Impacts of the Affordable Care Act Medicaid Expansion in California

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Abstract

We examined the impact of the Affordable Care Act (ACA) on healthcare coverage, access, health status, and affordability, as well as disparities in these outcomes by race/ethnicity among low-income Californians. We used nationally representative survey data from the Behavioral Risk Factor Surveillance Survey 2011-2019 and a difference-in-differences approach that compared California with nonexpansion states. We examined the impact of Medicaid expansion on health insurance coverage, having a usual source of care, self-reported health status, frequent (≥14) unhealthy days in the past month (physical, mental, and both), and foregone care due to cost. The sample population included low-income Californians (<100% of the federal poverty guidelines) aged 19-64 and low-income childless adults. Low-income adults, childless adults, and white childless adults in California saw post-ACA gains in six of seven outcomes, including a 7.7 percentage point increase in having a usual source of care for all low-income adults (CI: 0.051 to 0.104). Childless adult people of color (POC) reported significant improvements in three measures, with a 6.6 percentage point increase in having a usual source of care (CI: 0.013 to 0.120). All of the groups we examined had coverage gains, ranging from 3.9 percentage points for all low-income adults (CI: 0.013 0.066) to 8.4 percentage points for white childless adults (CI: 0.025 to 0.143). Additionally, all groups reported improved mental health, including an 8.2 percentage point decrease in frequent mental distress for childless adults (CI: -0.120 to -0.044). These findings indicate that the ACA coverage expansion benefitted the targeted population of low-income Californians. Additionally, the disparity between white and non-white Californians decreased for the unadjusted mean rate of having a usual source of care. However, unadjusted means showed that white low-income adults remained more likely to have health insurance coverage and a usual source of care compared with POC in both California and nonexpansion states.

Introduction

A cornerstone aim of the Affordable Care Act (ACA) was to make health insurance coverage readily available to more people in the United States through policies such as new federal subsidies to help people with moderate incomes purchase private insurance through new Marketplaces and expanding Medicaid's reach to many more low-income adults. Key components of the ACA were implemented in 2014, including state-level expansions of Medicaid. Studies that compared states that opted for and against expanding their Medicaid programs have documented gains in coverage, access, and health status particularly among low-income and childless adults, who were the main subpopulation beneficiaries of Medicaid expansion in states that adopted it (Simon, Soni, and Cawley 2017). However, few of these studies have focused specifically on California. To our knowledge, past studies on the effects of Medicaid expansion in California have not examined self-reported general health and physical/mental health for low-income adults. Self-reported health measures are important for monitoring population health over time, quantifying individual satisfaction with health, and complementing objective long-term outcomes such as mortality (Dwyer-Lindgren et al. 2017). We used a difference-in-differences (DD) design to evaluate the effect of Medicaid expansion on healthcare access and health status among low-income Californians, with a focus on childless adults. This study will help to inform policymakers in California, as well as other states, in regard to the impact of Medicaid expansion for low-income adults and disparities by race/ethnicity.

Background on the ACA Medicaid expansion

For low-income families, Medicaid plays an important role in health outcomes, well-being, and financial stability (Cha and Tan 2021). On a national scale numerous studies have produced consistent evidence that the ACA Medicaid expansion increased health insurance coverage, and most studies have also shown positive results regarding issues of healthcare access and affordability (Mazurenko et al. 2018; Gruber and Sommers 2019; Sommers, Gawande, and Baicker 2017; Guth, Garfield, and Rudowitz 2020). Evidence of the ACA's effects on health outcomes is weaker, however, due to the smaller number of studies and less consistent findings—though a majority of this literature found that expansion did provide benefits in the area of health outcomes. The issue of whether Medicaid expansion improves health outcomes is a key question because the value of health insurance lies in whether it translates into improved individual and population health through an increase in access to healthcare and financial stability. Medicaid expansion represents a plausible opportunity to improve the health of low-income families particularly because low income status is a substantial social factor in health outcomes. Low-income adults experience worse health, higher risks of death from treatable chronic illnesses such as diabetes, and higher annual mortality rates relative to adults with higher income (Miller, Johnson, and Wherry 2021). Miller et al. linked death certificate data with sociodemographic information and found that Medicaid expansion is associated with a 9.4% reduction in annual mortality for adults aged 55-64 who had low income or less than a high school education.

Though the ACA initially envisioned expanding Medicaid to low income childless adults nationally, that component of the law was made optional at the state level by the 2012 Supreme court decision, *National Federation of Independent Business v. Sebelius*. State-level variation in the decision of whether or not to expand Medicaid allows researchers to evaluate the effects of the ACA Medicaid expansion by comparing outcomes of people living in different states. Although this natural experiment is imperfect and clearly not random, the inclusion of a comparison group is a strength of the commonly used quasi-experimental approaches to studying the ACA. Statistical methods including multivariate analysis control for observed differences between the groups. However, the underlying differences between Medicaid expansion and nonexpansion states remain a limitation of this study design because unmeasured differences could affect health outcomes. The states that opted out of Medicaid expansion or blocked its implementation have been controlled by Republican governors and legislatures, while states with Democratic leadership (or more narrowly contested elections) have supported expansion (Rocco, Keller, and Kelly 2020). While partisanship is one lens through which to understand the issue, state decisions on whether to voluntarily expand their Medicaid programs may also reflect broader cultural and ideological perspectives on the role of government in fostering health among individuals. Such beliefs and policies could correlate with unmeasured differences between Medicaid expansion and nonexpansion states. For example, it may be that the states that had adopted Medicaid expansion were already taking other public health steps towards improving the health of their populations, and it may be that people in Medicaid nonexpansion states are more skeptical of government assistance regarding issues related to health.

California is a state that embraced the ACA's coverage expansion opportunities, establishing a state-based health insurance Marketplace (Covered California) and accepting the federal support to expand its Medicaid program. In fact, California was one of a few states that partially expanded its Medicaid program, known as Medi-Cal in the state, prior to broad implementation of the ACA in 2014. The ACA reduced California's uninsured rate to an historic low, driven in large part by the expansion of Medi-Cal. This shift was due to both newly eligible enrollees as well as the "welcome mat" effect, where enhanced outreach increases Medicaid enrollment among those previously eligible. In 2010-2013, California partially expanded Medi-Cal coverage up to 200% of the federal poverty guidelines (FPG), but enrollment was limited (Kaiser Family Foundation (KFF) 2012; Golberstein, Gonzales, and Sommers 2015). This partial expansion was associated with moderate changes: a 1.3 percentage point reduction in uninsurance, a 1.4 percentage point increase in public coverage, and no change in private coverage for young adults aged 19-25 in California (Cha and Brindis 2020). Although the ACA primarily increased Medicaid eligibility for adults, children's uninsurance decreased over 60% in California in 2015-2017 compared with 2011-2013, which indicates that the 2014 expansion was pivotal in increasing health insurance coverage for Californians (Cha 2019).

In California, despite coverage gains, disparities in access by race/ethnicity have persisted since the implementation of the ACA. A study using the 2015 California Health Interview Survey (CHIS) found that Latino adults reported low rates of having a usual source of care, and Asian-American adults reported low rates of clinic visits (Charles and McEligot 2018). For Asian

American subgroups, a study using the 2003-2017 CHIS reported increased coverage post-ACA but ongoing disparities relative to white Californians in coverage and several measures of access and utilization (Park et al. 2019). Racial/ethnic disparities in adolescent mental health and maltreatment have also persisted following the ACA (Cha and Tan 2021). Our study was designed in part to examine racial/ethnic disparities in healthcare access and health status for low-income adults by analyzing unadjusted means as well as stratified models for the white and POC childless adult subpopulations.

Study Design

We used a DD approach to examine the impact of the ACA Medicaid expansion on healthcare coverage and access, health status, and affordability for Californians (age 19-64) with incomes below 100% FPG, and we described post-ACA disparities by race/ethnicity among childless low-income adults. Because low-income parents in California were eligible for Medicaid prior to the ACA, the Medicaid expansion policy was most likely to affect childless adults (Golberstein, Gonzales, and Sommers 2015). Although the Medi-Cal expansion included those with incomes up to 138% of FPG, we limited our analysis to people with incomes up to 100% FPG because people with higher incomes may qualify for premium tax credits and cost sharing in nonexpansion states. Adults aged 65 and up are eligible for Medicare, so we excluded this population. DD analysis has been used extensively in the ACA impact and evaluation literature, and builds on the principle that the impact of a policy can be assessed by comparing the change over time in outcomes in a "treatment" group (Medicaid expansion) against a "control" group where the policy was not implemented (states that did not expand Medicaid). However, few of these studies have focused primarily on California.

We used nationally representative survey data from the Behavioral Risk Factor Surveillance Survey (BRFSS) 2011-2019. The BRFSS is an annual telephone survey conducted by the Centers for Disease Control and Prevention (CDC) and state governments to collect information on health behaviors, insurance coverage, and health outcomes. Our analyses were adjusted by the BRFSS sample weights, using the Stata "svy" command to account for the complex survey design, such as geographic stratification. We used Stata version 16 for all analyses (StataCorp, College Station, TX). Statistical tests were conducted at a 95% confidence level (p-value <0.05).

The study population was nonelderly low-income adults (19-64), with a focus on childless adults to reflect the population most likely to be affected by Medicaid expansion, since established Medicaid eligibility criteria are more generous for parents. To identify the study sample of individuals with incomes up to 100% FPG, we used several BRFSS variables in combination with annual FPG base-level income guidelines and incremental increases per additional family member (calculated separately for Alaska and Hawaii since their criteria differ from other states). The BRFSS income variable is categorical and we converted this to a continuous measure by using the midpoint of the category (Hest 2019). Household size was calculated from the number of adults and children per household. We capped the number of adults at two per household in order to reduce potential overestimation of the target population (e.g., a household with three

adults might be incorrectly identified as having an income below 100% FPG if the three adults were not considered a family for federal program eligibility). We capped household size at eight for the same reason. Additionally, we dropped the small number of households reporting over 20 people (unweighted n=50).

This study included seven outcome measures:

- Health insurance coverage (covered or not covered);
- Usual source of care (queried as whether or not individuals had a personal doctor or healthcare provider);
- Fair/poor self-reported health (versus excellent, very good, or good);
- Frequent self-reported physical distress (≥14 physically unhealthy days in the past 30 days);
- Frequent self-reported mental distress (≥14 mentally unhealthy days in the past 30 days);
- Frequent self-reported physical or mental distress (≥14 unhealthy days in the past 30 days); and
- Could not see a doctor because of cost in the past year.

We used binary variables for unhealthy days with a 14 day minimum because other studies have suggested this cutoff is clinically meaningful and the two-week duration has been associated with substantial activity limitations (Centers for Disease Control and Prevention (CDC) 1998; Dwyer-Lindgren et al. 2017).

Covariates included sex, age (19-24, 25-34, 35-44, 45-54, and 55-64), race/ethnicity (non-hispanic white, people of color [POC]), education (less than high school, high school graduate, some college, and college graduate), marital status (married or unmarried), employment status (employed for wages or self-employed versus all other categories including student or retired), and parental status (not applicable in childless adult models).

We compared California (the "treatment" group) with the group of 14 states that had not expanded Medicaid as of the most recent year of data, 2019 (Alabama, Florida, Georgia, Kansas, Mississippi, Missouri, Nebraska, North Carolina, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, and Wyoming) (Kaiser Family Foundation (KFF) 2021). As other researchers have done, we excluded Wisconsin from the nonexpansion group because this state increased Medicaid coverage for childless low-income adults below 100% FPG through the BadgerCare program (Simon, Soni, and Cawley 2017; Gates and Rudowitz 2014).

We examined outcomes pre- and post-ACA (2011-2013 vs. 2014-2019). We tabulated changes over time in California and nonexpansion states for low-income adults, childless low-income adults, and subpopulations of childless low-income adults by race/ethnicity (white and POC), using t-tests to assess unadjusted changes pre- and post-ACA implementation within population groups. To analyze adjusted DD among these populations, we used linear regression models for the main analysis in order to prioritize interpretability (Hellevik 2009).

DD analysis relies on the assumption of parallel trends; i.e., had California not expanded Medicaid, state-specific outcomes would have shown the same average changes over time as those in nonexpansion states. Thus, after controlling for the set of covariates detailed above, we assumed that any changes in outcomes reported by Californians following the passage of the ACA relative to the outcomes of people in nonexpansion states were due to ACA impact rather than other policies or pre-existing historical trends. Similar to previously published evaluations of Medicaid expansion (Simon, Soni, and Cawley 2017; Kaestner et al. 2017), we assessed the validity of this assumption quantitatively with regressions that interacted the treatment group indicator (California versus nonexpansion states) with a linear year variable during the pre-ACA period (2011-2013, with 2013 as the reference group), adjusting for covariates. The parallel trends assumption was supported for nearly all outcomes and subpopulations barring one exception: childless adult POC had a significant pre-treatment trend for coverage (Appendix Table 1).

To evaluate the robustness of our results, we included several sensitivity analyses. We used an alternative model specification (logistic regression). A study using BRFSS data through 2017 found that the gains in coverage and access associated with the ACA were partially reversed in 2017, which coincided with Republican-led efforts to repeal the law when they gained control of both houses of Congress and the White House, as well as other changes to implementation of the law by a new administration (Griffith et al. 2020). To consider the effects the ACA Medicaid expansion prior to these political shifts, we truncated the data to compare 2011-2013 and 2014-2016. Conversely, effects on measures such as health status may be lagged following a policy change, due to the time associated with steps such as take-up of insurance, finding a doctor, and receiving appropriate treatment (Sommers, Gawande, and Baicker 2017). Therefore we also examined 2011-2013 versus 2017-2019. For unhealthy days, we also examined a cutpoint of 7 days rather than 14 days, and a count of the number of unhealthy days in the previous month (physical, mental, and both). To recode income, we used the top rather than the midpoint of the BRFSS income categories. Additionally, we examined defining the sample by low education (high school or less) rather than low income because education may be a reliable proxy for Medicaid eligibility (Simon, Soni, and Cawley 2017; Kaestner et al. 2017).

Results

Population differences following Medicaid expansion

Table 1. Healthcare access and health status among low-income adults (19-64) and childless low-income adults in California and nonexpansion states pre-ACA (2011-2013) and post-ACA (2014-2019).

	California All adults (n= 4,803 pre; 7,986 post)[a]			Nonexpansion All adults (n=29,891 pre; 54,403 post)[a]			California Childless adults (n= 1,902 pre; 3,133 post)[a]			Nonexpansion Childless adults (n=14,561 pre; 21,942 post)[a]		
	Pre-ACA mean	Post-ACA mean	Unadjusted difference	Pre-ACA mean	Post-ACA mean	Unadjusted difference	Pre-ACA mean	Post-ACA mean	Unadjusted difference	Pre-ACA mean	Post-ACA mean	Unadjusted difference
Outcomes												
Had health insurance coverage	0.604	0.725	0.120***	0.473	0.545	0.072***	0.614	0.771	0.157***	0.493	0.586	0.093***
Self-reported health (fair/poor)	0.357	0.316	-0.041***	0.372	0.355	-0.017*	0.369	0.343	-0.026	0.451	0.463	0.012
Frequent physical distress (≥14 physically unhealthy days in the past 30 days)	0.198	0.167	-0.031***	0.258	0.223	-0.035***	0.234	0.216	-0.018	0.328	0.324	-0.004
Frequent mental distress (≥14 mentally unhealthy days in the past 30 days)	0.220	0.165	-0.055***	0.273	0.240	-0.033***	0.277	0.211	-0.066***	0.309	0.315	0.006
Frequent physical or mental distress (≥14 unhealthy days in the past 30 days)	0.336	0.275	-0.061***	0.399	0.357	-0.042***	0.398	0.350	-0.048*	0.464	0.461	-0.003
Could not see a doctor because of cost in the past year	0.331	0.229	-0.102***	0.452	0.382	-0.070***	0.322	0.212	-0.110***	0.442	0.378	-0.064***
Had a personal doctor or healthcare provider	0.504	0.584	0.080***	0.570	0.557	-0.013	0.540	0.616	0.076***	0.592	0.611	0.020

*** $p<0.001$, ** $p<0.01$, * $p<0.05$

[a] Unweighted sample sizes varied slightly for each outcome due to missing data and may be less than the maximum sample size shown.

Table 2. Healthcare access and health status among childless low-income adults (19-64) by race/ethnicity in California and nonexpansion states pre-ACA (2011-2013) and post-ACA (2014-2019).

	California White childless adults (n= 843 pre; 1,020 post)[a]			Nonexpansion White childless adults (n= 8,555 pre; 12,495 post)[a]			California Non-white childless adults (n= 1,059 pre; 2,113 post)[a]			Nonexpansion Non-white childless adults (n= 6,006 pre; 9,447 post)[a]		
	Pre-ACA mean	Post-ACA mean	Unadjusted difference	Pre-ACA mean	Post-ACA mean	Unadjusted difference	Pre-ACA mean	Post-ACA mean	Unadjusted difference	Pre-ACA mean	Post-ACA mean	Unadjusted difference
Outcomes												
Had health insurance coverage	0.677	0.851	0.174***	0.538	0.639	0.101***	0.583	0.739	0.156***	0.449	0.543	0.094***
Self-reported health (fair/poor)	0.324	0.313	-0.011	0.469	0.496	0.027	0.390	0.353	-0.038	0.434	0.431	-0.003
Frequent physical distress (≥14 physically unhealthy days in the past 30 days)	0.270	0.246	-0.023	0.369	0.400	0.031*	0.216	0.202	-0.014	0.283	0.257	-0.026
Frequent mental distress (≥14 mentally unhealthy days in the past 30 days)	0.341	0.316	-0.025	0.342	0.385	0.043**	0.246	0.166	-0.079***	0.271	0.250	-0.021
Frequent physical or mental distress (≥14 unhealthy days in the past 30 days)	0.453	0.450	-0.004	0.508	0.546	0.038**	0.371	0.308	-0.063**	0.416	0.384	-0.031
Could not see a doctor because of cost in the past year	0.341	0.221	-0.120***	0.421	0.372	-0.050***	0.312	0.206	-0.106***	0.460	0.383	-0.077***
Had a personal doctor or healthcare provider	0.622	0.671	0.048	0.648	0.674	0.026	0.498	0.599	0.100***	0.538	0.558	0.021

*** p<0.001, ** p<0.01, * p<0.05
[a] Unweighted sample sizes varied slightly for each outcome due to missing data and may be less than the maximum sample size shown.

Tables 1 and 2 show the mean percent of low-income adults (19-64) and childless low-income adults for each study outcome by race/ethnicity and treatment groups (California and nonexpansion states), along with unadjusted differences for the pre- (2011-2013) and post- (2014-2019) ACA periods. In unadjusted comparisons, nearly all groups saw improved or unchanged outcomes post-ACA, with the exception that increased frequent physical and/or mental distress was reported by white childless adults in nonexpansion states. The population groups in California reported a larger number of significant post-ACA improvements in unadjusted means than the low-income adults in nonexpansion states. Following the ACA, POC continued to report gaps in healthcare access relative to white people, both within California and within nonexpansion states; rates of coverage and having a usual source of care remained higher for whites. However, POC in California saw a reduced gap in having a usual source of care post-ACA, with a gain of 10.0 points, which was 5.2 points larger than the gain among white Californians.

Evaluation of Medicaid expansion: difference-in-differences between California and nonexpansion states pre- and post-ACA

The adjusted DD model results indicated significant benefits for low-income Californians under Medicaid expansion compared with low-income adults in nonexpansion states. In six of the seven outcomes we examined, low-income adults in California had improved results after the ACA expansion (Table 3). Expansion in California was associated with a 3.9 percentage point increase in coverage (CI: 0.013 to 0.066), a 4.2 point decrease in fair/poor self-reported health (CI: -0.067 to -0.017), a 3.6 point decrease in frequent mental distress (CI: -0.059 to -0.014), a 3.9 point decrease in frequent physical or mental distress (CI: -0.064 to -0.014), a 3.9 point decrease in not seeing a doctor due to cost (CI: -0.065 to -0.013), and a 7.7 point increase in having a usual source of care among low-income adults (CI: 0.051 to 0.104). No significant effect was seen on frequent physical distress.

Childless adults also had significant improvements in six of the seven outcomes (Table 3). Compared with all low-income adults, childless adults generally saw larger gains, such as a 7.5 point increase in coverage (CI: 0.034 to 0.116). Compared to white low-income childless adults in nonexpansion states, Californians reported significant gains in six of seven measures, including an 8.4 point decrease in foregone care due to cost (CI: -0.144 to -0.024). Non-white low-income childless adults had significant improvements in three outcomes: coverage (6.9 points; CI: 0.014 to 0.124), frequent mental distress (-6.4 points; CI -0.114 to -0.014), and having a usual source of care (6.6 points; CI: 0.013 to 0.120).

Table 3. Impact of Medicaid expansion among low-income adults (19-64) and childless low-income adults by race/ethnicity in California compared with nonexpansion states, 2011-2019.

	All (n= 97,083[a])		Childless adults (n= 41,538[a])		White childless adults (n= 22,913[a])		Non-white childless adults (n=18,625[a])	
	DD	CI	DD	CI	DD	CI	DD	CI
Outcomes								
Had health insurance coverage	0.039**	(0.013 0.066)	0.075***	(0.034 0.116)	0.084**	(0.025 0.143)	0.069*	(0.014 0.124)
Self-reported health (fair/poor)	-0.042***	(-0.067 -0.017)	-0.056**	(-0.093 -0.019)	-0.069*	(-0.123 -0.015)	-0.050	(-0.100 0.001)
Frequent physical distress (≥14 physically unhealthy days in the past 30 days)	-0.016	(-0.036 0.005)	-0.032	(-0.066 0.002)	-0.078**	(-0.130 -0.026)	-0.002	(-0.048 0.043)
Frequent mental distress (≥14 mentally unhealthy days in the past 30 days)	-0.036**	(-0.059 -0.014)	-0.082***	(-0.120 -0.044)	-0.085**	(-0.145 -0.024)	-0.064*	(-0.114 -0.014)
Frequent physical or mental distress (≥14 unhealthy days in the past 30 days)	-0.039**	(-0.064 -0.014)	-0.062**	(-0.102 -0.021)	-0.070*	(-0.131 -0.009)	-0.043	(-0.097 0.012)
Could not see a doctor because of cost in the past year	-0.039**	(-0.065 -0.013)	-0.058**	(-0.098 -0.019)	-0.084**	(-0.144 -0.024)	-0.036	(-0.090 0.017)
Had a personal doctor or healthcare provider	0.077***	(0.051 0.104)	0.052*	(0.011 0.093)	0.015	(-0.047 0.078)	0.066*	(0.013 0.120)

*** p<0.001, ** p<0.01, * p<0.05
DD=difference-in-differences; DD models were calculated separately for each outcome.
[a] Unweighted sample sizes varied slightly for each outcome due to missing data and may be less than the maximum sample size shown.

The sensitivity analyses supported our primary analysis. An alternative model specification produced results that were consistent with the main analysis in both statistical significance and sign (Appendix Table 2). Results for earlier (2014-2016) and later (2017-2019) post-ACA time periods were generally similar to the main analysis; however, in the comparison with 2017-2019, fewer measures reached statistical significance for the white and non-white subpopulations (Appendix Tables 3 and 4). Alternative variable recoding for unhealthy days in the past month produced similar results to the main analysis; using a 7-day cutpoint (rather than 14 days), the combined physical/mental distress measure was no longer significant for white people (Appendix Table 5). For recoding of the BRFSS income categories, using the top rather than the midpoint of the category yielded the same results as the main analysis in sign and statistical significance (not shown). Our analysis of adults with high school or lower educational attainment increased the sample size by approximately 50%, and estimates were in the same direction, but effect sizes were generally smaller and fewer measures reached statistical significance (not shown).

Discussion

We found significant benefits resulting from Medicaid expansion for low-income adults and childless low-income adults in California, with gains in access (including coverage, usual source of care, and foregone care due to cost) as well as improvements in self-reported health and mental health. We found evidence that both white and POC childless adults in California saw post-ACA improvements, and the gap by race/ethnicity in having a usual source of care narrowed following the ACA. However, key measures of healthcare access remained stronger for white childless adults compared with POC in both California and nonexpansion states. Targeted policy changes may be needed to fully address disparities in healthcare access.

Our study contributes to the literature documenting increases in coverage, access, and health status following the ACA. We found that these gains extended to low-income adults in California, particularly childless adults. Our results for Californians comport with previously published national studies, which found that the ACA had a larger impact for childless low-income adults when compared to the full population of non-elderly low-income adults (Simon, Soni, and Cawley 2017). These results were consistent with the scope of the policy change; childless adults were the subpopulation most likely to gain coverage under the Medicaid expansion. Our California-based findings were also consistent with recent national studies that also used BRFSS data, which generally found that increased rates of health insurance coverage resulted in intended improvements in health access such as having a usual source of care, care affordability, self-reported health, and mental but not physical health (Griffith and Bor 2020; Yue, Rasmussen, and Ponce 2018; Lee and Porell 2018; Courtemanche et al. 2018).

Regarding subpopulations by race/ethnicity, our results aligned with previous studies at the national level (also using a DD study design and BRFSS data) that found fewer significant effects in stratified analyses for POC than white people in measures of coverage and access to care (Yue, Rasmussen, and Ponce 2018; Singh and Wilk 2019; Lee and Porell 2018). However, one of these studies found that Latinos in expansion states had a larger improvement in fair/poor

health, relative to white low-income adults (Lee and Porell 2018), and one study using BRFSS data through 2017 found a significant reduction in coverage disparities for POC at the national level (Courtemanche et al. 2019). Targeted interventions may be necessary to address barriers to enrollment and utilization of healthcare, such as language, experienced by people of color (Kemmick Pintor et al. 2020). Another consideration is that coverage gains may not necessarily result in improved health outcomes for people of color due to discrimination within the health care system (Hall et al. 2015).

Although we controlled for a range of sociodemographic characteristics, our results could be affected by unobserved variables that vary across states and time periods. For example, it is possible that changes in immigration trends during the study time period could impact healthcare access, as the effects of Medicaid expansion may be more limited for populations with a greater proportion of noncitizens. Noncitizens face very low coverage rates (Buchmueller and Levy 2020; Stimpson and Wilson 2018). BRFSS data do not include information on immigration or citizenship status.

Our work provides a better understanding of the effects of Medicaid expansion at the state level. Although the Medicaid expansion in California was relatively moderate, compared with states with less generous public programs, we still found consistent results that indicated increased benefits post-ACA (Golberstein, Gonzales, and Sommers 2015). This suggests that states that have not yet expanded Medicaid and that had less generous programs prior to expansion stand to benefit substantially. Medicaid expansion continues to be an important health policy issue. For example, in 2020, constituents in Missouri and Oklahoma voted to expand Medicaid.

There were additional study limitations as well. The BRFSS is a cross-sectional survey, and all outcomes were self-reported. Coverage was a binary variable without details on sources of coverage. Social factors may also limit our understanding of some of our outcomes (e.g., foregone care due to cost), which makes it more challenging to assess disparities in these measures (e.g., some vulnerable populations are *less* likely to report foregone care). For example, in a study using the 2015 CHIS, white Californians were more likely to report both having a usual source of care and foregoing needed care than their POC counterparts (Charles and McEligot 2018). Reporting cost as a barrier to healthcare implies that the respondent perceived an unmet need for such services, and this may be less likely for people with the greatest barriers to care. Additionally, sample size remains an important limitation in this and similar subpopulation analyses, particularly for understanding the effects of policy changes on specific subpopulations by disaggregating subgroups by race/ethnicity.

Conclusion

Our study found that the ACA Medicaid expansion strengthened healthcare access as well as self-reported health and mental health for low-income Californians across subpopulations. Our findings of improved access and affordability post-ACA also suggest that Medicaid expansion has supported financial stability for low-income families. Despite the positive impacts of the ACA, disparities in key measures of healthcare access—health insurance coverage and having a

usual source of care—persisted in California. Future studies should continue to monitor changes in coverage, access, and health using both descriptive and quasi-experimental methods. Recently, the American Rescue Plan Act of 2021 renewed the potential of the ACA to increase healthcare access via tax credits, federal incentives for state-level Medicaid expansion, and funding for consumer outreach (Keith 2021). Communities of color may face additional barriers to accessing care that require targeted interventions and outreach and improved clinic infrastructure (Ortega, Rodriguez, and Bustamante 2015; Kemmick Pintor et al. 2020). The disproportionate impacts of the recent COVID-19 pandemic on communities of color in terms of both health and economic consequences have intensified the need for policies to address health disparities (Poteat et al. 2020). Understanding the beneficial effects of Medicaid expansion as well as the ongoing disparities in healthcare access for POC is critical for policymakers in California and other states.

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Appendix Table 1. Parallel trends tests, low-income adults (19-64) in California vs. nonexpansion states, 2011-2013.

	All (n= 34,694 [a])		Childless adults (n= 16,463 [a])		White childless adults (n= 9,398 [a])		Non-white childless adults (n= 7,065 [a])	
	Estimate	CI	Estimate	CI	Estimate	CI	Estimate	CI
Expansion/year interaction								
Had health insurance coverage	-0.008	(-0.035 0.019)	-0.030	(-0.071 0.011)	0.019	(-0.040 0.079)	-0.057*	(-0.111 -0.003)
Self-reported health (fair/poor)	-0.004	(-0.029 0.022)	-0.012	(-0.049 0.026)	-0.030	(-0.082 0.023)	-0.003	(-0.055 0.050)
Frequent physical distress (≥14 physically unhealthy days in the past 30 days)	0.011	(-0.010 0.031)	0.010	(-0.023 0.042)	-0.007	(-0.059 0.044)	0.014	(-0.029 0.057)
Frequent mental distress (≥14 mentally unhealthy days in the past 30 days)	-0.007	(-0.029 0.015)	-0.017	(-0.056 0.021)	-0.018	(-0.078 0.042)	-0.018	(-0.068 0.032)
Frequent physical or mental distress (≥14 unhealthy days in the past 30 days)	-0.001	(-0.026 0.024)	-0.026	(-0.066 0.014)	-0.029	(-0.088 0.031)	-0.030	(-0.083 0.024)
Could not see a doctor because of cost in the past year	0.019	(-0.007 0.044)	0.024	(-0.017 0.064)	-0.015	(-0.077 0.047)	0.051	(-0.002 0.104)
Had a personal doctor or healthcare provider	-0.021	(-0.047 0.006)	-0.032	(-0.073 0.009)	-0.021	(-0.081 0.040)	-0.044	(-0.098 0.010)

*** $p<0.001$, ** $p<0.01$, * $p<0.05$
Regression models were calculated separately for each outcome.
[a] Unweighted sample sizes varied slightly for each outcome due to missing data and may be less than the maximum sample size shown.

Appendix Table 2. Alternate model specification (logistic regression): impact of Medicaid expansion among low-income adults (19-64) in California compared with nonexpansion states, 2011-2019.

	All (n= 97,083[a])		Childless adults (n= 41,538[a])		White childless adults (n= 22,913[a])		Non-white childless adults (n=18,625[a])	
	DD	CI	DD	CI	DD	CI	DD	CI
Outcomes								
Had health insurance coverage	1.255***	(1.111 1.418)	1.591***	(1.301 1.944)	1.964***	(1.397 2.763)	1.482**	(1.144 1.919)
Self-reported health (fair/poor)	0.800***	(0.705 0.908)	0.746**	(0.614 0.906)	0.689*	(0.509 0.931)	0.777	(0.600 1.005)
Frequent physical distress (≥14 physically unhealthy days in the past 30 days)	0.865	(0.748 1.001)	0.833	(0.675 1.028)	0.649**	(0.475 0.887)	0.992	(0.746 1.319)
Frequent mental distress (≥14 mentally unhealthy days in the past 30 days)	0.764***	(0.663 0.881)	0.633***	(0.514 0.781)	0.669**	(0.499 0.898)	0.664**	(0.496 0.890)
Frequent physical or mental distress (≥14 unhealthy days in the past 30 days)	0.806***	(0.712 0.914)	0.751**	(0.620 0.910)	0.722*	(0.542 0.962)	0.816	(0.632 1.054)
Could not see a doctor because of cost in the past year	0.773***	(0.684 0.874)	0.689***	(0.567 0.836)	0.620**	(0.459 0.838)	0.756*	(0.585 0.976)
Had a personal doctor or healthcare provider	1.413***	(1.254 1.593)	1.277*	(1.052 1.549)	1.076	(0.799 1.449)	1.369*	(1.059 1.769)

*** p<0.001, ** p<0.01, * p<0.05

DD=difference-in-differences; DD models were calculated separately for each outcome.

[a] Unweighted sample sizes varied slightly for each outcome due to missing data and may be less than the maximum sample size shown.

Appendix Table 3. Examination of possible diminishing effects: impact of Medicaid expansion among low-income adults with (19-64) in California compared with nonexpansion states, 2011-2013 vs. 2014-2016.

	All (n= 68,597 [a])		Childless adults (n=30,046 [a])		White childless adults (n=16,815 [a])		Non-white childless adults (n=13,231 [a])	
	DD	CI	DD	CI	DD	CI	DD	CI
Outcomes								
Had health insurance coverage	0.038*	(0.008 0.067)	0.084***	(0.038 0.131)	0.081*	(0.014 0.149)	0.082*	(0.019 0.145)
Self-reported health (fair/poor)	-0.028*	(-0.056 -0.000)	-0.063**	(-0.105 -0.021)	-0.073*	(-0.133 -0.013)	-0.055	(-0.113 0.002)
Frequent physical distress (≥14 physically unhealthy days in the past 30 days)	-0.009	(-0.032 0.015)	-0.036	(-0.075 0.003)	-0.077*	(-0.136 -0.018)	-0.009	(-0.061 0.043)
Frequent mental distress (≥14 mentally unhealthy days in the past 30 days)	-0.026*	(-0.051 -0.001)	-0.091***	(-0.134 -0.048)	-0.078*	(-0.147 -0.009)	-0.086**	(-0.143 -0.030)
Frequent physical or mental distress (≥14 unhealthy days in the past 30 days)	-0.023	(-0.051 0.005)	-0.071**	(-0.117 -0.024)	-0.079*	(-0.149 -0.009)	-0.055	(-0.116 0.007)
Could not see a doctor because of cost in the past year	-0.035*	(-0.064 -0.006)	-0.066**	(-0.110 -0.022)	-0.070*	(-0.139 -0.002)	-0.054	(-0.113 0.005)
Had a personal doctor or healthcare provider	0.076***	(0.047 0.106)	0.051*	(0.004 0.098)	0.004	(-0.068 0.076)	0.071*	(0.010 0.131)

*** p<0.001, ** p<0.01, * p<0.05

DD=difference-in-differences; DD models were calculated separately for each outcome.

[a] Unweighted sample sizes varied slightly for each outcome due to missing data and may be less than the maximum sample size shown.

Appendix Table 4. Examination of possible lagged effects: impact of Medicaid expansion among low-income adults with (19-64) in California compared with nonexpansion states, 2011-2013 vs. 2017-2019.

	All (n= 63,180 [a])		Childless adults (n=27,955 [a])		White childless adults (n=15,496 [a])		Non-white childless adults (n=12,459 [a])	
	DD	CI	DD	CI	DD	CI	DD	CI
Outcomes								
Had health insurance coverage	0.042**	(0.011 0.073)	0.061*	(0.014 0.109)	0.086*	(0.019 0.152)	0.052	(-0.012 0.116)
Self-reported health (fair/poor)	-0.058***	(-0.087 -0.029)	-0.050*	(-0.095 -0.006)	-0.066	(-0.136 0.004)	-0.046	(-0.106 0.015)
Frequent physical distress (≥14 physically unhealthy days in the past 30 days)	-0.023	(-0.047 0.000)	-0.028	(-0.069 0.012)	-0.079*	(-0.144 -0.013)	0.004	(-0.049 0.057)
Frequent mental distress (≥14 mentally unhealthy days in the past 30 days)	-0.048***	(-0.074 -0.022)	-0.073**	(-0.117 -0.029)	-0.094*	(-0.169 -0.019)	-0.040	(-0.097 0.016)
Frequent physical or mental distress (≥14 unhealthy days in the past 30 days)	-0.058***	(-0.087 -0.029)	-0.052*	(-0.100 -0.004)	-0.059	(-0.134 0.017)	-0.030	(-0.094 0.033)
Could not see a doctor because of cost in the past year	-0.044**	(-0.075 -0.014)	-0.051*	(-0.097 -0.004)	-0.101**	(-0.171 -0.032)	-0.019	(-0.082 0.045)
Had a personal doctor or healthcare provider	0.079***	(0.047 0.110)	0.053*	(0.004 0.102)	0.030	(-0.044 0.104)	0.061	(-0.003 0.126)

*** p<0.001, ** p<0.01, * p<0.05
DD=difference-in-differences; DD models were calculated separately for each outcome.
[a] Unweighted sample sizes varied slightly for each outcome due to missing data and may be less than the maximum sample size shown.

Appendix Table 5. Examination of alternative variable recoding for unhealthy days: impact of Medicaid expansion among low-income adults with (19-64) in California compared with nonexpansion states, 2011-2019.

	All (n= 97,083[a])		Childless adults (n= 41,538[a])		White childless adults (n= 22,913[a])		Non-white childless adults (n=18,625[a])	
	DD	CI	DD	CI	DD	CI	DD	CI
Outcomes								
≥7 physically unhealthy days in the past 30 days	-0.029*	(-0.053 -0.006)	-0.030	(-0.068 0.007)	-0.077**	(-0.134 -0.019)	-0.002	(-0.052 0.049)
≥7 mentally unhealthy days in the past 30 days	-0.043***	(-0.068 -0.018)	-0.069**	(-0.111 -0.028)	-0.069*	(-0.134 -0.005)	-0.056*	(-0.111 -0.002)
≥7 physically or mentally unhealthy days in the past 30 days	-0.049***	(-0.076 -0.022)	-0.063**	(-0.106 -0.021)	-0.040	(-0.104 0.023)	-0.064*	(-0.121 -0.006)
Count of physically unhealthy days in the past 30 days	-0.379	(-0.884 0.126)	-0.857*	(-1.692 -0.021)	-1.992**	(-3.302 -0.681)	-0.107	(-1.221 1.006)
Count of mentally unhealthy days in the past 30 days	-0.922***	(-1.461 -0.383)	-1.686***	(-2.589 -0.782)	-1.457*	(-2.902 -0.011)	-1.453*	(-2.642 -0.264)
Count of physically or mentally unhealthy days in the past 30 days	-1.247***	(-1.877 -0.618)	-1.896***	(-2.906 -0.885)	-1.867*	(-3.430 -0.303)	-1.569*	(-2.913 -0.225)

*** p<0.001, ** p<0.01, * p<0.05

DD=difference-in-differences; DD models were calculated separately for each outcome.

[a] Unweighted sample sizes varied slightly for each outcome due to missing data and may be less than the maximum sample size shown.