Uninsurance and Purchases of Prescription Drugs with High Rates of Misuse: Evidence from the Federal Dependent Coverage Mandate

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Abstract:
Prescription central nervous system depressants, opioid pain relievers, and stimulants provide therapeutic value, but misuse for their recreational value is a growing problem in the United States. Because health insurance lowers the cost of purchasing prescription drugs, losing coverage may cause individuals to forgo treatment and decrease prescription drug consumption which could reduce health and increase the likelihood of overdose and death if individuals substitute to using illicit drugs. Using a regression discontinuity design, I estimate the effect of aging out of the federal dependent coverage mandate at age 26 on legal purchases of prescription central nervous system depressants, opioids, and stimulants. Individuals are 0.8-1 percentage points less likely to purchase a prescription central nervous system depressant and 1-2.6 percentage point less likely to purchase a prescription opioid after turning 26. These effects are strongest for women, while estimated effects for men are generally negative but imprecise.

Keywords: health insurance, prescription drugs, substance abuse
JEL classifications: I13, I19

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1. Introduction

The federal dependent coverage mandate (FDCM), part of the 2010 Patient Protection and Affordable Care Act (PPACA), aimed to increase insurance coverage and access to care among young adults by requiring family insurance plans to cover dependent children until their 26th birthday. This expansion of coverage led to increases in insurance coverage and utilization among young adults (Antwi, Moriya, and Simon, 2013; Barbaresco, Courtemanche, and Qi, 2015; Amuedo-Dorantes and Yaya, 2016). Individuals with health insurance are more likely to purchase prescription drugs because insurance decreases the cost of prescriptions and increases contact with healthcare providers.[1] Partial or full reductions in insurance coverage after aging out of the dependent coverage mandate at 26, therefore, may cause young adults to forgo prescription medications which can have serious health consequences for individuals who rely on prescription medication to maintain or improve their health, while nonmedical users of prescription drugs may substitute to illicit drugs and riskier health behaviors.

I focus on purchases of prescription central nervous system (CNS) depressants, opioids, and stimulants, medications that are generally used to treat anxiety, pain, and attention-deficit disorders, respectively. Forgoing medically necessary treatments likely decreases health, and for these drugs, abruptly decreasing consumption can cause individuals to experience serious medical issues, including seizures and death. Because CNS depressants, opioids, and stimulants have recreational value, they are the most commonly misused prescription medications. Nonmedical use of prescription medications is a growing problem in the United States. Nearly 17 million people age 12 or older in the United States reported misusing prescription drugs in 2017, and adults age 18 to 25 have highest rates of prescription medication misuse (Substance Abuse and Mental Health Services Administration, 2019; Schulenberg *et al*, 2019). By drug class, 9.9 million people reported misuse of prescription opioids, 6.4 million reported misuse of prescription CNS depressants, and 5.1 million reported misuse of prescription stimulants (Substance Abuse and Mental Health Services Administration, 2019). Misuse of prescription medications is associated with using illegal drugs (Compton and Volkow, 2006; Compton, Jones, and Baldwin 2016) and the recent opioid epidemic in the United States (Jones, Mack, and Paulozzi, 2013). Individuals who use these

[1] In the main sample used in this paper, a simple regression shows insurance coverage is associated with a 20 percentage point increase in the likelihood of purchasing any prescription drug.

medications for the recreational high value may also substitute to black market drugs which can cause additional negative health effects.

I examine the question of whether insurance coverage affects prescription drug purchases using the PPACA's federal dependent coverage mandate which allows dependent children to be covered until the individual turns 26 years old. I find young adults are 2.8-4.4 percentage points less likely to have health insurance, 0.8-1 percentage points less likely to purchase a prescription CNS depressant, and 1.-2.6 percentage points less likely to purchase a prescription opioid after turning 26 years old. Estimated effects on prescription stimulant purchases are negative but statistically insignificant. The results for prescription purchases are stronger for women who are 1.4-1.9 percentage points less likely to purchase a CNS depressant and 1.2-4.7 percentage points less likely to purchase an opioid. Given the potential negative health effects associated with decreased use of these prescription drugs, these results indicate important areas to target for policymakers and healthcare practitioners.

2. Background

2.1 Federal dependent coverage mandate

President Obama signed the PPACA in March 2010 with the goal of expanding access to healthcare and reducing costs. One of the major components of the PPACA was the federal dependent coverage mandate that expanded insurance coverage to young adults. This policy went into effect in late September 2010 and requires insurers to cover family policyholder's children until their 26th birthday. Before the policy change, family plans generally only covered children until age 18, and 29 percent of young adults were uninsured, the highest rate of uninsurance among all age groups (Nicholsen *et al*, 2009).[2] Prior work shows the FDCM increased insurance coverage (Antwi, Moriya, and Simon, 2013; Barbaresco, Courtemanche, and Qi, 2015; Amuedo-Dorantes and Yaya, 2016),utilization (Barbaresco, Courtemanche, and Qi, 2015), and the likelihood of purchasing prescription medications for young adults under age 26 (Amuedo-Dorantes and Yaya, 2016; Pakyz, Wang, and Cunningham, 2017).[3] Other work focuses on the effect of aging out of the FDCM at 26,

[2] Prior to the federal dependent coverage mandate, some states had dependent coverage mandates with different restrictions on eligibility that depended on age, school enrollment, and marital status.

[3] Other ACA policies such as health insurance subsidies, Medicaid expansions, and the individual health insurance mandate also likely contributed to increasing insurance coverage among young adults either directly or indirectly through insurance gains for their parents.

finding increases in uninsurance (Dahlen, 2015; Lee, 2018; Yoruk, 2018) and reports of worse coverage for those who remain insured (Dahlen, 2015). Lee (2018) provides evidence that aging out of the FDCM does not affect the demand for preventative care or risky health behaviors for adults under 26. Pakyzx, Wang, and Cunningham (2017) find the FDCM is associated with an increase in prescription expenditures and a decrease in out-of-pocket expenditures, with the CNS depressants as one of the most common medications. Breslau *et al* (2017) do not find evidence the FDCM increased risky substance use for adults under 26. Wettstein (2019) finds a 1 percentage point increase in coverage due to the mandate reduced opioid mortality among young adults by about 2.5 per 100,000 population (20 percent).

2.2 CNS depressants, opioids, stimulants and insurance coverage

Figure 1 shows trends in prescription rates for CNS depressants, opioids, and stimulants for young adults age 18-25 years old and 26-30 years old during the sample period from 2011-2017. The share of 18-25 year-olds who purchased a prescription CNS depressant increased from about 2.5 percent to 3.5 percent, while the share declined slightly from 4 percent to 3.75 percent for 26-30 year-olds. The 26-30 year-old group was more likely to purchase opioids, but the downward trend is similar for both groups over this period, likely due to changes in prescribing practices, prescription drug monitoring programs, and the 2010 reformulation of OxyContin. Stimulant prescription rates were relatively flat for the 18-25 group (6-7 percent), while the share roughly doubled from 3 percent to just over 6 percent for the 26-30 group.

Therapeutic uses for these drugs vary. CNS depressants are a class of drugs that include barbituates, benzodiazepines such as alprazolam (e.g. Xanax), and sleeping aids such as zolpidem (e.g. Ambien) and are commonly used to treat seizures, anxiety, and insomnia, respectively. Opioids (e.g. OxyContin) are used for pain relief, and stimulants such as methylphenidate (e.g. Ritalin) and dextroamphetamine/amphetamine (e.g Adderall) are used to treat attention-deficit disorders. These prescription medications also have the potential for misuse due to their recreational consumption value. Young adults cite various reasons for using prescription drugs (Rabiner et al., 2009; McCabe et al., 2007; Lord, Brevard, and Budman, 2011). For example, stimulants are often used to study and increase alertness (Rabiner et al., 2009), while opioids are often used to relieve pain and get "high" (McCabe et al., 2007; Lord, Brevard, and Budman, 2011). Misuse of prescription drugs is associated with addiction and illegal drug use. Nonmedical use of prescription pain relievers, for example, has been linked to later heroin use (Lankenau et al, 2012;

Jones, 2013; Muhuri, Gfroerer, and Davies, 2013). Polysubstance misuse is also an issue because combinations such as benzodiazepines and opioids have reinforcing effects (Jones, Mogali, and Comer, 2012).

Since insurance increases access to care and reduces the cost of prescription medications, losing insurance or having less full insurance (i.e. higher co-pays for prescription drugs) from aging out of the FDCM at 26, should reduce prescription purchases if demand is price elastic. Forward-looking individuals who expect to lose insurance coverage at 26 may attempt to smooth consumption through the insurance loss by reducing current consumption or, if possible, increasing current period prescription purchases to save for future consumption. The health effects from decreased use of these prescriptions will vary depending on the medication, past consumption, and reason for use. Long-term users of CNS depressants, opioids, and stimulants, whose use is for medical or nonmedical reasons, may become physiologically dependent on these drugs, and decreased consumption or withdrawal can negatively affect health. Withdrawal symptoms vary.[4] Tapering consumption of benzodiazepines for long-term users is recommended (Lader, Tylee, and Donoghue, 2009) because withdrawal can result in anxiety, seizures, and, in some cases, death. Opioid withdrawal symptoms such as anxiety, hot and cold flushes, muscle cramps, nausea, and vomiting may last for a few days or a few weeks. Stimulant withdrawal symptoms are less severe, and generally include depression, irritability, and muscle aches. Decreased consumption by individuals who use prescription drugs for therapeutic reasons will experience further reductions in health, although this could be lessened if relatively cheaper substitutable medications or treatments are available. An increase in the cost of legal prescriptions decreases the relative price of substitutes in the black market, and this may cause nonmedical users to substitute towards drugs like heroin in the case of nonmedical opioid users (Muhuri, Gfroerer, and Davies, 2013). Illicit drug quality is often unknown, and impurities are associated with an increased likelihood of overdose and death (Darke *et al*, 1999).

[4] A detailed discussion of withdrawal symptoms and treatments for substance abuse for many commonly abused drugs can be found in a guide for substance abuse counselors and clinicians, "TIP 45: Detoxification and Substance Abuse Treatment" produced by the U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration. Available at https://store.samhsa.gov/product/TIP-45-Detoxification-and-Substance-Abuse-Treatment/SMA15-4131. Accessed October 9, 2019.

3. Data

I use data from the 2010-2017 Medical Expenditure Panel Survey (MEPS), excluding data before October 2010 since the FDCM did not go into effect until September of that year. The MEPS interviews individuals five times over two years, and approximately 30,000 individuals are interviewed each year. It includes detailed information on health insurance coverage, utilization of healthcare services, the cost of these services, and how these services are paid for. More specifically, I use the MEPS full-year files that includes data on individual demographic and insurance information (insured during the survey round) and link this to the prescribed medicines files that contains information on prescription medications purchased in each survey round. The prescription data includes the drug name, national drug code, quantity, strength, form, days supplied, and amount paid. Using the detailed information on the prescription drugs purchased by individuals in the MEPS, I am able to narrowly focus on purchases of CNS depressants, opioids, and stimulants. Each individual in the MEPS may have up to five survey round observations, and while the MEPS is a short panel, I treat the data as pooled cross-sections. Table 1 shows the summary statistics for the main sample of individuals who are 36 months before or after their 26th birthday. A quarter of the sample is uninsured, and individuals who are at least 26 years old have higher rates of uninsurance (25 percent) relative to the younger group (24 percent). About 1.6 percent of the older group purchased a prescription CNS depressant compared to 1.7 percent of the younger group. The shares purchasing a prescription opioid or stimulant are similar across both groups, 4.3 percent and 1.6 percent, respectively. .

4. Empirical strategy

Consider a regression to estimate the effect of uninsurance (D_i) on individual purchases of a prescription drug (y_i), controlling for observable characteristics ($\boldsymbol{X_i}$):

$$y_i = \beta_0 + \beta_1 D_i + \boldsymbol{\gamma}' \boldsymbol{X_i} + \epsilon_i \quad (1)$$

The estimate of β_1 will be biased if unobservable individual characteristics such as risk preferences, discount factors, or underlying medical conditions are correlated with health insurance coverage and purchasing prescription drugs.

To address the endogeneity of health insurance coverage, I use a regression discontinuity design (RDD) that exploits the FDCM rule that dependent children lose access to their family's health insurance coverage at age 26. The RDD identification strategy relies on the assumption that individuals who are just below and just above an arbitrary cutoff, in this case being 26 years old, have similar observable and unobservable characteristics.[5] The federal dependent mandate creates exogenous variation in health insurance coverage at the cutoff age of 26 since individuals cannot change their age.[6] I calculate an individual's age in months at the beginning of each survey round using the birth month and year of the respondent and survey round month and year.[7]

Figures 2 plots the share uninsured and the shares who purchased a prescription CNS depressant, opioid, or stimulant by age in months for individuals within a three-year window around age 26. Linear fits are on either side of the cutoff in each panel. There is a clear jump in uninsurance at age 26. Figure 2 shows decreases in the share purchasing prescription CNS depressants and opioids. These differences are most apparent for opioids, while the decrease in stimulants is less clear.

To formally estimate the effect of aging out of the federal dependent coverage mandate at age 26 on uninsurance and prescription drug purchases, I estimate the following equation:

$$y_i = \beta_0 + \beta_1 D_i + \lambda age_i + \delta(D_i \times age_i) + \boldsymbol{\gamma' X_i} + \epsilon_i \quad (2)$$

Where y_i is an outcome for individual i: an indicator for no health insurance coverage during the interview round and, separately, indicators for whether an individual purchased prescription CNS depressants, opioids, or stimulants during the survey round. D_i is an indicator variable equal to one if the respondent is at least 26 years old in the first month of the survey round and age_i is the running variable, age in months, centered on age 26 and zero months. β_1 is the effect of turning 26 on one of the previously described outcomes. $\boldsymbol{X_i}$ is a vector of indicator variables that control for individual and survey characteristics including gender, marital status (married during survey round), race/ethnicity (black, Hispanic, Asian, and other race/ethnicity; white omitted), highest

[5] While I cannot test the assumption that unobservable characteristics are similar around cutoff, I test for discontinuities of the control variables in vector $\boldsymbol{X_i}$. These results, in Appendix Table A1, provide evidence that observable characteristics are similar around the cutoff.

[6] Appendix Figure A1 shows there is no bunching of observations around the cutoff.

[7] I drop individuals who turn 26 in the month of the survey round because I do not accurately know their date of birth.

level of education (high school diploma, some college or associate's degree, bachelor's degree, and more than bachelor's degree; less than a high school diploma omitted), region of the country (Midwest, South, and West; Northeast omitted), survey year, and first month of the survey round. I fit a linear function of age in months on either side of the cutoff because higher order polynomials reduce power with small sample sizes and the plots in Figures 2-4 suggest linearity in outcomes on either side of the cutoff.[8] I estimate equation (1) using the main bandwidth of individuals who are 36 months before and after their 26th birthday as well as larger (48 months) and smaller (24 months) bandwidths on either side of the cutoff. I also estimate the discontinuities at 26 using bias-corrected, robust local linear estimators (Calonico, Cattaneo, and Titiunik, 2014). All specifications are estimated using survey weights and standard errors are clustered on age in months.

I also explore whether the effect of aging out of the FDCM on insurance coverage and prescription purchases varies by gender because of differences in healthcare utilization, prescription drug use, pharmacological response, and substance use disorders. Women are more likely to use prescription CNS depressants and opioids, while men are more likely to use prescription stimulants (Roe, McNamara, Motheral, 2002; Olfson, King, and Schoenbaum, 2015; Serdarevic, Striley, and Cottler, 2017; Hachtel and Armstrong, 2019). Men and women may also respond differently to drugs because of biological differences (Anderson, 2008; Pisanu *et al*, 2019). While men tend to have higher rates of substance use, the gender gap varies across drugs, and prescription drug misuse is similar between genders (McHugh *et al*, 2018). Figures 3 and 4 plot the outcomes for men and women, respectively. Women are less likely to be uninsured than men and are more likely to have purchased CNS depressants and opioids. Both figures show jumps in uninsurance at 26. For men, Figure 2 shows a decrease in the share purchasing an opioid, and Figure 3 shows a decrease in CNS depressants and opioids for women.

[8] The estimates from regressions that include a quadratic polynomial on either side of the cutoff provide similar results to the main estimates. Estimated effects on insurance are similar in sign, magnitude, and statistical significance, while effects on prescription purchases are similar in sign and magnitude but generally imprecise in these specifications. These results are in Appendix Table A2.

5. Results

5.1 Main estimates

I first concentrate on the effect of aging out of the FDCM at 26 on the likelihood of being uninsured. Table 2 shows these estimates across multiple specifications that vary the bandwidth around 26, inclusion of controls, and local polynomial estimators. I find that aging out of the federal dependent coverage mandate at 26 increases the probability of being uninsured by 2.8-4.1. These estimates are between 14-18 percent of the sample means and similar to previous estimates (Dahlen, 2015; Lee, 2018; Yoruk, 2018).

Next, I turn to the question of whether purchases of addictive prescription drugs change after age 26. Table 3 shows the reduced-form or intent-to-treat estimated effects of being at least 26 years old on the likelihood of purchasing CNS depressants, opioids, or stimulants. Columns 1 and 2 in Table 3 show the estimated effects on the likelihood of purchasing a prescription CNS depressant. The parametric estimates are all negative and the estimates using the 36 and 48-month bandwidth samples, which increase power, are statistically significant. Local linear regression estimates are similar, but slightly smaller in magnitude. These estimates suggest the likelihood of purchasing a CNS depressant decreases by 0.5-1 percentage points. The parametric estimates in columns 3 and 4 suggest the likelihood of purchasing an opioid at age 26 decreases by about 1 percentage point. The local linear regressions, which place more weight on the area close to the cutoff, produce larger and statistically significant estimates, indicating the likelihood of purchasing an opioid decreases by 2.5-2.6 percentage points. These larger estimates are consistent with the drop in the share of individuals with a prescription opioid purchase near age 26 in Figure 2. The estimated effects on prescription stimulants are all negative, but imprecise. Given the standard errors, I am unable to detect effects smaller than a 0.8-1.4 percent point decrease in stimulant purchases. These results are consistent with the idea that losing health insurance coverage increases the cost of prescription drugs and reduces the likelihood of purchasing these prescription drugs.

5.2 Effects by gender

Table 4 shows the estimated change in the likelihood of being uninsured after 26 by gender. These estimates show men are 3.6-4.2 percentage points more likely to be uninsured after 26. For women, being at least 26 years old increases the likelihood of uninsurance by 2.3-4.0 percentage points.

Table 5 shows the reduced form effects of being at least 26 years old on the likelihood of purchasing prescription CNS depressants, opioids, or stimulants for men. Only two of the estimates are statistically significant. The estimates provide suggestive evidence of a decreased likelihood of purchasing opioids and stimulants, while the effects for CNS depressants are mixed. In percentage points, I am unable to detect effects smaller than about 0.8-1.1 for CNS depressants, 1.1-1.7 for opioids, and 2.2-5 for stimulants.

The estimates for women in Table 6 show statistically significant decreases in the likelihood of purchasing a CNS depressant and purchasing an opioid at age 26. In every specification, the estimated effects on CNS depressants are negative and statistically significant. These estimates range from a 1.4-1.9 percentage point decrease in the likelihood of purchasing a CNS depressant. The likelihood of purchasing an opioid decreases by 1.2-1.6 percentage points under the parametric specifications. These estimates are statistically significant using the 36-month and 48-month bandwidth samples, while the estimates using the 24-month bandwidth are slightly smaller and less precise. Similar to the main results, the local linear regression estimates for opioids are statistically significant but much larger for opioids, and this large drop around the cutoff is evident in the opioids panel in Figure 4. The estimated effects on stimulants are negative but imprecise.

6. Discussion

Estimating the effect of insurance coverage on health-related outcomes such as prescription drug purchases is difficult since those who have coverage may differ in unobservable ways from those who do not have coverage. The federal dependent coverage mandate, which requires insurers to cover dependent children until age 26, creates the potential for a plausibly exogenous change in insurance coverage at 26 as individuals age out of the mandate. I use this rule to examine its effects on the likelihood of uninsurance and purchasing prescription CNS depressants, opioids, and stimulants, drugs with high rates of misuse. Reductions in insurance coverage may cause individuals to decrease purchases of CNS depressants, opioids, and stimulants which can create significant negative health effects from withdrawal. Because adults 18-25 years old have the highest rates of misusing prescription drugs, nonmedical users of these prescription drugs may substitute to illicit drugs, increasing the likelihood of negative health effects from illicit drug use, including overdose and death.

After age 26, I find individuals are 2.8-4.1 percentage points less likely to be insured, 0.5-1 percentage points less likely to purchase a prescription CNS depressant, and 1-2.6 percentage points less likely to purchase a prescription opioid. Point estimates suggest individuals that are at least 26 years old are less likely to purchase prescription stimulants, but these effects are imprecisely estimated. Inflating the effects on prescription purchases by the change in insurance coverage suggests that individuals who lose insurance coverage from aging out of the mandate are 26 percentage points less likely to purchase a CNS depressant and 31 percentage points less likely to purchase a prescription opioid.[9] Consistent with previous studies that find women have higher rates of prescription CNS depressant and opioid use (Roe, McNamara, and Motheral, 2002); Olfson, King, and Schoenbaum, 2015; Serdarevic, Striley, and Cottler, 2017), I find women have higher rates of prescriptions for CNS depressants and opioids, and the negative effects on the likelihood of purchasing of these drugs are stronger for women.

A back of the envelope calculation shows that about 37,000 individuals may not purchase a prescription CNS depressant after turning 26 and 47,000 may not purchase a prescription opioid, increasing the likelihood of health issues associated with decreased consumption of these drugs.[10] These estimates may overlap due to polysubstance use of CNS depressants and opioids so the total number affected may be lower. Policies and interventions targeted at individuals nearing their 26 birthday who may be at risk of losing insurance coverage, particularly women with prescriptions for CNS depressants and opioids, may be beneficial to address the potential negative health consequences of reductions in consumption of prescription drugs.

This analysis has some limitations and directions for future work. The estimated effects only apply to individuals around the cutoff because of the empirical design, so it is not possible to extrapolate how changes in insurance coverage affects prescription purchases for a broader population. I am unable to estimate whether consumption of prescriptions change since the data is

[9] These estimates are calculated from the specifications that include controls and a linear function of age on either side of the cutoff with the 36-month bandwidth sample. I divide the effect on CNS depressants (-0.008) and opioids (-0.010), separately, by the estimated effect on uninsurance (0.032).

[10] I calculate the number of women who do not purchase a prescription CNS depressant and prescription opioid at age 26 by multiplying the estimated effect on the likelihood of purchasing the prescription drug by the age 26 population. The population estimate, 4,669,782, comes from the 2017 American Community Survey. I use the estimates from the specifications that include controls and a linear function of age on either side of the cutoff with the 36-month bandwidth sample. For CNS depressants, the calculation is (0.008 x 4,669,782) = 37,358. For opioids the calculation is (0.010 x 4,669,782) = 46,697.

limited to information about purchases. This is problematic because some individuals may change consumption due to expectations about future insurance coverage. For example, individuals may reduce consumption of their medication to save for future consumption in anticipation of losing insurance. I am also unable to test whether individuals substitute to drugs sold on the black market, either illegal prescriptions or illicit drugs such as heroin or methamphetamine. Future work can explore the relationship between aging out of the federal dependent coverage mandate and illegal drug use (identifying possible substitution effects), treatment for substance abuse, emergency hospitalizations related to drug abuse, and drug-related mortality.

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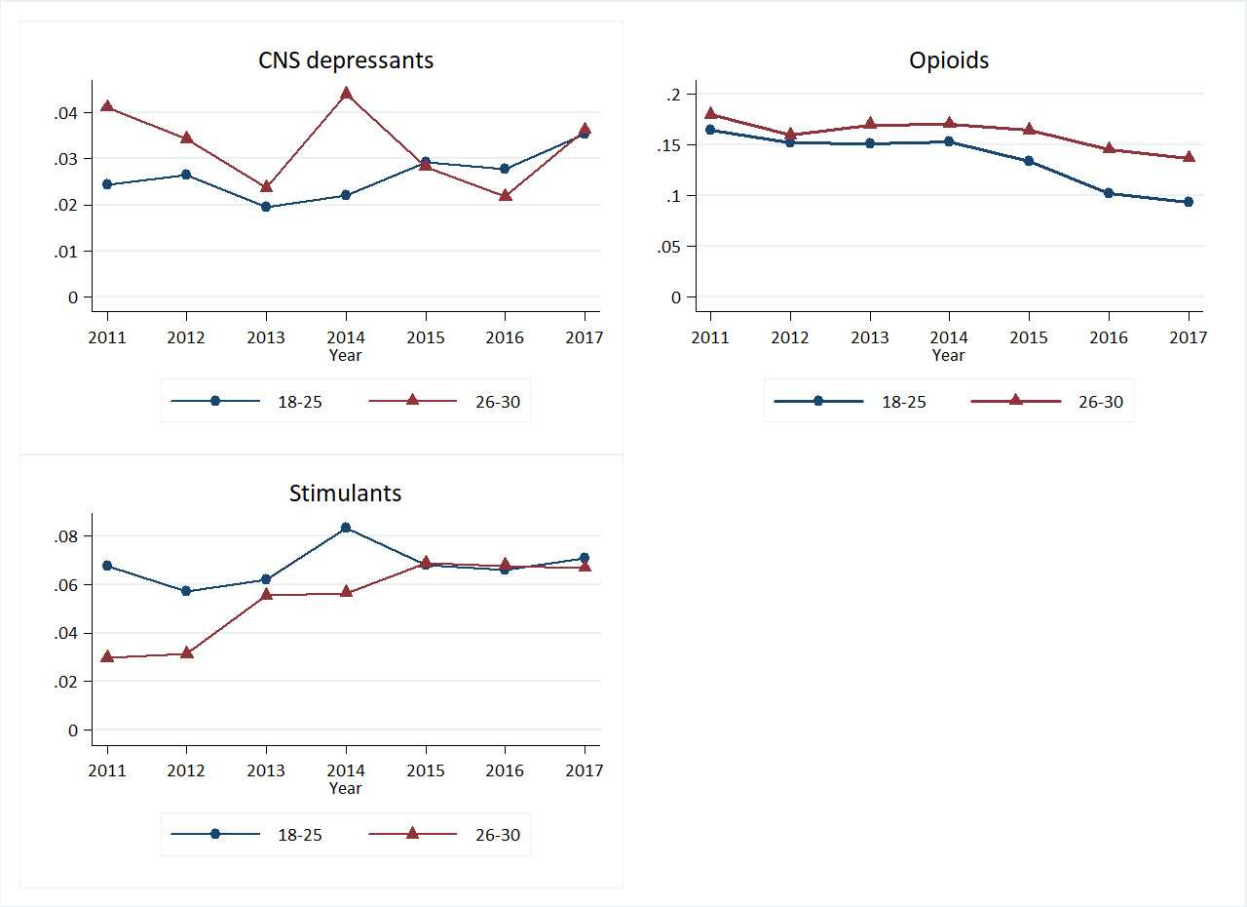
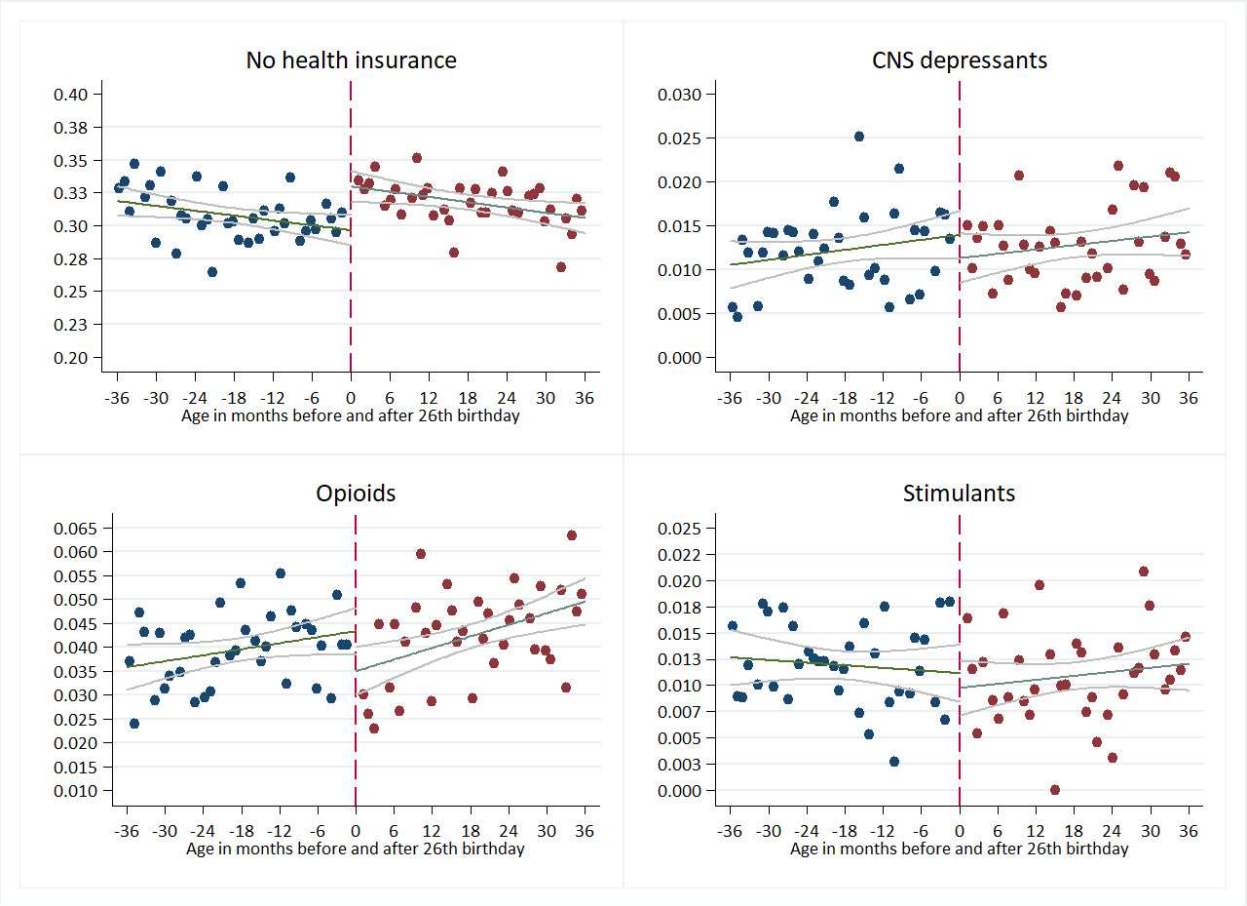
Figures

Figure 1: Prescription purchases of CNS depressants, opioids, or stimulants by young adults, 2011-2017



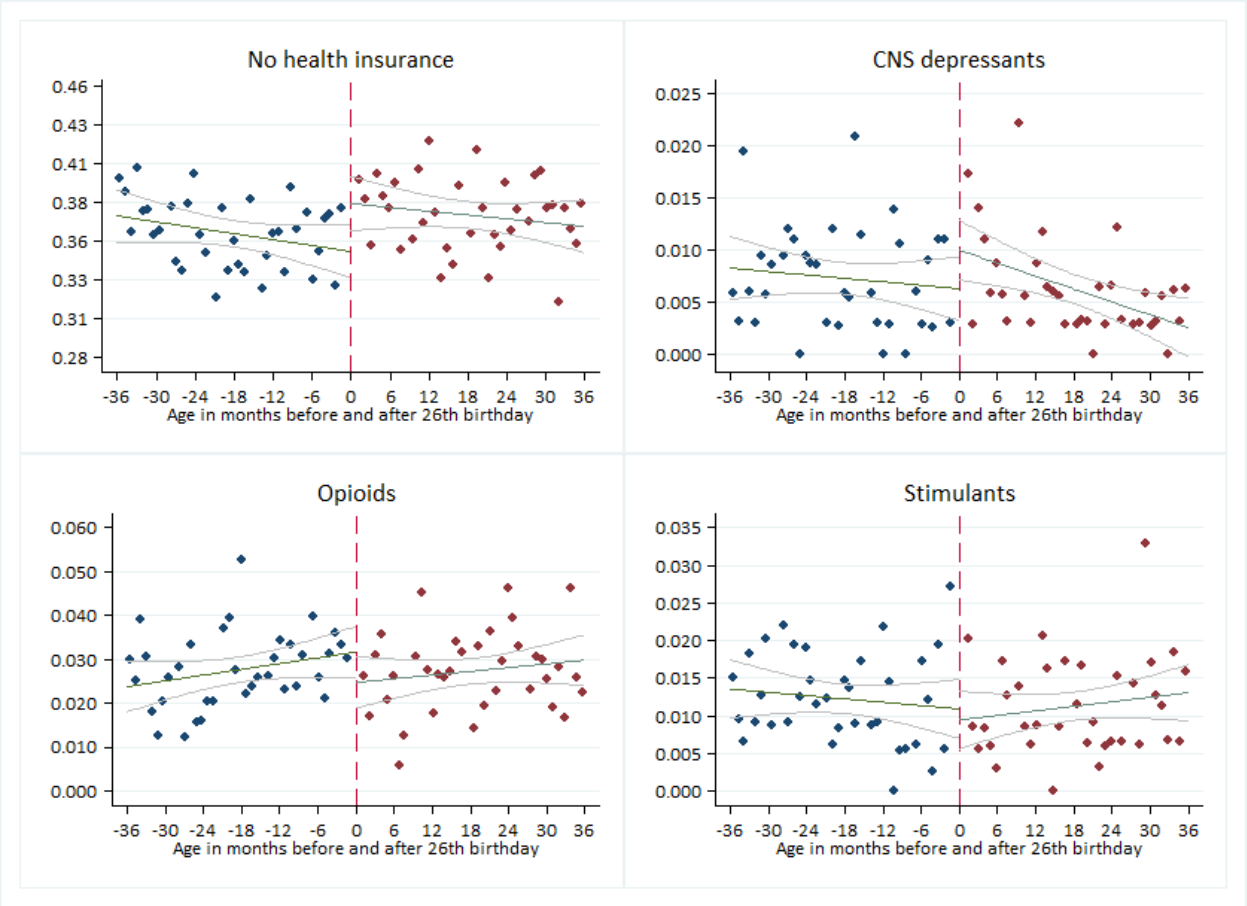
Note: Fraction of individuals, age 18-25 and 26-30 that purchased a prescription CNS depressant, opioid, or stimulant each year. Data from the 2011-2017 Medical Expenditure Panel Surveys.

Figure 2: Changes in insurance coverage and prescription purchases around 26 years old



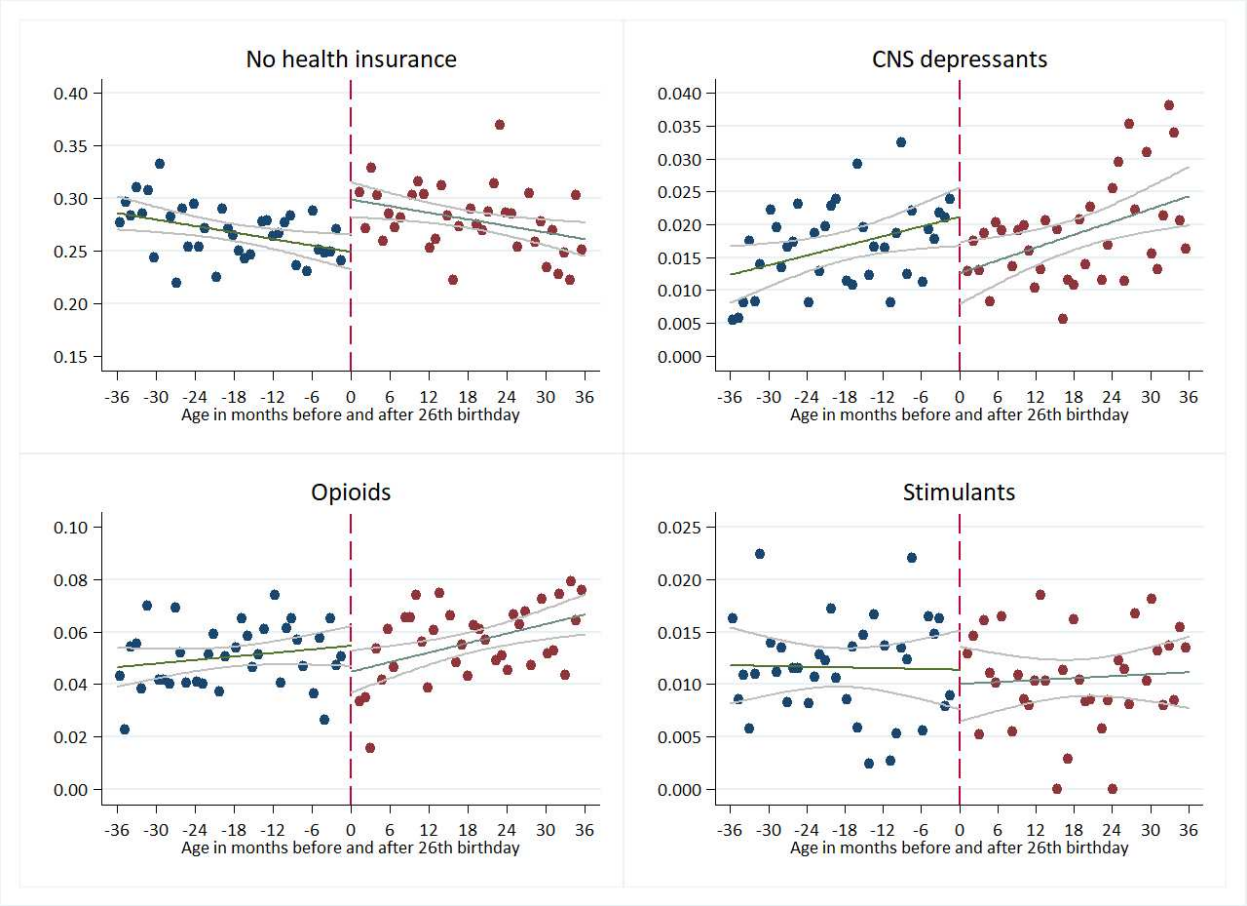
Notes: Mean of outcomes in 1-month intervals for individuals who are between 36 months before and 36 months after their 26th birthday. Lines of best fit with confidence intervals are also shown on either side of age 26. Dashed red line at zero represents cutoff point, age 26 and zero months. Data from the 2010-2017 Medical Expenditure Panel Surveys.

Figure 3: Changes in insurance coverage and prescription purchases around 26 years old, men



Notes: Mean of outcomes in 1-month intervals for men who are between 36 months before and 36 months after their 26th birthday. Lines of best fit with confidence intervals are also shown on either side of age 26. Dashed red line at zero represents cutoff point, age 26 and zero months. Data from the 2010-2017 Medical Expenditure Panel Surveys.

Figure 4: Changes in insurance coverage and prescription purchases around 26 years old, women



Notes: Mean of outcomes in 1-month intervals for women who are between 36 months before and 36 months after their 26th birthday. Lines of best fit with confidence intervals are also shown on either side of age 26. Dashed red line at zero represents cutoff point, age 26 and zero months. Data from the 2010-2017 Medical Expenditure Panel Surveys.

Tables

Table 1: Summary statistics for 23-29 year olds

	All	23-25	26-29
Outcomes			
Uninsured	0.240	0.236	0.245
Purchased CNS depressant	0.017	0.017	0.016
Purchased opioid	0.043	0.043	0.043
Purchased stimulant	0.016	0.016	0.016
Controls			
Female	0.506	0.503	0.508
Black	0.131	0.134	0.128
Hispanic	0.207	0.210	0.203
Asian	0.067	0.061	0.073
Other race/ethnicity	0.030	0.032	0.029
High school degree	0.271	0.286	0.256
Some college	0.334	0.376	0.291
Bachelor's degree	0.261	0.238	0.285
Post bachelor's degree	0.059	0.029	0.089
Married	0.284	0.203	0.368
Northeast	0.171	0.168	0.173
Midwest	0.218	0.217	0.219
South	0.366	0.379	0.352
West	0.245	0.236	0.255
N	47,353	23,657	23,689

Notes: Weighted sample means. Data from the 2010-2017 Medical Expenditure Panel Surveys.

Table 2: Change in likelihood of uninsurance at age 26

	(1)	(2)
Panel A: 24-month bandwidth		
At least 26 years old	0.041***	0.036***
	(0.011)	(0.009)
N: 31,705		
Panel B: 36-month bandwidth		
At least 26 years old	0.039***	0.032***
	(0.009)	(0.007)
N: 47,353		
Panel C: 48-month bandwidth		
At least 26 years old	0.034***	0.030***
	(0.008)	(0.006)
N: 63,000		
Panel D: local linear regression		
At least 26 years old	0.038	0.028**
	(0.055)	(0.011)
Controls	No	Yes

Notes: Standard errors clustered on age in months. Column (1) does not include individual or survey controls. Column (2) includes individual and survey controls. Individual and survey controls include age in months, sex, marital status (married during survey round), race/ethnicity (black, Hispanic, Asian, and other race/ethnicity; white omitted), highest level of education (high school diploma, some college, bachelor's degree, and higher than a bachelor's degree; less than high school diploma omitted), region of the country (Midwest, south, and west; northeast omitted), survey year, and first month of the survey round. Parametric regressions include a linear fit of age in months on each side of the cutoff. Local linear regression estimated using triangular kernel. All regressions are estimated using survey weights. Data from the 2010-2017 Medical Expenditure Panel Surveys. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Change in likelihood of purchasing of prescription CNS depressants, opioids, and stimulants at age 26

	CNS depressants		Opioids		Stimulants	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: 24-month bandwidth						
At least 26 years old	-0.006	-0.006	-0.010*	-0.010*	-0.003	-0.003
	(0.004)	(0.004)	(0.005)	(0.006)	(0.005)	(0.005)
N: 31,705						
Panel B: 36-month bandwidth						
At least 26 years old	-0.008**	-0.008**	-0.010**	-0.010**	-0.004	-0.004
	(0.003)	(0.003)	(0.005)	(0.005)	(0.004)	(0.004)
N: 47,353						
Panel C: 48-month bandwidth						
At least 26 years old	-0.010***	-0.010***	-0.011***	-0.011**	-0.003	-0.003
	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)
N: 63,000						
Panel D: local linear regression						
At least 26 years old	-0.005	-0.007**	-0.025***	-0.026***	-0.007	-0.009
	(0.004)	(0.003)	(0.004)	(0.003)	(0.009)	(0.007)
Controls	No	Yes	No	Yes	No	Yes

Notes: Standard errors clustered on age in months. Columns (1), (3), and (5) do not include individual and survey controls. Columns (2), (4), and (6) include individual and survey controls. Individual and survey characteristics include age in months, sex, marital status (married during survey round), race/ethnicity (black, Hispanic, Asian, and other race/ethnicity; white omitted), highest level of education (high school diploma, some college, bachelor's degree, and higher than a bachelor's degree; less than high school diploma omitted), region of the country (Midwest, south, and west; northeast omitted), survey year, and first month of the survey round. Parametric regressions include a linear fit of age in months on each side of the cutoff. Local linear regression estimated using triangular kernel. All regressions are estimated using survey weights. Data from the 2010-2017 Medical Expenditure Panel Surveys. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Change in likelihood of uninsurance at age 26, by gender

	Men		Women	
	(1)	(2)	(3)	(4)
Panel A: 24-month bandwidth				
At least 26 years old	0.042**	0.041***	0.040***	0.032**
	(0.017)	(0.015)	(0.014)	(0.013)
N:	15,081		16,624	
Panel B: 36-month bandwidth				
At least 26 years old	0.039***	0.039***	0.036***	0.025**
	(0.013)	(0.012)	(0.012)	(0.011)
N	22,371		24,982	
Panel C: 48-month bandwidth				
At least 26 years old	0.036***	0.037***	0.031***	0.023**
	(0.011)	(0.010)	(0.010)	(0.009)
N:	29,860		33,140	
Panel D: local linear regression				
At least 26 years old	0.036	0.037*	0.039	0.024*
	(0.067)	(0.019)	(0.055)	(0.013)
Controls	No	Yes	No	Yes

Notes: Standard errors clustered on age in months. Columns (1) and (3) do not include individual or survey controls. Columns (2) and (4) include individual and survey controls. Individual and survey controls include age in months, sex, marital status (married during survey round), race/ethnicity (black, Hispanic, Asian, and other race/ethnicity; white omitted), highest level of education (high school diploma, some college, bachelor's degree, and higher than a bachelor's degree; less than high school diploma omitted), region of the country (Midwest, south, and west; northeast omitted), survey year, and first month of the survey round. Parametric regressions include a linear fit of age in months on each side of the cutoff. Local linear regression estimated using triangular kernel. All regressions are estimated using survey weights. Data from the 2010-2017 Medical Expenditure Panel Surveys. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Change in likelihood of purchasing of prescription CNS depressants, opioids, and stimulants at age 26, men

	CNS depressants		Opioids		Stimulants	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: 24-month bandwidth						
At least 26 years old	0.006	0.006*	-0.009	-0.009	-0.005	-0.006
	(0.004)	(0.004)	(0.006)	(0.006)	(0.008)	(0.008)
N: 15,081						
Panel B: 36-month bandwidth						
At least 26 years old	0.002	0.003	-0.006	-0.006	-0.007	-0.007
	(0.003)	(0.003)	(0.005)	(0.005)	(0.006)	(0.006)
N: 22,371						
Panel C: 48-month bandwidth						
At least 26 years old	-0.005	-0.005	-0.007	-0.007	-0.002	-0.002
	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)	(0.005)
N: 29,860						
Panel D: local linear regression						
At least 26 years old	-0.000	-0.000	-0.007*	-0.003	-0.017	-0.018
	(0.004)	(0.004)	(0.004)	(0.005)	(0.018)	(0.015)
Controls	No	Yes	No	Yes	No	Yes

Notes: Standard errors clustered on age in months. Columns (1), (3), and (5) do not include individual and survey controls. Columns (2), (4), and (6) include individual and survey controls. Individual and survey characteristics include age in months, sex, marital status (married during survey round), race/ethnicity (black, Hispanic, Asian, and other race/ethnicity; white omitted), highest level of education (high school diploma, some college, bachelor's degree, and higher than a bachelor's degree; less than high school diploma omitted), region of the country (Midwest, south, and west; northeast omitted), survey year, and first month of the survey round. Parametric regressions include a linear fit of age in months on each side of the cutoff. Local linear regression estimated using triangular kernel. All regressions are estimated using survey weights. Data from the 2010-2017 Medical Expenditure Panel Surveys. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

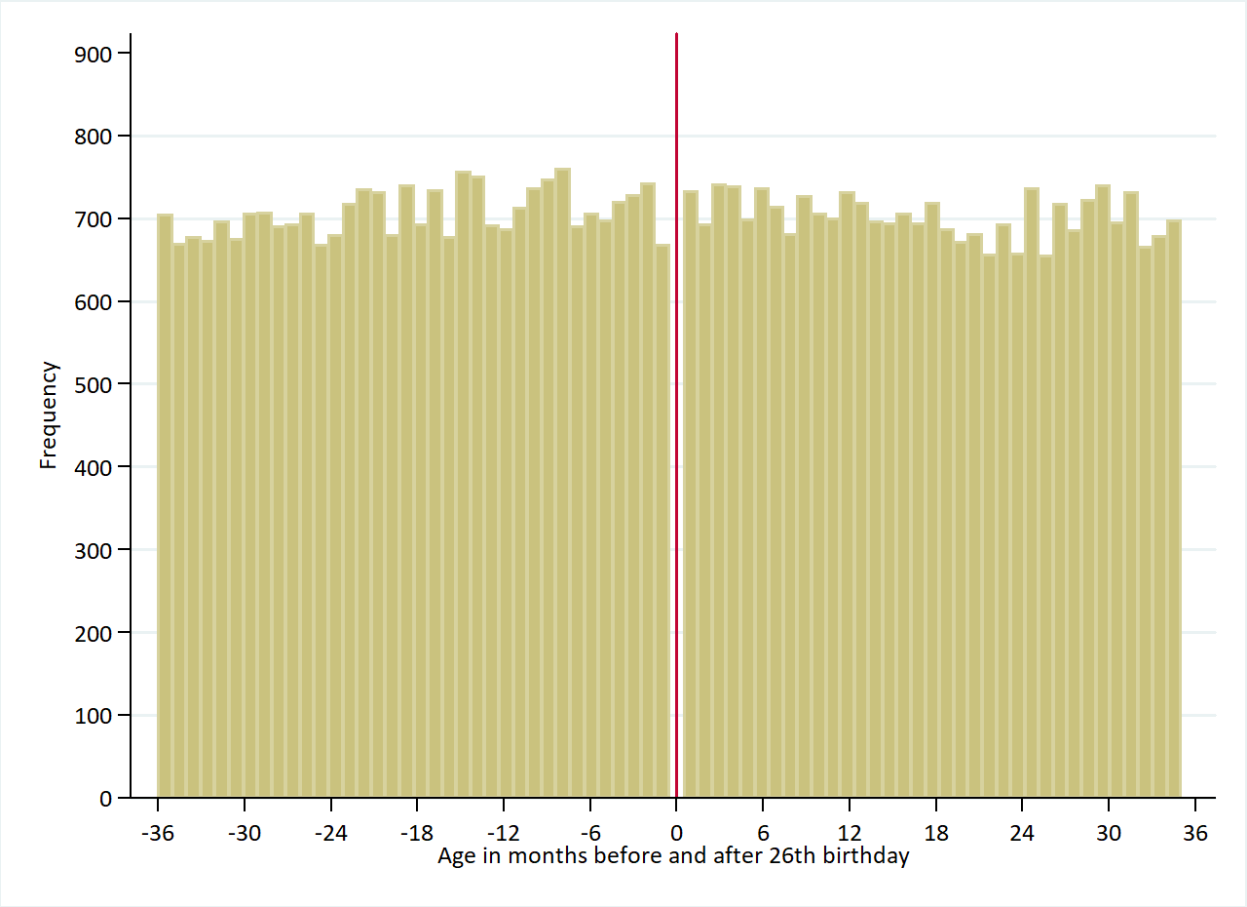
Table 6: Change in likelihood of purchasing of prescription CNS depressants, opioids, and stimulants at age 26, women

	CNS depressants		Opioids		Stimulants	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: 24-month bandwidth						
At least 26 years old	-0.018***	-0.018***	-0.012	-0.012	-0.001	-0.010
	(0.006)	(0.006)	(0.010)	(0.010)	(0.005)	(0.005)
N: 16,624						
Panel B: 36-month bandwidth						
At least 26 years old	-0.019***	-0.019***	-0.015*	-0.015*	-0.001	-0.001
	(0.005)	(0.005)	(0.008)	(0.008)	(0.005)	(0.005)
N: 24,982						
Panel C: 48-month bandwidth						
At least 26 years old	-0.016***	-0.016***	-0.015**	-0.016**	-0.004	-0.004
	(0.004)	(0.004)	(0.007)	(0.007)	(0.004)	(0.004)
N: 33,140						
Panel D: local linear regression						
At least 26 years old	-0.014**	-0.017***	-0.044***	-0.047***	-0.002	-0.002
	(0.007)	(0.005)	(0.012)	(0.010)	(0.008)	(0.005)
Controls	No	Yes	No	Yes	No	Yes

Notes: Standard errors clustered on age in months. Columns (1), (3), and (5) do not include individual and survey controls. Columns (2), (4), and (6) include individual and survey controls. Individual and survey characteristics include age in months, sex, marital status (married during survey round), race/ethnicity (black, Hispanic, Asian, and other race/ethnicity; white omitted), highest level of education (high school diploma, some college, bachelor's degree, and higher than a bachelor's degree; less than high school diploma omitted), region of the country (Midwest, south, and west; northeast omitted), survey year, and first month of the survey round. Parametric regressions include a linear fit of age in months on each side of the cutoff. Local linear regression estimated using triangular kernel. All regressions are estimated using survey weights. Data from the 2010-2017 Medical Expenditure Panel Surveys. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix

Figure A1: Frequency of observations by age in months



Note: Frequency of observations in each month, 36 months before and after 26. Red line marks the cutoff point for the discontinuity at age 26 and zero months. Data from the 2010-2017 Medical Expenditure Panel Surveys.

Appendix Table A1: Test for changes in individual characteristics at age 26

	(1)
Female	-0.007
	(0.013)
White	-0.013
	(0.012)
Black	0.011*
	(0.006)
Hispanic	-0.006
	(0.008)
Asian	0.005
	(0.005)
Other race/ethnicity	0.003
	(0.003)
Married	-0.000
	(0.011)
Less than high school degree	0.010
	(0.009)
High school degree	-0.002
	(0.008)
Some college	0.010
	(0.010)
Bachelor's degree	-0.019
	(0.012)
Post-bachelor's degree	-0.000
	(0.005)
Northeast	0.008
	(0.009)
Midwest	-0.011
	(0.009)
South	-0.001
	(0.011)
West	0.004
	(0.010)
N	47,353

Notes: Standard errors clustered on age in months. All regressions include a linear fit of age in months on each side of the cutoff and are estimated using survey weights. Data from the 2010-2017 Medical Expenditure Panel Surveys. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix Table A2: Change in likelihood of uninsurance and prescription purchases at age 26, quadratic polynomial and 36-month bandwidth

	Full sample		Men		Women	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: uninsurance						
At least 26 years old	0.037***	0.038***	0.033	0.039**	0.041**	0.038**
	(0.013)	(0.010)	(0.021)	(0.019)	(0.017)	(0.015)
Panel B: purchased a CNS depressant						
At least 26 years old	-0.003	-0.003	0.008	0.008	-0.015**	-0.015**
	(0.004)	(0.004)	(0.003)	(0.005)	(0.006)	(0.006)
Panel C: purchased an opioid						
At least 26 years old	-0.009*	-0.009	-0.010	-0.011	-0.009	-0.009
	(0.006)	(0.006)	(0.007)	(0.007)	(0.011)	(0.010)
Panel D: purchased a stimulant						
At least 26 years old	-0.007	-0.007	-0.009	-0.010	-0.005	-0.005
	(0.006)	(0.006)	(0.010)	(0.010)	(0.006)	(0.006)
Controls	No	Yes	No	Yes	No	Yes
N	47,353	47,353	22,371	22,371	24,982	24,982

Notes: Standard errors clustered on age in months. Columns (1), (3), and (5) do not include individual and survey controls. Columns (2), (4), and (6) include individual and survey controls. Individual and survey characteristics include age in months, sex, marital status (married during survey round), race/ethnicity (black, Hispanic, Asian, and other race/ethnicity; white omitted), highest level of education (high school diploma, some college, bachelor's degree, and higher than a bachelor's degree; less than high school diploma omitted), region of the country (Midwest, south, and west; northeast omitted), survey year, and first month of the survey round. All regressions include a second-degree polynomial of age in months on both sides of the cutoff and are estimated using survey weights. Data from the 2010-2017 Medical Expenditure Panel Surveys. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$