THE EFFECTS OF THE AFFORDABLE CARE ACT MEDICAID EXPANSION ON MENTAL HEALTH SYMPTOMS

by

KAYLEE ANN RANCK

(Under the Direction of Patryk Babiarz)

ABSTRACT

This study analyzes the effects the Affordable Care Act's (ACA) Medicaid expansion had on mental health symptoms. Data from adults aged 18-64 years in the nationally representative Panel Study of Income Dynamics 2009-2019 waves were used in a difference-in-differences analysis to compare uninsurance, Medicaid insurance, self-reported life satisfaction, self-reported psychological distress, severe psychological distress, and health professional diagnosis depression, anxiety, and permanent memory loss. The study examines individuals in four income categories, focusing on those within 100-138% the federal poverty level in states that opted for Medicaid expansion. Key findings show a reduction of 13 percentage points in the probability of being uninsured (p=<.001), an increase of 12.6 percentage points in the probability of being covered by Medicaid (p=<.001), and a 3.4 percentage point increase self-reported life satisfaction. Men had a marginally significant 3.2 percentage point decrease in the probability of having severe psychological distress (p=<.1). There was a 1 percentage point increase in the probability of being diagnosed with depression and a 2.5 percentage point probability of an anxiety diagnoses by a health care professional (p=<.05). Self-reported psychological distress resulted in no significant change score change after the implementation of Medicaid expansion

for those in the 100-138% federal poverty level. The evidence from this study implies the solution to improving mental health through public policies is complex and requires a multi-faceted approach. Further research is needed to develop a broader understanding of impact of Medicaid expansion on mental health.

INDEX WORDS: Medicaid expansion, Affordable Care Act, Difference-in-difference, Mental Health, K6 Scale, Panel Study of Income Dynamics, Health Insurance, Life satisfaction, Depression, Anxiety

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CHAPTER 1

INTRODUCTION

Having affordable health insurance is a key determinant of health outcomes and an important mechanism for preserving financial stability for those with chronic conditions (Baicker et al., 2013; Hadley, 2007; Keeler, 1983; Sloss et al., 1987). Prior to 2010, nearly 18% of the United States population lacked health insurance (Kaiser Family Foundation, 2022b). Lack of health insurance can create financial problems due to the challenges of paying off medical debt (Hamel, Liz et al., 2016). Lack of health insurance can also result in strong cumulative negative impact on adult health outcomes (Quesnel-Vallée, 2004). Uninsured and underinsured individuals are more likely to forgo preventative health screenings and not seek treatment for chronic health conditions (Liang et al., 2019). The uninsured are also more likely to delay or not fill prescriptions, end up in the hospital for preventable ailments, and suffer higher mortality rates (Castaneda & Saygili, 2016; Christopher et al., 2016; Usher et al., 2018). Uninsured individuals often are low- income, despite most having at least one person employed full-time within the family (Kaiser Family Foundation, 2022b).

The Patient Protection and Affordable Care Act of 2010 (ACA) was enacted to reduce the number of uninsured Americans (Cohen et al., 2017). The passing of the ACA provided access to health insurance through several methods, including national or state-run exchanges, premium subsidies for those who qualify, and through Medicaid expansion for states opting for expansion. National and state run-exchanges allowed individuals to shop and select a health insurance plan to fit their needs. Subsidies are provided to those who qualify based on annual income levels.

These subsidies offset the total cost of health care premiums. In states that opted for Medicaid expansion, those who qualified based on income became eligible for Medicaid. Increasing access to health insurance had a profound impact, reducing the number of uninsured in the U.S. by about half between 2010 and 2016. According to the National Center for Health Statistics, 9% of individuals of all ages were uninsured in 2016, 20 million fewer than in 2010 prior to the Affordable Care Act (Cohen et al., 2017). Previous studies provided compelling evidence that ACA Medicaid expansion led to significant insurance coverage gains among those living in newly expanding states (Buchmueller et al., 2021; Courtemanche et al., 2017; Cowan & Hao, 2021). Increased access to health insurance is related to improvements in preventive health care through health screenings, diagnostic follow-ups, and treatment (Simon et al., 2017; Sommers et al., 2017). Significantly, the Affordable Care Act also increased access to mental health services, allowing for treatment that was previously expensive and difficult to access for people without insurance. With access to medical treatment, mental illness symptoms and overall impacts can be mitigated (Marcus & Olfson, 2010).

The expansion of access to mental health services through the Affordable Care Act addressed an important gap in the U.S. healthcare system. Approximately 20% of the adult population suffers from mental illness disorders in the United States (Mental Health America, 2020; National Institute on Mental Health, 2022). Having a mental illness, especially serious mental illness, has a negative effect on individual well-being, physical health, employment status, educational attainment, and overall costs to society. Beyond the costs to the individual, nearly $519 billion is spent annually on healthcare expenditures, disability payments and diminished productivity in the workforce for those with mental illness in the United States (Insel et al., 2015; Robson & Gray, 2007). Mental health can be effectively treated through talk

therapy, psychotropic medications, and intensive psychopharmacological treatments, which is the interaction between medication effects and psychosocial treatments, such as talk therapy (Olfson, 2016). Mental illness is particularly prevalent among lower-income, uninsured or underinsured individuals (Rowan et al., 2013). For those individuals who sought care and did not receive further treatment, it was often due to the inability to pay for treatment (Rowan et al., 2013). Given the significant economic and social impacts of having a mental illness and the success of treatment, it is of interest to policy makers to consider how access to free or reduced-cost health insurance may impact those who suffer from a mental illness and reduce the prevalence of symptoms.

1.1 PURPOSE OF STUDY

The purpose of this study is to determine the impact of the Affordable Care Act on the psychological and mental well-being of Americans. More specifically, I investigate how the increased access to Medicaid insurance brought about by the Affordable Care Act impacted various measures of mental health. Using data from the 2009-2019 waves of the Panel Survey of Income Dynamics (PSID), I measure changes in self-reported life satisfaction and self-reported psychological distress (K6 scale), as well as the onsets of doctor-diagnosed psychiatric conditions such as memory loss, depression, anxiety. I examined these scores following the implementation of Medicaid expansion at the state level. I identify the effects of interest by grouping PSID respondents based on different federal poverty threshold levels and by examining the differential effect of the state-level expansion of Medicaid. Given that individuals with incomes within 100-138% of the federal poverty level constitute the primary beneficiaries of insurance expansion, I expect to find both statistically and quantitatively significant variations in

the psychological well-being measures for this group, relative to respondents in other income groups.

1.2 RESEARCH CONTRIBUTIONS TO CURRENT LITERATURE

The findings of this study augment the body of literature on the impact of the Affordable Care Act on mental health outcomes. This will be accomplished by analyzing self-reported life satisfaction, self-reported psychological distress indicator (K6 scale), and doctor diagnosed psychological disorders, namely depression, anxiety, memory loss, and health insurance status using a difference-in-differences technique among PSID respondents from waves 2009-2019. The research is guided by the following objectives:

1) Describe the respondents' mean self-reported life satisfaction, psychological distress, and percentages of those diagnosed with psychological conditions
2) Evaluate the effect of living in a state that opted in for Medicaid expansion on being uninsured after the implementation of the expansion
3) Evaluate the effect of living in a state that opted in for Medicaid expansion on the following variables of interest: self-reported life satisfaction, self-reported psychiatric distress levels, and being doctor diagnosed with a psychological condition including, depression, anxiety, and memory loss
4) Estimate the effects of Medicaid expansion on the variables of interest (described above) specifically for males and females

In addition to these objectives, the results of this research will inform public insurance policy makers and academic researchers concerned with the impacts of health insurance on mental health outcomes. This study adds to the body of scholarly literature on health care reforms, health care utilization, and health outcomes. More specially, the research contributes to the

understanding of how the ACA's Medicaid expansion influences mental health, as defined by the dependent variables. (Levy, Helen & Meltzer, David, 2004) note that many studies analyzing causal effects between health insurance and health outcomes fall short because the observed correlations between insurance and good health may be due to contributing factors that are unobservable. That is, it is difficult to determine how health insurance relates to health status are also related to an individual's health insurance coverage (Levy & Meltzer, 2008). Levy and Metzer (2008) refer to the "endogeniety problem", which are common among what they label as observational studies:

> Most of these studies find a positive correlation between health insurance coverage and health. Unfortunately, we cannot rely on such approaches to address the endogeneity problem; unobservable differences between the insured and the uninsured may drive the observed differences in health outcomes. Because of the potential for confounding unobservables, we cannot count on observational studies to provide insight into the causal effect of health insurance on health (p. 401).

The authors conclude that utilizing experimental or quasi-experimental research design can better determine the effectiveness of policy related to health insurance. Previous studies looking to determine the effectiveness of the ACA on mental health outcomes use only self-reported health outcomes, typically from Behavioral Risk Factor Surveillance System or National Health Interview Survey data, and do not include specific medically diagnosed mental health conditions (Lee & Porell, 2020; Margerison et al., 2020; McMorrow et al., 2017). Through this quasi-experimental study, I will add to the body of literature on the impact of Medicaid expansion by utilizing a difference in difference analysis for both self-reported mental health status as well as healthcare professional diagnosis of a mental health condition.

1.3 SUMMARY

The effect of the Affordable Care Act on increased access to health insurance through Medicaid expansion and individual mental health outcomes are the primary focus of this study. Individuals will be compared over time with regards to their health insurance status and self-reported mental health symptoms as well as medical professional diagnoses of mental health conditions.

The dissertation is organized as follows: Chapter 2 provides a detailed review of the academic literature that addresses the role of health insurance in health outcomes. Chapter 3 details the study's research methodology to determine if there is an effect on mental health symptoms with the implementation of the Affordable Care Act. The results from the analysis are presented in Chapter 4. Limitations, implications for the research and policy development, and suggestions for future research are presented in Chapter 5.

CHAPTER 2

LITERATURE REVIEW

2.1 ACCESS TO HEALTH CARE IN THE UNITED STATES

Health insurance access has long been part of the political and economic landscape of American families. Unlike many other industrialized nations, the United States has a predominately private health insurance market which makes access challenging especially for those who are not covered by employer-subsidized plans or who are ineligible for governmental sponsored programs, namely those for children, the elderly, or the disabled. An individual is covered by private insurance if the coverage is provided by an employer or is purchased directly from the insurance company. This contrasts with those who are covered by a public plan such as Medicaid or Medicare. For many adults, private health insurance is too costly and governmental sponsored programs are unavailable due to strict acceptance criteria and limited funding, making access to health care challenging for millions of Americans. In 2010, prior to the enactment of the ACA, 48.6 million individuals were uninsured (Martinez & Cohen, Robin A., 2012). As of 2016, the number of uninsured individuals dropped to 27 million (Tolbert et al., 2019). People of color are more likely to be uninsured when compared to non-Hispanic whites. A 2018 Kaiser Family Foundation survey report found that 45% of uninsured individuals indicated high premium costs as the key factor in forgoing health insurance coverage (Tolbert et al., 2019). The report stated 70% of those who were employed were not offered health insurance by their employers. Lack of health insurance can put an individual's financial well-being at risk. Uninsured individuals are more likely to suffer financial hardships due to medical bills and may

be forced to use savings, forgo paying necessities, face collections or bankruptcy (Kirzinger, Ashley & Munana, Cailey, 2019). Individuals who suffer from chronic illnesses (i.e. depression, anxiety, diabetes, etc.) may be at risk of employment instability, loss of income, and ultimately the loss of employment sponsored health insurance (Pollack & Kronebusch, 2008).

2.2 AFFORDABLE CARE ACT

Despite health insurance being a topic for U.S. policy discussion for nearly a century, it was not until 1965 when President Johnson enacted a law implementing Medicare and Medicaid, the first national health legislation (United States Senate, n.d.). Noting the groundbreaking importance of the legislation, President Johnson stated: “It is recognized for a long time that government should accept some of the responsibility for economically needy persons, including their medical care. It might be assumed that in the future the care made available for such persons will continue to improve in score and quality” (Follman, Joseph F., 1963). President Johnson’s assumption that healthcare would improve, health insurance would remain unobtainable to many Americans due to expensive premiums, pre-existing conditions and limited state funded health insurance until the Affordable Care Act passed nearly 50 years later.

In 2010, Congress enacted the Patient Protection and Affordable Care Act (ACA) in 2010 to minimize health disparities and expand access to health insurance. Initiated by the Obama administration, the ACA was a cornerstone of his presidency. The passing of the ACA required a great deal of compromise from political leaders and stakeholders (Oberlander, 2010). In its early draft, the ACA was meant to provide all uninsured individuals with a form of universal health insurance. However, this proposed legislation met with serious opposition from political leaders. Given the history of health reform in the United States, this opposition was not surprising to its

supporters. Over the last 75 years, there have been many efforts from American presidents and their administrations to provide health insurance for the general population. The Obama administration learned from previous attempts to enact federal health reform and developed tactics to ensure adoption of the legislation (Oberlander, 2009). To ensure the passing of the bill, additional funds were funneled to Medicaid for states that supported the passing of the ACA.

The passing of the ACA changed the landscape of health insurance in the United States in two main categories: 1) through federal subsidies and 2) sweeping changes to the health insurance market regulation. Federal subsidies include federal financial support for Medicaid expansion and health insurance subsidies for individuals and families earning 400% or below the federal poverty level to be purchased via an insurance marketplace. The health insurance market changes included 1) establishing ten essential health benefits; 2) requiring no-cost preventative health screenings; 3) increasing the age limit for children to remain on their parents' insurance plan; 4) removing exclusions for pre-existing conditions; and 5) ending yearly and lifetime dollar limits for essential health benefits (Blumenthal & Abrams, 2020). These changes made to the funding and regulating health insurance have decreased the number of individuals without health insurance.

2.3 MEDICAID EXPANSION

The three main goals of ACA are to reduce the number of uninsured individuals, expand Medicaid to those below 138% the federal poverty level and reduce the overall cost of health care (U.S. Centers for Medicare & Medicaid Services, n.d.). In passing the ACA, the federal government offered states additional funding to expand Medicaid. This additional funding was meant to help fund individuals below the 138% poverty level to give them access to Medicaid

where they would have previously been ineligible. States could opt in for Medicaid expansion but were not required to do so. Table 2.1 shows the 40 states, including the District of Columbia, that have opted for Medicaid expansion (Kaiser Family Foundation, 2022a). States that chose to not expand Medicaid often cited future cost concerns as the main reason to not opt for expansion despite the evidence for this result being incomplete or misrepresented (Hall, 2018). This regulation and state self-selection provides quasi-experimental conditions to determine the impact of Medicaid expansion (access to health insurance) by comparing the differences in health outcomes within individuals between states that opted for the expansion and non-expansion states.

States could opt in for Medicaid expansion starting in 2009. By 2014, the federal government fully funded the Medicaid expansion. The expansion allowed federal dollars to be used to increase Medicaid health insurance coverage for those who fall between 100 and 138 percent the national poverty level. Previous research has investigated the overall effectiveness of Medicaid expansion on the reduction of uninsured individuals. Expansion accounts for 60% of the reduction in uninsured individuals (Frean et al., 2017). Prior to the implementation of the Affordable Care Act (ACA) in 2014, over 40 million Americans were uninsured.

TABLE 2.1

State Medicaid Expansion Status

State	Expansion	Date of Expansion	Expansion for this Study
Alabama	Not Adopted	NA	N
Alaska	Adopted	9/1/2015	Y

Arizona	Adopted	1/1/2014	Y
Arkansas	Adopted	1/1/2014	Y
California	Adopted	1/1/2014	Y
Colorado	Adopted	1/1/2014	Y
Connecticut	Adopted	1/1/2014	Y
Delaware	Adopted	1/1/2014	Y
District of Columbia	Adopted	1/1/2014	Y
Florida	Not Adopted	NA	N
Georgia	Not Adopted	NA	N
Hawaii	Adopted	1/1/2014	Y
Idaho	Adopted	1/1/2020 (enrollment 11/1/2019)	N
Illinois	Adopted	1/1/2014	Y
Indiana	Adopted	2/1/2015	Y
Iowa	Adopted	1/1/2014	Y
Kansas	Not Adopted	NA	N
Kentucky	Adopted	1/1/2014	Y
Louisiana	Adopted	7/1/2016	Y
Maine	Adopted	1/10/2019 retroactive to 7/2/2018	N
Maryland	Adopted	1/1/2014	Y
Massachusetts	Adopted	1/1/2014	Y
Michigan	Adopted	4/1/2014	Y
Minnesota	Adopted	1/1/2014	Y
Mississippi	Not Adopted	NA	N

Missouri	Adopted	10/1/2021 retroactive to 7/1/2021	N
Montana	Adopted	1/1/2016	Y
Nebraska	Adopted	10/1/2020	N
Nevada	Adopted	1/1/2014	Y
New Hampshire	Adopted	8/15/2014	Y
New Jersey	Adopted	1/1/2014	Y
New Mexico	Adopted	1/1/2014	Y
New York	Adopted	1/1/2014	Y
North Carolina	Not Adopted	NA	N
North Dakota	Adopted	1/1/2014	Y
Ohio	Adopted	1/1/2014	Y
Oklahoma	Adopted	7/1/2021	N
Oregon	Adopted	1/1/2014	Y
Pennsylvania	Adopted	1/1/2015	Y
Rhode Island	Adopted	1/1/2014	Y
South Carolina	Not Adopted	NA	N
South Dakota	Adopted	Not Implemented	N
Tennessee	Not Adopted	NA	N
Texas	Not Adopted	NA	N
Utah	Adopted	1/1/2020	N
Vermont	Adopted	1/1/2014	Y
Virginia	Adopted	1/1/2019 enrollment 11/1/2018	N
Washington	Adopted	1/1/2014	Y
West Virginia	Adopted	1/1/2014	Y

Wisconsin	Not Adopted	NA	N
Wyoming	Not Adopted	NA	N

Note. Adapted from *Status of state Medicaid Expansion decisions: Interactive map*. (2022) https://www.kff.org/medicaid/issue-brief/status-of-state-medicaid-expansion-decisions-interactive-map/

2.4 HEALTH INSURANCE EVIDENCE FROM PREVIOUS RESEARCH

Several studies have highlighted positive economic and health outcomes that result from having access to healthcare insurance. As noted by Levy and Meltzer (2008) counting on observational studies to better understand the true impact of health insurance on economic and health outcomes is not enough in making a case for health insurance. Rather, citing studies that use a randomized control trial, the gold standard, is required to determine causal inference. Prior to the implementation of the ACA there were three large scale experiments that offered researchers an exogenous variation to determine individuals' responses to a policy change. The three experiments include the RAND Health Insurance Experiment conducted from 1974 to 1982, the Oregon Health Insurance Experiment conducted in 2008, and the Accelerated benefits Demonstration conducted from 2007-2010.

The RAND Health Insurance Experiment (1971-1982) was a large-scale study funded by the Department of Health, Education, and Welfare (which is now called the Department of Health and Human Services) and is considered the largest health policy study in U.S. history (Brook et al., 2006). The study recruited 2,750 families who were then randomly assigned to one of five types of health insurance plans, which provided either free health insurance or one of the several insurance plans requiring varied copayments (Brook et al., 2006). The participants were

aged 14-61 and did not have a disability. The intent of the study was to measure the effect of cost sharing on use of health services and consequences for health (Brook et al., 2006). The RAND Health Insurance Experiment showed positive impacts on individuals' health outcomes, reduced health related expenditures, decreased financial distress, and improvements in overall health, including the prevalence of serious symptoms among poor individuals receiving free insurance (Brook et al., 2006).

The Oregon Health Insurance Experiment was "a landmark study examining the effect of expanding public health insurance on health care use, health outcomes, financial strain, and the well-being of low-income adults" (Baicker et al., n.d.). The study used a lottery system to provide low-income adults in Oregon the chance to be selected for its Medicaid program. The purpose of the lottery was to provide a randomized sample to study the impact of Medicaid coverage using a control group (individuals not selected through the lottery) and a treatment group (lottery winners) (Finkelstein et al., 2012). The study provided better understanding of individual usage and outcomes of Medicaid services, particularly individual care usage, financial strain associated with medical care costs, and health status in relation to public health insurance expansion (Finkelstein et al., 2012). Ultimately, Finkelstein et al. found after the first year of implementation individuals indicated an increase in usage of medical services, resulted in less debt, fewer bills sent to collections, and reduced rates of depression and overall better self-reported health status but didn't have a statistically significant effect on physical health measures.

The Accelerated Benefits Demonstration project was a study funded by the Social Security Administration to test early access to health care and health outcomes among new Social Security Disability Insurance recipients (Michalopoulos et al., 2011). The study provided

health benefits and specific employment programs to newly entitled Social Security Disability Insurance (SSDI) recipients. Participants were randomly assigned to one of three groups: 1) a group with access to health care benefits designed for the project; 2) a group with access to these health care benefits plus voluntary services to help them navigate the health care system and return to work; and 3) a control group that did not receive the health care insurance benefits or support. The findings from this study suggested access to health insurance among low-income individuals results in an increase in health care use, a reduction in personal funds used for medical expenses, and an expressed a reduction in unmet medical needs (Michalopoulos et al., 2011).

2.5 SEMINAL STUDIES ON THE EFFECTS OF MEDICAID EXPANSION

A body of research has examined the effects of Medicaid expansion on health. (Wherry & Miller, 2016) researched changes in health insurance coverage, health care utilization and health outcomes due to the Medicaid expansion. Utilizing the National Health Interview Survey (NHIS), the study examined individuals 19-64 years of age on health insurance status changes, health care utilization, and self-reported health status before and after the implementation of the Affordable Care Act. More specifically, the target population for analysis was limited to those newly eligible for Medicaid through the Medicaid expansion, those below 138% the federal poverty level, between 2010 and 2014.

The study first looked at the changes in insurance status based on use of private insurance, Medicaid, and no insurance. The results showed a significant increase in health insurance coverage by 7.4 percentage points and an increase in Medicaid insurance by 10.5 percentage points (Wherry & Miller, 2016). The findings of this research supported two of the main goals of the ACA, to decrease the number of uninsured individuals and to increase the

number of individuals on Medicaid. To understand the impact of the additional insurance through Medicaid expansion, Wherry and Miller (2016) looked at two outcomes, whether the health care coverage was better than a year before and whether individuals utilized health care. Better coverage was determined through a survey question, which asked respondents whether their health care coverage was better than the year before. Health care utilization was determined through a series of questions including, whether they saw or spoke to a physician in general practice, internal medicine, or a specialist (excluding OBGYNs, psychiatrists and ophthalmologists), and if they were hospitalized overnight or used an emergency department. Diagnoses of chronic medical conditions, such as diabetes and high cholesterol were examined. The researchers found there was an increase in visits to general health physicians by 6.6 percentage points and increase in diagnosis of treatable conditions including diabetes and high cholesterol (5.7 and 5.7 percentage points respectively) (Wherry & Miller, 2016).

Other studies (Simon et al., 2017; Sommers et al., 2014, 2015, 2016) have used similar variables to address similar questions and analyze the outcomes of the study by Wherry and Miller (2016). For example, a study conducted by (Sommers et al., 2017) found similar results. Their research specifically looked at two states that expanded Medicaid, Kentucky and Arkansas, as well as results from Texas, a state without Medicaid expansion. The researchers found that uninsurance rates dropped by 20 percentage points relative to the non-expansion state (Texas). They also found a 41-percentage point increase in those having a usual source of care and an increase in “excellent” self-reported health status. For those who identify as having a chronic health condition, there was an improvement in regular health care for those conditions, medication adherence, and self-reported health status of “great”.

The studies addressed in this section use a methodological design that looks specifically at the same individual prior to and after the implementation of Medicaid expansion. (Sommers et al., 2017) compared health outcome results among those in expansion states to states that did not opt for expansion. They found that prior to ACA, those who were in the 138% poverty level group questioned for the Gallup-Healthways Well-Being Index had significantly worse health outcomes overall. However, after the implementation of ACA's Medicaid expansion this same group experienced a decrease of 8 percentage points in those who lacked a personal physician as well as 3.5 percentage point decrease in those who lacked easy access to medicine and a 2.5 percentage point decrease in those who were unable to afford health care. Minority populations saw a great decrease in probability of being uninsured. The study by Sommers et al. (2017) revealed individuals in Medicaid expansion states saw an improved impact of health insurance on health outcomes, including a reduction in days limited by health and a decrease in those reporting fair/poor health. Despite the improvement to health outcomes, none of the studies listed here address specific mental health outcomes.

Ultimately, the seminal studies that address health insurance status, health care utilization and health outcomes after the implementation of the ACA's Medicaid expansion for the states that opted in empirically show there is a decrease in uninsured individuals. Within those states, there was an increase in individuals who stated access to health care and medication improved and an overall self-response health status improvement. After several years of the ACA's Medicaid expansion provision,(Miller & Wherry, 2019) found that a reduction in those who are uninsured in states that expanded Medicaid and found that individuals had a reduction in financial stress.

2.6 MENTAL HEALTH DISORDERS AND ACCESS TO INSURANCE

The (National Institute on Mental Health, 2022), a subsidiary of the National Institute of Health, defines any mental illness (AMI) as a mental, behavioral, or emotional disorder. The disorders can range in impact from no impairment, mild, moderate to severe. If the disorder is considered severe, (SMI) there is serious functional impairment that substantially interferes with major life activities. Mental health disorders are prevalent in the U.S. population. Approximately 20% of the adult population, or about 40 million people, suffer from mental illness disorders in the United States (Mental Health America, 2020; National Institute of Mental Health, 2022). The Substance Abuse and Mental Health Services Administration (SAMHSA) includes individuals with substance abuse disorders for an estimated 56 million adults suffering from mental health disorders. Of the estimated 40 million adults suffering from mental illness in the United States, over half (57%) do not receive any treatment (Mental Health America, 2020; National Institute of Mental Health, 2022). Among those who did receive treatment, over 22 percent have an unmet need for treatment. Nearly 44 percent of individuals did not seek treatment or had unmet mental health treatment needs due to the cost for care (Mental Health America, 2020). Mental Health America (2020) found a reduction in insured adults of about 8.2% since 2012. Despite the decrease in the number of uninsured adults, there is evidence that insurance ownership does not significantly reduce the unmet need for mental health care. Reasons for this unmet treatment need can be linked to cost-related barriers to being under-insured through private insurance plans (Collins, Sara R. et al., 2019).

According to the NIMH, adults with any mental illness (AMI) are those who have had inpatient or outpatient treatment, participated in counseling, or who used a prescription medication to treat problems for emotions, mental health, or nerves. Less than half of those who identified as having an AMI received treatment (46.2% of the 46.6 million individuals).

Individuals 18-25 years of age made up 38.4% of those who received treatment while those 26-49 years of age made up 43.3%. Those over the age of 50 made up 44.2% of those who received treatment. Additionally, given that rates of mental illness differ substantially among males and females (37.4% vs. 51.2% respectively) (National Alliance on Mental Illness, 2022) assessing the difference among males and females would be useful to understanding a more holistic picture of mental health baselines prior to the implementation of the ACA.

2.7 DEPRESSIVE SYMPTOMS AND DOCTOR DIAGNOSISED MENTAL ILLNESS AND HEALTH INSURANCE STATUS

Hundreds of correlational studies have found that having health insurance resulted in better health outcomes (Gaudette et al., 2018). That said, only a limited number of studies designed to determine a causal relationship between having health insurance and better health outcomes have been published. The results of those studies conclude there is a reduction in mortality, increased self-reported health status, decrease in the prevalence of chronic health condition, and declines in prevalence of risk factors that result in poor health (Baicker et al., 2013; Finkelstein et al., 2012; Lasser et al., 2014; Sommers et al., 2012). These findings suggest there is a causal relationship between health insurance and better health outcomes.

More specifically, some of the earliest evidence from randomized health insurance studies that address the impact of having health insurance on mental health conditions are from the RAND study of the 70s and early 80s. Findings from the RAND study state individuals with health insurance have provided consistent evidence that health insurance improves health, most notably among vulnerable populations including children, the elderly and low-income individuals (Levy et al., 2004; Newhouse, 1996).

The Oregon Health Insurance Study found having health insurance is associated with improvement in both self-reported physical and mental health (Finkelstein et al., 2012). The authors conclude having health insurance affects overall well-being and found individuals had an overall happiness increase of 32% if they have Medicaid. (Baicker et al., 2013) found a 9.2 percentage point decrease in the probability a positive depression screening would occur overall and 13.1 percentage points for those who had preexisting depression diagnoses. The greatest relief identified was a decrease in feeling down or hopeless, a reduction in feeling tired, and few nights with troubled sleeping. Oregon lottery Medicaid recipients had a reduced likelihood of having undiagnosed depression by 50% and untreated depression by 60% and an overall reduction in unmet medical treatment for mental health disorders by 40% (Baicker et al., 2018). Additionally, the authors found a significant increase in the use of medications commonly used to treat depression.

2.8 INDIVIDUAL AND SOCIETAL COSTS OF UNTREATED MENTAL HEALTH DISORDERS

Determining whether access to Medicaid has an impact on individuals' mental health is essential, given the prevalence of unmet treatment needs and previous research on the outcomes associated with having health insurance. Individuals diagnosed with mental illness are estimated to have significantly lower employment rates than those without mental health disorders (Baldwin & Marcus, 2007). Additionally, those who are employed and have a mental illness earn approximately 10% less than individuals without a mental illness (Baldwin & Marcus, 2007; Kessler et al., 2008). (Mitra & Jones, 2017) found that mental health problems lead to a significant increase in the probability of becoming unemployed; those in recovery (i.e., treatment) were more likely to obtain employment. Unemployment and underemployment have

direct economic burdens on society. Rice et al. (1991) were the first to estimate a societal cost to mental illness, finding that over $44 billion earnings were lost due to mental health issues. An updated study in 1992 on this issue determined the cost had increased to $77 billion (Harwood, H. et al., 1992). Other studies have found those with serious mental illness lose an average of $16,306 in lost wages when compared to those who do not suffer from serious mental illness, making the societal cost closer to $193 billion in lost earnings (Kessler et al., 2008).

2.9 CONCEPTUAL MECHANISMS

Literature investigating the relationship between health insurance ownership and health outcomes continues to grow rapidly providing a foundation on empirical analyses to better establish a thorough understanding of how health insurance impacts overall health status. Much of the literature highlights studies indicating a relationship between health insurance and health outcomes. Determining the impact of Medicaid expansion on mental health is essential in adding to the body of knowledge as to whether implementation of the ACA's Medicaid Expansion affects health outcomes. Medicaid expansion may have a similar impact on health-related health outcomes, more specifically mental health outcomes. The effect of Medicaid expansion on mental health occurs through three main conceptual mechanisms: 1) through a reduction of uninsured individuals; 2) increased demand for and utilization of healthcare services; and 3) reducing financial stress from health-related expenditures.

Reduction in uninsured individuals

Uninsured individuals with access to health insurance through health care reform are more likely to be insured after the implementation of the reform. A health care policy change offering lower income individuals' access to health insurance will likely result in a reduction of

uninsured individuals. Previous health care policy reform implementation, such as the Massachusetts health insurance legislation found a reduction in insured individuals (Kolstad & Kowalski, 2012). Similar results were observed in early studies assessing the impact of Medicaid expansion on the reduction of uninsured individuals (Sommers et al., 2017; Wherry & Miller, 2016). The reduction in uninsured individuals not only includes those who are newly eligible for enrollment but also for individuals who were previously eligible for Medicaid expansion (Frean et al., 2017; Hudson & Moriya, 2017). This can be attributed to the "Welcome mat" effect, which is when individuals who were previously eligible for Medicaid enroll due to an increase in media coverage of the policy, enhanced outreach by federal and state advocates and a simpler application process to obtain Medicaid (Hudson & Moriya, 2017).

Increasing demand for and utilization of services

Secondly, health insurance lowers the cost of care to consumers, therefore an increase in demand for services would be anticipated with an introduction of sweeping policy change making healthcare more affordable through insurance subsidies or free Medicaid expansion through state programs. Studies examining the impact of the implementation of the Oregon Health Insurance experiment, which offered a group of individuals Medicaid at random, found individuals newly eligible for the Medicaid had a 13 percentage point increase in the mean annual visits with a medical professional when compared to those who did not receive Medicaid (Gold et al., 2014). Additionally, Medicaid offered through the Oregon Health Insurance Experiment was found to significantly increase overall emergency use by .41 visits per person (Taubman et al., 2014). The ACA's Medicaid expansion resulted in improved access to care and increased rates of individuals having a source of regular care (Simon et al., 2017; Sommers et al., 2014). In addition to increased rates of individuals having a regular physician, individuals

increased preventative health visits, lab tests and cancer screenings (Simon et al., 2017; Sommers et al., 2014). Beyond office visits and regular screenings, there is an increase in prescription drug utilization and adherence (Ghosh et al., 2019; Sommers et al., 2016).

Having health insurance for those who suffer from mental illness, generalized or serious is positively correlated to receiving treatment for their diagnosed condition (Walker et al., 2015). The Oregon Health Insurance Experiment study found substantial improvements in depression. Closely related to the improvement in depression, a greater prevalence in diagnoses of depression, an increase in antidepressant medication use, and an overall 30 percentage point reduction in depressive symptoms was identified (Baicker et al., 2013).

Reduced financial stress

Thirdly, access to health insurance reduces financial stress and constitutes an indirect pathway in which Medicaid Expansion may improve mental health. The strongest evidence of this is found through research conducted on the effect of the Oregon Health Insurance Experiment. Allen et al (2010) found there were substantial financial savings when compared to those not selected for Medicaid. Other studies found there Medicaid offered through the Oregon Health Insurance Lottery resulted in an elimination of catastrophic out-of-pocket medical expenses (Baicker et al., 2013; Finkelstein et al., 2012). The Massachusetts Health reform resulted in a reduction of personal bankruptcies and improved credit scores (Mazumder & Miller, 2016). The lack of health insurance can increase stress due to unexpected health related expenditures. Previous research suggests financial stress can increase depressive symptoms (Asebedo & Wilmarth, 2017; Mendes De Leon et al., 1994; Vinokur et al., 1996). Findings from

previous research show an increase in life satisfaction and an overall reduction in stress after receiving health insurance (Baicker et al., 2013; Finkelstein et al., 2012; Tran et al., 2017)

The aim of this study is to understand how the increased access to Medicaid insurance brought about by the Affordable Care Act affected various measures of mental health using data from the 2009-2019 waves of the Panel Survey of Income Dynamics (PSID). The following section, Chapter 3, describes the methodology used in this research.

CHAPTER 3

METHODOLOGY

3.1 DATA AND SAMPLE

This study used data from the Panel Study of Income Dynamics (PSID), waves 2009-2019. The PSID began in 1968 with a nationally representative sample of 4,802 families who were interviewed annually until 1997 when it switched to a biannual interview (Panel Study of Income Dynamics, n.d.). The PSID is the world's longest-running nationally representative panel data set and has a response rate of 91% since the survey's inception (Johnson et al., 2018). Children from these original families continued in the survey as "split-offs" sample members once they left their household of origin. The original sample was limited to respondents between the ages of 26 to 75 starting in 1999.

The PSID survey details lifestyle choices, health conditions and financial status. Given its longitudinal character and rich information on both subjective and doctor-diagnosed mental health conditions, the PSID data are well suited to investigate the research question posed in this study. The key variables that were analyzed included a respondent's insurance status, perceived health status (i.e., life satisfaction and depression symptoms), as well as reported mental health conditions diagnosed by a medical professional.

3.2 VARIABLES

The first variable used to assess respondents' psychological well-being was life satisfaction. Since 2009, the PSID has asked the respondent to answer the following question: Please think about your life as a whole. How satisfied are you with it? Are you:

1. Completely satisfied
2. Very satisfied
3. Somewhat satisfied
4. Not very satisfied
5. Not at all satisfied?

The variable was scored from 1 to 5, with 1 being “completely satisfied” and 5 being “not at all satisfied”.

Another key dependent variable analyzed in this study was an individual’s self-reported psychological distress measured on Kessler’s Psychological Distress Scale (K6 scale), an instrument developed by Dr. Ronald Kessler, Professor of Healthcare Policy at Harvard Medical School (Kessler, R.K. & Mroczek, D. K., 1992). The scale includes six items/questions that asked the respondent to reply to the question: In the past 30 days, about how often did you feel:

1. So sad nothing could cheer you up
2. Nervous
3. Restless or fidgety
4. Hopeless
5. That everything was an effort
6. Worthless

The responses ranged from “*all of the time*” (score of 4 points) to “*none of the time*” (score of 0). The summary K6 score thus ranges between 0 and 24. In addition to a metric variable summary score, a binary variable indicating a score of 13 or more was used to identify clinically significant psychological distress. Arguably, the K6 measure is the most sensitive measure of the

dependent variables given it is the most granular with six questions and the slightest variation may suggest change in mental health.

To further understand the mental health of respondents after the implementation of the Affordable Care Act and Medicaid Expansion, this study used reports of mental health diagnoses by a medical professional. The PSID survey respondents were asked the following question: Has a doctor or other health professional ever told {you/your spouse} that {you/he/she} had:

1. An emotional, nervous, or psychiatric problem?
2. Permanent loss of memory or mental ability?

Two binary indicator variables are constructed to identify the affirmative responses to these questions. Additionally, respondents who answered in the affirmative to the first question, were asked the follow-up question: "What was the diagnosis?". While there were several possible responses, two of them, namely "depression" and "anxiety (panic)", were prevalent enough to be suitable for statistical analysis. Consequently, dichotomous indicator variables were created to identify onsets of depression and anxiety (panic) disorders.

An important calculation feature of both life satisfaction and K6 score measures described above is only the interviewed respondent who answered these questions was included in the analysis. Consequently, the values of these variables were only available for one individual per PSID household. In contrast, all questions about doctor-diagnosed conditions were answered for both spouses if the PSID household was a couple. Thus, the sample of observations of doctor-diagnosed conditions is larger than the sample of respondents for whom life satisfaction or K6 measures was available.

The independent variable is a binary indicator of whether the individual lives in a state that has opted for Medicaid expansion. Individuals were grouped into 4 groups, including:

1. Those below 100% of the national poverty level, their access to Medicaid did not change with the implementation of the ACA.
2. Those between 100-138% of the national poverty level, who were newly eligible in a state that opted for Medicaid expansion.
3. Individuals between 138-400% of the national poverty level, who are eligible for governmental premium subsidies.
4. Those 400% of the national poverty level or greater, whose eligibility for any assistance through the ACA did not change.

TABLE 3.1 Variables to determine the impact of health insurance on mental health

Variables	Measurements
Dependent Variables	
Self-Reported Subjective Wellbeing	1-5 (1 being completely satisfied, 5 not being satisfied at all
Self-Reported Psychological distress K6 Score	0-24 (0 no psychological distress-24 extreme psychological distress)
Significant psychological distress	K6 score below 13=no, K6 score 13 and above=yes
Have you been diagnosed with depression or anxiety by a medical professional?	Yes=1, No=0
Independent Variables	
Income Level	0-100% poverty level, 100%-138% poverty level, 138%-400% poverty level, 400%+ poverty level
State of Residency	0 if respondent lived in a state that DID NOT have Medicaid Expansion, 1 if respondent lived in a state with Medicaid Expansion
Age	16-64, Limited to those below age 65 (who are Medicare eligible)
Marital Status	If 0 respondent is not married, if 1 respondent is married
Number of Family Members	Min 1 Max 14
Number of Children	Min 0 Max 11
Employment status	Employed, Self-employed, retired, Student, Disabled,

	Unemployed, Domestic homemaker
Retirement status	Yes, No
Disabled status	Yes, No
Type of Insurance	
Uninsured	If 0 respondent is insured, if 1 respondent is uninsured
Wealth of family	Total Wealth
Unemployment state	
State GDP	
Maximum EITC	Min 0 Max 11, 598

3.3 EMPIRICAL MODEL

Conceptually, the effect of the 2014 ACA's Medicaid expansion on mental health should operate primarily by reducing the number of uninsured people and by increasing the number of individuals who are enrolled in Medicaid. Accordingly, the first step in the empirical analysis is to test if such mechanisms can be observed in the data. I estimate the following equation:

$$Y_{ist} = \beta \cdot E_{st} + X'_{ist}\theta + \mu_i + \gamma_t + \varepsilon_{it} \quad (1)$$

where Y_{ist} is a measure of Medicaid enrollment (or insurance coverage status) of individual i living in state s in time t, E_{st} denotes a binary indicator for Medicaid expansion being in effect in state s in time t, X_{ist} represent control variables (quadratic function of age, education, marital status, number of household members, interview month average census division-level unemployment, census division fixed effects, and month of interview fixed effects. Moreover, the estimations control for individual fixed effects, μ_i, and year fixed effects, γ_t, while ε_{it} denotes a random error. The above equation is estimated as a linear probability model with robust standard errors clustered at household and year levels. To avoid confounding effects of Medicare eligibility, the sample for this estimation, as well as all subsequent estimations, is limited to individuals younger than 65.

The coefficient of interest in the above model, β, identifies the causal effect of the ACA Medicaid expansion. Equation (1) is a flexible implementation of the difference-in-

differences (DiD) framework (analogous to using the *post x treatment* variable in a standard difference-in-differences setup) that accounts for the fact that Medicaid expansion occurred at different times in different states. Therefore, the coefficient β measures the marginal effect of Medicaid expansion on the specific outcome variable. Given the controls for individual fixed effects, the value of this coefficient is identified by calculating the average change in the dependent variable experienced by an individual before vs. after the implementation of Medicaid expansion in her state of residence.

As explained in previous sections, the theoretical impact of ACA's Medicaid expansion should depend on household income. Individuals whose income is below the federal poverty threshold should experience no effect as they qualified for Medicaid even before the ACA became effective. Individuals whose income falls between 100% to 138% of the federal poverty level (and who reside in expansion states) should experience a large effect of Medicaid expansion as they constitute the primary beneficiary group of health coverage. Respondents with income between 138% to 400% of the federal poverty level might also experience a significant effect as the ACA law created sliding scale subsidies that help these individuals pay health insurance premiums in state or federal health marketplace. Finally, the most affluent households, i.e., those with income exceeding 400% of the federal poverty guidelines, should experience no significant effect as the law does not offer them new benefits.

To evaluate the differential effect of the ACA Medicaid expansion by income the model specification is altered by the inclusion of interaction terms between the Medicaid expansion dummy and a set of indicators of income distribution:

$$Y_{ist} = \alpha E_{st} + \beta_1 P1_{it} + \beta_2 P2_{it} + \beta_3 P3_{it} + \delta_1 (E_{st} \times P1_{it}) + \delta_2 (E_{st} \times P2_{it}) + \delta_3 (E_{st} \times P3_{it}) + X'_{ist}\theta + \mu_i + \gamma_t + \varepsilon_{it} \quad (2)$$

where $P1_{it}$, $P2_{it}$, and $P3_{it}$ indicate that individual i's household income in the previous calendar year was below 100%, 100-138%, and 138-400% of the federal need standard, respectively, and all other elements are as in Equation (1) above.

After establishing that Medicaid expansion resulted in a significant increase in Medicaid enrollment and a decrease in the likelihood of being uninsured, I proceeded to the examination of mental health effects of ACA law. Toward this purpose, I re-estimate equations (1) and (2) with dependent variables operationalized as: (1) life satisfaction, (2) K-6 score, (3) an indicator for K-6 score being 13 or higher, (4) doctor-diagnosed onset of psychological disorder, (5) doctor-diagnosed onset of psychological disorder – depression, (6) doctor-diagnosed onset of psychological disorder – anxiety/panic, and (7) doctor-diagnosed onset of loss of memory or mental ability.

CHAPTER 4

RESULTS

4.1 DESCRIPTIVE STATISTICS

Data from the Panel Study of Income Dynamics (PSID), waves 2009-2019, resulting in several key findings. The PSID began in 1968 with a nationally representative sample of 4,802 families who were interviewed annually until 1997 when it switched to a biannual interview (Panel Study of Income Dynamics, 2017). PSID is a nationally representative panel data set and has a response rate of 91% since the survey's inception (Johnson et al., 2018).

The descriptive statistics are shown in Table 4.1 below detailing the make-up of the sample and the dependent and independent variables used in the analysis. All dollar variables from previous waves are adjusted for 2019 dollars. The mean life satisfaction score for the full sample is M=2.148. The mean K6 psychological distress score is 3.48 points out of a maximum of 24 points. Four percent of the full sample was identified as having clinically significant psychological distress based on their K6 score. Among the full sample, 20 % had been diagnosed by a health professional as having a psychiatric condition, 11% had been diagnosed as having depression and 8% had a diagnosis of anxiety.

The average respondent in the full sample is 44 years old, likely to be married (68%), have children (79%) and have some college education (13 years of education). Over three-quarters (78%) of the sample was White; 14% was Black. The vast majority (88%) were non-Hispanic. About 5% had incomes between 100-138% of the national poverty level (the group newly eligible for Medicaid expansion) and 37% were between 138-400%, the group who

become eligible for governmental premium subsidies through the ACA. Fourteen percent were uninsured.

Table 4.1 Descriptive Statistics

	M/Percentages		
	Full Sample	Females	Males
Life satisfaction score	2.1481	2.1429	2.1540
K6 score	3.4761	3.6912	3.1880
K6 score--Severe	4%	5%	3%
Psychiatric condition	20%	24%	15%
Diagnosed depression	11%	15%	8%
Diagnosed anxiety	8%	10%	5%
Federal Poverty level			
FPL < 100% (ref: 400+%)	9%	10%	9%
FPL 100-138%	5%	5%	5%
FPL 138-400%	37%	38%	36%
FPL < 400%	49%	47%	51%
Gender			
Male	47%	0%	100%
Female	53%	100%	0%
Race			
White	78%	77%	79%
Black	14%	15%	13%
Other	8%	8%	8%
Ethnicity			
Non-Hispanic	88%	67%	88%
Hispanic	12%	33%	12%
Age	44.0910	44.2298	43.9343
Education Level	13.6862	13.7562	13.6076
Married	68%	66%	70%
Family Size	2.7209	2.7489	2.6894
Children	79%	82%	75%
Employment Status			
Employed	63%	61%	52%
Self-employed	11%	8%	13%
Homemaker	8%	14%	1%
Student	2%	2%	1%
Retired	6%	6%	6%
Other	0%	0%	0%
Disabled	4%	4%	4%
Unemployed	6%	5%	7%
Uninsured	14%	12%	16%
Income	$101,439.10	$98,553.37	$104,695.30
Net worth	$343,625.00	$338,984.37	$348,861.30

Note: all $ are adjusted for 2019 dollars

The sample included slightly more females than males, at 53% and 47% respectively. Females and males had similar means in most of the variables however there were some differences in employment status and uninsured status. Nearly 13 percent of males were self-employed whereas only 8 percent of females are self-employed. Sixteen percent of males were uninsured, and 12 percent of females were uninsured.

4.2 MULTIVARIATE REGRESSION RESULTS

Each dependent variable was analyzed by estimating two model specifications across three distinct samples. Three of these estimations aimed to measure the overall effect of Medicaid expansion, both for the full sample and separately for females and males. Each of the estimated models was then modified with the addition of indicator variables for respondents' income range, as well as the interaction terms between the Medicaid expansion variable and these income indicators. The income groups were defined using the following cutoffs of the federal poverty threshold: 0-100%, 100-138%, and 138-400%, with respondents reporting income greater than 400% of the federal poverty level serving as the reference group. Therefore, the coefficient estimates on interaction terms reveal if and how the changes in outcome variables due to Medicaid expansion are different across groups of individuals who fall into different ranges as defined by the multiples of the federal poverty threshold. Moreover, the tests of linear restrictions are carried out to confirm the statistical significance of variation in outcome variables brought about by the ACA Medicaid expansion within each of the income groups.

The effect of the 2014 implementation of Medicaid expansion on mental health should operate primarily by reducing the number of uninsured people and by increasing the number of

individuals who are enrolled in Medicaid. Accordingly, the first step in the empirical analysis is to measure the effect of Medicaid expansion on these two outcomes.

Probability of Being Uninsured

Table 4.2 reports regression results from estimations where the dependent variable was a binary indicator for not having any insurance coverage. Measured across the whole sample, Medicaid expansion reduced the probability of being uninsured by about 1.2 percentage points, the effect significant at 0.1 level (column 1). Estimations conducted with sub-samples of females (column 3) and males (column 5) revealed similar magnitudes of the effect for both populations, although only the effect for males was estimated with enough precision to deem it statistically significant at 0.1 level.

Table 4.2: OLS regression results, dependent variable is Uninsured

	Full sample				Females				Males			
	(1)		(2)		(3)		(4)		(5)		(6)	
	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)
a: Medicaid expansion	-0.0117	(0.0060) †	0.0429	(0.0093) ***	-0.0123	(0.0085)	0.0399	(0.0122) ***	-0.0109	(0.0063) †	0.0467	(0.0081) ***
FPL < 100% (ref: 400+%)			0.1072	(0.0158) ***			0.0888	(0.0187) ***			0.1391	(0.0176) ***
FPL 100-138% (ref: 400+%)			0.0960	(0.0175) ***			0.0854	(0.0201) ***			0.1100	(0.0182) ***
FPL 138-400% (ref: 400+%)			0.0437	(0.0070) ***			0.0415	(0.0087) ***			0.0460	(0.0062) ***
b1: (Medicaid exp.) * (FPL < 100%)			-0.1638	(0.0140) ***			-0.1278	(0.0162) ***			-0.2289	(0.0204) ***
b2: (Medicaid exp.) * (FPL 100-138%)			-0.1798	(0.0237) ***			-0.1547	(0.0305) ***			-0.2199	(0.0225) ***
b3: (Medicaid exp.) * (FPL 138-400%)			-0.0698	(0.0110) ***			-0.0676	(0.0123) ***			-0.0728	(0.0123) ***
Age	-0.0057	(0.0045)	-0.0011	(0.0045)	-0.0072	(0.0062)	-0.0031	(0.0061)	-0.0046	(0.0054)	0.0008	(0.0054)
Age Squared	0.0001	(0.0000) **	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0001	(0.0000) ***	0.0001	(0.0000) *
Years of educ. completed	0.0010	(0.0024)	0.0009	(0.0022)	-0.0006	(0.0034)	-0.0005	(0.0033)	0.0025	(0.0033)	0.0018	(0.0033)
# of hhd members	-0.0093	(0.0020) ***	-0.0109	(0.0020) ***	-0.0062	(0.0036) †	-0.0077	(0.0037) *	-0.0121	(0.0030) ***	-0.0139	(0.0027) ***
Married	-0.0054	(0.0056)	-0.0007	(0.0062)	0.0015	(0.0067)	0.0069	(0.0078)	-0.0169	(0.0085) *	-0.0142	(0.0084) †
Max EITC	0.0000	(0.0000) **	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000) ***	0.0000	(0.0000) *
State unemployment	0.0070	(0.0030) *	0.0047	(0.0027) †	0.0072	(0.0028) **	0.0052	(0.0025) *	0.0070	(0.0041) †	0.0044	(0.0037)
State GDP (millions $)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)
State effective min. wage	0.0077	(0.0018) ***	0.0056	(0.0018) **	0.0076	(0.0021) ***	0.0058	(0.0020) **	0.0081	(0.0027) **	0.0057	(0.0025) *
N		66,461		66,461		36,767		36,767		29,693		29,693
R2 (within)		0.0320		0.0407		0.0288		0.0353		0.0403		0.0535
Linear restrictions (and p-values) of tests that these linear restrictions are equal to zeros:												
a+b1 (Effect of expansion for those below 100% of FPL)			-0.1210	(0.0000) ***			-0.0880	(0.0000) ***			-0.1822	(0.0000) ***
a+b2 (Effect of expansion for those between 100-138% of FPL)			-0.1307	(0.0000) ***			-0.1148	(0.0000) ***			-0.1733	(0.0000) ***
a+b3 (Effect of expansion for those between 138-400% of FPL)			-0.0270	(0.0005) ***			-0.0278	(0.0053) **			-0.0262	(0.0097) **

P-values: *** < 0.001, ** < 0.01, * < 0.05, † < 0.1. All estimations control for individual, state, year and month of interview fixed effects. Robust standard errors are clustered at individual and year levels.

The estimation results from specifications that included interaction effects between income group indicators and the Medicaid expansion dummy revealed important differences in the change in the probability of being uninsured across various groups of respondents. Most importantly, those with incomes between 100-138% of the federal poverty threshold experienced a sizable 13 percentage points reduction in the probability of being uninsured (linear restriction in the bottom panel in column 2), and this effect appeared to be more pronounced among males (17 percentage points) than among females (11 percentage points). This result was expected given that Medicaid expansion was designed to serve this group of consumers.

Interestingly, the estimations also revealed that ACA Medicaid expansion had an outsized negative effect on the probability of being uninsured among those who were already eligible for Medicaid before expansion, i.e., those with incomes below the federal poverty threshold. Measured across the whole sample, the expansion of Medicaid suggested a 12-percentage point reduction in the likelihood of being uninsured among these individuals, and the effect appeared to be much greater among males than among females (18 vs. 9 percentage points), although no formal test of statistical significance of the difference by sex was conducted. One of the possible reasons why the probability of being uninsured reduced after Medicaid expansion among previously eligible individuals might be the "welcome-mat" effect. The "welcome-mat effect" is when previously eligible individuals who may not have known they were eligible for coverage enrolled because of increased outreach efforts surrounding ACA Medicaid expansion in the states that opted for the policy implementation (Frean et al., 2017; Hudson & Moriya, 2017).

The implementation of ACA Medicaid expansion also led to about a 3 percentage point drop in the probability of being uninsured for those with incomes between 138-400% of the federal poverty guidelines. It has also led to a slight increase in the probability of being

uninsured among those with income over the four-fold multiple of the poverty threshold (as judged by coefficient estimates on Medicaid expansion variable in models with interaction terms). The reduction in the likelihood of being uninsured in the former group can be explained by the fact that, in states that expanded Medicaid, the expansion overlapped with the implementation of subsidies for the purchase of insurance in the state or federal marketplaces created by ACA. The seemingly surprising estimate for respondents with the highest income, on the other hand, could suggest that the Medicaid expansion variable captured the effect of the tax law passed and signed in 2017 that repealed the individual mandate penalty for not having insurance.

Medicaid Enrollment

The regression results presented in Table 4.3 provide strong evidence that the statutory objectives of ACA Medicaid expansion were achieved. Measured across the whole sample, ACA Medicaid expansion led to approximately a five percentage point increase in the probability of being enrolled under Medicaid (column 1). Expectedly, the effect was concentrated among low-income respondents. The primary beneficiaries of Medicaid, those in the 100-138% range of the federal poverty level, experienced about a 12-13 percentage point increase in the probability of being covered by Medicaid, and the effect was similar in magnitude for both females and males (columns 3 and 5).

Table 4.3: OLS regression results, dependent variable is Medicaid Insured

	Full sample				Females				Males			
	(1)		(2)		(3)		(4)		(5)		(6)	
	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)
a: Medicaid expansion	0.0503	(0.0065) ***	-0.0032	(0.0051)	0.0548	(0.0104) ***	-0.0007	(0.0068)	0.0445	(0.0054) ***	-0.0063	(0.0062)
FPL < 100% (ref: 400+%)			0.0606	(0.0097) ***			0.0744	(0.0146) ***			0.0356	(0.0080) ***
FPL 100-138% (ref: 400+%)			0.0375	(0.0106) ***			0.0404	(0.0133) **			0.0343	(0.0151) *
FPL 138-400% (ref: 400+%)			-0.0035	(0.0039)			-0.0043	(0.0062)			-0.0022	(0.0028)
b1: (Medicaid exp.) * (FPL < 100%)			0.1841	(0.0272) ***			0.1637	(0.0285) ***			0.2224	(0.0323) ***
b2: (Medicaid exp.) * (FPL 100-138%)			0.1297	(0.0210) ***			0.1310	(0.0230) ***			0.1268	(0.0247) ***
b3: (Medicaid exp.) * (FPL 138-400%)			0.0645	(0.0061) ***			0.0644	(0.0087) ***			0.0641	(0.0063) ***
Age	-0.0077	(0.0055)	-0.0069	(0.0053)	-0.0060	(0.0085)	-0.0045	(0.0084)	-0.0093	(0.0046) *	-0.0094	(0.0046) *
Age Squared	0.0001	(0.0000) ***	0.0001	(0.0000) ***	0.0001	(0.0000) ***	0.0002	(0.0000) ***	0.0001	(0.0000) ***	0.0001	(0.0000) ***
Years of educ. completed	-0.0056	(0.0022) *	-0.0047	(0.0022) *	-0.0062	(0.0027) *	-0.0055	(0.0026) *	-0.0043	(0.0029)	-0.0029	(0.0028)
# of hhd members	0.0066	(0.0024) **	0.0074	(0.0023) ***	0.0053	(0.0036)	0.0062	(0.0036) †	0.0071	(0.0023) **	0.0081	(0.0021) ***
Married	-0.0349	(0.0063) ***	-0.0213	(0.0051) ***	-0.0486	(0.0081) ***	-0.0324	(0.0072) ***	-0.0064	(0.0070)	0.0040	(0.0066)
Max EITC	0.0000	(0.0000) ***	0.0000	(0.0000) ***	0.0000	(0.0000) ***	0.0000	(0.0000) ***	0.0000	(0.0000) ***	0.0000	(0.0000) *
State unemployment	-0.0043	(0.0020) *	-0.0027	(0.0017)	-0.0045	(0.0021) *	-0.0029	(0.0018)	-0.0043	(0.0026) †	-0.0025	(0.0024)
State GDP (millions $)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)
State effective min. wage	-0.0025	(0.0022)	-0.0005	(0.0023)	-0.0024	(0.0029)	-0.0006	(0.0029)	-0.0031	(0.0021)	-0.0008	(0.0022)
N		66,461		66,461		36,767		36,767		29,693		29,693
R2 (within)		0.0227		0.0410		0.0265		0.0420		0.0228		0.0477
Linear restrictions (and p-values) of tests that these linear restrictions are equal to zeros:												
a+b1 (Effect of expansion for those below 100% of FPL)			0.1809	(0.0000) ***			0.1629	(0.0000) ***			0.2161	(0.0000) ***
a+b2 (Effect of expansion for those between 100-138% of FPL)			0.1266	(0.0000) ***			0.1303	(0.0000) ***			0.1205	(0.0000) ***
a+b3 (Effect of expansion for those between 138-400% of FPL)			0.0613	(0.0000) ***			0.0637	(0.0000) ***			0.0578	(0.0000) ***

P-values: *** < 0.001, ** < 0.01, * < 0.05, † < 0.1. All estimations control for individual, state, year and month of interview fixed effects. Robust standard errors are clustered at individual and year levels.

Interestingly, after Medicaid expansion, the magnitude of increase in the probability of being enrolled was even greater among those who had been eligible even before the policy reform. The likelihood of being covered among these low-income respondents increased by 18 percentage points overall, and by 16 and 22 percentage points among females and males, respectively. This sizable estimate could again arise from the "welcome-mat" effect. Quite possibly, the coefficient estimates could also capture transitions across income groups in the sample. Such transitions might also explain why the probability of being covered by Medicaid increased slightly in expansion states among individuals who have incomes above 138% of the federal poverty level. This explanation seems especially likely given that income in PSID is measured for the previous calendar year. For example, an individual who reported a household income in the 138-400% range of poverty guidelines in the previous year, might have income in the 100-138% in the present year and qualify for the expanded Medicaid benefit.

Overall, results in Tables 4.2 and 4.3 suggest that Medicaid expansion led to both statistically significant and quantitatively meaningful reductions in the probability of not having health insurance coverage and increases in the probability of being enrolled under Medicaid. Expectedly, the effects were concentrated among respondents who were targeted by the policy, i.e., those with incomes in the 100-138% bracket of the federal poverty guidelines, although some spillover effects were experienced by respondents in the adjacent income groups.

Life Satisfaction

Table 4.4 reports results from estimations of regression models where the dependent variable was life satisfaction measured on a five-item scale, with lower values indicating higher satisfaction. Life satisfaction was measured using responses to the following question: "Please

think about your life as a whole. How satisfied are you with it? Are you completely satisfied, very satisfied, somewhat satisfied, not very satisfied, or not at all satisfied?" The variable is scored from 1 to 5, with 1 being "completely satisfied" and 5 being "not at all satisfied". As above, estimation results are presented separately for the full sample and sub-samples of females and males, both for model specifications that intend to capture the overall effect of Medicaid expansion, as well as model specifications that examine the differential effects by income groups.

Estimates presented in column 1 reveal that, as measured across the entire sample, Medicaid expansion improved subjectively rated life satisfaction by about 0.01 points. However, the effect is not statistically significant and cannot be extrapolated to the general population. Similarly, no significant expansion-induced variation was detected when estimations were conducted separately with sub-samples of females and males (columns 3 and 5, respectively).

The estimations of models that included indicator variables for income groups, as well as the interaction terms between these indicators and Medicaid expansion, revealed that the effect of expansion on life satisfaction was concentrated among respondents who constituted the primary target of the policy. For those with income between 100-138% of the federal poverty threshold, experiencing the state expansion of Medicaid improved life satisfaction by 0.073 points, an effect significant at the 0.01 level (linear combination reported in the bottom panel in column 2). Simulated at the sample mean (life satisfaction = 2.1481), this effect translates into an improvement in life satisfaction by about 3.4%. Although no formal tests were conducted to examine the statistical significance of differences in expansion-induced variation in life satisfaction scores between females and males, the effects appear to be more pronounced among males. Female respondents with household income in the 100-138% range of the federal poverty

guidelines reported an improvement in life satisfaction in the magnitude of 0.059 (column 4), while the equivalent effect for males was measured at 0.095 (column 6). Both effects are statistically significant. At the same time, while the estimates of the impact of Medicaid expansion on life satisfaction point to an improvement in satisfaction following the expansion in all other income groups, none of these effects is statistically significant. Thus, it seems like the primary beneficiaries of Medicaid expansion based on eligibility rules also constitute the only group of respondents who experienced an improvement in life satisfaction with the new policy.

In terms of the effects of other covariates, life satisfaction is a non-linear function of age, improves with marriage and family size, and worsens with educational attainment. Moreover, the state GDP and the generosity of state welfare policy measured with the maximum dollar amount of tax credit that a low-income household is eligible to receive were negatively correlated with life satisfaction. The subjective life satisfaction of females was also inversely correlated with state minimum wage. Finally, estimations that control for grouping based on poverty threshold provide some evidence of the relationship between household income and life satisfaction. In these estimations, the coefficient estimates on federal poverty group indicators reveal how the reports of life satisfaction changed for respondents in no expansion states when they transition from the group with income above 400% of the poverty threshold into the groups with lower incomes. The equivalent effect for individuals in expansion states can be calculated as the sum of the coefficient on Medicaid expansion dummies and coefficients on poverty threshold multiples indicators. Results show that individuals who make a transition from the highest-income group into lower-income groups experienced a decline in life satisfaction.

Table 4.4: OLS regression results, dependent variable is life satisfaction (1 - very satisfied … 5 - not at all satisfied).

	Full sample				Females				Males			
	(1)		(2)		(3)		(4)		(5)		(6)	
	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)
a: Medicaid expansion	-0.0129	(0.0089)	-0.0150	(0.0091)	-0.0090	(0.0095)	-0.0143	(0.0119)	-0.0181	(0.0163)	-0.0172	(0.0132)
FPL < 100% (ref: 400+%)			0.1095	(0.0144) ***			0.1028	(0.0159) ***			0.1218	(0.0249) ***
FPL 100-138% (ref: 400+%)			0.1024	(0.0199) ***			0.1121	(0.0216) ***			0.0889	(0.0254) ***
FPL 138-400% (ref: 400+%)			0.0557	(0.0111) ***			0.0658	(0.0129) ***			0.0436	(0.0117) ***
b1: (Medicaid exp.) * (FPL < 100%)			0.0138	(0.0355)			0.0347	(0.0319)			-0.0167	(0.0536)
b2: (Medicaid exp.) * (FPL 100-138%)			-0.0579	(0.0286) *			-0.0450	(0.0304)			-0.0774	(0.0390) *
b3: (Medicaid exp.) * (FPL 138-400%)			0.0080	(0.0114)			0.0071	(0.0122)			0.0099	(0.0207)
Age	0.0107	(0.0082)	0.0143	(0.0083) †	0.0093	(0.0150)	0.0132	(0.0148)	0.0131	(0.0135)	0.0165	(0.0136)
Age Squared	-0.0002	(0.0000) ***	-0.0002	(0.0001) ***	-0.0001	(0.0001) *	-0.0001	(0.0001) *	-0.0002	(0.0001) ***	-0.0003	(0.0001) ***
Years of educ. completed	0.0089	(0.0043) *	0.0096	(0.0043) *	0.0091	(0.0055) †	0.0097	(0.0054) †	0.0093	(0.0050) †	0.0099	(0.0051) †
# of hhd members	-0.0258	(0.0067) ***	-0.0275	(0.0068) ***	-0.0179	(0.0073) *	-0.0196	(0.0075) **	-0.0354	(0.0076) ***	-0.0369	(0.0075) ***
Married	-0.1910	(0.0117) ***	-0.1763	(0.0121) ***	-0.2093	(0.0135) ***	-0.1911	(0.0141) ***	-0.1602	(0.0162) ***	-0.1502	(0.0163) ***
Max EITC	0.0000	(0.0000) **	0.0000	(0.0000)	0.0000	(0.0000) *	0.0000	(0.0000)	0.0000	(0.0000) †	0.0000	(0.0000)
State unemployment	0.0069	(0.0046)	0.0066	(0.0044)	0.0032	(0.0057)	0.0031	(0.0055)	0.0109	(0.0048) *	0.0105	(0.0046) *
State GDP (millions $)	0.0000	(0.0000) *	0.0000	(0.0000) *	0.0000	(0.0000) ***	0.0000	(0.0000) ***	0.0000	(0.0000)	0.0000	(0.0000)
State effective min. wage	0.0055	(0.0035)	0.0058	(0.0035)	0.0144	(0.0044) ***	0.0146	(0.0045) ***	-0.0061	(0.0048)	-0.0058	(0.0047)
N		66,152		66,152		36,589		36,589		29,562		29,562
R2 (within)		0.0159		0.0172		0.0180		0.0193		0.0163		0.0176
Linear restrictions (and p-values) of tests that these linear restrictions are equal to zeros:												
a+b1 (Effect of expansion for those below 100% of FPL)			-0.0012	(0.9713)			0.0204	(0.4890)			-0.0338	(0.5102)
a+b2 (Effect of expansion for those between 100-138% of FPL)			-0.0729	(0.0058) **			-0.0592	(0.0340) *			-0.0946	(0.0097) **
a+b3 (Effect of expansion for those between 138-400% of FPL)			-0.0069	(0.5145)			-0.0072	(0.5597)			-0.0072	(0.7496)

P-values: *** < 0.001, ** < 0.01, * < 0.05, † < 0.1. All estimations control for individual, state, year and month of interview fixed effects. Robust standard errors are clustered at individual and year levels.

K6 Psychological Distress Screening Score

The self-reported life satisfaction is a useful measure of the overall subjective well-being that likely captures variation in mental health. Several studies report that mental health is strongly associated with self-reported life satisfaction even after considering factors such as income, general health, sex, and other socio-demographic factors (e.g., Fergusson et al. 2015; Lombardo, et al., 2018). However, it is difficult to argue that self-reported life satisfaction is a precise measure of mental health as individuals' responses to life satisfaction survey questions could be influenced by changes in economic prosperity, professional life, family relations, or numerous other events, even if the respondents do not experience psychological distress related to these events. Therefore, in addition to life satisfaction, symptoms of self-reported psychological distress were analyzed to more precisely delineate the mental health impacts of Medicaid expansion.

Table 4.5 reports results from estimations of regression models where the dependent variable is K6 psychological distress screening measured for a total score between 0-24, calculated from six items/questions that ask the respondent to reply to: "*In the past 30 days, about how often did you feel {1. so sad nothing could cheer you up; 2. nervous; 3. restless or fidgety; 4. hopeless; 5. that everything was an effort; 6. worthless}?*" The responses ranged from "*all of the time*" (score of 4 points) to "*none of the time*" (score of 0). Higher values indicate greater psychological distress. As the other variables addressed earlier, estimation results are presented separately for the full sample and sub-samples of females and males, both for model specifications that intend to capture the overall effect of Medicaid expansion, as well as model specifications that examine the differential effects by income groups.

Table 4.5: OLS regression results, dependent variable is K6 score (score ranging from 0-24)

	Full sample				Females				Males			
	(1)		(2)		(3)		(4)		(5)		(6)	
	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)
a: Medicaid expansion	0.05143	(0.0089)	0.0419	(0.0702)	0.0975	(0.0690)	0.0949	(0.0680)	-0.0033	(0.1146)	-0.0185	(0.1119)
FPL < 100% (ref: 400+%)			0.4350	(0.0855) ***			0.5378	(0.1212) ***			0.2252	(0.1114) *
FPL 100-138% (ref: 400+%)			0.2045	(0.1060) †			0.2090	(0.1136) †			0.1994	(0.1453)
FPL 138-400% (ref: 400+%)			0.0596	(0.0706)			0.0456	(0.0825)			0.0724	(0.1006)
b1: (Medicaid exp.) * (FPL < 100%)			0.0768	(0.1157)			-0.0763	(0.1325)			0.3621	(0.1962) †
b2: (Medicaid exp.) * (FPL 100-138%)			-0.0602	(0.1169)			0.0394	(0.2022)			-0.3328	(0.3268)
b3: (Medicaid exp.) * (FPL 138-400%)			-0.0064	(0.0827)			0.0160	(0.1142)			-0.0491	(0.1153)
Age	0.1469	(0.0500) **	0.1610	(0.0507) ***	0.2283	(0.0932) *	0.2466	(0.0934) **	0.0170	(0.0716)	0.0257	(0.0718)
Age Squared	-0.0006	(0.0002) ***	-0.0007	(0.0002) ***	-0.0009	(0.0003) ***	-0.0011	(0.0003) ***	0.0000	(0.0003)	-0.0001	(0.0004)
Years of educ. completed	0.0184	(0.0228)	0.0204	(0.0221)	0.0268	(0.0224)	0.0283	(0.0221)	-0.0028	(0.0450)	0.0003	(0.0438)
# of hhd members	-0.0676	(0.0268) *	-0.0661	(0.0275) *	-0.0876	(0.0296) **	-0.0876	(0.0305) **	-0.0393	(0.0433)	-0.0350	(0.0418)
Married	-0.3944	(0.0770) ***	-0.3545	(0.0797) ***	-0.3828	(0.0750) ***	-0.3291	(0.0773) ***	-0.3963	(0.1247) ***	-0.3780	(0.1252) **
Max EITC	0.0000	(0.0000) **	0.0000	(0.0000)	0.0000	(0.0000) **	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)
State unemployment	0.0258	(0.0226)	0.0244	(0.0217)	0.0519	(0.0296) †	0.0493	(0.0285) †	-0.0226	(0.0367)	-0.0230	(0.0358)
State GDP (millions $)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000) *	0.0000	(0.0000) *
State effective min. wage	0.0388	(0.0302)	0.0387	(0.0310)	0.0392	(0.0273)	0.0381	(0.0273)	0.0430	(0.0492)	0.0456	(0.0503)
N		44,041		44,041		27,229		27,229		16,811		16,811
R2 (within)		0.0077		0.0089		0.0095		0.0111		0.0130		0.0142
Linear restrictions (and p-values) of tests that these linear restrictions are equal to zeros:												
a+b1 (Effect of expansion for those below 100% of FPL)			0.1187	(0.3727)			0.0186	(0.8890)			0.3436	(0.1353)
a+b2 (Effect of expansion for those between 100-138% of FPL)			-0.0183	(0.8953)			0.1343	(0.5702)			-0.3513	(0.2468)
a+b3 (Effect of expansion for those between 138-400% of FPL)			0.0355	(0.5050)			0.1109	(0.2628)			-0.0676	(0.6575)

P-values: *** < 0.001, ** < 0.01, * < 0.05, † < 0.1. All estimations control for individual, state, year and month of interview fixed effects. Robust standard errors are clustered at individual and year levels.

Estimation results revealed no evidence of the meaningful impact of Medicaid expansion on psychological distress symptoms. Estimates presented in column 1 reveal that, as measured across the entire sample, Medicaid expansion increased psychological distress by a mere 0.05 points. However, the effect is not statistically significant and cannot be extrapolated to the general population. Similarly, no significant expansion-induced variation was identified when estimations were conducted separately with sub-samples of females and males (columns 3 and 5, respectively).

The estimations of models that included indicator variables for income groups, as well as the interaction terms between these indicators and Medicaid expansion, confirmed that the effect of expansion on psychological distress symptoms was not statistically significant, even among respondents who constituted the primary target of the policy. For those with income between 100-138% of the federal poverty threshold, experiencing the state expansion of Medicaid decreased psychological distress by 0.018 points, an estimate that is not significant and cannot be generalized to the population (linear combination reported in the bottom panel in column 2). Although no formal tests were conducted to examine the statistical significance of differences in expansion-induced variation in psychological distress scores between females and males, the distress-reducing effects appear to be more pronounced among males. However, even among males, the magnitude of the effect measured at -0.35 (column 6) is too small to be statistically significant. Female respondents with household income in the 100-138% range of the federal poverty guidelines reported a non-significant increase in psychological distress in the magnitude of 0.134 (column 4). Overall, it seems Medicaid expansion did not have any meaningful effect

on depressive symptomatology measured on the K-6 scale for anyone within the target population or anyone regardless of the income range.

In terms of the effects of other covariates, the psychological distress score increases at a diminishing rate with age and decreases with marriage and family size. Unlike life satisfaction, the state GDP and the generosity of state welfare policy measured with the maximum dollar amount of tax credit that a low-income household is eligible to receive are not correlated to psychological distress. Moreover, estimations of models with interaction terms reveal that psychological distress increased by about 0.44 or 0.20 points for individuals in no expansion states whose income dropped from above 400% FPL to 0-100% FPL range or 100-138% FPL range, respectively.

Severe Psychological Distress

Table 4.6 reports results from estimations of regression models where the dependent variable is a binary indicator of severe psychological distress (K6 score >13). Estimates presented in column 1 show that, as measured across the entire sample, Medicaid expansion had a negligible negative effect on the probability of experiencing severe psychological distress. No significant expansion-induced variation was identified when estimations were conducted separately with the female sub-sample (column 3). However, state expansion of Medicaid translated into about 1.2 percentage points lower probability of experiencing severe psychological distress among male respondents (column 5). The estimations of models that included indicator variables for income groups, as well as the interaction terms between these indicators and Medicaid expansion, confirmed that the significant effect among male respondents was concentrated among those who constituted the primary target of the policy. For males with

incomes between 100-138% of the federal poverty threshold, experiencing the state expansion of Medicaid decreased the probability of having severe psychological distress by 3.2 percentage points, an effect that is significant at the .1 level (linear combination reported in the bottom panel in column 6). Interestingly, following Medicaid expansion, male respondents with household incomes above 400% of FPL also experienced a small (about 1 percentage point) decrease in the probability of serious mental illness, although the reason for this effect is unclear.

In terms of the effects of other covariates, the probability of having severe psychological distress is a non-linear function of age, decreases with marriage, and increases with the state minimum wage. Individuals whose income declined from the 400% FPL range to the 0-100% FPL range also experienced a statistically significant and quantitatively large (about 1.7 percentage points) increase in serious psychological distress. It is plausible, however, that this finding arises due to causality running in reverse, i.e., psychological illness being the determinant of income losses.

The remaining dependent variables examined in this study include onsets of doctor-diagnosed mental health conditions. Similarly, to the dependent variables used in the estimations described above, these medical diagnoses are also self-reported by PSID survey respondents. However, the survey questions used by PSID interviewers inquired specifically about medical conditions diagnosed by a healthcare professional. This deliberate wording used in survey questions implies that the measures of onsets of mental health conditions are more objective than the measures of life satisfaction or K-6 symptomatology, and therefore less prone to be influenced by temporary personal feelings, moods, tastes, or opinions.

Table 4.6: OLS regression results, dependent variable is K6 score >13 severe psychological distress

	Full sample				Females				Males			
	(1)		(2)		(3)		(4)		(5)		(6)	
	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)
a: Medicaid expansion	-0.00178	(0.0044)	-0.0035	(0.0036)	0.0044	(0.0070)	0.0008	(0.0061)	-0.0118	(0.0052) *	-0.0109	(0.0042) **
FPL < 100% (ref: 400+%)			0.0168	(0.0058) **			0.0217	(0.0078) **			0.0061	(0.0098)
FPL 100-138% (ref: 400+%)			0.0005	(0.0057)			-0.0060	(0.0057)			0.0137	(0.0099)
FPL 138-400% (ref: 400+%)			0.0004	(0.0033)			-0.0033	(0.0040)			0.0057	(0.0045)
b1: (Medicaid exp.) * (FPL < 100%)			-0.0011	(0.0092)			-0.0035	(0.0095)			0.0043	(0.0169)
b2: (Medicaid exp.) * (FPL 100-138%)			-0.0021	(0.0083)			0.0071	(0.0110)			-0.0215	(0.0167)
b3: (Medicaid exp.) * (FPL 138-400%)			0.0047	(0.0020) *			0.0081	(0.0041) *			-0.0014	(0.0066)
Age	0.0075	(0.0041) †	0.0079	(0.0042) †	0.0144	(0.0056) **	0.0149	(0.0056) **	-0.0034	(0.0045)	-0.0030	(0.0045)
Age Squared	0.0000	(0.0000) *	0.0000	(0.0000) **	0.0000	(0.0000) **	-0.0001	(0.0000) **	0.0000	(0.0000)	0.0000	(0.0000)
Years of educ. completed	0.0006	(0.0010)	0.0007	(0.0010)	0.0003	(0.0015)	0.0004	(0.0015)	0.0004	(0.0017)	0.0005	(0.0018)
# of hhd members	-0.0014	(0.0014)	-0.0014	(0.0014)	-0.0035	(0.0017) *	-0.0035	(0.0018) *	0.0018	(0.0019)	0.0018	(0.0019)
Married	-0.0095	(0.0038) *	-0.0081	(0.0035) *	-0.0093	(0.0047) *	-0.0074	(0.0046)	-0.0106	(0.0049) *	-0.0100	(0.0046) *
Max EITC	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)
State unemployment	-0.0011	(0.0008)	-0.0012	(0.0008)	-0.0006	(0.0014)	-0.0007	(0.0014)	-0.0020	(0.0016)	-0.0020	(0.0016)
State GDP (millions $)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)
State effective min. wage	0.0023	(0.0013) †	0.0024	(0.0013) †	0.0003	(0.0014)	0.0003	(0.0014)	0.0060	(0.0023) **	0.0061	(0.0023) **
N		44,041		44,041		27,229		27,229		16,811		16,811
R2 (within)		0.0037		0.0051		0.0095		0.0065		0.0078		0.0082
Linear restrictions (and p-values) of tests that these linear restrictions are equal to zeros:												
a+b1 (Effect of expansion for those below 100% of FPL)			-0.0047	(0.6735)			-0.0027	(0.8181)			-0.0066	(0.6860)
a+b2 (Effect of expansion for those between 100-138% of FPL)			-0.0056	(0.5049)			0.0079	(0.5409)			-0.0324	(0.0769) †
a+b3 (Effect of expansion for those between 138-400% of FPL)			0.0012	(0.7676)			0.0088	(0.2450)			-0.0123	(0.1034)

P-values: *** < 0.001, ** < 0.01, * < 0.05, † < 0.1. All estimations control for individual, state, year and month of interview fixed effects. Robust standard errors are clustered at individual and year levels.

Medical Professional Diagnosis of Psychological Disorder

Table 4.7 reports results from estimations of regression models where the binary dependent variable was an indicator-coded medical professional diagnosis of any psychological disorder. Estimates presented in column 1 reveal that, as measured across the entire sample, Medicaid expansion did not meaningfully change the probability of being diagnosed with a psychological disorder. Similarly, no significant expansion-induced variation in the probability of psychiatric diagnosis was identified when estimations were conducted separately with sub-samples of females and males (columns 3 and 5, respectively).

The measurements of Medicaid expansion effects within income groups revealed rather ambiguous and curious estimates. The reduction in the probability of being diagnosed with a psychiatric condition was observed only among the sample participants in the highest income group. For those respondents, Medicaid expansion resulted in 0.6 percentage point reduction in the probability of reporting doctor-diagnosed psychiatric illness (p-value=0.084, the coefficient estimate on Medicaid expansion dummy in column 2). The reason for this effect is not clear. For respondents with income below 100% of the federal poverty threshold, the state expansion of Medicaid increased the probability of being diagnosed with a psychiatric disorder by about 1.4 percentage points, an effect that is significant at the .1 level (linear combination reported in the bottom panel in column 2). While this narrative was not subjected to rigorous testing in this study, the positive association between Medicaid expansion and the probability of receiving a psychiatric illness diagnosis may reflect improved access to mental health services following the policy change due to the “welcome-mat” effect mentioned earlier. Additionally, the ACA introduced regulations that enhanced health insurance coverage against psychiatric illness.

Therefore, it is possible that individuals who exhibited undiagnosed psychiatric disorders prior to the ACA and/or Medicaid expansion eventually received the proper diagnosis after enrolling under Medicaid and using their health coverage benefits. It should be acknowledged, however, that this explanation is not entirely corroborated by the measurement of the expansion effect among the primary beneficiaries of state Medicaid expansion. In this group of respondents, the expansion translated into half a percentage point increase in the probability of receiving a psychiatric illness diagnosis from a doctor, but the effect is not statistically significant at the conventional type I error levels.

In terms of the effects of other covariates, the probability of being diagnosed with a psychological disorder increases at a diminishing rate with age and decreases with marriage. There is also a positive correlation between years of education and being diagnosed with a psychological disorder.

Table 4.7: OLS regression results, dependent variable is doctor diagnosed psychological condition

	Full sample				Females				Males			
	(1)		(2)		(3)		(4)		(5)		(6)	
	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)
a: Medicaid expansion	0.00083	(0.0033)	-0.0062	(0.0036) †	0.0003	(0.0043)	-0.0068	(0.0051)	0.0017	(0.0043)	-0.0043	(0.0046)
FPL < 100% (ref: 400+%)			0.0161	(0.0080) *			0.0098	(0.0076)			0.0238	(0.0105) *
FPL 100-138% (ref: 400+%)			0.0076	(0.0067)			0.0033	(0.0075)			0.0114	(0.0079)
FPL 138-400% (ref: 400+%)			0.0001	(0.0038)			-0.0043	(0.0046)			0.0046	(0.0042)
b1: (Medicaid exp.) * (FPL < 100%)			0.0202	(0.0087) *			0.0194	(0.0099) *			0.0183	(0.0143)
b2: (Medicaid exp.) * (FPL 100-138%)			0.0116	(0.0071) †			0.0064	(0.0084)			0.0184	(0.0106) †
b3: (Medicaid exp.) * (FPL 138-400%)			0.0102	(0.0053) †			0.0102	(0.0069)			0.0089	(0.0060)
Age	0.0119	(0.0029) ***	0.0122	(0.0028) ***	0.0163	(0.0033) ***	0.0163	(0.0033) ***	0.0065	(0.0047)	0.0070	(0.0046)
Age Squared	-0.0002	(0.0000) ***	-0.0002	(0.0000) ***	-0.0002	(0.0000) ***	-0.0002	(0.0000) ***	-0.0001	(0.0000) ***	-0.0001	(0.0000) ***
Years of educ. completed	0.0027	(0.0015) †	0.0028	(0.0015) †	0.0016	(0.0016)	0.0017	(0.0016)	0.0034	(0.0026)	0.0036	(0.0026)
# of hhd members	-0.0016	(0.0012)	-0.0015	(0.0012)	-0.0014	(0.0019)	-0.0012	(0.0019)	-0.0019	(0.0014)	-0.0019	(0.0015)
Married	-0.0189	(0.0035) ***	-0.0165	(0.0037) ***	-0.0219	(0.0051) ***	-0.0202	(0.0055) ***	-0.0138	(0.0054) **	-0.0112	(0.0052) *
Max EITC	0.0000	(0.0000) ***	0.0000	(0.0000) *	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000) **	0.0000	(0.0000)
State unemployment	0.0007	(0.0012)	0.0009	(0.0012)	0.0017	(0.0017)	0.0018	(0.0017)	-0.0004	(0.0021)	-0.0003	(0.0021)
State GDP (millions $)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000) †	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)
State effective min. wage	0.0022	(0.0016)	0.0025	(0.0016)	0.0047	(0.0022) *	0.0050	(0.0023) *	-0.0009	(0.0017)	-0.0006	(0.0017)
N	66,684		66,684		36,895		36,895		29,788		29,788	
R2 (within)	0.0630		0.0642		0.0732		0.0741		0.0548		0.0566	
Linear restrictions (and p-values) of tests that these linear restrictions are equal to zeros:												
a+b1 (Effect of expansion for those below 100% of FPL)			-0.0047	(0.0706) †			0.0126	(0.1403)			0.0140	(0.3069)
a+b2 (Effect of expansion for those between 100-138% of FPL)			-0.0056	(0.3724)			-0.0003	(0.9618)			0.0141	(0.1446)
a+b3 (Effect of expansion for those between 138-400% of FPL)			0.0012	(0.4203)			0.0035	(0.5925)			0.0046	(0.3964)

P-values: *** < 0.001, ** < 0.01, * < 0.05, † < 0.1. All estimations control for individual, state, year and month of interview fixed effects. Robust standard errors are clustered at individual and year levels.

Medical Professional Diagnosis of Depression

The PSID respondents who answer in the affirmative to the question if they were ever diagnosed by a doctor with a psychiatric condition are asked the follow-up question about the type of illness. The next two sets of regressions aim to analyze two conditions reported in response to this follow-up question, depression and anxiety disorder, both of which are observed frequently enough to warrant statistical analysis. Table 4.8 reports results from estimations of regression models where the binary dependent variable indicates the diagnosis of depression. To a large degree, the results mirror those reported above for the doctor-issued diagnosis of any psychiatric illness. As before, no evidence was found that Medicaid expansion affected the probability of being diagnosed with depression when measured for the full sample (column 1), or separately for sub-samples of females (column 3) or males (column 5).

The estimation results from specifications that included interaction effects between income group indicators and the Medicaid expansion dummy revealed important differences in the change in the probability of being diagnosed with depression across various groups of respondents. Most importantly, following Medicaid expansion, those with income between 100-138% of the federal poverty threshold experienced a one percentage point increase in the probability of being diagnosed with depression (linear restriction in the bottom panel in column 2). This effect appeared to come entirely from the male respondents for whom the magnitude of Medicaid expansion-induced increase in the probability of being diagnosed with depression was estimated at 2.5 percentage points. A statistically significant increase in the probability of depression diagnosis after state expansion of Medicaid is also observed among respondents in the 138-400% range of FPL (measured for the full sample) and among male respondents in the 0-

100% range of FPL. As before the plausible logical explanation for these positive effects appears to be the following two mechanisms: (1) the states that opted to expand Medicaid strengthened the provision of mental health services and (2) ACA-mandated enhanced coverage of mental health services by insurance contracts that overlapped with Medicaid expansion. The estimations results reported in Table 4.8 also shed some light on the previously documented reduction in the probability of psychiatric illness diagnosis among high-income respondents following state expansion of Medicaid benefits. While the current results do not explain the mechanism of this unexpected finding, they show that the estimate can be attributed specifically to the decrease in the likelihood of receiving a depression diagnosis among male respondents.

Table 4.8 also reveals that age and marital status are the remaining determinants of depression diagnosis in the estimation sample. Moreover, estimates suggest that experiencing an income shock leads to a much greater probability of the onset of depression.

Table 4.8: OLS regression results, dependent variable is doctor diagnosed depression

	Full sample				Females				Males			
	(1)		(2)		(3)		(4)		(5)		(6)	
	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)
a: Medicaid expansion	0.00214	(0.0033)	-0.0070	(0.0030) *	0.0020	(0.0051)	-0.0057	(0.0054)	0.0024	(0.0040)	-0.0070	(0.0040) †
FPL < 100% (ref: 400+%)			0.0128	(0.0057) *			0.0122	(0.0076)			0.0135	(0.0068) *
FPL 100-138% (ref: 400+%)			0.0112	(0.0067) †			0.0102	(0.0075)			0.0118	(0.0070) †
FPL 138-400% (ref: 400+%)			0.0022	(0.0031)			0.0002	(0.0044)			0.0040	(0.0030)
b1: (Medicaid exp.) * (FPL < 100%)			0.0204	(0.0088) *			0.0139	(0.0083) †			0.0260	(0.0124) *
b2: (Medicaid exp.) * (FPL 100-138%)			0.0171	(0.0056) **			0.0051	(0.0075)			0.0324	(0.0108) **
b3: (Medicaid exp.) * (FPL 138-400%)			0.0148	(0.0042) ***			0.0137	(0.0051) **			0.0145	(0.0055) **
Age	0.0069	(0.0025) **	0.0071	(0.0024) **	0.0107	(0.0030) ***	0.0109	(0.0029) ***	0.0019	(0.0031)	0.0021	(0.0030)
Age Squared	-0.0001	(0.0000) ***	-0.0001	(0.0000) ***	-0.0001	(0.0000) ***	-0.0001	(0.0000) ***	0.0000	(0.0000) **	0.0000	(0.0000) **
Years of educ. completed	0.0016	(0.0014)	0.0018	(0.0014)	0.0014	(0.0018)	0.0015	(0.0018)	0.0012	(0.0021)	0.0015	(0.0021)
# of hhd members	-0.0010	(0.0010)	-0.0010	(0.0010)	-0.0015	(0.0014)	-0.0015	(0.0014)	-0.0003	(0.0013)	-0.0004	(0.0013)
Married	-0.0215	(0.0043) ***	-0.0190	(0.0039) ***	-0.0242	(0.0045) ***	-0.0218	(0.0044) ***	-0.0169	(0.0065) **	-0.0144	(0.0061) *
Max EITC	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)
State unemployment	-0.0001	(0.0009)	0.0001	(0.0010)	0.0018	(0.0015)	0.0020	(0.0015)	-0.0025	(0.0015) †	-0.0022	(0.0015)
State GDP (millions $)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)
State effective min. wage	-0.0005	(0.0011)	-0.0001	(0.0011)	0.0003	(0.0017)	0.0005	(0.0017)	-0.0012	(0.0015)	-0.0008	(0.0015)
N		66,655		66,655		36,874		36,874		29,780		29,780
R2 (within)		0.0459		0.0473		0.0563		0.0572		0.0373		0.0402
Linear restrictions (and p-values) of tests that these linear restrictions are equal to zeros:												
a+b1 (Effect of expansion for those below 100% of FPL)			0.0134	(0.1324)			0.0082	(0.4096)			0.0190	(0.1089) †
a+b2 (Effect of expansion for those between 100-138% of FPL)			0.0101	(0.0422) **			-0.0005	(0.9297)			0.0254	(0.0129) *
a+b3 (Effect of expansion for those between 138-400% of FPL)			0.0079	(0.0730) †			0.0080	(0.1655)			0.0075	(0.1569)

P-values: *** < 0.001, ** < 0.01, * < 0.05, † < 0.1. All estimations control for individual, state, year and month of interview fixed effects. Robust standard errors are clustered at individual and year levels.

Medical Professional Diagnosis of Anxiety

Table 4.9 reports results from estimations of regression models where the binary dependent variable is a medical professional diagnosis of anxiety disorder. The results provide perhaps the best evidence yet that the ACA Medicaid expansion led to more frequent diagnoses of mental health problems. Measured across the whole sample, Medicaid expansion increased the probability of being diagnosed with anxiety by nearly 1 percentage point, an effect statistically significant at the .05 level. Estimations conducted with sub-samples of females (column 3) and males (column 5) revealed similar magnitudes of the effect for both populations, about 1 percentage point and .8 percentage points respectively, both of which were statistically significant.

The estimation results from specifications that included interaction effects between income group indicators and the Medicaid expansion dummy revealed that the increased frequency of doctor-diagnosed anxieties following Medicaid expansion was observed primarily among low-income respondents. Those with income between 100-138% of the federal poverty threshold experienced a 2.6 percentage points increase in the probability of being diagnosed with anxiety (linear restriction in the bottom panel in column 2), and the effect appeared to be spread somewhat evenly between females and males. Female respondents with household income in the 100-138% range of the federal poverty guidelines responded to Medicaid expansion by reporting an increase in the prevalence of doctor-diagnosed anxiety in a magnitude of 2.4 percentage points (column 4). The equivalent effect among male respondents was measured at 2.7 percentage points (column 6). These effects are statistically significant for both sub-groups. Moreover, Medicaid expansion increased the probability of being diagnosed with anxiety among

the lowest-income respondents of both sexes, as well as among males with income in the 138-400% range of the FPL. Finally, similarly to the determinants of doctor-diagnosed depression discussed above, the probability of being diagnosed with anxiety increases with age and decreases after marriage.

Table 4.9: OLS regression results, dependent variable is doctor diagnosed anxiety

	Full sample				Females				Males			
	(1)		(2)		(3)		(4)		(5)		(6)	
	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)
a: Medicaid expansion	0.0089	(0.0035) *	0.0010	(0.0034)	0.0099	(0.0044) *	0.0011	(0.0051)	0.008	(0.0043) †	0.0032	(0.0040)
FPL < 100% (ref: 400+%)			-0.0018	(0.0038)			-0.0025	(0.0076)			-0.0006	(0.0051)
FPL 100-138% (ref: 400+%)			-0.0074	(0.0041) †			-0.0087	(0.0070)			-0.0075	(0.0048)
FPL 138-400% (ref: 400+%)			-0.0037	(0.0020) †			-0.0082	(0.0034) *			0.0016	(0.0029)
b1: (Medicaid exp.) * (FPL < 100%)			0.0332	(0.0120) **			0.0357	(0.0127) **			0.0218	(0.0132) †
b2: (Medicaid exp.) * (FPL 100-138%)			0.0252	(0.0092) **			0.0231	(0.0102) *			0.0241	(0.0102) *
b3: (Medicaid exp.) * (FPL 138-400%)			0.0071	(0.0046)			0.0069	(0.0065)			0.0044	(0.0043)
Age	0.0102	(0.0017) ***	0.0099	(0.0017) ***	0.0146	(0.0023) ***	0.0143	(0.0023) ***	0.0043	(0.0024) †	0.0041	(0.0025) †
Age Squared	-0.0001	(0.0000) ***	-0.0001	(0.0000) ***	-0.0002	(0.0000) ***	-0.0002	(0.0000) ***	-0.0001	(0.0000) ***	-0.0001	(0.0000) ***
Years of educ. completed	0.0018	(0.0011)	0.0019	(0.0011) †	0.0013	(0.0015)	0.0014	(0.0015)	0.0013	(0.0013)	0.0014	(0.0013)
# of hhd members	-0.0011	(0.0013)	-0.0008	(0.0013)	0.0002	(0.0019)	0.0006	(0.0019)	-0.0029	(0.0016) †	-0.0029	(0.0016) †
Married	-0.0137	(0.0036) ***	-0.0128	(0.0032) ***	-0.0212	(0.0049) ***	-0.0207	(0.0047) ***	-0.0015	(0.0050)	-0.0007	(0.0049)
Max EITC	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000) †	0.0000	(0.0000)	0.0000	(0.0000)
State unemployment	0.0007	(0.0010)	0.0010	(0.0010)	0.0004	(0.0015)	0.0008	(0.0015)	0.0013	(0.0014)	0.0015	(0.0014)
State GDP (millions $)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000) †	0.0000	(0.0000) *
State effective min. wage	0.0003	(0.0012)	0.0006	(0.0011)	0.0015	(0.0017)	0.0018	(0.0017)	-0.0008	(0.0013)	-0.0006	(0.0013)
N		66,651		66,651		36,872		36,872		29,778		29,778
R2 (within)		0.0490		0.0504		0.0664		0.0680		0.0320		0.0332
Linear restrictions (and p-values) of tests that these linear restrictions are equal to zeros:												
a+b1 (Effect of expansion for those below 100% of FPL)			0.0343	(0.0023) **			0.0368	(0.0009) ***			0.0250	(0.0734) †
a+b2 (Effect of expansion for those between 100-138% of FPL)			0.0262	(0.0020) **			0.0243	(0.0048) **			0.0273	(0.0166) *
a+b3 (Effect of expansion for those between 138-400% of FPL)			0.0081	(0.0636) †			0.0080	(0.1778)			0.0077	(0.0801) †

P-values: *** < 0.001, ** < 0.01, * < 0.05, † < 0.1. All estimations control for individual, state, year and month of interview fixed effects. Robust standard errors are clustered at individual and year levels.

Medical Professional Diagnosis of Permanent Memory Loss or Mental Ability

The last type of medical condition analyzed in this study is the doctor-diagnosed permanent loss of memory or mental ability. This condition is measured as an indicator-coded affirmative response to the question: *"Has a doctor or other health professional EVER told (you/spouse/partner) that (you/he/she) had...) permanent loss of memory or mental ability?"*. The presentation of results in Table 4.10 follows a familiar pattern, where results are presented separately for the full sample and sub-samples of females and males, both for model specifications that intend to capture the overall effect of Medicaid expansion, as well as model specifications that examine the differential effects by income groups. Measured across the whole sample, Medicaid expansion increased the probability of being diagnosed with permanent loss of memory or mental ability by a non-significant .1 percentage points. Similarly, estimations conducted with sub-samples of females (column 3) and males (column 5) produced non-significant estimates only.

Table 4.10: OLS regression results, dependent variable diagnosed with psychological disorder

	Full sample				Females				Males			
	(1)		(2)		(3)		(4)		(5)		(6)	
	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)	Coeff	(St. Err)
a: Medicaid expansion	0.0015	(0.0018)	-0.0087	(0.0019) ***	0.0011	(0.0022)	-0.0097	(0.0025) ***	0.0024	(0.0025)	-0.0069	(0.0020) ***
FPL < 100% (ref: 400+%)			0.0017	(0.0028)			0.0017	(0.0029)			0.0014	(0.0040)
FPL 100-138% (ref: 400+%)			-0.0002	(0.0027)			0.0000	(0.0033)			-0.0009	(0.0038)
FPL 138-400% (ref: 400+%)			-0.0005	(0.0011)			0.0000	(0.0014)			-0.0012	(0.0015)
b1: (Medicaid exp.) * (FPL < 100%)			0.0359	(0.0093) ***			0.0361	(0.0094) ***			0.0353	(0.0121) **
b2: (Medicaid exp.) * (FPL 100-138%)			0.0298	(0.0064) ***			0.0254	(0.0059) ***			0.0373	(0.0123) **
b3: (Medicaid exp.) * (FPL 138-400%)			0.0114	(0.0027) ***			0.0112	(0.0030) ***			0.0116	(0.0034) ***
Age	0.0021	(0.0016)	0.0019	(0.0016)	0.0032	(0.0023)	0.0031	(0.0023)	0.0007	(0.0015)	0.0006	(0.0015)
Age Squared	0.0000	(0.0000)	0.0000	(0.0000) †	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)
Years of educ. completed	-0.0010	(0.0008)	-0.0008	(0.0008)	-0.0011	(0.0008)	-0.0009	(0.0008)	-0.0009	(0.0014)	-0.0007	(0.0014)
# of hhd members	-0.0025	(0.0007) ***	-0.0023	(0.0007) ***	-0.0025	(0.0009) **	-0.0023	(0.0010) *	-0.0025	(0.0010) *	-0.0023	(0.0010) *
Married	-0.0014	(0.0024)	0.0003	(0.0022)	-0.0017	(0.0031)	0.0002	(0.0029)	-0.0017	(0.0031)	-0.0003	(0.0029)
Max EITC	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000)	0.0000	(0.0000) †	0.0000	(0.0000)
State unemployment	-0.0010	(0.0006) †	-0.0006	(0.0006)	-0.0006	(0.0008)	-0.0002	(0.0009)	-0.0015	(0.0009)	-0.0012	(0.0009)
State GDP (millions $)	0.0000	(0.0000) *	0.0000	(0.0000) *	0.0000	(0.0000) *	0.0000	(0.0000) *	0.0000	(0.0000)	0.0000	(0.0000)
State effective min. wage	0.0006	(0.0007)	0.0010	(0.0007)	0.0013	(0.0011)	0.0017	(0.0011)	-0.0004	(0.0007)	0.0000	(0.0007)
N		66,686		66,651		36,890		36,872		29,795		29,795
R2 (within)		0.0171		0.0224		0.0195		0.0244		0.0171		0.0230
Linear restrictions (and p-values) of tests that these linear restrictions are equal to zeros:												
a+b1 (Effect of expansion for those below 100% of FPL)			0.0272	(0.0011) **			0.0264	(0.0015) *			0.0284	(0.0125) *
a+b2 (Effect of expansion for those between 100-138% of FPL)			0.0211	(0.0001) ***			0.0158	(0.0018) *			0.0303	(0.0084) **
a+b3 (Effect of expansion for those between 138-400% of FPL)			0.0028	(0.2199)			0.0015	(0.5768)			0.0046	(0.1467)

P-values: *** < 0.001, ** < 0.01, * < 0.05, † < 0.1. All estimations control for individual, state, year and month of interview fixed effects. Robust standard errors are clustered at individual and year levels.

The estimation results from specifications that included interaction effects between income group indicators and the Medicaid expansion dummy again revealed that the Medicaid expansion increased the likelihood of reporting doctor-issued diagnoses of the loss of mental capacity among low-income groups that constitute the target population for Medicaid. Following Medicaid expansion, those with incomes between 100-138% of the federal poverty threshold experienced a 2.1 percentage points increase in the probability of being diagnosed with permanent memory loss or mental ability (linear restriction in the bottom panel in column 2). The estimated effect for males was about twice the magnitude of the estimated effect for females. Following Medicaid expansion, female respondents with household incomes in the 100-138% range of the federal poverty guidelines reported an increase in the probability of being diagnosed with a permanent loss of mental ability in the magnitude of 1.6 percentage points (column 4). The equivalent effect for male respondents was measured at 3 percentage points (column 6). Moreover, respondents with incomes in the 0-100% range of FPL also responded to Medicaid expansion with about a 2.7 percentage point increase in the likelihood of being handed a similar diagnosis, and this effect was nearly even for both sexes. Similarly, to results noted for other mental health conditions, respondents with the highest income group experienced a small but statistically significant decrease in being diagnosed with permanent loss of memory or mental ability.

In terms of the effects of other covariates, the probability of being diagnosed with permanent loss of memory or mental ability is negatively correlated to the number of people in the household.

CHAPTER 5

CONCLUSIONS

5.1 SUMMARY

Building on prior scholarly research, I examined the impact of Medicaid expansion on mental health. Given that nearly 20% of the United States population suffers from mental illness as well as the negative impact mental health can have on physical health, employment status, and educational attainment, understanding the role in having health insurance is critical (National Alliance on Mental Illness, 2022). Ownership of health insurance results in improved access to a primary care physician, increased preventative screenings, and improved health outcomes (Baicker, et al., 2013).

To measure the effect of Medicaid expansion, I examined how the values of various metrics of mental health changed before and after the respondent's state of residence expanded this insurance program. I measured the variation in mental health by adjusting for socio-demographic characteristics both for the full sample, as well as for groups of respondents delineated by the criteria of eligibility for expanded Medicaid or ACA subsidies. I proposed that access to Medicaid expansion would result in a reduction in the probability of being uninsured, Medicaid expansion would result in an increased probability of having Medicaid insurance, and that having health insurance would increase demand and utilization of health care services and would decrease overall stress. I expected to find respondents who were newly eligible for health insurance through Medicaid expansion would see a reduction in mental health symptoms. The results point to multi-faceted conclusions.

The study resulted in several key findings. First, the probability of being uninsured decreased as a result of Medicaid expansion for respondents in the target population, i.e. those with household incomes in the 100-138% federal poverty level. For those in the 100-138% federal poverty limit group as well as those previously eligible (i.e., those below 100% of the federal poverty limit), Medicaid expansion increased the probability of being enrolled in Medicaid. Self-reported life satisfaction increased after state expansion of Medicaid among respondents targeted by the policy overhaul (i.e., those with household income between 100-138% of the federal poverty level). While Medicaid expansion had no statistically significant impact on self-reported 6-item Kessler psychological distress score measured 0-24, it did reduce the probability of having severe psychological distress, a binary outcome of having a Kessler psychological distress score above 13, for males in the target population. There was no evidence that Medicaid expansion affected the probability of being diagnosed with a psychological condition by a professional. However, it was positively associated with the probability of being diagnosed with depression, anxiety and memory loss or mental ability by a health care professional. Overall, the results revealed a nuanced and complex effect of Medicaid expansion on mental well-being. Despite some evidence that the target recipients of Medicaid expansion benefited from an increase in self-reported life satisfaction, little evidence was found in favor of a meaningful change in the psychological distress symptoms as measured by the validated 6-item Kessler Psychological Distress Scale (K6). This finding diverges from the results showing an increased prevalence of medical diagnoses of depression or anxiety disorders issued by medical professionals. The post-expansion rise in the probability of being diagnosed with depression or anxiety detected not only among the target population of the Medicaid expansion but also among

those with incomes below or above the eligibility thresholds, suggests alternative explanations for the increased prevalence of diagnoses.

The complex results may be explained by several factors, including: 1) the "welcome mat" effect 2) an increase in demand for care due to newly attained health insurance and 3) influence of the provision in the ACA that includes mental health as an essential health benefit. The "welcome mat" effect may account for the statistically significant increase in Medicaid enrollees in the target population, the 100-138% the federal poverty level group, as well as those in the income group already eligible for Medicaid (0-100% the federal poverty level). Previous studies showed significant increases in enrollment among the intended beneficiaries of policy change but also for individuals who were previously eligible for Medicaid expansion (Frean, et al., 2017; Hudson & Moriya, 2017). This can be attributed to the "welcome mat" effect, which is when individuals who were previously eligible for Medicaid enroll due to an increase in media coverage of the policy, enhanced outreach by federal and state advocates and a simpler application process to obtain Medicaid (Hudson & Moriya, 2017).

In addition to the "welcome mat" effect, additional key findings addressed in Chapter 4 may be influenced by the broader provisions included in ACA, including a focus on mental health. Prior to the implementation of the ACA, laws permitted individual or small-group health plans to omit mental health care (Palanker et al., 2018). The ACA emphasized the focus on mental health by including it as one of the ten essential benefits provided by insurance contracts. This meant that all health plans under the ACA were required to include benefits for mental health and substance abuse coverage. Thus, resulting in behavioral health coverage for anyone regardless of income levels or Medicaid eligibility. Studies reviewing the impact of this essential benefit found an increase in health insurance coverage for young adults with mental health

conditions, increased access to care, and improved mental well-being for young adults (Cowell et al., 2018; Shane & Wehby, 2018; Winkelman & Chang, 2018). This may affect the results in Chapter 4 when specifically looking at the variables related to doctor diagnosed psychological disorders specifically, depression, anxiety, and permanent memory loss. For newly diagnosed depression, anxiety and/or permanent memory loss, the findings were significant for all income groups beside the target population for Medicaid expansion, those in the 100-138% FPL.

In conjunction with the changes to insurance contracts to include mental health care, there was a shift within common medical practices to include both anxiety and depression screenings (Siu et al., 2016). Guaranteed insurance coverage for behavioral health and increased depression and anxiety screenings by medical providers may account for the significant differences in the probability of being diagnosed with one or more of these psychological conditions. Therefore, Medicaid expansion may not be fully responsible for these results. An additional explanation for the increased probability of being diagnosed with a psychological condition may be an increased demand for services by those who are newly eligible for health insurance (Gerfin, 2019). Previous research on the ACA's Medicaid expansion resulted in improved access to care and increased rates of individuals having a source of regular care (Sommers, et al., 2014, Simon et al., 2017). In addition to increased rates of individuals having a regular physician, individuals increased preventative health visits, lab tests and cancer screenings (Sommers, et al., 2014, Simon et al., 2017). For those who were newly diagnosed, increased preventative screenings may result in a health care professional diagnosis of depression, anxiety, or permanent memory loss with access to treatment, regardless of income range.

Limitations of the research

Limitations to the research exist including limited variable selection for the PSID data set. To assess changes to mental health prior to and after the implementation of the Medicaid expansion, I used a comprehensive set of variables to address the multifaceted components of mental health including, life satisfaction, self-reported psychological distress, and being diagnosed with a mental health condition (depression, anxiety, permanent memory loss or mental ability). These variables were used to determine if there was, in fact, a causal relationship between Medicaid expansion and mental health. The results were mixed among the variables, suggesting there is an impact however, additional or alternative variables present in another dataset may augment the research to better understand if there has been a change in demand for services and impact of any subsequent treatment. In addition, to limitations with the dataset, there was no analysis for those who were eligible for health insurance subsidies offered through the ACA for those in the 138-400% FPL. As noted in Chapter 4, this income group had significant changes in diagnosis of psychological conditions.

Implications

The evidence from this study implies the solution to improving mental health through public policies is complex and requires a multi-faceted approach. Ultimately, research addressing the impact of policies, such as the ACA, on mental health is essential for the individuals behind the data. This is the practical significance of the work, not just the statistically significant data. Public policy that increases health insurance access, improve affordability of care and treatment and support health care parity for mental health and substance abuse issues can improve overall life satisfaction and provide diagnosis of mental conditions prior to treatment.

Future Research

The findings from this study offer an opportunity to conduct future research to address some of the limitations as well as further develop a broader understanding of impact of Medicaid expansion on mental health. A further and more in-depth comparative analysis of males and females would provide clarity on whether the differences were significant. Researching whether respondents sought treatment or continued treatment after diagnosis of a psychological condition would provide additional evidence whether Medicaid affects mental health.

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