Figures 4 and 5).

Medicaid Expansion Effects on Access to Care

In Appendix Figure 6, we show descriptive and unadjusted trends in the access to care measures between Virginia and all control states from 2016 to 2019 from the BRFSS data. In most cases, there appear to be improvements in access but

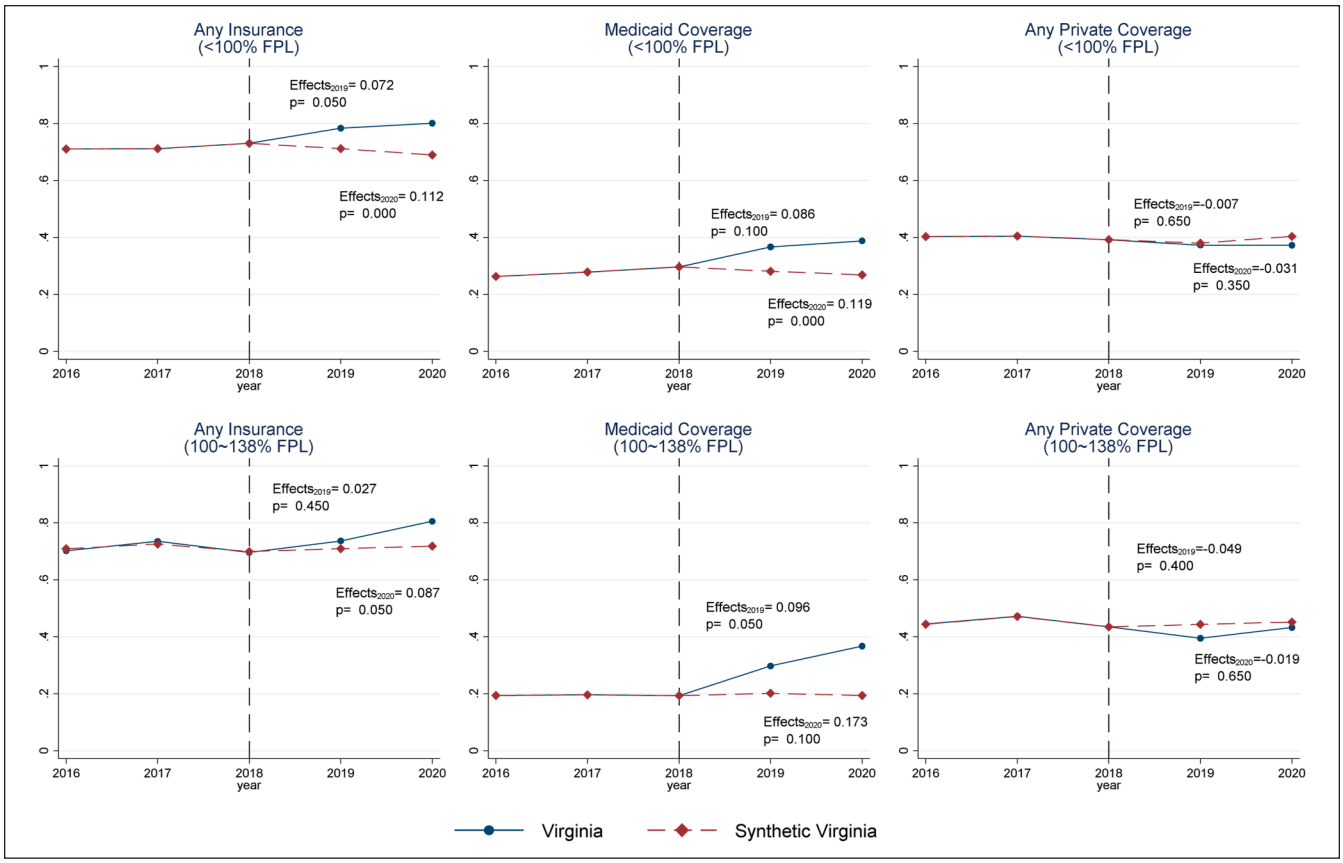

Figure 1. Synthetic control estimates of Virginia's 2019 Medicaid expansion effects on health insurance coverage of non-elderly adults below 100% FPL and within 100–138% FPL, synthetic control matching on the means of outcome in each pre-expansion year, 2016–2020 data from the American community survey.

Notes. The trends in Virginia are summary statistics for reported data. The trends for the synthetic control are estimated using synthetic control methods. The matching of the synthetic control to Virginia is based on the pre-expansion (2016–2018) means of the health insurance outcome in each of the pre-expansion year.

also some differences in pre-trends between Virginia and the control states.

Table 2 reports the difference-in-differences estimates of Virginia's Medicaid expansion effects on access using the 2016–2019 BRFSS data (separately for individuals with income below 100% and 100–138% FPL) and the randomization inference test. Overall, there were some improvements in all four access measures for both income groups after the Medicaid expansion but not all of them are statistically significant. The estimates for any health insurance in BRFSS are overall consistent with the ACS estimates but the BRFSS estimates are not statistically significant. There was a significant ($P < .05$) decline in reporting cost as a barrier to medical care by nearly 9 percentage points among individuals with income below 100% FPL in 2019, and a similar significant decline by 7 percentage points among individuals within 100–138% FPL in 2020. The estimates based on classical inference using state-clustered standard errors are presented in Appendix Table 7.

Figure 2 shows the SCM trends and estimates for the BRFSS health care access measures based on pre-expansion year-by-year outcome matching (state matching weight assignments are in Appendix Table 8). Overall, there were similar improvements (qualitatively based on estimates sign) in all access measures even though most estimates were not statistically significant. However, the increase in any insurance coverage (6 percentage points with $P = .05$) among individuals below 100% FPL was statistically significant, which is consistent with the findings from ACS. SCM estimates also suggest improvement when matching based on outcome and covariate means in the pre-expansion period (Appendix Figure 7), but with more differences in outcome trends during pre-expansion period.

Medicaid Expansion Effects on Self-Reported Health Status

Appendix Figure 8 shows descriptive trends in the four health status measures using BRFSS data. The trends in self-rated health are similar between Virginia and the control states both before and after the expansion, suggesting no effects on this outcome in the first two years. Also, these

Table 2. Difference-in-Differences Estimates of Virginia's 2019 Medicaid Expansion Effects on Access to Care of Non-elderly Adults Below 100% FPL and within 100–138% FPL with using Randomization Inference, 2016–2019 Data from the Behavioral Risk Factors Surveillance System.

	N	2016	2017	2019	2020
Household income below 100% FPL					
Any health insurance	62,442	−.042	.036	.043	.063
		[.250]	[.500]	[.350]	[.200]
Has a personal health provider	62,360	−.021	−.078	.045	−.003
		[.750]	[.150]	[.450]	[1.000]
Avoided medical care due to cost	62,448	.030	−.042	−.085***	−.023
		[.500]	[.500]	[.000]	[.550]
Had a routine check-up	60,889	.021	.030	.032	.022
		[.850]	[.400]	[.500]	[.550]
Household income within 100–138% FPL					
Any health insurance	38,470	.013	.009	.060	.054
		[.700]	[.800]	[.250]	[.150]
Has a personal health provider	38,429	−.059	−.096	.014	−.037
		[.250]	[.150]	[.750]	[.350]
Avoided medical care due to cost	38,465	−.011	−.069	−.071	−.075***
		[.80]	[.30]	[.150]	[.000]
Had a routine check-up	37,668	−.024	−.011	.011	−.049
		[.750]	[.950]	[.700]	[.350]

Notes. The table reports the difference-in-differences estimates of Virginia's 2019 Medicaid expansion effects on access to care among non-elderly adults below 100% FPL and within 100–138% FPL. All regressions control for age, gender, race/ethnicity, education, employment status, marital status, homeownership status, and whether respondent was selected as a cell phone or landline user, state fixed effects and year fixed effects, and are weighted by BRFSS sampling weights. P-values based on the randomization inference are reported in brackets.
*Significant at 5% level; **significant at 1% level; ***significant at .1% level.

plots show overall no evidence of an effect from the expansion on the number of days not in good mental health or good physical health.

The difference-in-difference estimates reported in Table 3 also show little evidence that the Medicaid expansion in Virginia had discernable effects on health status measures. However, the SCM estimates (Figure 3) indicate that there was a decline in number of days not in good mental health by 2.7 ($P = .05$) days in 2020 among individuals with income within 100–138% FPL. However, there was no change for individuals with income below 100% FPL. The details on SCM matching weights were reported in Appendix Table 10. SCM estimates when matching based on outcome and covariate means in the pre-expansion period also suggest similar findings (Appendix Figure 7) with more differences in outcome trends during pre-expansion period.

Discussion

This paper provides timely evidence on the recent ACA Medicaid expansion in Virginia that substantially modified income eligibility for both childless adults and parents. We find a relatively large increase in Medicaid coverage in the first year for individuals below 138% FPL. This increase is observed for those below 100% FPL who were not eligible for marketplace subsidies and those at 100–138% FPL who were previously eligible for these subsidies before the expansion. There is also a clear increase in the insured rate among individuals below 100% FPL in 2019–2020 and for individuals within 100–138% FPL in 2020. We find no statistically significant changes in private insurance coverage for both income groups, suggesting little evidence of switching from private coverage to Medicaid. When examining effects on access measures, both income groups show a decline in delaying necessary medical visits due to cost post expansion, suggesting improvement in access based on that measure. Overall, we find little evidence of changes in self-reported health status for either income group in the first two years of expansion. Taken as a whole, the results are largely similar to those on the 2014 Medicaid expansions in their first year,[6-8,36,37] indicating similar benefits to the eligible population for an expansion that happened six years later.

The study employs two research designs (difference-in-differences and SCM models) and finds overall comparable results between them. It also evaluates several conceptually relevant outcome measures and considers two income groups that differed in access to private insurance coverage before the expansion (due to the differences in marketplace subsidies). One limitation of our study common to similar studies is that outcomes and income are self-reported, which might involve errors including possible misclassification of some individuals as Medicaid eligible or missing some individuals

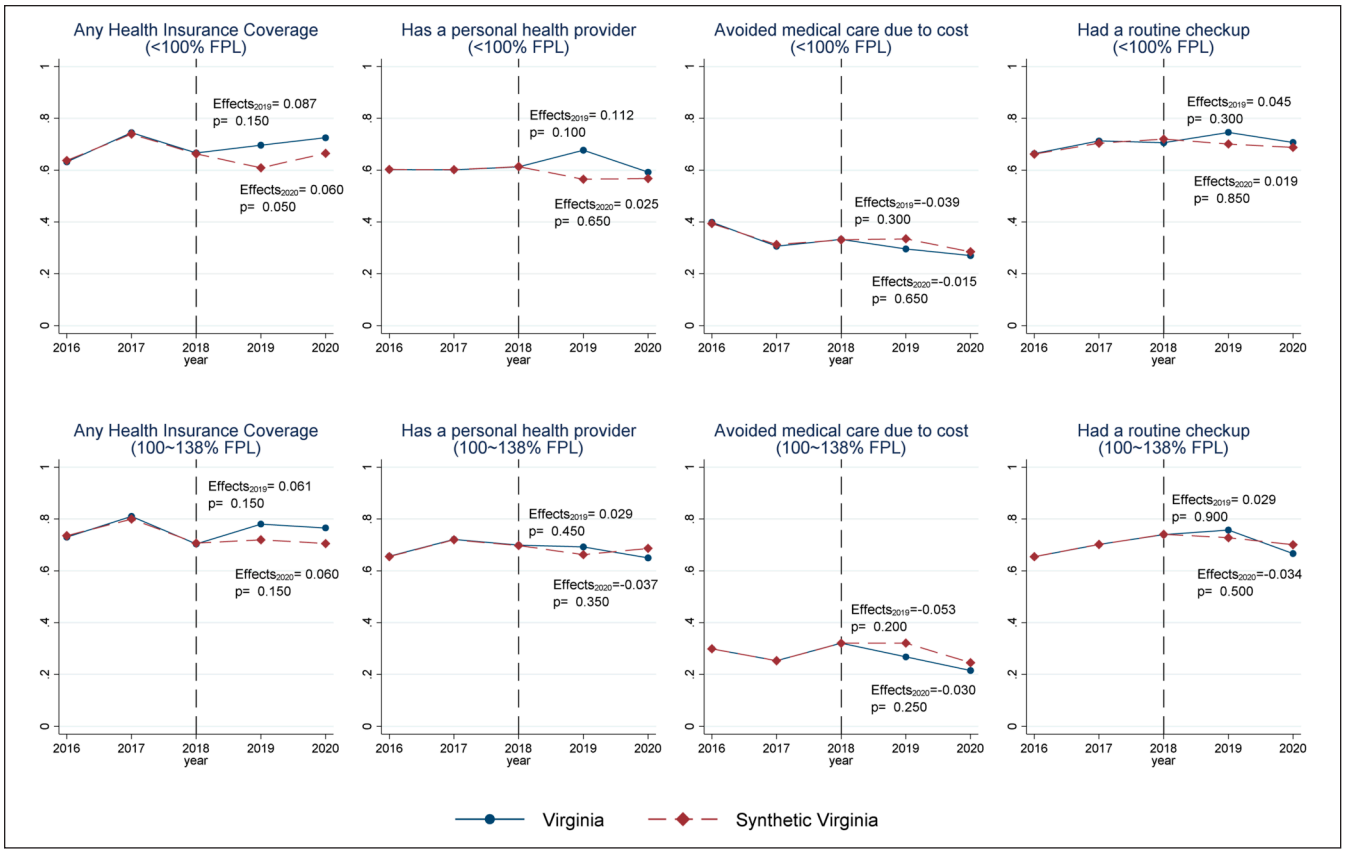

Figure 2. Synthetic control estimates of Virginia's 2019 Medicaid expansion effects on access to care of non-elderly adults below 138% FPL and within 100–138% FPL, synthetic control matching on the means of outcome in each pre-expansion year, 2016–2020 data from the behavioral risk factors surveillance system.

Notes. The trends in Virginia are summary statistics for reported data. The trends for the synthetic control are estimated using synthetic control methods. The matching of the synthetic control to Virginia is based on the pre-expansion (2016–2018) means of the health insurance outcome in each of the pre-expansion year.

Table 3. Difference-in-Differences Estimates of Virginia's 2019 Medicaid Expansion Effects on Self-reported Health Measures of Non-elderly Adults Below 100% FPL and within 100–138% FPL with using Randomization Inference, 2016–2020 Data from the Behavioral Risk Factors Surveillance System.

	N	2016	2017	2019	2020
Household Income below 100% FPL					
Self-rated health: Excellent/Very good health	62 523	−.050	−.013	−.077	−.051
		[.400]	[.900]	[.150]	[.250]
Self-rated health: Poor/Fair health	62 523	−.030	−.030	−.028	−.004
		[.450]	[.500]	[.400]	[.850]
Days in past 30 not in good mental health	61 286	−.245	−1.074	−.517	1.284
		[.850]	[.450]	[.600]	[.100]
Days in past 30 not in good physical health	60 998	−.654	−.796	.282	−.022
		[.150]	[.850]	[.150]	[.300]
Household income within 100–138% FPL					
Self-rated health: Excellent/Very good health	38 523	.047	.003	.020	.034
		[.250]	[.950]	[.80]	[.50]
Self-rated health: Poor/Fair health	38 523	−.029	−.049	−.006	−.076
		[.400]	[.250]	[.950]	[.20]
Days in past 30 not in good mental health	37 862	.700	−1.376	−1.779	−1.661
		[.450]	[.250]	[.150]	[.150]
Days in past 30 not in good physical health	37 784	.203	−1.710	.053	−1.735
		[.250]	[.200]	[.400]	[.300]

Notes. The table reports the difference-in-differences estimates of Virginia's 2019 Medicaid expansion effects on self-reported health status among non-elderly adults below 100% FPL and within 100–138% FPL. All regressions control for age, gender, race/ethnicity, education, employment status, marital status, homeownership status, and whether respondent was selected as a cell phone or landline user, state fixed effects and year fixed effects, and are weighted by BRFSS sampling weights. P-values based on the randomization inference are reported in brackets.

*Significant at 5% level; **significant at 1% level; ***significant at .1% level.

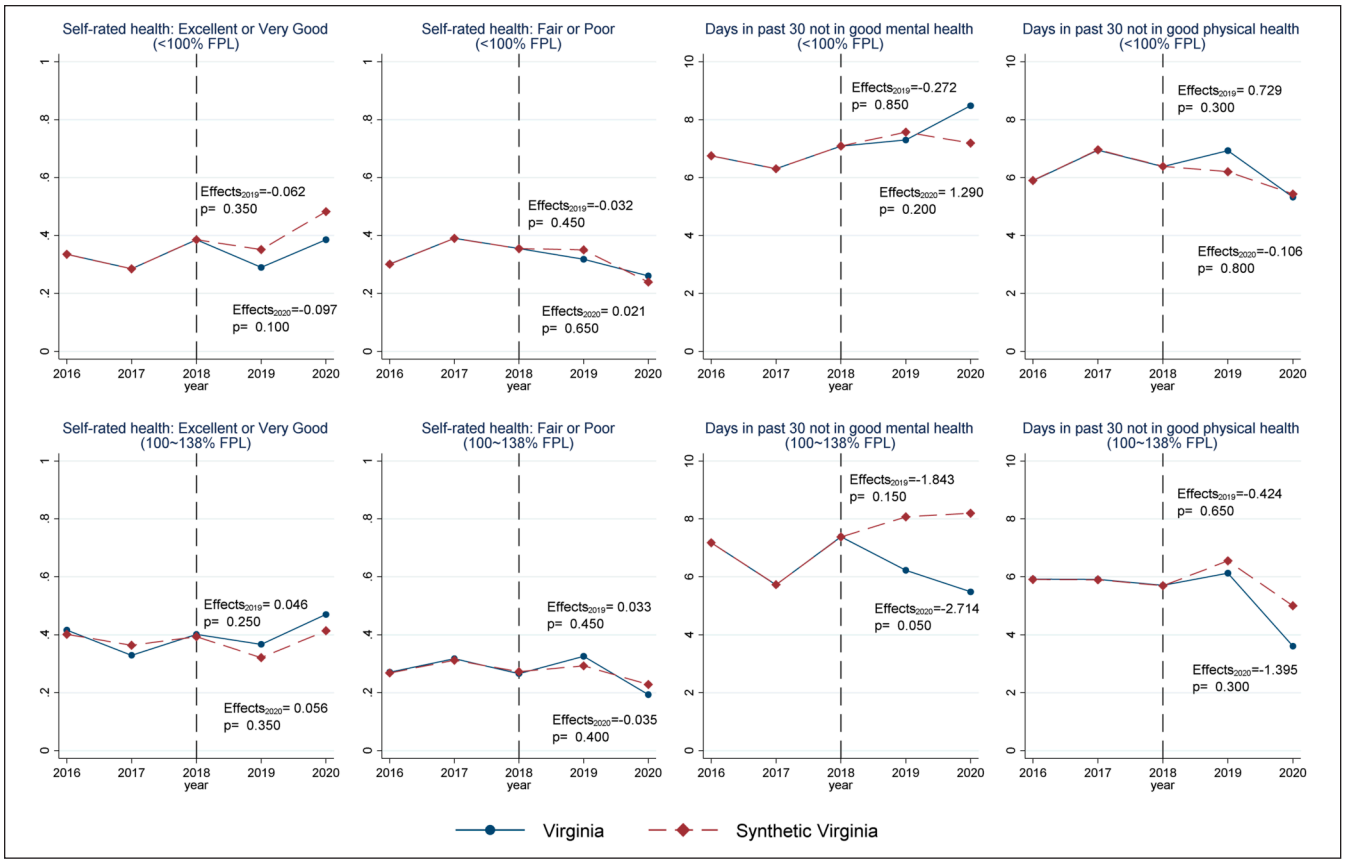

Figure 3. Synthetic control estimates of Virginia's 2019 Medicaid expansion effects on health insurance coverage of non-elderly adults below 100% FPL and within 100–138% FPL, synthetic control matching on the means of outcome in each pre-expansion year, 2016–2020 data from American community survey.

Notes. The trends in Virginia are summary statistics for reported data. The trends for the synthetic control are estimated using synthetic control methods. The matching of the synthetic control to Virginia is based on the pre-expansion (2016–2018) means of the health insurance outcome in each of the pre-expansion year.

who are actually eligible. However, these two datasets are leading national survey data sources for the examined outcomes, and any self-report errors are unlikely to bias the estimates, but more likely to reduce precision and statistical significance. Further, the sample sizes from ACS and BRFSS for one treatment state and one post-expansion year are small to evaluate possible heterogeneity by other demographic and socioeconomic factors.

The findings complement prior evidence from the earlier expansions indicating that Medicaid expansion remains one of the most effective provisions from the ACA to increase insurance coverage and improve access for low-income non-elderly adults. This evidence further highlights the missed opportunity for other states that have not yet decided to expand their Medicaid programs under the ACA (12 states as of November 2021) to improve coverage and access among their low-income citizens.[2] The need for Medicaid coverage has further increased following the millions of lost jobs from the COVID-19 pandemic, estimated to include over 4 million low-income workers who lost their jobs as of November 2021.[38] Expanding Medicaid in these states would help in shielding eligible low-income individuals who have lost their earnings or employer-sponsored coverage from being uninsured. Evidence from prior economic downturns shows declines in private coverage and increased enrollment in Medicaid,[39,40] further highlighting the need for Medicaid coverage during this pandemic for low-income families and individuals.

States with more generous Medicaid eligibility are better able to smooth insurance coverage losses (from unemployment rise) during recessions.[40] From Feb 2020 to March 2021, total Medicaid enrollment increased by nearly 10.5 million, including 7.8 million in Medicaid expansion states.[41] Even though so far no state has changed its income eligibility for Medicaid specifically to increase coverage during the COVID-19 pandemic, many states have taken administrative actions to make it easier for eligible individuals to enroll, such as using less restrictive measures to determine eligibility, temporarily providing Medicaid coverage for non-state residents, accepting self-attestation for non-income eligibility factors, and eliminating premiums.[42] The pandemic is also increasing mental health risks, substance abuse, and delays in seeking care, which will further increase the need

for coverage and access, particularly among low-income individuals.[43-47] Non-expansion states can look to the evidence from Virginia that it is not too late to expand Medicaid.

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ORCID iD

Wei Lyu https://orcid.org/0000-0001-7441-9961

Supplemental Material

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References

1. Kaiser Family Foundation. *Medicaid expansion enrollment*. State Health Facts; 2020. https://www.kff.org/health-reform/state-indicator/medicaid-expansion-enrollment/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Accessed August 20, 2021.
2. The Henry J. Kaiser Family Foundation. *Status of state action on the medicaid expansion decision*. State Health Facts; 2021. https://www.kff.org/health-reform/state-indicator/state-activity-around-expanding-medicaid-under-the-affordable-care-act/. Accessed August 20, 2021.
3. Wehby GL, Lyu W. The impact of the ACA medicaid expansions on health insurance coverage through 2015 and coverage disparities by age, race/ethnicity, and gender. *Health Serv Res*. 2018;53(2):1248-1271.
4. Kaestner R, Garrett B, Chen J, Gangopadhyaya A, Fleming C. Effects of ACA medicaid expansions on health insurance coverage and labor supply. *J Pol Anal Manag*. 2017;36(3):608-642.
5. Miller S, Wherry LR. Health and access to care during the first 2 years of the ACA Medicaid expansions. *N Engl J Med*. 2017;376(10):947-956.
6. Courtemanche C, Marton J, Ukert B, Yelowitz A, Zapata D. Early impacts of the affordable Care Act on health insurance coverage in Medicaid expansion and non-expansion states. *J Pol Anal Manag*. 2017;36(1):178-210.
7. Simon K, Soni A, Cawley J. The impact of health insurance on preventive care and health behaviors: evidence from the first two years of the ACA Medicaid expansions. *J Pol Anal Manag*. 2017;36(2):390-417.
8. Wherry LR, Miller S. Early coverage, access, utilization, and health effects associated with the affordable care act medicaid expansionsa quasi-experimental studymedicaid expansions and coverage, access, utilization, and health effects. *Ann Intern Med*. 2016;164(12):795-803.
9. Lyu W, Shane DM, Wehby GL. Effects of the recent medicaid expansions on dental preventive services and treatments. *Med Care*. 2020;58(8):749-755.
10. Graves JA, Hatfield LA, Blot W, Keating NL, McWilliams JM. Medicaid expansion slowed rates of health decline for low-income adults in Southern States. *Health Aff*. 2020;39(1):67-76.
11. McMorrow S, Gates JA, Long SK, Kenney GM. Medicaid expansion increased coverage, improved affordability, and reduced psychological distress for low-income parents. *Health Aff*. 2017;36(5):808-818.
12. Mazurenko O, Balio CP, Agarwal R, Carroll AE, Menachemi N. The effects of Medicaid expansion under the ACA: a systematic review. *Health Aff*. 2018;37(6):944-950.
13. Baten RBA, Wehby GL. Effects of the ACA medicaid expansions on access and health by nurse practitioner scope of practice laws. *Nurs Outlook*. 2022. doi:10.1016/j.outlook.2021.12.011
14. Wehby GL, Lyu W, Shane D. Racial and ethnic disparities in dental services use declined after medicaid adult dental coverage expansions: study examines impact of medicaid expansion on dental care disparities. *Health Aff*. 2022;41(1):44-52.
15. Bin Abdul Baten R, Wehby GL. Effects of the 2014 affordable care act medicaid expansions on health care access and health status of poor adults aged 60-64 years: evidence from the first six years. *Gerontologist*. 2021. doi:10.1093/geront/gnab189
16. Lee H, Porell FW. The effect of the affordable care act medicaid expansion on disparities in access to care and health status. *Med Care Res Rev*. 2020;77(5):461-473.
17. Semprini J, Lyu W, Shane DM, Wehby GL. The effects of ACA Medicaid expansions on health after 5 years. *Med Care Res Rev*. 2022;79(1):28-35.
18. Miller S, Johnson N, Wherry LR. Medicaid and mortality: new evidence from linked survey and administrative data*. *Q J Econ*. 2021;136(3):1783-1829.
19. Skopec L, Shartzer A, Aarons J. *A profile of virginia's uninsured, 2018*; 2020. https://www.vhcf.org/wp-content/uploads/2020/03/Profile-of-Virginias-Uninsured-2March2020-FINAL.pdf. Accessed Feb 20, 2021.
20. The Henry J. Kaiser Family Foundation. *Medicaid income eligibility limits for parents, 2002-2020*. State Health Facts; 2020. https://www.kff.org/medicaid/state-indicator/medicaid-income-eligibility-limits-for-parents/. Accessed Nov. 2020, 2020.
21. Lyu W, Wehby GL. Heterogeneous effects of affordable care act medicaid expansions among women with dependent children by state-level pre-expansion eligibility. *J Wom Health*. 2021;30(9):1278-1287.
22. Miller S, Wherry LR. Four years later: insurance coverage and access to care continue to diverge between ACA medicaid expansion and non-expansion states. *AEA Papers Proc*. 2019;109:327-333.
23. Census Bureau. 2019 American Community Survey Questionnaire; 2019. https://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2019/quest19.pdf. Accessed Aug 20, 2021.
24. Centers for Disease Control and Prevention (CDC). *Behavioral risk factor surveillance system survey data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2011-2018.
25. Lyu W, Wehby GL. The impacts of the ACA Medicaid expansions on cancer screening use by primary care provider supply. *Med Care*. 2019;57(3):202-207.

26. Ugwi P, Lyu W, Wehby GL. The effects of the patient protection and affordable care act on children's health coverage. *Med Care*. 2019;57(2):115-122.
27. Wehby G, Lyu W, Shane D. The impact of the ACA medicaid expansions on dental visits by dental coverage generosity and dentist supply. *Med Care*. 2019;57(10):781-787.
28. Cameron AC, Miller DL. A practitioner's guide to cluster-robust inference. *J Hum Resour*. 2015;50(2):317-372.
29. Donald SG, Lang K. Inference with difference-in-differences and other panel data. *Rev Econ Stat*. 2007;89(2):221-233.
30. Kaestner R. Did Massachusetts health care reform lower mortality? No according to randomization inference. *Stat Publ Policy*. 2016;3(1):1-6.
31. Conley TG, Taber CR. Inference with "difference in differences" with a small number of policy changes. *Rev Econ Stat*. 2011;93(1):113-125.
32. Courtemanche CJ, Zapata D. Does Universal coverage improve health? the massachusetts experience. *J Pol Anal Manag*. 2014;33(1):36-69.
33. Abadie A, Diamond A, Hainmueller J. Synthetic control methods for comparative case studies: estimating the effect of California's tobacco control program. *J Am Stat Assoc*. 2012.
34. Kaul A, Klößner S, Pfeifer G, Schieler M. Standard synthetic control methods: the case of using all pre-intervention outcomes together with covariates. *J Bus Econ Stat*. 2021. doi:10.1080/07350015.2021.1930012. (just-accepted):1-34.
35. McClelland R, Gault S. *The synthetic control method as a tool to understand state policy*. Washington, DC: The Urban Institute; 2017.
36. Semprini J, Lyu W, Shane DM, Wehby GL. The effects of ACA medicaid expansions on health after 5 years. *Med Care Res Rev*. 2020. doi:10.1177/1077558720972592.
37. Kaestner R, Garrett B, Gangopadhyaya A, Fleming C. *Effects of ACA medicaid expansions on health insurance coverage and labor supply.* National Bureau of Economic Research; 2015.
38. MacDonald G, Davis C, Narayanan A, Zheng VS, Su Y. *Where low-income jobs are being lost to COVID-19*; 2021. https://www.urban.org/features/where-low-income-jobs-are-being-lost-covid-19. Accessed Feb 20, 2021.
39. Holahan J. The 2007–09 recession and health insurance coverage. *Health Aff*. 2011;30(1):145-152.
40. Cawley J, Moriya AS, Simon K. The impact of the macroeconomy on health insurance coverage: evidence from the great recession. *Health Econ*. 2015;24(2):206-223.
41. Corallo B, Rudowitz R. Analysis of recent National Trends in Medicaid and CHIP Enrollment. Coronavirus (COVID-19); 2021. https://www.kff.org/coronavirus-covid-19/issue-brief/analysis-of-recent-national-trends-in-medicaid-and-chip-enrollment/. Accessed Feb 20, 2021.
42. Schubel J, Wagner J. State medicaid changes can improve access to coverage and care during and after COVID-19 Crisis. 2020. https://www.cbpp.org/research/health/state-medicaid-changes-can-improve-access-to-coverage-and-care-during-and-after. Accessed Feb 16, 2020.
43. Patrick SW, Henkhaus LE, Zickafoose JS, et al. Well-being of parents and children during the COVID-19 pandemic: A National Survey. *Pediatrics*. 2020;146(4):e2020016824.
44. Blavin F, Ramos C. Medicaid expansion: effects on hospital finances and implications for hospitals facing COVID-19 challenges. *Health Aff*. 2021;40(1):82-90.
45. Pfefferbaum B, North CS. Mental health and the Covid-19 pandemic. *N Engl J Med*. 2020;383(6):510-512.
46. Polyakova M, Udalova V, Kocks G, Genadek K, Finlay K, Finkelstein AN. Racial disparities in excess all-cause mortality during the early COVID-19 pandemic varied substantially across states. *Health Aff*. 2021;40(2):307-316.
47. Berkowitz SA, Basu S. Unmet social needs and worse mental health after expiration of COVID-19 federal pandemic unemployment compensation. *Health Aff*. 2021. 10.1377/hlthaff.2020.01990.