It is illegal to post this copyrighted PDF on any website. Insurance Coverage and Health Outcomes in Young Adults With Mental Illness Following the Affordable Care Act Dependent Coverage Expansion

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ABSTRACT

Objective: As a provision of the Affordable Care Act, young adults were able to remain on their parents' health insurance plans until age 26. We examined the impact of the 2010 dependent coverage expansion on insurance coverage and health outcomes among young adults with mental illness.

Methods: Data are from the 2008–2013 National Survey on Drug Use and Health, an annual population-based survey of noninstitutionalized US individuals aged 12 and older. We used a difference-in-differences approach to compare young adults with mental illness subject to the provision (aged 19–25 years, n = 19,051) with an older comparison group (aged 26–34 years, n = 7,958) before (2008–2009) and after (2011–2013) the dependent coverage expansion in their insurance coverage, use of health services, and self-reported health.

Results: In adjusted analyses, following the dependent coverage expansion, private insurance coverage increased by 11.7 percentage points (95% CI, 8.4-15.1, P < .001) and uninsurance decreased by 8.9 percentage points (95% CI, -12.1 to -5.7, P < .001) among 19- to 25-year-olds with mental illness, relative to 26- to 34-year-olds. The provision was associated with a modest increase in young adults with mental illness who received outpatient mental health treatment at least monthly on average (+2.0% [95% Cl, 0.1% to 4.0%, P=.04]) and a modest decrease in those reporting their overall health as fair or poor (-2.3% [95% Cl, -4.6% to -0.0%, P=.05]). Unmet mental health needs due to cost decreased significantly among those with moderate-to-serious mental illness (-12.3% [95% CI, -22.7% to -2.0%, P=.02]), but did not change among those with mild illness.

Conclusions: The 2010 dependent coverage expansion was associated with an increase in insurance coverage, several indicators of mental health treatment, and improved self-reported health among young adults with mental illness.

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*Corresponding author: Nicole Kozloff, MD, SM, SM1 Program, Department of Health Policy and Management, Harvard T. H. Chan School of Public Health, 677 Huntington Ave, Boston, MA 02115 (n.kozloff@mail.utoronto.ca). **Y** oung adults in the United States have historically had the lowest rates of health insurance coverage compared with all other age groups, leading to significant barriers to health care.¹ Young adults also face a high burden of mental illness: around three-quarters of all mental disorders start by age 24.² Average delays in treatment-seeking among Americans with mental disorders exceed a decade, despite the importance of early intervention.³ Even among people with severe mental illness, most do not receive mental health treatment, and young adults are the age group least likely to receive minimally adequate treatment.⁴ People with mental illness.⁵ Health system factors, including health insurance coverage, contribute to excess mortality among people with mental illness.⁶

Beginning in September 2010, the dependent coverage provision of the Affordable Care Act (ACA) extended private health insurance coverage to individuals up to age 26 under their parents' plans. Studies prior to the dependent coverage expansion showed that 5% to 8% of young Americans lost health insurance coverage shortly after their 19th birthdays, leading to significant decreases in the use of medical services.⁷ It has been estimated that approximately 3 million uninsured young adults gained health insurance between September 2010 and December 2011, increasing rates of coverage by over 10%.⁸ Together with the Mental Health Parity and Addiction Equity Act of 2008, which requires that mental health and substance use disorder benefits in a given plan be comparable to medical and surgical benefits, the dependent coverage expansion would be expected to facilitate a major expansion of mental health care to young adults. Several studies have documented the overall impact of the dependent coverage expansion on young adults, including improved access to care, decreased out-of-pocket spending, and improved self-reported physical and mental health.⁹⁻¹¹

However, fewer studies have specifically examined the effect of the dependent expansion on young adults with mental illness. One study documented increased admissions and decreased growth in emergency department (ED) visits for mental health reasons among young adults following the ACA's dependent coverage expansion.¹² Other research showed that young adults with possible mental illness experienced a shift in payer mix for visits away from being uninsured toward more private insurance,¹³ and those with diagnosed behavioral health disorders were significantly less likely to have high levels of out-of-pocket spending after the dependent coverage expansion.¹⁴ Our study builds on this literature by examining a wider range of outcomes among young people identified as having mental illness using a sensitive and well-validated tool. Although the majority of people with mental health and substance use disorders access care in outpatient facilities,¹⁵ this setting has been previously understudied with respect to the dependent coverage expansion. Furthermore, we

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- Young adults have a significant need for mental health services yet have historically had the lowest rates of health insurance coverage.
- The Affordable Care Act's policy of expanding insurance to young adults under their parents' plans improved insurance rates, rates of outpatient mental health care, and self-rated health in young people with mental illness.

also are able to assess for differential effects based on the level of severity of mental illness in our sample.

The objectives of this study were to assess the effect of the ACA dependent coverage provision on insurance coverage, health service use, and self-reported health in young people with mental illness and to assess how these changes vary based on the severity of mental illness.

METHODS

Data and Study Population

We used publicly available data from the 2008 to 2013 National Survey on Drug Use and Health (NSDUH) administered by the Substance Abuse and Mental Health Services Administration. NSDUH is an annual crosssectional survey of noninstitutionalized members of US households selected through a stratified random sample of addresses as well as people residing in noninstitutional group quarters, homeless shelters, and single-room occupancy hotels. The survey covers use and misuse of drugs and alcohol, mental health problems, and experiences with mental health and substance use treatment.

From 2008 to 2012, a subsample of NSDUH respondents completed a detailed psychiatric questionnaire, the Structured Clinical Interview for DSM-IV, which was used to refine the screening tool for mental illness used in the larger NSDUH survey.¹⁶ The survey was then back-coded to identify all respondents with mental illness since 2008 based on the following survey items: age, past-year serious thoughts of suicide, major depressive episode, worst level of distress based on the Kessler-6 screening instrument,^{17,18} and number of daily activities that a respondent had moderate or severe difficulty performing or did not perform due to problems with emotions, nerves, or mental health based on the World Health Organization Disability Assessment Schedule.^{19,20} Threshold scores were generated to categorize respondents as having mild, moderate, and serious mental illness. When compared with clinical data, previous analyses of this measure indicated that it had a sensitivity of 0.569, specificity of 0.906, and an area under the receiver operating characteristic curve of 0.738; these results all indicate improved test performance compared to previous methods.²¹

Our sample contained adults aged 19 to 34 years with mild, moderate, or serious mental illness. This study was deemed exempt by the Harvard University Human Research Protection Program since it used only secondary deidentified data.

We categorized respondents as having mental illness in the past year according to NSDUH's updated screening tool. We grouped NSDUH's defined age categories to create categories of adults aged 19-25, 26-29, and 26-34 years. Outcomes were the proportion of respondents with insurance coverage, health services use, and self-reported health. Insurance coverage outcomes were private insurance coverage, public insurance coverage (Medicaid, Children's Health Insurance Program, Medicare, or military/veteran coverage), other health insurance, or no health insurance. Health service use outcomes were any past-year inpatient mental health treatment, any outpatient mental health treatment, having an average of at least 12 (ie, monthly) outpatient mental health visits, prescription mental health treatment, the log of out-of-pocket expenses for inpatient and outpatient mental health treatment, alcohol or drug treatment (among ever-users), and ED use. The variable for number of outpatient mental health visits was generated by adding together several variables for outpatient visits in different mental health settings (eg, outpatient mental health center). The variable for out-of-pocket expenses combined separate variables for inpatient and outpatient mental health treatment, each with a minimum of "less than \$100" and a maximum of "more than \$5,000." We added the midpoint of each expense range for inpatient and outpatient expenses and then took the logarithm of this variable to account for positive skewness and top-coding. Access measures were perceived unmet need for mental health care and unaffordable cost as the reason for not receiving mental health care in the past 12 months. We analyzed self-rated health in 4 categories (excellent, very good, good, or fair/ poor) in the last 12 months. Demographic variables used as covariates included gender, self-reported race/ethnicity, highest completed education, and size of metropolitan statistical area.

Statistical Analysis

We used a difference-in-differences analysis to estimate the effect of the dependent coverage expansion on the target population of 19- to 25-year-olds relative to 26- to 34-yearolds before (2008-2009) and after (2011-2013) the provision. This quasi-experimental study design uses a slightly older comparison group not subject to the dependent coverage expansion but expected to be influenced by similar economic and health trends, isolating the effect of the provision. This design has been used in several previous studies of the ACA dependent coverage expansion.^{10,11,13,22-24} A 26- to 34-yearold comparison group, consistent with use in many of these studies, is close enough in age to have experienced similar conditions in the workforce and health insurance market (other than the provision) as 19- to-25-year-olds and large enough to optimize sample size for greater statistical power, particularly since NSDUH sample sizes decrease with age.^{10,11,13,23,24}

We modeled time trends in 19- to 25-year-olds relative to 26- to 34-year-olds preceding the dependent coverage

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expansion (ie, 2008–2009) for each of our outcomes of interest to examine changes unrelated to the expansion, both unadjusted and adjusted for demographic variables not expected to change with the dependent coverage expansion (sex, race/ ethnicity, education, and urban/rural status). None of the pre-ACA trends for any of our outcomes were significantly different for 19- to 25-year-olds relative to 26- to 34-year-olds.

We calculated baseline (2008–2009) demographics describing the study population. Prior to examining our main outcomes of interest, we needed to determine if rates of mental illness changed with the expansion, which would bias our results. Rates of mental illness could plausibly change in young adults, for example, if the expansion lessened financial hardship and improved access to treatment. We also used a difference-in-differences analysis to address this question and found no evidence for changing rates of underlying mental illness overall or stratified by severity (mild and moderate-to-serious) as a result of the policy.

We fit generalized linear models, unadjusted and adjusted for sex, race/ethnicity, education, and urban/rural status, using the identity link function for all outcomes except out-of-pocket mental health expenses, for which we used the log link function. We conducted sensitivity analyses to determine whether our results were robust to our chosen comparison group (comparing the 19- to 25-year-olds to 26- to 29-year-olds instead of 26- to 34-year-olds) and inclusion of mental illness severity as a covariate in our adjusted model. We then stratified our analysis by level of mental illness to determine the effect of the expansion on those with mild and moderate-toserious mental illness, based on NSDUH's validated severity index.

We conducted all of our statistical analyses in Stata 14 (StataCorp, College Station, TX) and used the survey weights provided by NSDUH for all analyses to yield national estimates. We used a 2-tailed significance level of .05 for all analyses.

RESULTS

Between 2008 and 2013, 97,092 19- to 25-yearolds and 33,594 26- to 34-year-olds completed NSDUH interviews. During that same period, 19,051 19- to 25-year-olds and 7,958 26- to 34-yearolds in the sample were identified as having mental illness. The proportion of the population with mental illness averaged 19.2% among 19- to 25-yearolds and 22.6% among 26- to 34-year-olds and was stable during the study period (difference-indifference estimate, 0.3 percentage points [95% CI, -1.2 to 1.9, P = .67]). Table 1 presents demographic characteristics of adults with mental illness by age

Table 1. Characteristics of the Intervention Group (aged 19–25 y) and Comparison Group (aged 26–34 y) With Mental Illness in 2008–2009^a

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	Dependent	Comparison
	Coverage Group	Group
	(Aged 19–25 y)	(Aged 26–34 y)
Characteristic	(n=6,104)	(n=2,707)
Female	60.7	61.3
Race/ethnicity		
Non-Hispanic white	65.1	66.5
Non-Hispanic black	11.8	12.1
Hispanic	16.4	15.1
Non-Hispanic other or mixed	6.7	6.3
Highest level of education		
Less than high school	13.4	11.4
High school	31.5	26.8
Some college	38.0	30.4
College graduate	17.1	31.3
Urban/rural status		
Large metropolitan area	55.7	52.9
Small metropolitan area	30.2	31.8
Non-metropolitan area	14.1	15.3
Mental illness severity		
Mild	52.4	53.6
Moderate-to-serious	47.2	46.4
Mental illness definition components (past-year)		
Worst level of distress on Kessler-6 (mean \pm SD)	8.4 ± 0.1	6.9 ± 0.1
WHODAS (mean ± SD)	4.4 ± 0.0	4.0 ± 0.1
Major depressive episode	41.9	35.1
Suicidal thoughts	32.9	18.5
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^aData are presented as weighted percentages of survey participants, except where otherwise indicated as a (mean±SD).

Abbreviations: WHODAS = World Health Organization Disability Assessment Schedule.



Figure 1. Private Health Insurance Coverage Among 19- to 25-Year-Olds and 26- to 34-Year-Olds With Mental Illness by Year, 2008 to 2013

group. The sample in both age groups was roughly 60% female, and nearly two-thirds were white.

Figure 1 shows the unadjusted time trends of the proportion of adults aged 19 to 34 years with mental illness with private insurance coverage by age group. The age groups diverge after 2010, when the ACA dependent coverage provision first took effect. Table 2 shows the changes in insurance coverage, health services use, and self-reported health in both age groups before and after the dependent coverage expansion and the overall difference-in-differences estimates from the multivariate analysis. Our results below focus primarily on the adjusted difference-in-differences results. The dependent coverage expansion was associated with an 11.7 percentage point increase (95% CI, 8.4 to 15.1, P < .001) in private insurance coverage and an 8.9

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Table 2. Effect of the ACA Dependent Coverage Expansion on Health Outcomes in Adults Aged 19–25 and 26–34 Years With Mental Illness^a

	Unadjusted					Adjusted for Sex		
	Dependent Coverage Group (Aged 19–25 y)		Comparison Group (Aged 26–34 y)		Difference-In-		Race/Ethnicity, Educati Urban/Rural Status	
	2008-2009	2011-2013	2008-2009	2011-2013	Difference	Р	Difference	Р
Outcome	(n=6,104)	(n=9,751)	(n=2,707)	(n=3,911)	(95% CI)	Value	(95% CI)	Value
Insurance coverage ^b								
No health insurance	31.1	25.1	24.5	27.4	-8.9 (-12.2 to -5.5)	<.001	-8.9 (-12.1 to -5.7)	<.001
Private	50.1	54.9	57.7	51.1	11.5 (7.7 to 15.3)	<.001	11.7 (8.4 to 15.1)	<.001
Public (CHIP, Medicaid, Medicare, military)	17.1	18.6	17.8	20.2	-1.0 (-4.1 to 2.2)	.55	-1.1 (-4.0 to 1.8)	.45
Other	9.9	13.2	7.2	8.5	2.0 (-1.9 to 5.9)	.30	1.8 (–1.9 to 5.5)	.35
Mental health treatment								
Any inpatient treatment	3.6	3.6	3.4	2.3	1.1 (-0.5 to 2.7)	.18	1.1 (–0.5 to 2.7)	.17
Any outpatient treatment	19.5	21.1	22.7	21.4	2.9 (-0.5 to 6.3)	.09	3.1 (-0.3 to 6.5)	.07
At least monthly outpatient visits	6.1	7.1	8.0	7.1	1.9 (-0.1 to 4.0)	.06	2.0 (0.1 to 4.0)	.04
Any prescription treatment	24.8	26.4	32.4	31.2	2.8 (-0.9 to 6.4)	.14	2.9 (-0.7 to 6.5)	.11
Log of average inpatient and outpatient out-of-pocket expenses	4.2	4.5	4.4	4.4	17.6 (-37.8 to 73.1)	.53	20.5 (-12.8 to 53.7)	.23
Other health care use								
Alcohol or drug treatment	6.0	5.8	5.3	5.7	–0.6 (–2.3 to 1.1)	.49	-0.5 (-2.2 to 1.2)	.58
Emergency department visit	43.2	42.0	41.1	39.0	1.0 (–3.5 to 5.5)	.65	1.0 (–3.5 to 5.6)	.65
Perceived unmet mental health need	29.8	28.2	26.3	25.6	-0.9 (-4.3 to 2.4)	.58	-0.8 (-4.2 to 2.6)	.63
Unmet need due to cost	50.4	47.4	50.3	55.9	-8.6 (-17.5 to 0.3)	.06	-8.6 (-17.4 to 0.2)	.06
Overall health rating fair/poor	11.2	10.8	12.2	14.2	-2.3 (-4.6 to -0.1)	.04	-2.3 (-4.6 to -0.0)	.05
^a Data are presented as weighted percentages	of survey par	ticipants.						

^bAll items were reported for the period of the past year.

Abbreviations: ACA = Affordable Care Act, CHIP = Children's Health Insurance Program.

Figure 2. Rates of any Outpatient Mental Health Treatment Among 19- to 25-Year-Olds and 26- to 34-Year-Olds With Mental Illness by Year, 2008 to 2013



percentage point decrease (95% CI, -12.1 to -5.7, P < .001) in the uninsured rate among 19- to 25-year-olds year olds with mental illness, relative to the comparison group.

Figure 2 presents rates of receiving any outpatient mental health treatment among adults aged 19 to 34 years with mental illness by age group and year. Whereas more 26- to 34-year-olds than 19- to 25-year-olds received treatment prior to 2010, following the dependent coverage expansion, treatment rates converged in the 2 age groups. In the adjusted analysis, outpatient mental health treatment increased by 3.1 percentage points, which was not statistically significant (95% CI, -0.3 to 6.5, P=.07). The dependent coverage expansion resulted in a statistically significant change in receiving

outpatient mental health treatment at least monthly on average (2.0 percentage points [95% CI, 0.1 to 4.0, P = .04]). The share of young adults with mental illness reporting fair or poor health decreased by 2.3 percentage points (95% CI, -4.6 to -0.0, P = .05), relative to the comparison group. We did not detect any statistically significant changes in the remaining outcomes, including inpatient, substance abuse or prescription mental health treatment, out-of-pocket mental health spending, ED use, or perceived unmet mental health treatment need.

Subgroup Analysis by Severity of Mental Illness

When we stratified our results by severity of mental illness (mild vs moderate-to-serious), we found similar gains in coverage for young adults in both groups (Table 3). Changes in rates of any outpatient mental health treatment (4.5 percentage points, P=.08; vs 2.5 percentage points, P=.22) and self-reported health (-3.6 percentage points, P=.08; vs -0.8 percentage points, P=.59) both appeared larger among those with moderate-to-serious mental illness than those with mild illness, though the changes were not statistically significant in either group. Those with moderate-to-serious mental illness experienced a statistically significant decrease in reporting unmet mental health needs due to cost (-12.3 percentage points [95% CI, -22.7 to -2.0, P=.02]), with no significant change in that outcome for those with mild illness.

Sensitivity Analyses

In sensitivity analyses, changing our comparison group from 26- to 34-year-olds to 26- to 29-year-olds resulted in 2 small differences: the relative decrease in self-rating

t is illegal to post this copyrighted PDF on any website. Table 3. Changes in Coverage, Treatment, and Self-Reported Health in Adults Aged 19–25 and 26–34 Years With Mild and Moderate-To-Serious Mental Illness After the ACA Dependent Coverage Expansion^{a,b}

	Mild Mental Illness (n=11,569) ^c		Moderate-To-Serious Mental Illness (n = 10,904)			
	Treatment vs Comparison, Difference-In-Difference P		Treatment vs Comparison, Difference-In-Difference P			
Outcome	(95% CI)	Value	(95% CI)	Value		
Insurance coverage ^d						
No health insurance	-6.3 (-10.5 to -2.1)	.003	-11.7 (-16.8 to -6.7)	<.001		
Private	11.8 (7.4 to 16.1)	<.001	11.5 (6.6 to 16.4)	<.001		
Public (CHIP, Medicaid, Medicare, military)	-3.3 (-7.2 to 0.7)	.11	1.5 (–2.3 to 5.3)	.43		
Other	-0.7 (-6.7 to 5.2)	.81	4.2 (-1.8 to 10.2)	.17		
Mental health treatment						
Any inpatient treatment	0.6 (-0.5 to 1.8)	.27	1.9 (–1.1 to 4.9)	.22		
Any outpatient treatment	2.5 (-1.5 to 6.6)	.22	4.5 (-0.6 to 9.6)	.08		
At least monthly outpatient visits	1.8 (-0.1 to 3.7)	.06	2.6 (-0.8 to 6.1)	.14		
Any prescription treatment	3.1 (-0.7 to 6.9)	.11	3.6 (-2.0 to 9.2)	.21		
Log of average inpatient and outpatient out-of-pocket expenses	34.0 (-100.9 to 168.8)	.62	-8.8 (-93.5 to 75.9)	.84		
Other health care use						
Alcohol or drug treatment	-1.0 (-3.1 to 1.2)	.39	0.3 (-2.8 to 3.4)	.85		
Emergency department visit	1.9 (-3.3 to 7.2)	.47	0.3 (-6.0 to 6.6)	.92		
Perceived unmet mental health need	-2.7 (-6.5 to 1.1)	.16	2.4 (-2.3 to 7.1)	.31		
Unmet need due to cost	-0.2 (-15.4 to 15.1)	.98	-12.3 (-22.7 to -2.0)	.02		
Overall health rating fair/poor	-0.8 (-3.7 to 2.1)	.59	-3.6 (-7.7 to 0.4)	.08		

^aData are presented as weighted percentages of survey participants.

^bModel adjusted for sex, race/ethnicity, education, and urban/rural status.

^cSample sizes were calculated for all participants aged 19–34 y before (2008–2009) and after (2011–2013) the dependent coverage expansion.

^dAll items were reported for the period of the past year.

Abbreviations: ACA = Affordable Care Act, CHIP = Children's Health Insurance Program.

overall health as fair or poor among 19- to 25-year-olds became statistically nonsignificant (-1.7% [95% CI, -4.8% to 1.4%, P=.29]), and the decrease in reporting unmet mental health need due to cost among 19- to 25-year-olds became statistically significant (-11.1% [95% CI, -21.4% to -0.8%, P=.04]) (Supplementary eTable 1). Directly adjusting for mental illness severity in the model in Table 2 resulted in 2 small differences: the relative increase in outpatient mental health treatment among 19- to 25-year-olds became statistically significant (+3.5% [95% CI, 0.2% to 6.7%, P=.04]) and the decrease in reporting health status as fair or poor among 19- to 25-year-olds became statistically inonsignificant (-2.1% [95% CI, -4.4% to 0.0%, P=.06]).

DISCUSSION

Using a large, nationally representative survey, we found that the ACA's 2010 dependent coverage expansion increased overall and private insurance coverage among young adults with mental illness compared with older adults unaffected by the provision. Our analysis also revealed indications of improved mental health care access, including increased rates of at least monthly outpatient mental health visits. We also found suggestive evidence that the changes in outpatient treatment rates and cost-related barrier to mental health care were larger for those with moderate-to-serious mental illness, compared to those with mild illness. Lastly, our results suggest that young adults with mental illness subject to the dependent coverage expansion experienced an improvement in their overall perceived health status, as indicated by a modest decrease in the percentage of those who rated their health as fair or poor.

These findings are broadly consistent with the research literature on impact of the ACA dependent coverage expansion, but with several novel features. Numerous studies have documented improvements in health insurance coverage in young adults in general following this provision.^{10,22,23} Our findings extend the results of a study by Saloner and Le Cook¹³ that identified increased private insurance coverage and decreased rates of uninsurance among young adults with possible mental illness, but add further evidence that the policy has improved insurance coverage among young people with both mild and moderate-to-serious mental illness. Our results also suggest that outpatient mental health treatment responded more noticeably to the ACA provision, without significant changes in inpatient mental health care. This differs from the results of a study by Golberstein et al¹² using data from the National Inpatient Sample representing US nonspecialty community hospitals, which found an increase in national inpatient admissions with primary psychiatric diagnoses as a result of the dependent coverage expansion. The discrepancy could be explained by differences in survey methodology, including use of hospital-collected data compared with self-report, and that the National Inpatient Sample captures only nonspecialty hospitals.

We also did not find a significant effect of the dependent coverage provision on alcohol or drug treatment among young adults with mental illness, consistent with prior work.¹³ This may reflect nonfinancial barriers to substance abuse treatment, including stigma and waitlists for treatment,

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It is illegal to post this copy as well as ongoing economic barriers such as high cost sharing that could deter newly insured young adults from seeking care.¹³ Additionally, newly insured young adults with mental illness may preferentially use mental health treatment rather than substance treatment, since insurance benefits for mental health treatment tend to be more generous.²⁵

Perhaps most importantly, this pattern of increased coverage and outpatient mental health treatment utilization appears to be associated with improvements in how young adults with mental illness described their overall health. While our finding of a reduction in the share of young adults with mental illness reporting fair or poor health was small, it is consistent with documented improvements in self-reported health among young adults in general after the policy.⁹ Given that mental illness is one of the most common causes of morbidity in this age group, this finding is suggestive evidence that the policy has been an effective approach in meeting the health needs of young adults.

Our study has several notable limitations. First, while NSDUH surveys a large representative sample, it does not collect data from individuals who are homeless and not staying in shelters, incarcerated, or active duty military personnel. Although NSDUH has been designed to promote honesty and recall, self-reported data—particularly on stigmatized conditions such as mental illness—may be subject to reporting biases. While the model to identify mental illness was validated against a structured clinical interview in a subset of participants, we did not have access to any detailed clinical information for our analysis from **coded Surveys** using their revised mental illness definition to 2008, we were unable to establish a baseline trend using any more than 2 years of data. Finally, while our study design has been widely used and is appropriate for determining the impact of large-scale policy interventions, drawing causal inference from difference-in-differences methods relies on the assumption that no factors other than the policy changed differentially for the target group and comparison group. It is possible that unmeasured factors differentially impacted the young adults in our study relative to the older comparison group, though our analysis of pre-2010 data suggests that trends for our study outcomes were similar for the 2 age groups before the ACA took effect.

Our study also has several strengths. To our knowledge, it is the first to examine the impact of a major ACA provision on a range of health and health care access outcomes in young adults stratified by severity of mental illness. It is further strengthened by the use of both nationally representative data and a validated tool to identify severity of mental illness, as well as a rigorous quasi-experimental study design. Overall, we found that the dependent coverage expansion led to increased insurance coverage and access to outpatient mental health care as well as improved overall health among young adults with mental illness. However, even after these changes, significant numbers of young adults with mental illness lack insurance or face barriers to appropriate care, suggesting that more research is needed on barriers to health care among this vulnerable population.

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Supplementary material: See accompanying pages.

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Supplementary material follows this article.



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Supplementary Material

- Article Title: Insurance Coverage and Health Outcomes in Young Adults With Mental Illness Following the Affordable Care Act Dependent Coverage Expansion
- Author(s): Nicole Kozloff, MD, SM, and Benjamin D. Sommers, MD, PhD

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List of Supplementary Material for the article

1. <u>eTable 1</u> Effect of the ACA Dependent Coverage Expansion on Health Outcomes in Adults Aged 19–25 y and 26–29 y With Mental Illness

Disclaimer

This Supplementary Material has been provided by the author(s) as an enhancement to the published article. It has been approved by peer review; however, it has undergone neither editing nor formatting by in-house editorial staff. The material is presented in the manner supplied by the author.

eTable 1. Effect of the ACA dependent coverage expansion on health outcomes in adults aged 19-25 y and 26-29 y with mental illness^a

	Unadjusted					Adjusted for sex,		
						urban/rural status		
Outcome	Dependen Gr (Aged	t Coverage oup 19-25 v)	Comparison group (Aged 26-29 y)		Difference-in- difference (95% CI)	P value	Difference-in- difference (95% CI)	P value
	2008- 2009 (n=6104)	2011- 2013 (n=9751)	2008- 2009 (n=1286)	2011- 2013 (n=1819)				
Insurance coverage ^b								
No health insurance	31.1	25.1	27.9	30.1	-8.2 (-12.9 to - 3.4)	.001	-8.0 (-12.6 to - 3.4)	.001
Private	50.1	54.9	54.0	47.9	11.1 (6.3 to 15.8)	<.001	11.5 (7.1 to 15.8)	<.001
Public (CHIP, Medicaid, Medicare, Military)	17.1	18.6	18.0	20.3	-0.8 (-5.1 to 3.5)	.72	-1.4 (-5.5 to 2.8)	.52
Other	9.9	13.2	6.8	8.9	1.2 (-3.9 to 6.3)	.65	1.0 (-4.0 to 6.0)	.69
Mental health treatment								
Any inpatient	3.6	3.6	2.8	2.4	0.4 (-1.5 to 2.4)	.67	0.5 (-1.5 to 2.4)	.64
treatment								
Any outpatient treatment	19.5	21.1	23.5	22.2	3.0 (-1.0 to 6.9)	.15	2.7 (-1.2 to 6.6)	.17
At least monthly outpatient visits	6.1	7.1	7.3	6.7	1.7 (-1.0 to 4.4)	.22	1.7 (-1.0 to 4.3)	.22
Any prescription treatment	24.8	26.4	31.3	28.6	4.3 (-0.8 to 9.3)	.10	3.8 (-1.0 to 8.5)	.12
Log of average inpatient and outpatient out-of- pocket expenses	4.2	4.5	4.3	4.3	32.5 (-28.0 to 93.1)	.29	21.0 (-47.3 to 89.3)	.55
Other health care use								
Alcohol or drug treatment	6.0	5.8	4.9	5.6	-0.9 (-3.1 to 1.3)	.42	-0.7 (-2.9 to 1.5)	.52
Emergency department visit	43.2	42.0	40.8	39.5	0.1 (-6.3 to 6.5)	.97	-0.5 (-6.7 to 5.8)	.89
Perceived unmet mental health need	29.8	28.2	28.1	27.1	-0.7 (-5.5 to 4.1)	.79	-1.0 (-5.9 to 3.8)	.68
Unmet need due to cost	50.4	47.4	50.7	58.9	-11.2 (-21.8 to - 0.5)	.04	-11.1 (-21.4 to - 0.8)	.04
Overall health rating fair/poor	11.2	10.8	11.1	12.4	-1.7 (-4.8 to 1.5)	.30	-1.7 (-4.8 to 1.4)	.29

^a Data are presented as weighted percentages of survey participants ^b All items were reported for the period of the past year