SPECIAL REPORT

Medicaid Work Requirements — Results from the First Year in Arkansas

Benjamin D. Sommers, M.D., Ph.D., Anna L. Goldman, M.D., M.P.A., M.P.H., Robert J. Blendon, Sc.D., E. John Orav, Ph.D., and Arnold M. Epstein, M.D.

In recent years, policymakers have introduced unprecedented changes to Medicaid. As of April 2019, nine states have received approval by means of a federal waiver to implement work requirements in Medicaid, and six have applications pending.[1] According to the Centers for Medicare and Medicaid Services, work requirements — also known as community engagement requirements — may promote better health and help beneficiaries escape poverty.[2] However, critics dispute these claims[3,4] and warn that the policy could lead to large coverage losses.[5] Work requirements have been used previously in programs such as the Supplemental Nutrition Assistance Program and the Temporary Assistance for Needy Families program. Studies of those programs showed that work requirements produced modest, short-term increases in employment but no increases in income.[6,7] The effects of work requirements in a health insurance program are unclear.

In June 2018, Arkansas became the first state to implement work requirements in Medicaid. Medicaid beneficiaries 30 to 49 years of age were notified by the state (by mail and informational fliers) that they were required to work 80 hours per month, participate in another qualifying community engagement activity such as job training or community service, or meet criteria for an exemption such as pregnancy or disability.[8] Three months of noncompliance or nonsubmission of monthly online reports within a year led to removal from Medicaid. By December, nearly 17,000 adults were notified by mail that they had been removed from Medicaid.[9] In March 2019, a federal judge halted the program owing to concerns about its effect on coverage. Although several analyses have predicted various results of Medicaid work requirements,[10-15] data from independent assessments since the policy took effect have been limited. Our objective was to assess early changes in insurance coverage and employment after implementation of the work requirements in Arkansas.

METHODS

STUDY DESIGN AND SETTING

We conducted a telephone survey to compare changes in outcomes before and after implementation of the work requirements in Arkansas among persons 30 to 49 years of age, as compared with Arkansans 19 to 29 years of age and those 50 to 64 years of age (who were not subject to the requirement in 2018) and with adults in three comparison states — Kentucky, Louisiana, and Texas. Kentucky, like Arkansas, expanded Medicaid under the Affordable Care Act (ACA) in 2014 and planned to introduce work requirements in 2018, but the requirements were blocked by a federal judge before implementation. Neither Louisiana (which expanded Medicaid in 2016) nor Texas (which has not expanded Medicaid) has implemented work requirements. All four study states are in the Southern census region and have poverty rates in the highest quartile of the United States. We used baseline data from 2016 (before the implementation of work requirements) for these states from a previous survey conducted by our team that has been validated against government data sources.[16-18] This project was approved by the institutional review board of the Harvard T.H. Chan School of Public Health.

SAMPLE AND SURVEY

Our survey was conducted by means of cellular and landline telephones, in English or Spanish, between November 8 and December 30, 2018. The sample comprised U.S. citizens 19 to 64 years of

age who reported family incomes in 2017 below 138% of the federal poverty level (e.g., $16,600 for a single adult or $33,900 for a family of four), which corresponds to the income limit for the ACA Medicaid expansion. This inclusion criterion was based on the respondent's income in the previous year in order to prevent any potential employment response to the policy from biasing the sample composition.

We contacted potential survey participants in Arkansas, Kentucky, Louisiana, and Texas primarily by means of random-digit dialing. The study also included respondents from different surveys that had been previously conducted by our survey vendor who were recontacted for this survey; this facilitated oversampling in the age group subject to work requirements in Arkansas. We combined the 2018 data with baseline data from November and December 2016, which had been obtained from a different set of respondents.[17,18] Further details on the survey design are provided in the Methods section in the Supplementary Appendix, available with the full text of this article at NEJM.org.

OUTCOMES

Our study had three primary outcomes: the percentage of respondents with Medicaid, the percentage of respondents who were uninsured, and the percentage of respondents reporting any employment. Secondary outcomes were the number of hours worked per week, the percentage of respondents satisfying any category of community engagement requirement (described below), the percentage of respondents with employer-sponsored insurance, and two measures of access to care — the percentages of respondents having a personal physician and reporting any cost-related delays in care. We also examined Arkansas respondents' experience with work requirements: whether they had heard "a lot," "a little," or "nothing" about the requirements; whether they thought they were (or would be) subject to the requirements; and their reporting activities to the state.

Health insurance was categorized into mutually exclusive categories (see the Methods section in the Supplementary Appendix). The 2014 expansion in Arkansas used Medicaid funds to purchase ACA marketplace plans for most newly eligible adults (sometimes called the "private option").[19] In contrast, most low-income adults in the other expansion states in our study (Kentucky and Louisiana) were eligible for Medicaid but not ACA marketplace plans. Because of the blurred boundary between Medicaid and marketplace coverage in Arkansas, coverage with Medicaid alone or marketplace coverage alone in Arkansas as compared with the other states would be misleading. Accordingly, we combined Medicaid and marketplace coverage into a single category.

Activities meeting the Arkansas work requirements included 80 hours per month of employment, job search, job training, or community service. Populations of adults who were eligible for exemptions included pregnant women, persons with disabilities or medical frailty, full-time students, persons caring for a child or other household member, and anyone receiving treatment for substance abuse. Since our baseline survey did not assess employment-related activities, our 2018 survey asked respondents about their activities 12 months earlier (during 2017) and then assessed their current activities. The survey questions are shown in the Supplementary Appendix; the 2018 survey questions used identical wording to our baseline survey whenever possible.

STATISTICAL ANALYSIS

Our approach was a difference-in-difference-in-differences (or triple-difference) model, which used comparisons according to year, state, and age group to identify changes in outcomes associated with the policy. Our model tested whether the change among respondents 30 to 49 years of age in Arkansas, relative to the change in other age groups in Arkansas, was larger than the comparable relative changes in other states. This method filters out time trends common to all four states and any state-specific factors influencing employment and coverage in Arkansas that were not due to work requirements. For instance, the waiver in Arkansas increased cost sharing and premiums for some enrollees in addition to work requirements, but these features were not specific to age.[20] We implemented this model with adjustment for state, year, and age group (19 to 29 years, 30 to 39 years, 40 to 49 years, 50 to 59 years, and 60 to 64 years) and with pairwise interaction terms between those variables. The policy estimate came from the three-way interaction among indicator variables for Arkansas, the 30-to-49–year-old age group, and the year 2018; the regression equations are shown in the Supplementary Appendix.

For outcomes regarding insurance coverage and health care access, which were measured in separate samples from 2016 and 2018, we used a linear model with standard errors clustered according to age group and state (20 state–age group clusters); we used linear models for ease of interpretation of interaction terms, as is standard practice in difference-in-differences analyses.[21] For community engagement outcomes, which were measured in the 2018 sample on the basis of questions regarding activities in the previous year and current year, we used a multilevel mixed model with random effects for age groups in each state and for each respondent.

All models adjusted for sex, respondent-reported race and ethnic group, educational level, interview language (English or Spanish), marital status, and residence area (urban or rural). All analyses used survey weights to reflect the target population in each state (see the Supplementary Appendix).

To assess awareness of and experiences with work requirements in Arkansas, we calculated survey-weighted means. We estimated a multivariate logistic model to identify demographic predictors of awareness of work requirements.

We conducted several sensitivity analyses: a difference-in-differences model that was limited to respondents 30 to 49 years of age, comparing Arkansas with the other states; models for community engagement that adjusted directly for baseline employment (before the implementation of a work requirement), with the use of a single observation per person; and an analysis of the U.S. Census Bureau American Community Survey for 2016 and 2017 to test whether trends in coverage and employment were similar across our study states and age groups before the implementation of work requirements. We report P values (unadjusted and post hoc family-wise adjusted; see the Supplementary Appendix) only for our three primary outcomes, and we report results with 95% confidence intervals (without adjustment for multiple comparisons) for the primary and secondary outcomes.

RESULTS

STUDY SAMPLE AND DESCRIPTIVE STATISTICS

The overall sample included 5955 respondents (3004 respondents from the 2018 survey, and 2951 from the 2016 baseline data[17,18]). Approximately half the 2018 sample was from Arkansas. Most respondents (90.3%) were recruited by means of random-digit dialing; the remainder consisted of respondents from previous surveys conducted by our survey vendor who were recontacted. A total of 14% of the persons who were contacted for the survey completed it.

Table 1 presents summary statistics for the study sample according to state (Arkansas vs. others) and age (30 to 49 years vs. others). In all four groups, the majority of the respondents were non-Hispanic white, and approximately one quarter of the respondents were black; Hispanic ethnicity was more common in the comparison states than in Arkansas. Respondents in Arkansas disproportionately lived in rural areas.

HEALTH INSURANCE COVERAGE

Figure 1 and Table S1 in the Supplementary Appendix present unadjusted rates of insurance coverage according to year, age, and state. The share of Arkansans 30 to 49 years of age who had Medicaid or ACA marketplace coverage went from 70.5% in 2016 to 63.7% in 2018, a decline of 6.8 percentage points. Meanwhile, the levels of Medicaid or marketplace coverage in the other age groups in Arkansas and among non-Arkansas residents showed smaller changes, ranging from an increase of 3.9 to a decrease of 1.3 percentage points. The percentage of uninsured respondents among Arkansans 30 to 49 years of age increased from 10.5% in 2016 to 14.5% in 2018, with smaller or no changes in the other groups. The percentage of Arkansans 30 to 49 years of age with employer-sponsored coverage increased slightly, from 10.6% to 12.2%.

Table 2 presents regression estimates of our primary insurance coverage outcomes. The model indicated that the percentage of respondents with Medicaid or marketplace coverage declined by 13.2 percentage points (95% confidence interval [CI], −23.3 to −3.2) more among Arkansans 30 to 49 years of age relative to other age groups in the state than the comparable age-based difference in the control states (P=0.01). The analogous estimate of changes in the percentage of respondents who were not insured was an increase of 7.1 percentage points (95% CI, 0.5 to 13.6; P=0.04). Models that were limited to respondents 30 to 49 years of age showed a pattern of coverage changes associated with the Arkansas work requirements that were similar to those in our pri-

Table 1. Characteristics of the Study Sample of Low-Income Adults in Arkansas and in the Control States of Kentucky, Louisiana, and Texas.*

Characteristic	Arkansas, 30–49 Yr of Age (N=804)	Arkansas, Other Ages (N=1430)	Control States, 30–49 Yr of Age (N=1295)	Control States, Other Ages (N=2426)
	percentage of respondents			
Age group				
19–29 Yr	0	50.8	0	49.3
30–39 Yr	57.0	0	54.5	0
40–49 Yr	43.0	0	45.5	0
50–59 Yr	0	31.0	0	31.4
60–64 Yr	0	18.2	0	19.3
Race or ethnic group†				
White non-Hispanic	61.9	64.9	53.1	53.9
Hispanic	4.7	5.8	16.3	17.0
Black non-Hispanic	27.2	23.7	27.1	24.2
Other	6.2	5.7	3.5	4.9
Educational level				
No high school diploma	18.9	18.5	22.7	23.2
High school diploma or equivalent	45.0	42.7	41.9	38.1
Some college or college degree	36.1	38.8	35.3	38.7
Female sex	58.6	54.6	60.1	55.6
Married or living with a partner	44.6	37.8	47.1	35.0
Interview conducted in Spanish	0.7	0.1	4.0	3.2
Resident in rural area	50.2	54.8	35.8	31.1

* Data are from a telephone survey involving low-income adults (income <138% of the federal poverty level), 19 to 64 years of age, who were U.S. citizens. The survey was conducted in November and December 2016 and in November and December 2018. The target group comprised respondents 30 to 49 years of age in Arkansas. For the comparison groups, other ages were respondents 19 to 29 years of age and those 50 to 64 years of age. All estimates are survey-weighted. Percentages may not total 100 because of rounding.

† Race and ethnic group were reported by the respondent.

mary model. There were no significant changes associated with work requirements in the percentage of respondents with employer-sponsored insurance or the two access measures (Table S2 in the Supplementary Appendix).

EMPLOYMENT AND COMMUNITY ENGAGEMENT

Figure 2 and Table S3 in the Supplementary Appendix present unadjusted estimates of employment and community engagement according to year, age, and state. In all groups, the percentages of respondents who were employed at least 20 hours per week declined from 2017 to 2018, and the percentage of respondents reporting disability increased. Employment declined from 42.4% to 38.9% among Arkansans 30 to 49 years of age, a change of –3.5 percentage points. The three comparison groups had similar decreases, ranging from –2.9 to –5.7 percentage points. Overall, more than 92% of the respondents in all four groups — and nearly 97% of the respondents 30 to 49 years of age in Arkansas — were already meeting the community engagement requirement or should have been exempt before the policy took effect. The share of respondents who were not meeting the requirement increased from 3.3% in 2017 to 3.9% in 2018 in the Arkansas target age group (an increase of 0.6 percentage points), whereas other groups had changes ranging from –1.0 to +0.2 percentage points.

Table 3 presents the regression results for employment. Table S4 in the Supplementary Appen-

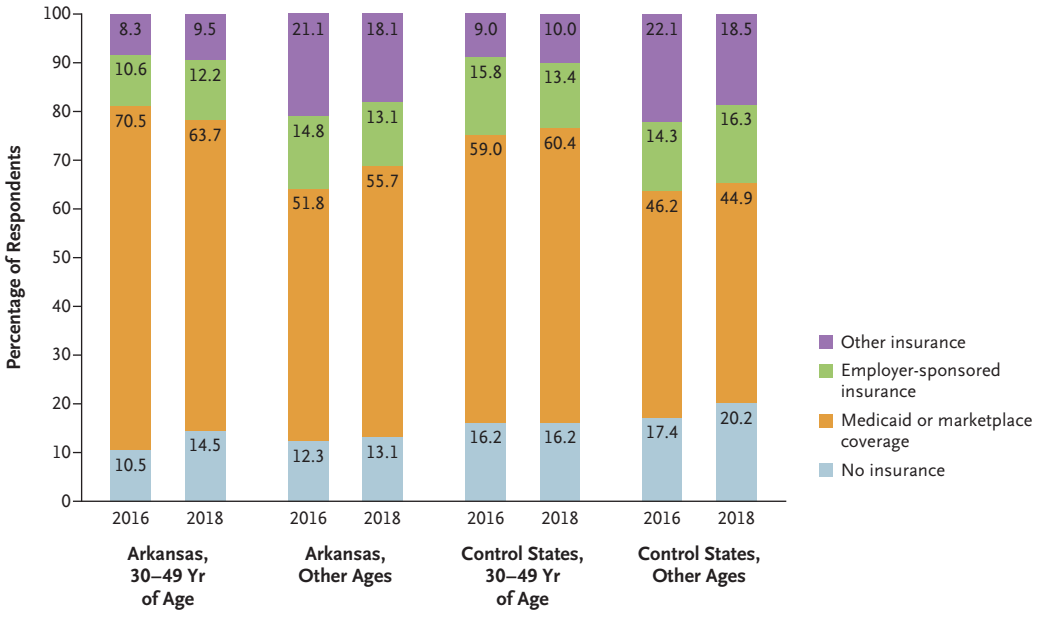


Figure 1. Health Insurance Status According to Year, State, and Age Group.

Data are from a telephone survey involving 5955 low-income adults 19 to 64 years of age that was conducted in November and December 2016 and in November and December 2018. All estimates are survey-weighted. Medicaid and Affordable Care Act marketplace coverage were combined because the Medicaid expansion in Arkansas was implemented with the use of a private insurance expansion, in which most (but not all) expansion enrollees were placed in subsidized marketplace coverage rather than traditional Medicaid. Coverage types were mutually exclusive and categorized according to an insurance hierarchy (see the Methods section in the Supplementary Appendix). The target group comprised respondents 30 to 49 years of age in Arkansas. "Other ages" were the groups of respondents 19 to 29 years of age and those 50 to 64 years of age. Kentucky, Louisiana, and Texas were the control states. Percentages may not total 100 because of rounding.

dix shows secondary outcomes of hours worked and any community engagement. Neither the main model nor analyses involving only respondents 30 to 49 years of age indicated any significant changes in these outcomes. Similar results were seen in alternative models that adjusted for employment in the previous year (Table S5 in the Supplementary Appendix).

EXPERIENCE WITH WORK REQUIREMENTS

Table S6 in the Supplementary Appendix describes Arkansas residents' awareness of and experience with work requirements. A total of 32.9% of the adults 30 to 49 years of age who had Medicaid or marketplace coverage had not heard anything about the policy. Multivariate analysis indicated that Medicaid or marketplace enrollees were more likely to know about the policy than those with other coverage (Table S7 in the Supplementary Appendix). Adults 19 to 29 years of age, men, and those without a high-school diploma were less likely to know about the requirements than respondents 30 to 49 years of age, women, and respondents with some college or a college degree, respectively.

Nearly half the target population was unsure whether the requirements applied to them (Table S6 in the Supplementary Appendix). Among Arkansans 30 to 49 years of age who had Medicaid or marketplace coverage or no insurance, only 21.8% thought that they were (or would be) subject to the new work requirements; 44.2% were unsure. A total of 14.4% of the respondents outside this age group incorrectly believed that they were subject to the requirements in 2018, and 50.2% were unsure. Among the respondents who had been told by the state that they needed to report community engagement activities, only 49.3% were doing so regularly. The most common reason for not reporting was a belief that they were

Table 2. Regression Estimates of Changes in Health Insurance Associated with Medicaid Work Requirements in Arkansas.*

Outcome and Analysis	Arkansas		Control States		Adjusted Difference in Change (95% CI)†	P Value‡
	2016 (N=733)	2018 (N=1501)	2016 (N=2218)	2018 (N=1503)		
	percent of respondents				*percentage points*	
Respondents with Medicaid or marketplace coverage						
Difference-in-differences analysis involving respondents 30–49 yr of age	70.5	63.7	59.0	60.4	−10.4 (−18.5 to −2.4)	0.02
Difference-in-differences analysis involving respondents in control age groups of 19–29 yr and 50–64 yr of age	51.8	55.7	46.2	44.9	4.0 (−3.9 to 11.9)	0.29
Triple-difference analysis of target age group vs. control age groups and of Arkansas vs. control states	—	—	—	—	−13.2 (−23.3 to −3.2)	0.01
Respondents with no insurance						
Difference-in-differences analysis involving respondents 30–49 yr of age	10.5	14.5	16.2	16.2	5.9 (0.4 to 11.4)	0.04
Difference-in-differences analysis involving respondents in control age groups of 19–29 yr and 50–64 yr of age	12.3	13.1	17.4	20.2	−1.5 (−6.0 to 2.9)	0.46
Triple-difference analysis of target age group vs. control age groups and of Arkansas vs. control states	—	—	—	—	7.1 (0.5 to 13.6)	0.04

* The study sample was from a telephone survey involving 5955 low-income adults 19 to 64 years of age conducted in November and December 2016 and in November and December 2018, minus item nonresponse for each study outcome. All estimates are survey-weighted. Standard errors were clustered according to age group in each state. Coverage types were mutually exclusive and categorized according to an insurance hierarchy. All models were adjusted for sex, respondent-reported race and ethnic group, education, language of the interview (English or Spanish), marital status, and urban or rural residence, as well as by age group, state, and year. Details and full regression equations are provided in the Methods section in the Supplementary Appendix. CI denotes confidence interval.

† The adjusted change associated with work requirements is the policy estimate. Results are from difference-in-differences analysis for the first two rows of each outcome and for the difference-in-difference-in-differences (or triple-difference) analysis for the third row of each outcome.

‡ Family-wise P values, with adjustment for two primary outcomes within the family of coverage outcomes, yield the following P values (in the same order as in the table): 0.03, 0.54, 0.03, 0.03, 0.49, and 0.04 (see the Methods section in the Supplementary Appendix).

not meeting the requirement (40.4%), but their other responses indicated that all 22 of these respondents did satisfy the requirements. Other reasons for not reporting to the state were lack of Internet access (32.3% of respondents) and confusion about reporting (17.8%).

TRENDS IN OUTCOMES BEFORE WORK REQUIREMENTS

Table S8 in the Supplementary Appendix shows analysis of data from the American Community Survey from 2016 and 2017. These results revealed no significant differential changes in coverage or employment according to state or age group before 2018.

DISCUSSION

Using a timely survey involving low-income adults in Arkansas and three comparison states, we found that implementation of the first-ever work requirements in Medicaid in 2018 was associated with significant losses in health insurance coverage in the initial 6 months of the policy but no

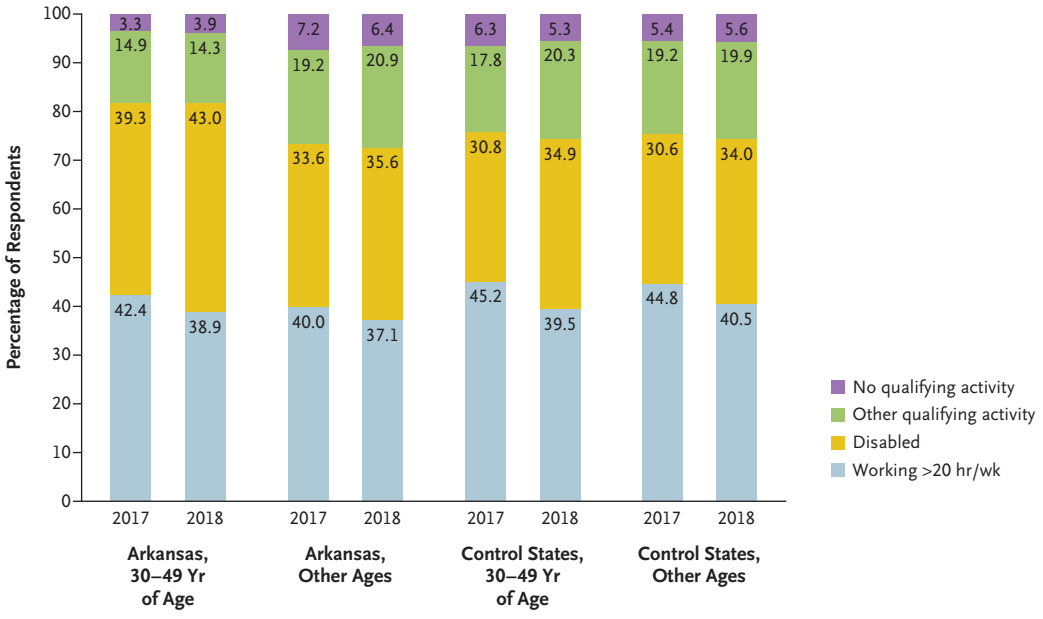


Figure 2. Employment and Community Engagement Activities According to Year, State, and Age Group

Shown are the results from a telephone survey involving 3004 low-income adults 19 to 64 years of age that was conducted in November and December 2018. Respondents were asked about these outcomes for the current year and for the 12 months before the survey (in 2017). All estimates are survey-weighted. Other qualifying activity included full-time student status, participation in job training, actively seeking work, community service, pregnancy, or caring for a child or household member who could not care for himself or herself. Outcomes were assessed in a mutually exclusive hierarchy, from the bottom to top in each bar (e.g., if a person was working >20 hours a week, we did not assess whether the person was disabled or met another category of activity). The target group comprised respondents 30 to 49 years of age in Arkansas. "Other ages" were the groups of respondents 19 to 29 years of age and those 50 to 64 years of age. Kentucky, Louisiana, and Texas were the control states. Percentages may not total 100 because of rounding.

significant change in employment. Lack of awareness and confusion about the reporting requirements were common, which may explain why thousands of persons lost coverage even though more than 95% of the target population appeared to meet the requirements or qualify for an exemption.

Our findings regarding coverage are consistent with the official report from Arkansas that nearly 17,000 adults were removed from Medicaid between October and December 2018.[9] We estimate from the American Community Survey that our sampling frame corresponds to 140,000 low-income adults 30 to 49 years of age in Arkansas. Taken together, these numbers imply a reduction in Medicaid enrollment of 12 percentage points, which is well within our confidence intervals. Our results show that this loss of Medicaid coverage was accompanied by a significant increase in the percentage of adults who were uninsured, indicating that many persons who were removed from Medicaid did not obtain other coverage. Although point estimates suggest a potential increase in the use of employer-sponsored insurance, confidence intervals for this measure included no effect. We did not detect any meaningful changes in the percentages of respondents having a personal physician or cost-related delays in care in the first 3 months of disenrollment; longer-term assessment will be essential.[22-25]

We did not find any significant change in employment (one of our three primary outcomes) or in the related secondary outcomes of hours worked or overall rates of community engagement activities. Although our confidence intervals are wide enough that policy-relevant changes cannot be ruled out, nearly everyone who was targeted by the policy already met the requirements, so there was

Table 3. Regression Estimates of Changes in Employment Associated with Medicaid Work Requirements in Arkansas.*

Outcome and Analysis	Arkansas		Control States		Adjusted Difference in Change (95% CI)†	P Value
	2017 (N=1501)	2018 (N=1501)	2017 (N=1503)	2018 (N=1503)		
	percent of respondents				*percentage points*	
Respondents reporting employment						
Difference-in-differences analysis involving respondents 30–49 yr of age	46.9	42.2	50.6	44.0	1.6 (–5.0 to 8.2)	0.63
Difference-in-differences analysis involving respondents in control age groups of 19–29 yr and 50–64 yr of age	45.0	43.5	49.3	45.2	2.7 (–1.7 to 7.1)	0.23
Triple-difference analysis of target age group vs. control age group and of Arkansas vs. control states	—	—	—	—	–1.1 (–8.7 to 6.5)	0.78

* The study sample was from a telephone survey involving low-income adults 19 to 64 years of age. Respondents in 2018 were asked about their activities for the previous year (12 months earlier in 2017) and about the current year. Thus, each sample contains two observations per person. The model used random effects at the individual and age-group (per state) levels to account for repeated observations. All estimates are survey-weighted. Standard errors were clustered according to age group in each state. All models were adjusted for sex, respondent-reported race and ethnic group, educational level, language of the interview (English or Spanish), marital status, and urban or rural residence, as well as for age group, state, and year. The full regression equations are provided in the Methods section in the Supplementary Appendix.

† The adjusted change associated with work requirements is the policy estimate. Results are from difference-in-differences analysis for the first two rows and for the difference-in-difference-in-differences (or triple-difference) analysis for the third row.

little margin for the program to increase community engagement. This finding is consistent with analyses predicting that most Medicaid beneficiaries already satisfy work requirements in one way or another.[10,11,14,15,26]

Our descriptive results indicate that the implementation of this policy was plagued by confusion among many enrollees, a finding consistent with qualitative research.[27,28] Lack of Internet access was also a barrier to reporting information to the state, although in late December 2018 Arkansas added a telephone option.[29] To reduce the administrative burden on beneficiaries, state officials used existing data sources when possible to confirm employment or disability status, which exempted two thirds of enrollees from the reporting requirement.[30] Nonetheless, major barriers remain. One third of persons who were subject to the policy had not heard anything about it, and 44% of the target population was unsure whether the requirements applied to them. Levels of awareness were worse among persons with less education and among adults 19 to 29 years of age, who became subject to the Arkansas requirements in January 2019.[20] Although Medicaid has always struggled with high turnover owing in part to legally required annual eligibility redeterminations,[31] our findings suggest that work requirements have substantially exacerbated administrative hurdles to maintaining coverage.

Our study has several limitations. First, our response rate was lower than that of government surveys. However, our approach of combining random-digit dialing telephone surveys with demographic weighting for nonresponse has been used to provide timely evidence regarding Medicaid and the ACA, with results similar to those produced by subsequent analyses of government data.[32-36]

Our analysis is based on survey data regarding a policy that created substantial confusion, which makes it difficult to attribute any single respondent's loss of coverage directly to work requirements as opposed to other factors, such as income changes or incompletion of renewal paperwork. Questions about employment may suffer from social desirability bias, leading to greater reporting of employment this year among persons who were subject to the new work requirement. Our lack of baseline data on employment meant that

we had to ask respondents about employment activities in the current and previous years, which raises the possibility of recall bias. However, this phenomenon is likely to be similar across states and age groups and would be filtered out by our study design.

The study was limited to a single state implementing work requirements and approximately 6000 respondents overall. Survey questions about experiences reporting work hours to the state applied only to small numbers of respondents. In addition, details regarding work requirements in other states vary and could produce different results.[10] Finally, our study was nonrandomized, and unmeasured time-varying confounders could bias the results. However, our use of both within-state and out-of-state control groups reduces this possibility.

In conclusion, in its first 6 months, work requirements in Arkansas were associated with a significant loss of Medicaid coverage and rise in the percentage of uninsured persons. We found no significant changes in employment associated with the policy, and more than 95% of persons who were targeted by the policy already met the requirement or should have been exempt. Many Medicaid beneficiaries were unaware of the policy or were confused about how to report their status to the state, which suggests that bureaucratic obstacles played a large role in coverage losses under the policy.

Supported by grants from the Commonwealth Fund, Robert Wood Johnson Foundation's Policies for Action program, and Baylor Scott and White Health.

Disclosure forms provided by the authors are available with the full text of this article at NEJM.org.

We thank Dennis Lee for research assistance.

From the Department of Health Policy and Management, Harvard T.H. Chan School of Public Health (B.D.S., A.L.G., R.J.B., A.M.E.), and the Department of Medicine, Brigham and Women's Hospital (B.D.S., E.J.O., A.M.E.), Boston, and Cambridge Health Alliance, Cambridge (A.L.G.) — all in Massachusetts. Address reprint requests to Dr. Sommers at Harvard T.H. Chan School of Public Health, 677 Huntington Ave., Rm. 406, Boston, MA 02115, or at bsommers@hsph.harvard.edu.

This article was published on June 19, 2019, at NEJM.org.

1. Medicaid waiver tracker: approved and pending Section 1115 waivers by state. Washington, DC: Kaiser Family Foundation, April 28, 2019.
2. Opportunities to promote work and community engagement among Medicaid beneficiaries. Baltimore: Centers for Medicare and Medicaid Services, January 11, 2018.
3. Sanger-Katz M. Can requiring people to work make them healthier? New York Times. January 11, 2018.
4. Katch H, Wagner J, Aron-Dine A. Medicaid work requirements will reduce low-income families' access to care and worsen health outcomes. Washington, DC: Center on Budget and Policy Priorities, 2018.
5. Carroll AE. The problem with work requirements for Medicaid. JAMA 2018;319:646-7.
6. Greenberg D, Deitch V, Hamilton G. Welfare-to-work program benefits and costs: a synthesis of research. New York: Manpower Demonstration Research Corporation (MDRC), 2009.
7. Hamilton G, Freedman S, Gennetian L, et al. National evaluation of welfare-to-work strategies — how effective are different welfare-to-work approaches? Five-year adult and child impacts for eleven programs. Washington, DC: Department of Health and Human Services and Department of Education, 2001.
8. Arkansas Department of Human Services. "Healthcare notice summary: you are subject to the work requirement." January 8, 2019 (no longer available online).
9. Hardy B. Work requirement ends Medicaid coverage for 4,600 more Arkansans in December. Arkansas Times. December 18, 2018.
10. Garfield R, Rudowitz R, Damico A. Understanding the intersection of Medicaid and work. Washington, DC: Kaiser Family Foundation, 2018.
11. Huberfeld N. Can work be required in the Medicaid program? N Engl J Med 2018;378:788-91.
12. Musumeci MB, Garfield R, Rudowitz R. Medicaid and work requirements: new guidance, state waiver details and key issues. Washington, DC: Kaiser Family Foundation, 2018.
13. Rosenbaum S. Medicaid work requirements: inside the decision overturning Kentucky HEALTH's approval. Health Affairs Blog. July 2, 2018 (https://www.healthaffairs.org/do/10.1377/hblog20180702.144007/full/).
14. Goldman AL, Woolhandler S, Himmelstein DU, Bor DH, McCormick D. Analysis of work requirement exemptions and Medicaid spending. JAMA Intern Med 2018;178:1549-52.
15. Sommers BD, Fry CE, Blendon RJ, Epstein AM. New approaches in Medicaid: work requirements, health savings accounts, and health care access. Health Aff (Millwood) 2018;37:1099-108.
16. Sommers BD, Blendon RJ, Orav EJ, Epstein AM. Changes in utilization and health among low-income adults after Medicaid expansion or expanded private insurance. JAMA Intern Med 2016;176:1501-9.
17. Sommers BD, Maylone B, Blendon RJ, Orav EJ, Epstein AM. Three-year impacts of the Affordable Care Act: improved medical care and health among low-income adults. Health Aff (Millwood) 2017;36:1119-28.
18. Sommers BD, Epstein AM. Red-state Medicaid expansions — Achilles' heel of ACA repeal? N Engl J Med 2017;376(6):e7.
19. Guyer J, Shine N, Musumeci M, Rudowitz R. A look at the private option. Washington, DC: Kaiser Family Foundation, 2015.
20. Arkansas Section 1115 demonstration waiver. Baltimore: Centers for Medicare & Medicaid Services, 2018.
21. Karaca-Mandic P, Norton EC, Dowd B. Interaction terms in nonlinear models. Health Serv Res 2012;47:255-74.
22. Sommers BD, Gawande AA, Baicker K. Health insurance coverage and health — what the recent evidence tells us. N Engl J Med 2017;377:586-93.
23. Mazurenko O, Balio CP, Agarwal R, Carroll AE, Menachemi N. The effects of Medicaid expansion under the ACA: a systematic review. Health Aff (Millwood) 2018;37:944-50.
24. Kominski GF, Nonzee NJ, Sorensen A. The Affordable Care Act's impacts on access to insurance and health care for low-income populations. Annu Rev Public Health 2017;38:489-505.
25. Wilson JC, Thompson J. Nation's first Medicaid work requirement sheds thousands from rolls in Arkansas. Health Affairs Blog. October 2, 2018 (https://www.healthaffairs.org/do/10.1377/hblog20181001.233969/full/).
26. Greene J. Medicaid work requirements: who will the new state policies impact? J Gen Intern Med 2019;34:532-4.

27. Musumeci M, Rudowitz R, Lyons B. Medicaid work requirements in Arkansas: experience and perspectives of enrollees. Washington, DC: Kaiser Family Foundation, 2018.
28. Greene J. Medicaid recipients' early experience with the Arkansas Medicaid work requirement. Health Affairs Blog. September 5, 2018 (https://www.healthaffairs.org/do/10.1377/hblog20180904.979085/full/).
29. DHS expanding phone reporting, outreach for Arkansas Works enrollees. Little Rock: Arkansas Department of Human Services, December 12, 2018.
30. Sanger-Katz M. One big problem with Medicaid work requirement: people are unaware it exists. New York Times. September 24, 2018.
31. Rosenbaum S, Lopez N, Dorley M, Teitelbaum J, Burke T, Miller J. Mitigating the effects of churning under the Affordable Care Act: lessons from Medicaid. New York: Commonwealth Fund, 2014.
32. Skopec L, Musco T, Sommers BD. A potential new data source for assessing the impacts of health reform: evaluating the Gallup-Healthways Well-Being Index. Healthc (Amst) 2014;2:113-20.
33. Collins SR, Gunja M, Doty MM, Beutel S. Americans' experiences with ACA marketplace and Medicaid coverage: access to care and satisfaction. New York: Commonwealth Fund, 2016.
34. Sommers BD, Gunja MZ, Finegold K, Musco T. Changes in self-reported insurance coverage, access to care, and health under the Affordable Care Act. JAMA 2015;314:366-74.
35. Sommers BD, Musco T, Finegold K, Gunja MZ, Burke A, McDowell AM. Health reform and changes in health insurance coverage in 2014. N Engl J Med 2014;371:867-74.
36. McMorrow S, Gates JA, Long SK, Kenney GM. Medicaid expansion increased coverage, improved affordability, and reduced psychological distress for low-income parents. Health Aff (Millwood) 2017;36:808-18.

DOI: 10.1056/NEJMsr1901772
Copyright © 2019 Massachusetts Medical Society.

Supplementary Appendix

This appendix has been provided by the authors to give readers additional information about their work.

Supplement to: Sommers BD, Goldman AL, Blendon RJ, Orav EJ, and Epstein AM. Medicaid work requirements — results from the first year in Arkansas. N Engl J Med. DOI: 10.1056/NEJMsr1901772

Medicaid Work Requirements: Results from the First Year in Arkansas
Supplemental Materials

Table of Contents

Appendix Methods – Page 1

Survey Questions – Page 11

Appendix Table S1 – Page 15

Appendix Table S2 – Page 16

Appendix Table S3 – Page 17

Appendix Table S4 – Page 18

Appendix Table S5 – Page 19

Appendix Table S6 – Page 20

Appendix Table S7 – Page 21

Appendix Table S8 – Page 22

Appendix References – Page 23

APPENDIX METHODS

Additional Detail on Survey Sample, Response Rates, and Weighting

A stratified random-digit dialing (RDD) survey was conducted by the non-partisan polling firm SSRS. The target population contained low-income adults who reported being U.S. citizens ages 19-64, with a 2017 family income under 138% of the Federal Poverty Level. Screening questions asked at the outset identified potential respondents meeting these inclusion criteria, and then the full survey was administered to this group; we did not collect data from individuals who did not meet the inclusion criteria. The final sample came from Arkansas (n=1,501), Kentucky (n=500), Louisiana (n=402), and Texas (n=601), and in total, 3,004 interviews were completed. To ensure representation of the entire target population, interviews were conducted with respondents reached by landline (n=654) and cell phones (n=2,350), and in both English (n=2,925) and Spanish (n=79).

The 2018 survey was designed to have a total of 3000 respondents, including 1500 from Arkansas reflecting the impact of work requirements and 1500 from the combination of control states. With these sample sizes, we would have close to 80% power to detect a 4.6% increase in the uninsured rate in Arkansas compared to no change in control states, and a decrease of 5.7% in Medicaid/Marketplace coverage in Arkansas compare to no change in control states. We would also have over 90% power to detect an 11% increase in employment in Arkansas compared to a 6% increase in control states. These calculations reflect a simplified design with no age subgroups since at the time of the sample design we had no data from which to estimate outcome rate changes within those age subgroups.

While most respondents were newly-identified individuals contacted via random-digit dialing who screened positive for the study's inclusion criteria, a small portion of respondents in

all four states was reached by calling back respondents who completed a different interview with SSRS in previous years. The two interviews used for callbacks were the SSRS Omnibus poll and the 2013-2014 survey conducted by our team in these four states. This both increased the efficiency of screening and also facilitated oversampling in the 30-49 age range targeted by the work requirements policy. The SSRS Omnibus is a national weekly dual-frame (cell phone and landline) RDD telephone poll. The other callback group consisted of respondents who completed interviews for the earlier waves of our Medicaid-focused survey from 2013-2014. None of the observations were callbacks from the 2016 survey that we used as the baseline data for this analysis. Overall, 90.3% of the sample was new to the survey in 2018, and 9.7% represented callbacks from previous RDD surveys. While using callbacks may lead to bias if previous respondents were systematically different, our use of demographic reweighting should mitigate this somewhat; moreover, when we repeat our analyses excluding the 9.7% callbacks, the overall pattern of our results is similar, with a significant reduction in Medicaid, a significant increase in the uninsured rate, and no significant changes in employment or our secondary outcomes.

Response rates were calculated based on the American Association for Public Opinion Research's RR3 definition. Below are the response rates by year, state, and phone type.

State and Phone Type	**2016**	**2018**
Arkansas Cell Phone	26%	17%
Arkansas Land Line	25%	11%
Arkansas Callbacks	*NA*	28%
Arkansas TOTAL	27%	15%
Kentucky Cell Phone	22%	10%
Kentucky Land Line	25%	19%
Kentucky Callbacks	*NA*	26%
Kentucky TOTAL	23%	12%
Texas Cell Phone	21%	10%
Texas Land Line	20%	19%
Texas Callbacks	*NA*	20%
Texas TOTAL	21%	13%

Louisiana Cell Phone	16%	16%
Louisiana Land Line	18%	15%
Louisiana Callbacks	*NA*	23%
Louisiana TOTAL	17%	16%
TOTAL	22%	14%

Insurance type was categorized into mutually-exclusive categories using the following hierarchy: Medicaid, Medicare, Marketplace, Employer-Sponsored Insurance (ESI), and other insurance. We then combined the Medicaid and Marketplace categories into a single "ACA-subsidized coverage" group, since Arkansas's original 2014 expansion placed most Medicaid-eligible adults into highly-subsidized Marketplace plans, though roughly 10% still received traditional Medicaid. We model the different coverage types using independent linear regression models, as opposed to using a multinomial model, to provide straightforward estimates of the magnitude of policy change, which is difficult with difference-in-difference analyses in non-linear models.[1] Prior research indicates this approach has similar power as a multinomial model.[2] This also follows the common approach used in the literature assessing the effects of policy changes on insurance coverage type.[3-6]

We used survey weights to ensure an accurate representation of the target population in each of the study states. These weights accounted for differential response rates across demographic groups, cellphone vs. landline use, and the probability of selection within households. The weights used population benchmarks from the 2017 American Community Survey (ACS) for age, gender, race/ethnicity, marital status, geographic region within-state (by region), population density; benchmarks for cellphone vs. landline status came from the 2016 National Health Interview Survey, since this information is not available in the ACS.

Item Non-Response

For item non-response, we followed the basic approach of our prior research with the baseline survey data in this study.[3] We omitted from each regression any observation with a missing value for the outcome in question (which ranged from 0.8 to 1.0%). For individual-level covariates, non-response for race/ethnicity (1.0%) was treated as "other." For 0.6% of the weighted sample with missing age, 0.4% with missing education, and 0.8% with missing marital status, we imputed these values based on multivariate regression models using race/ethnicity, gender, income, family size, urban/rural location, cell phone usage, and political affiliation as predictor variables. Our overall results were extremely similar if we omitted observations with imputed covariates (1.4% of the sample) from the analysis.

Regression Equations

1) Difference-in-Difference-in-Difference (DDD) Model of Coverage and Access to Care – Table 2 and Appendix Table S2:

$$Uninsured_{isat} = \beta_0 + \beta_1 X_i + \beta_2 State_s + \beta_3 AgeGroup_a + \beta_4 Year2018_t$$
$$+ \beta_5 Arkansas_s * Year2018_t + \beta_6 Arkansas_s * Age30_49_a + \beta_7 Age30_49_a * Year2018_t$$
$$+ \beta_8 Arkansas_s * Year2018_t * Age30_49_a + \varepsilon_{isat} \quad \textbf{(1)}$$

where *i* indexed individuals, *s* state, *a* age group, and *t* year. X_i was a vector of demographics (gender, race/ethnicity, education, language of interview, marital status, and urban vs. rural status). β_2, β_3, and β_4 capture the direct effects of State (with fixed effects for each), age (age group indicators in 5 categories), and the year. β_5, β_6, and β_7 capture the two-way interactions between state (dichotomized for the interaction terms to Arkansas vs. other states), age group (dichotomized for the interaction terms to age 30-49 versus all other ages), and year. β_8 is the DDD estimate for the change in outcome after work requirements in Arkansas,

comparing 30-49 year-olds vs. other age groups, compared to the same age-related difference in the control states. The error terms, ε_{isat}, were assumed to be correlated between individuals within state-age group clusters, which we addressed using robust sandwich-based estimates for our standard errors. In an alternative model (available from the authors upon request), we used a mixed model replacing fixed effects for the state-age groups with random effects, and the results were quite similar. The models for Medicaid, employer-sponsored insurance, and the two access to care measures were identical to Equation 1, except for the change in the dependent variable.

2) Difference-in-Difference (DD) Model of Coverage and Access to Care (sample limited to ages 30-49) – Table 2 and Appendix Table S2:

$$Uninsured_{isat} = \beta_0 + \beta_1 X_i + \beta_2 State_s + \beta_3 Year2018_t + \beta_4 Arkansas_s * Year2018_t + \varepsilon_{isat} \quad \textbf{(2)}$$

where *i* indexed individuals, *a* age group, *s* state, and *t* year. X_i was a vector of demographics (gender, race/ethnicity, marital status, education, language of interview, urban vs. rural status, and age group – 30-39 and 40-49 for this subsample). β_2 and β_3 capture the direct effects of State (with fixed effects for each) and the year. β_4 is the DD estimate for the change in outcome before vs. after work requirements in Arkansas, comparing Arkansas to the control states. In an alternative model (available from the authors upon request), we used a mixed model replacing fixed effects with random effects for the state-age groups, and the results were quite similar.

3) Difference-in-Difference-in-Difference (DDD) Model of Employment and Community Engagement – Table 3 and Appendix Table S4:

$$Working_{isat} = \beta_0 + \beta_1 X_i + \beta_2 State_s + \beta_3 AgeGroup_a + \beta_4 Year2018_t$$
$$+ \beta_5 Arkansas_s * Year2018_t + \beta_6 Arkansas_s * Age30_49_a + \beta_7 Age30_49_a * Year2018_t$$
$$+ \beta_8 Arkansas_s * Year2018_t * Age30_49_a + U_{sa} + P_i + \varepsilon_{isat} \quad \textbf{(3)}$$

where *i* indexed individuals, *a* age group, *s* state, and *t* year. X_i was a vector of demographics as above. β_2, β_3, and β_4 capture the direct effects of State (with fixed effects for each), age (age group indicators in 5 categories), and the year. β_5, β_6, and β_7 capture the two-way interactions between state, age group, and year (defined as in Equation 1). β_8 is the DDD estimate for the change in outcome after work requirements in Arkansas, comparing 30-49 year-olds vs. other age groups, compared to the same age-related difference in the control states. For these outcomes, the before and after observations came from the same individuals – two measures per person. We modeled this using U_{sa} as the state-age group random effect (n=20), and P_i as the person-specific random effect (n=3004, minus item non-response for each given outcome, which ranged from 0.8 to 1.0%).

4) Difference-in-Difference (DD) Model of Employment and Community Engagement (sample limited to ages 30-49) – Table 3 and Appendix Table S4:

$$Working_{isat} = \beta_0 + \beta_1 X_i + \beta_2 State_s + \beta_3 Year2018_t + \beta_4 Arkansas_s * Year2018_t + U_{sa} + P_i + \varepsilon_{isat} \quad \textbf{(4)}$$

where *i* indexed individuals, *s* state, *a* age group, and *t* year. X_i was a vector of demographics (gender, race/ethnicity, marital status, education, language of interview, urban vs. rural status, and age group – 30-39 and 40-49 for this subsample). β_2 and β_3 capture the direct effects of State (with fixed effects for each) and the year. β_4 is the DD estimate for the change in outcome before vs. after work requirements in Arkansas, comparing Arkansas to the control

states. Again, U_{sa} was the state-age group random effect, and P_i was the person-specific random effect.

5) Changes in Employment and Community Engagement, Adjusting for Baseline Year Activity – Appendix Table S5:

$$Working_{isa} = \beta_0 + \beta_1 X_i + \beta_2 State_s + \beta_3 AgeGroup_a + \beta_4 Arkansas_s * Age30_49_a + \beta_5 WorkingLastYr_i + \varepsilon_{isa} \quad \textbf{(5a)}$$

where *i* indexed individuals, *s* state, and *a* age group. X_i was a vector of demographics as above. β_2 and β_3 capture the direct effects of State (with fixed effects for each) and age group (in 5 categories). Unlike in Equations 3 and 4, each person only appears once in this sample; *WorkingLastYr* represents individual i's working status in 2017, meaning that the model still estimates a within-person change in employment, analogous to Equations 3 and 4. β_4 is the DD estimate for the change in outcome after work requirements in Arkansas (controlling for each respondent's prior year outcome), comparing 30-49 year-olds vs. other age groups, compared to the same age-related difference in the control states. Standard errors were clustered by state-age group.

$$Working_{isa} = \beta_0 + \beta_1 X_i + \beta_1 Arkansas_s + \beta_2 WorkingLastYr_i + \varepsilon_{isa} \quad \textbf{(5b)}$$

Equation 5b is similar to Equation 5a, except that it limits the sample to 30-49 year-olds in all four states. Again, *i* indexed individuals and *s* state. X_i was a vector of demographics (gender, race/ethnicity, marital status, education, language of interview, age group [indicators for 30-39 and 40-49], and urban vs. rural status). β_2 measures the change in outcome after work

requirements in Arkansas (controlling for each respondent's prior year outcome), compared to 30-49 year-olds in the control states. Standard errors were clustered by state-age group.

6) Pre-Policy Testing of Coverage and Employment Outcomes for 30-49 year-olds in Arkansas vs. Comparison Groups – Appendix Table S8:

This model assessed whether trends in coverage and employment were already differentially changing prior to 2018 for 30-49 year-olds in Arkansas, relative to that age group in other states as part of a DD model, or relative to other age groups in Arkansas and other states as part of a DDD model. Using the 2016-2017 ACS, we replicated Equations 1 and 2, with the following revisions:

- *Year2017* instead of *Year2018*
- The ACS does not include a Marketplace measure, so we focused here on Medicaid only (defined in the survey as "Medicaid, Medical Assistance, or any kind of government-assistance plan for those with low incomes or a disability," which likely captures Arkansas's private option as well).
- In the covariate vector *X*, the variable for Spanish interview was replaced with an indicator for someone who speaks a language other than English in the home.

Family-Wise p-Values and Multiple Comparisons

To reduce the risk of false-positives due to multiple comparisons, we only present p-values for our primary endpoints: Medicaid/Marketplace coverage, uninsurance, and employment. All secondary outcomes are presented only with point estimates and 95% confidence-interval, which were not adjusted post-hoc for multiple comparisons. For the two primary coverage outcomes, we present both per-comparison p-values and post-hoc family-wise

adjusted p-values, based on the free step-down resampling method of Westfall and Young (1993),[7] which accounts for the possibility of falsely rejecting at least one true null hypothesis in this family of two primary outcomes. See Finkelstein et al. (2012)[8] for similar applications of this method and relevant statistical code, which we adapted for our analysis.

Survey Questions

The following survey items were used for our study outcomes:

1) Health Insurance

Ask all

		Marketplace Name	Medicaid Program
AR	Arkansas	The Arkansas Health Connector, also called "My Arkansas Insurance" OR The HealthCare.gov website	Medicaid, the Private Option, or the Arkansas Works health insurance program
KY	Kentucky	KYnect (pronounced: Connect) OR The HealthCare.gov website	Medicaid, Kentucky Partnership Program, or Kentucky HEALTH
TX	Texas	The HealthCare.gov website	Medicaid, STAR, or STAR+PLUS
LA	Louisiana	The HealthCare.gov website	Medicaid, Healthy Louisiana, or Bayou Health

I am going to read a few common types of health insurance. For each one, please tell me 'yes' if you currently have it and 'no' if you don't. You can answer 'yes' more than once.

a. [State Medicaid Plan Name] (INTERVIEWER NOTE: Clarify, if needed, "Medical Assistance or government-assistance plan for those with low incomes or a disability")
b. Medicare (INTERVIEWER NOTE: Clarify, if needed, "for people 65 and older, or people with certain disabilities")
c. A military health care plan, such as TRI-CARE, CHAMPUS, or CHAMP-VA
d. A health plan you got through an employer or union (INTERVIEWER NOTE: This also includes through a spouse's employer or union)
e. A health insurance plan that you signed up for through [State Marketplace Name] or a health insurance Marketplace created by the national health reform law. (INTERVIEWER NOTE: If respondent says "do you mean Obamacare or ACA," then say: "The national health reform law is sometimes referred to as Obamacare or the Affordable Care Act")
f. A health plan that you bought directly from an insurance company, not through an employer or union, and not through a health insurance Marketplace
g. Some other kind of health insurance I haven't already mentioned (SPECIFY TYPE:____)

If no to all:

h. Does this mean you have no health insurance of any kind?

If respondent does not currently have Medicaid:

i. In the past 12 months, did you ever lose Medicaid coverage or drop out of the program?

2) Do you have one person you think of as your personal doctor or health care provider?

3) At any time in the last year, have you waited to seek medical care or chosen not to seek medical care for an illness, injury, or condition because you couldn't afford it?

Last Year's Employment & Community Engagement Activities
Ask all

4) The next set of questions deal with employment and your ability to work. Thinking back to 12 months ago in [current month] 2017, did you work for pay at a job or business?

If employed:
5) At that time, how many hours did you usually work each week?

If not employed:
6) Again, thinking back to 12 months ago in [current month] 2017, did you have a disability or health problem that kept you from working?

If employed but working less than 20 hours a week:
7) At that time in 2017, including the hours you were working, were you spending at least 20 hours a week total on working plus any of the following activities?

a. As a full-time student
b. Participating in job training
c. Actively looking for work
d. On community service
e. On a combination of working at your job, job training, actively looking for work, and community service

If not employed and not disabled:
8) At that time in 2017, were you spending at least 20 hours a week total on any of the following activities?

a. As a full-time student
b. Participating in job training
c. Actively looking for work
d. On community service
e. On a combination of job training, actively looking for work, and community service

If not meeting any previous category:
9) At that time in 2017, were you either pregnant [if female], taking care of a child under 18 years old, or caring for a person who cannot care for him/herself?

Current Employment & Community Engagement Activities

Ask all
10) Now thinking about your present circumstances, do you work for pay at a job or business?

11) Currently, how many hours do you usually work each week?

If not employed:
12) Currently, do you have a disability or health problem that kept you from working?

If employed but working less than 20 hours a week:
13) Currently, including the hours you were working, are you spending at least 20 hours a week total on working plus any of the following activities?

a. As a full-time student
b. Participating in job training
c. Actively looking for work
d. On community service
e. On a combination of working at your job, job training, actively looking for work, and community service

If not employed and not disabled:
14) Currently, are you spending at least 20 hours a week total on any of the following activities?

a. As a full-time student
b. Participating in job training
c. Actively looking for work
d. On community service
e. On a combination of job training, actively looking for work, and community service

If not meeting any previous category:
15) Currently, are you either pregnant [if female], taking care of a child under 18 years old, or caring for a person who cannot care for him/herself?

<u>Arkansas-Specific Questions</u>

16) Starting in June 2018, Arkansas began requiring certain adults to work or engage in other activities like job training or school in order to qualify for Medicaid coverage. This new requirement is called the Arkansas Works program, and it is sometimes referred to as "work requirements." How much have you heard or read about this new requirement?

1 A lot
2 A little
3 Nothing at all

If in Medicaid, Marketplace coverage, or uninsured:

17) To your knowledge, (do you need to meet this requirement in order to keep your insurance coverage / would you need to meet this requirement in order to obtain Medicaid coverage), or are you not sure?

18) Do you personally receive any disability payments from Social Security or the state, sometimes called SSI? Do not include payments made to other members of your family.

If not receiving SSI:

19) Have you been told by the state that you need to report information regarding work or other activities in order to keep your insurance coverage, or not?

If told by state to report work activities:

20) Have you been regularly reporting your work hours or an exemption through the state's reporting portal, "Arkansas Works", or not? (INTERVIEWER NOTE: "An exemption means that you are not working, but you are meeting the requirements in another way or that you don't have to meet the requirements").

If required but not regularly reporting work activities:

21) What is the **main** reason you have not been regularly reporting your work hours or an exemption to the state?

1 You are not currently working and don't qualify for an exemption
2 You couldn't figure out how to use the system
3 You don't have internet access
9 Other (SPECIFY)

(Note – free text responses to OTHER were recoded into the other categories based on independent review by two of the study authors, with consensus reached on any areas of disagreement. 14 of 18 free text responses were reclassified, while 4 could not be reclassified and remained as "Other.")

APPENDIX TABLE S1: Health Insurance Status By Year, State, and Age Group

	Uninsured	Medicaid/ Marketplace	ESI	Other Insurance
Arkansas 30-49, 2016	10.5% (2.8)	70.5% (4.2)	10.6% (2.8)	8.3% (2.5)
Arkansas 30-49, 2018	14.5% (2.0)	63.7% (2.6)	12.2% (1.7)	9.5% (1.6)
Arkansas Other Ages, 2016	12.3% (2.3)	51.8% (3.2)	14.8% (2.5)	21.1% (2.5)
Arkansas Other Ages, 2018	13.1% (1.6)	55.7% (2.2)	13.1% (1.6)	18.1% (1.6)
Control States 30-49, 2016	16.2% (1.8)	59.0% (2.5)	15.8% (1.9)	9.0% (1.3)
Control States 30-49, 2018	16.2% (2.1)	60.4% (2.8)	13.4% (2.0)	10.0% (1.6)
Control States Other Ages, 2016	17.4% (1.5)	46.2% (1.9)	14.3% (1.3)	22.1% (1.6)
Control States Other Ages, 2018	20.2% (2.1)	44.9% (2.4)	16.3% (1.9)	18.5% (1.8)

Notes: All results report weighted percentages with each coverage type, with standard errors in parentheses. Study sample from telephone survey of low-income adults ages 19-64 conducted in Nov-Dec. 2016 and Nov-Dec. 2018. N= 5,955. All estimates are survey-weighted as described in the Methods.
Medicaid and Marketplace are combined since Arkansas' Medicaid expansion was implemented using a private insurance expansion, where most (but not all) expansion enrollees were placed in subsidized Marketplace coverage rather than traditional Medicaid. Coverage types were mutually exclusive and categorized using an insurance hierarchy – see Appendix Methods for details.
"Control States" = Kentucky, Louisiana, and Texas
"Other Ages" = 19-29 and 50-64.
"ESI" = Employer Sponsored Insurance

APPENDIX TABLE S2: Regression Estimates of Changes in Employer Coverage and Access to Care Associated with Arkansas's Medicaid Work Requirements

Outcome and Model	Employer-Sponsored Insurance (%)	Has a Personal Physician (%)	Cost-Related Delays in Care (%)
Difference-in-Difference-in-Difference (Sample contains all adults ages 19-64, n=5920): ***Post Work Requirements, Age 30-49, in Arkansas vs. Comparison Groups***			
Coefficient (Percentage Point Change)	7.1	1.1	-4.1
95% Confidence Interval	(-1.2, 15.3)	(-8.1, 10.2)	(-18.5, 10.2)
Difference-in-Difference (Sample contains only adults ages 30-49, n=2085): ***Post Work Requirements in Arkansas vs. Comparison Groups***			
Coefficient (Percentage Point Change)	3.8	-3.6	1.1
95% Confidence Interval	(-2.8, 10.5)	(-11.2, 4.0)	(-10.4, 12.6)

Notes: Study sample from telephone survey of low-income adults ages 19-64 conducted in Nov-Dec. 2016 and Nov-Dec. 2018 with sample sizes listed above, minus item non-response for each study outcome. All estimates are survey-weighted as described in the Methods. Standard errors were clustered by state-age group. All models adjusted for gender, self-reported race and ethnicity, education, language of the interview (English or Spanish), marital status, and urban vs. rural residence, as well as age group, state, and year. See Appendix Methods for full regression equations.

APPENDIX TABLE S3: Community Engagement Activities By Year, State, and Age Group

	Working > 20 hrs a week	Disabled	Looking for Work or Job Training	Student, Caretaker, Community Service or Other	NONE
Arkansas 30-49, 2017	42.4% (2.7)	39.3% (2.6)	5.4% (1.2)	9.5% (1.6)	3.3% (0.8)
Arkansas 30-49, 2018	38.9% (2.6)	43.0% (2.7)	5.6% (1.1)	8.7% (1.6)	3.9% (1.0)
Arkansas Other Ages, 2017	40.0% (2.2)	33.6% (1.9)	6.1% (1.1)	13.1% (1.6)	7.2% (1.1)
Arkansas Other Ages, 2018	37.1% (2.2)	35.6% (1.9)	9.1% (1.4)	11.8% (1.6)	6.4% (1.1)
Control States 30-49, 2017	45.2% (2.8)	30.8% (2.6)	8.0% (1.6)	9.8% (1.8)	6.3% (1.3)
Control States 30-49, 2018	39.5% (2.8)	34.9% (2.7)	8.5% (1.6)	11.8% (2.0)	5.3% (1.2)
Control States Other Ages, 2017	44.8% (2.4)	30.6% (2.1)	5.0% (1.0)	14.2% (1.8)	5.4% (1.0)
Control States Other Ages, 2018	40.5% (2.4)	34.0% (2.2)	6.2% (1.2)	13.7% (1.8)	5.6% (1.1)

Notes: All results report weighted percentages in each category, with standard errors in parentheses. Study sample from telephone survey of low-income adults ages 19-64 conducted in Nov-Dec. 2018. N= 3,004. Respondents were asked about these outcomes for the current year and for 12 months prior to the survey in 2017. All estimates are survey-weighted as described in the Methods.
Outcomes were assessed in a mutually-exclusive hierarchy, from bottom to top in each bar (e.g., if a person was working >20 hours a week, we did not assess whether he/she was disabled, looking for work, or a student/caretaker).
"Control States" = Kentucky, Louisiana, and Texas
"Other Ages" = 19-29 and 50-64.

APPENDIX TABLE S4: Regression Estimates of Changes in Hours Worked and Community Engagement Associated with Arkansas's Medicaid Work Requirements

Outcome and Model	Average Hours Worked Per Week (number)	No Community Engagement or Qualifying Exemption (%)
Difference-in-Difference-in-Difference (Sample contains all adults ages 19-64, n=5966): ***Post Work Requirements, Age 30-49, in Arkansas vs. Comparison Groups***		
Coefficient	-0.37	2.2
95% Confidence Interval	(-3.11, 2.38)	(-1.8, 6.2)
Difference-in-Difference (Sample contains only adults ages 30-49, n=2398): ***Post Work Requirements in Arkansas vs. Comparison Groups***		
Coefficient	0.47	1.2
95% Confidence Interval	(-2.03, 2.97)	(-1.9, 4.3)

Notes: Study sample from telephone survey of low-income adults ages 19-64 conducted in Nov-Dec. 2018 with sample sizes listed above, minus item non-response for each study outcome. Respondents were asked about their activities for the prior year (12 months earlier in 2017) and about the current year. Thus, each sample contains two observations per person (N=5966 person-years). The model used random effects at the individual person and state-age group levels to account for repeated observations. All estimates are survey-weighted as described in the Methods. All models adjusted for gender, self-reported race and ethnicity, education, language of the interview (English or Spanish), marital status, and urban vs. rural residence, as well as age group, state, and year. See Appendix Methods for full regression equations.

APPENDIX TABLE S5:
Changes in Employment and Community Engagement, Adjusting for Baseline Year Activity

Outcome and Model	Any Employment (%)	Average Hours Worked Per Week (number)	No Community Engagement or Qualifying Exemption (%)
Difference-in-Difference (Sample contains all adults ages 19-64, n=3004): ***Age 30-49, in Arkansas vs. Comparison Groups – Adjusted for Prior Year Activity***			
Coefficient	-0.4	-0.07	-0.5
95% Confidence Interval	(-6.8, 5.9)	(-2.10, 1.96)	(-2.9, 1.9)
State Comparisons (Sample contains only adults ages 30-49, n=1199): ***Arkansas vs. Comparison States***			
Coefficient	0.1	0.01	0.1
95% Confidence Interval	(-7.8, 7.9)	(-2.42, 2.43)	(-1.8, 1.9)

Notes: Study sample from telephone survey of low-income adults ages 19-64 conducted in Nov-Dec. 2018. Sample excludes observations with missing values for outcomes for either the current year or last year. Respondents were asked about their activities for the prior year (12 months earlier in 2017) and about the current year. Each observation adjusted directly for the prior year's response for a given outcome; thus, the sample contains a single observation per person (e.g. controlling for last year's employment in the model of the current year's employment). All estimates are survey-weighted as described in the Methods. Standard errors were clustered by state-age group. All models adjusted for gender, self-reported race and ethnicity, education, language of the interview (English or Spanish), marital status, and urban vs. rural residence, as well as age group, state, and year. See Appendix Methods for full regression equations.

APPENDIX TABLE S6: Awareness of and Experience with Medicaid Work Requirements Among Arkansas Residents, 2018

Variable	Percent
Heard of Work Requirements ("A lot" or "A little," vs. "Nothing at all")	
All Arkansas Residents (N=1,501)	52.1
Arkansas Residents 30-49 with Medicaid / Marketplace in past year (N=429)	67.1
Thinks They are or Would Be Subject to Arkansas's Work Requirements	
Ages 30-49 in Medicaid, Marketplace, or Uninsured (N=466)	
—Yes	21.8
—No or Exempt	34.0
—Not Sure	44.2
Ages 30-49 in Medicaid, Marketplace, or Uninsured ***who have heard*** of work requirements (N=296)	
—Yes	28.2
—No or Exempt	40.0
—Not Sure	31.8
Ages 30-49 in Medicaid, Marketplace, or Uninsured ***who have not heard*** of work requirements (N=170)	
—Yes	11.6
—No or Exempt	24.4
—Not Sure	63.9
Ages 19-29 or 40-64 in Medicaid, Marketplace, or Uninsured (N=593) *[NOTE this group is NOT subject to work requirements]*	
—Yes	14.4
—No or Exempt	35.4
—Not Sure	50.2
Told By State that They Need to Report Work Activity or an Exemption	
Ages 30-49 with Medicaid / Marketplace in past year, not on SSI (N=305)	30.5
Share Who are Regularly Reporting Information to the State	
Among those told by the state to report (N=96)	49.3
Main Reason for Not Reporting to State, Even Though Required (N=46)	
—Not currently working and don't qualify for an exemption	40.4
—No Internet access	32.3
—Confused / couldn't figure out how to use the system	17.8
—Other	9.5
Community Engagement / Exemption Status Among Those Not Reporting Because They Think They Don't Meet the Requirements (N=22)	
—Disabled	41.5
—Working ≥ 20 Hours a Week	28.7
—Job Training or Job Search ≥ 20 Hours a Week	16.8
—Student, Community Service, or Taking Care of a Child / Other Household Member	13.1
—No Qualifying Activity or Exemption	0.0

Notes: Authors' analyses of survey responses of US citizens with incomes below 138% FPL between the ages of 19-64 living in Arkansas. All responses are survey weighted to produce representative estimates. See Appendix Methods for precise question wording.

APPENDIX TABLE S7:
Demographic Predictors of Having Heard About Medicaid Work Requirements, Among Low-Income Adults in Arkansas

	Odds Ratio	**95% Confidence Interval**	**p-value**	Predicted Probability (%)
Health Insurance				
Medicaid or Marketplace	2.04	1.50, 2.78	<0.001	60.3%
Uninsured	0.78	0.48, 1.25	0.30	37.6%
Medicare, Employer-Sponsored, or Other	1.00	Reference	--	43.5%
Age Group				
19-29 years old	0.51	0.34, 0.78	0.002	44.3%
30-39 years old	1.00	Reference	--	59.6%
40-49 years old	0.83	0.53, 1.29	0.41	55.4%
45-54 years old	0.72	0.47, 1.08	0.11	52.0%
55-64 years old	0.94	0.57, 1.53	0.79	58.1%
Race/Ethnicity				
Latino	0.79	0.45, 1.40	0.42	49.1%
Black, Not Latino	0.74	0.53, 1.03	0.072	47.6%
Other, Not Latino	0.72	0.44, 1.19	0.20	47.0%
White, Not Latino	1.00	Reference	--	54.6%
Educational Attainment				
No High School Degree	0.43	0.29, 0.64	<0.001	39.8%
High School Graduate or GED	0.69	0.50, 0.95	0.023	50.7%
Some College or College Graduate	1.00	Reference	--	59.2%
Other Characteristics				
Male (vs. Female)	0.74	0.56, 0.97	0.030	48.2%
Live in Rural Area (vs. Urban)	0.89	0.67, 1.18	0.41	50.8%
Spanish Interview (vs. English)	0.51	0.78, 3.25	0.47	36.8%
Married / Partnered (vs. Not Married)	1.04	0.78 ,1.39	0.78	52.7%
N		**1,501**		

Notes: Study sample from telephone survey of low-income adults ages 19-64 living in Arkansas, conducted in Nov-Dec. 2018. All estimates are survey-weighted as described in the Methods. Odds Ratios are from a logistic regression model. Predicted probabilities were obtained using the Stata "margins" command.

APPENDIX TABLE S8:
Pre-Policy Testing of Coverage and Employment Outcomes for 30-49 year-olds in Arkansas vs. Comparison Groups

Outcome and Model	Medicaid or Marketplace Coverage (%)	Uninsured (%)	Employer-Sponsored Insurance (%)	Currently Employed (%)	Hours Worked Per Week (number)
Difference-in-Difference-in-Difference (Sample contains all adults 19-64, n= 72,193): ***2016 vs. 2017, Age 30-49, in Arkansas vs. Comparison Groups***					
Coefficient (Percentage Point Change)	3.1	-0.5	2.7	-0.1	-0.03
95% Confidence Interval	(-3.8, 9.9)	(-4.6, 3.5)	(-3.7, 9.0)	(-6.5, 6.2)	(-1.39, 1.34)
p-value	0.37	0.80	0.39	0.96	0.97
Difference-in-Difference (Sample contains only adults ages 30-49, n=26,325): ***2016 vs. 2017 in Arkansas vs. Comparison Groups***					
Coefficient (Percentage Point Change)	3.6	-0.4	-0.9	2.1	0.52
95% Confidence Interval	(-3.1, 10.2)	(-4.1, 3.2)	(-7.0, 5.1)	(-3.2, 7.5)	(-0.44, 1.47)
p-value	0.24	0.78	0.72	0.38	0.24

Notes: Study sample from the 2016 and 2017 public-use versions of the American Community Survey, including low-income U.S. citizens ages 19-64 with incomes below 138% of the Federal Poverty Level and living in Arkansas, Kentucky, Louisiana, and Texas. This model tests for divergence in outcomes between treatment and comparison groups in 2016 vs. 2017, *prior* to the implementation of Arkansas' work requirements.
All estimates use the standard survey weights Standard errors were clustered by state-age group. Coverage types were mutually exclusive and categorized using an insurance hierarchy – see Appendix Methods for details. All models adjusted for gender, self-reported race and ethnicity, education, language proficiency (English or other), marital status, and urban vs. rural residence as captured by area-level (public use microdata area) fixed effects, as well as age group, state, and year. See Appendix Methods for full regression equations.

APPENDIX REFERENCES

1. Karaca-Mandic P, Norton EC, Dowd B. Interaction terms in nonlinear models. Health Serv Res 2012;47:255-74.
2. Begg CB, Gray R. Calculation of Polychotomous Logistic Regression Parameters Using Individualized Regressions. Biometrika 2019;71:11-8.
3. Sommers BD, Blendon RJ, Orav EJ, Epstein AM. Changes in Utilization and Health Among Low-Income Adults After Medicaid Expansion or Expanded Private Insurance. JAMA Intern Med 2016;176:1501-9.
4. Miller S, Wherry LR. Health and Access to Care during the First 2 Years of the ACA Medicaid Expansions. N Eng J Med 2017;376:947-56.
5. Sommers BD, Baicker K, Epstein AM. Mortality and access to care among adults after state Medicaid expansions. N Engl J Med 2012;367:1025-34.
6. McMorrow S, Gates JA, Long SK, Kenney GM. Medicaid Expansion Increased Coverage, Improved Affordability, And Reduced Psychological Distress For Low-Income Parents. Health Aff (Millwood) 2017;36:808-18.
7. Westfall PH, Young SS. Resamplingbased multiple testing: examples and methods for p-value adjustment. New York: John Wiley & Sons, 1993.
8. Finkelstein A, Taubman S, Wright BJ, et al. The Oregon Health Insurance Experiment: Evidence from the First Year. Quarterly Journal of Economics 2012;127:1057-106.