Mental Health Care in the Reform Decade (2011-2019): Changes in Utilization, Expenditure, and Affordability among Vulnerable Populations

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DEDICATION

To my parents, for their unwavering support and sacrifices.

To the soul of my grandmother, with whom I cherish invaluable memories.

To mentors, professors, and peers who have contributed to my success.

To everyone suffering in silence. You are not alone. Your stories matter.

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ABSTRACT

The United States has one of the highest rates of unmet mental health care needs in the developed world. Before the enactment of the Affordable Care Act (ACA), mental health care benefits were typically inaccessible or unaffordable among low- and middle-income Americans. The ACA introduced various reforms aimed at expanding mental health care coverage and affordability, including Medicaid expansion, the establishment of subsidized health insurance Marketplaces, mental health parity extension to plans in the non-group market, and recognizing mental health as an essential benefit. However, limited empirical evidence exists on whether and to what extent mental health care use has improved across ACA-targeted income groups, particularly low-to-middle-income adults eligible for Marketplace coverage. Additionally, little is known about the extent of financial burden faced by individuals with mental health care needs, especially those with comorbid physical conditions in the post-reform era. This dissertation seeks to address these critical gaps using nationally representative data from the 2011-2019 Medical Expenditure Panel Survey through a threefold pursuit: (1) describe population-level changes in mental health care access across reform-relevant income groups; (2) employ a quasi-experimental design to evaluate changes in mental health care access, expenditure, and affordability within the non-group market; and (3) examine the association between chronic physical comorbidities and financial burden experienced by individuals with mental health needs following the ACA implementation.

The analysis reveals an increase in mental health care utilization, primarily driven by ambulatory mental health care visits, among the income groups targeted by the ACA. However, disparities in mental health care use relative to high-income individuals continue to persist or worsen, particularly among those with mental health needs. The difference-in-differences estimates of the ACA's impact on the non-group market demonstrate gains in mental health care utilization and expenditure. However, these improvements were mainly observed among individuals who already had established access to the health care system. Additionally, individuals with mental health needs face a substantial burden of physical comorbidities, significantly contributing to an increase in their financial burden. Conditions associated with high health care costs or those that compromise an individual's quality of life and productivity, such as cancer, diabetes, heart disease, and arthritis, are particularly associated with a high

financial burden in this population, although their relative importance varies when considering subjective and objective measures of burden.

These findings underscore the improvements in mental health care access following the ACA implementation, but they also highlight the ongoing barriers faced by vulnerable patient groups when seeking mental health care. In addition to improving the affordability of care for Medicaid and Marketplace plans, it is essential to address structural barriers that hinder access to mental health care beyond insurance coverage, such as the limited network of providers, low provider participation, and shortage of mental health professionals. By addressing these challenges, the ACA can more effectively achieve its intended goals of enhancing access to mental health care and reducing disparities.

CHAPTER 1: INTRODUCTION

"Access to mental health services is one of the most important and most neglected civil rights issues facing the Nation. For too long, persons living with mental disorders have suffered from discriminatory treatment at all levels of society" – Former Congressman Patrick Kennedy advocating for the passage of the landmark Mental Health Parity and Addiction Equity Act (MHPAEA)

Congressional Record. (2007, February 12). S1864–5. Daily edition, 153

Mental illness has become a growing public health concern in the United States, where it ranks among the worst in mental health outcomes, including suicide and drug overdose deaths, compared to other high-income countries.[1] According to the 2019 National Survey on Drug Use and Health (NSDUH), approximately 1 in 5 adults in the US (over 50 million individuals) experienced a mental health condition in the past year, with more than a quarter of them perceiving an unmet need for mental health care.[2] Accessing mental health care is often hindered by barriers that can be categorized into two main groups: (1) structural barriers, such as the high cost of care for the uninsured and underinsured, and the inaccessibility of mental health providers; (2) attitudinal barriers, which are associated with the stigma surrounding seeking mental health care and the negative perceptions about treatment.[3] Individuals with mental illnesses who report unmet mental health care needs are more likely to face structural barriers to access to mental health care.[3] Structural financial barriers can be exacerbated in individuals with mental health conditions who often have multiple physical comorbidities that substantially increase their health care utilization.[4–6]

Historically, mental health care has been characterized by disparate benefit design, with a higher cost-sharing burden and limitations on annual use compared with medical and surgical benefits.[7] These disparities were driven by concerns over moral hazard (i.e., the higher tendency for beneficiaries to use more services if their cost share is low) and the more elastic demand for mental health services compared with medical services.[8,9] While managed care expansion in the 1980s and 1990s attempted to address these concerns through utilization management techniques, mental health benefits continued to be less generous and more restrictive than medical services.[7] Over time, state and federal parity policies have evolved to address these disparities. The 2008 Mental Health Parity and Addiction Equity Act (MHPAEA) was the most comprehensive federal parity policy, mandating parity on quantitative (e.g., cost share and visit

limits) and non-quantitative (e.g., prior authorization and step therapy) treatment limits.[10] However, MHPAEA regulations only applied to large-group employer-sponsored insurance (ESI) plans that voluntarily offered mental health benefits, leaving such benefits in plans purchased in the non-group (individual) private market inaccessible or less affordable. In addition to the high cost and restrictive benefits, insurers in the non-group market were likely to exclude mental health benefits, deny coverage for individuals with pre-existing mental health conditions, or charge higher premiums, further hindering access to mental health care for this population. Consequently, beneficiaries in the individual market had lower utilization of mental health services compared to those with ESI before the enactment of the Affordable Care Act (ACA).[11]

The ACA, signed into law in 2010, represents the largest health care reform in the United States in decades, since the establishment of Medicare and Medicaid programs in 1965. The ACA expanded mental health coverage to millions of Americans through major provisions that took effect in 2014. First, the ACA expanded Medicaid eligibility to individuals with incomes up to 138% of poverty. This expansion targeted a low-income group characterized by a high prevalence of poor mental health and a substantial need for mental health care.[1,12] Although the decision to expand Medicaid was left to each state's discretion following the 2012 United States Supreme Court ruling, the majority of states (41 as of May 2023) opted to expand Medicaid eligibility.

The ACA also regulated the non-group market and introduced several changes that were likely to impact patients with mental health care needs. Under the ACA, insurers were prohibited from denying coverage based on pre-existing conditions, allowing premiums to be based solely on age, geographic region, and tobacco use. Additionally, a web-based Marketplace portal was established, enabling individuals with incomes up to 400% of the Federal Poverty Level (FPL) to purchase income-based subsidized insurance plans if they lacked ESI coverage and did not qualify for Medicaid. The ACA also mandated that all individual plans adhere to the 2008 MHPAEA, thereby making mental health care coverage as comprehensive as that for medical services. Additionally, mental health care was recognized as one of the ten essential benefits that individual plans were required to cover.

Despite the growing evidence of gains in coverage, access, and outcomes among individuals with mental health needs following the implementation of the ACA, little is known about the changes in mental health care access across income groups targeted by the ACA. Furthermore, the existing literature documenting and quantifying the effects of the ACA on mental health care has predominantly focused on the Medicaid expansion provision, likely due to the ease of constructing a control group comprising non-expansion states and the higher mental health care needs observed among Medicaid beneficiaries. Limited empirical research, mostly observational, has evaluated mental health care coverage and access in the non-group market, despite the multiple ACA provisions intended to regulate and expand access to mental health services in this sector. The non-group market also has undergone several changes during different administrations, and the impact of these changes on mental health care access remains poorly understood. For instance, during the Trump administration, the cessation of federal government cost-sharing subsidies payments, the expansion of short-term health plans that are exempt from ACA comprehensive coverage requirements, and the repeal of the individual mandate penalty created market instability and increased premiums, particularly for individuals who were ineligible for subsidies.

The non-group market can be a safety net for affordable insurance access for individuals who lose their employment benefits during times of economic crisis, such as the COVID-19 pandemic. Enrollment in the non-group market reached a record high in 2021 following the enactment of the American Rescue Plan Act (ARPA), signed by President Biden, which temporarily expanded and enhanced subsidies in this market during the COVID-19 public health emergency.[13] Understanding the role of the non-group market in addressing mental health care and the financial protection it offers to beneficiaries is necessary to guide existing and future reforms.

This dissertation fills several gaps in the literature by examining changes in mental health care following the implementation of the ACA, with a specific focus on vulnerable segments of the US population, including the socioeconomically disadvantaged, individuals with mental and physical comorbidities, and those with moderate-to-severe mental illness. This is achieved through the following key objectives:

1. Assessing national, population-level changes in mental health care access among income groups relevant to the ACA reforms in the non-elderly adult population.
2. Evaluating the impact of the ACA's health insurance Marketplace and non-group market reforms on access, expenditure, and affordability of mental health care during the first three years post-reform (2014-2016) and during the Trump administration (2017-2019).
3. Investigating the association between financial burden and physical comorbidity among individuals with mental health needs in the post-ACA reform era.

CHAPTER 2: LITERATURE REVIEW

This chapter begins by discussing the individual and societal burden of mental health conditions in the United States and barriers to mental health care access. It then provides an overview of two major policies that have influenced mental health care provision: the Mental Health Parity and Addiction Equity Act (MHPAEA) and the Affordable Care Act (ACA). The chapter then proceeds to summarize the existing literature on the impact of the ACA on insurance coverage, access to mental health care services, mental health outcomes, and the financial burden experienced by individuals with mental health conditions.

Given the specific focus of this dissertation on mental health care provision in the non-group market, this chapter provides a summary of the limited research on access to and affordability of mental health benefits in the non-group market before and after the ACA reforms. Additionally, it highlights ACA policy changes during the Trump and Biden administrations relevant to the non-group market. Recognizing the vulnerability of individuals with physical and mental health comorbidities, a brief discussion of the importance of the ACA for this population is included.

The chapter concludes by identifying gaps in the literature that serve as the rationale for the key objectives of this dissertation. Throughout the literature review, the terms “non-group” or “individual” insurance are used to refer to individuals who purchase insurance coverage directly from insurers, whether inside or outside the health insurance Marketplace (a.k.a. health insurance exchanges). The terms “group” or “employer-sponsored insurance, ESI” are used to refer to individuals who obtain their insurance coverage as an employment benefit.

2.1 Mental Health Burden in the United States

The United States has a high mental health burden compared to other high-income countries, ranking among the worst in mental health outcomes, including suicide rates and drug overdose deaths.[1] Death of despair, a term coined to describe premature mortality resulting from suicide, alcohol abuse, and drug overdose, has been on the rise across all racial and ethnic groups, contributing to a decline in overall life expectancy.[14,15] Nearly, one in five adults in the United States experiences a mental health condition.[2] Findings from the 2019 National Survey on

Drug Use and Health (NSDUH) indicated that among adults aged 18 and older, 51.5 million individuals (20.6%) reported experiencing any mental illness, while 13.1 million (5.2%) reported a serious mental illness within the past year.[2] During this same period, a substantial fraction of individuals with mental illnesses, 26% with any mental illness and 48% with serious mental illness, perceived unmet needs for mental health care.[2]

Disease burden. The literature has extensively documented the strong correlation between physical and mental health.[16–18] Individuals living with mental illnesses often have concurrent chronic physical conditions. The high prevalence of these comorbidities can be attributed to various factors, such as the complex bidirectional causal pathways connecting mental and physical conditions, potential exacerbation of symptoms of one condition by medications used to treat the other, challenges patients encounter in self-managing chronic physical conditions alongside mental illnesses, and the influence of associated unhealthy behaviors.[16] Multimorbidity, the coexistence of two or more chronic conditions, has been an increasingly growing public health concern globally, including in the United States.[16,19–22] Nearly one in four adults in the United States reported having multiple chronic conditions, with certain groups such as women, non-Hispanic Whites, older adults, publicly insured, and rural residents, being at higher risk.[23] Compared to individuals without any physical conditions, the presence of multimorbidity is associated with a threefold increase in the risk of experiencing depressive disorders.[18] Several factors are consistently identified as determinants of multimorbidity, including aging, lower socioeconomic status, female gender, and the presence of a mental illness.[19–21] Multimorbidity involving a mental disorder is strongly associated with socioeconomic deprivation[20,21] and a higher number of comorbid medical conditions.[20,24] The co-occurrence of mental and physical chronic conditions increases the risk of premature mortality, leads to poor health outcomes and quality of care,[6,25,26] and results in substantial individual and societal costs.[6,17,27]

Economic burden. Mental health conditions impose an economic burden on both patients and the healthcare system. Analyses conducted on the US non-institutionalized population in 2002 and 2012 ranked mental disorders among the top five most costly conditions in the United States, alongside heart disease, cancer, trauma-related disorders, and respiratory diseases. While cancer and heart diseases incurred the highest mean expenditure per person, individuals with

mental health conditions faced the highest out-of-pocket (OOP) expenses.[28] When accounting for institutionalized populations with mental illnesses – such as nursing home residents, prison inmates, and patients in psychiatric hospitals – the total expenditure on mental health care surpassed that of all other costly conditions, reaching $201 billion in 2013.[27]

Before the passage of the ACA, nonelderly adults aged 18-64 with serious psychological distress, defined as a score of 13 or above on the Kessler-6 scale, were less likely to have access to any form of insurance coverage compared to those without such distress.[29,30] Despite subsequent coverage expansions and the widespread implementation of mental health parity laws under the ACA, cost remained a significant barrier to accessing mental health care.[1,31] Additionally, the United States has a shortage of mental health care providers, with approximately 105 professionals per 100,000 population, who are primarily comprised of social workers.[1] These rates are much lower than some other high-income countries (Canada, 277 per 100,000; Australia, 207 per 1000,000; and France, 168 per 100,000).[1] Individuals with mental health conditions and unmet mental health care needs are more likely to attribute these unmet needs to structural barriers, such as unaffordability and provider inaccessibility, rather than attitudinal barriers, such as stigma and negative perception towards treatment.[3]

2.2 *Policy Context*: Mental Health Parity Act and Mental Health Parity and Addiction Equity Act

The Mental Health Parity Act of 1996 marked the first federal legislation to address mental health coverage. The Act prohibited large-group employer-sponsored insurance (ESI) plans with 50 or more employees from imposing more restrictive annual or lifetime dollar limits on mental health benefits compared to medical or surgical benefits. The law did not mandate coverage of mental health services but only required parity for ESI plans that chose to offer these services. Parity did not apply to substance use disorder treatment (SUD) and did not address financial requirements (e.g., deductibles, copayments) or treatment limits (e.g., the total number of inpatient days covered).[10]

Recognizing the limitations of the Mental Health Parity Act, Congress passed the landmark Paul Wellstone and Pete Domenici Mental Health Parity and Addiction Equity Act (MHPAEA) in 2008. The MHPAEA expanded parity to encompass financial protection and treatment limits for all behavioral health services, including mental health and SUD, on par with

medical and surgical benefits. This expansion of parity was applied only to large group plans, including employers with 50 or more employees and Medicaid-managed care plans that included these services in their benefits packages. Guidance on the implementation of the MHPAEA was issued in an interim final rule in February 2010, with provisions becoming effective for plan years beginning on or after July 1, 2010. The rule made a distinction between quantitative (e.g., day or visit limits) and non-quantitative treatment limits (e.g., prior authorization and step therapy), both of which were subject to parity protection. In November 2013, the MPAEA final rule, clarifying the interaction between MHPAEA and ACA, was issued and applied to plan years beginning on or after July 2014.[10]

2.3 *Policy Context*: The Patient Protection and Affordable Care Act

The Patient Protection and Affordable Care Act, commonly known as the Affordable Care Act (ACA), was signed into law by President Barack Obama in March 2010. The ACA aimed to enhance coverage, improve access to health care, and provide financial protection against catastrophic health care spending.[32] In combination with the MHPAEA, the ACA expanded mental health care access to millions of Americans through two main mechanisms: the expansion of insurance coverage and reforms in the healthcare delivery system.

2.3.1 Coverage Expansion and Insurance Reforms

Multiple provisions of the ACA have targeted insurance coverage expansion among various segments of the American population. Young adults were the earliest group to benefit from insurance expansion through the *dependent coverage mandate,* which became effective in September 2010. This provision allowed young adults to remain covered under their parent's insurance plans until the age of 26 years. The ACA introduced two major provisions in 2014: Medicaid eligibility expansion and income-based subsidized plans offered through the newly established health insurance Marketplace. These provisions aimed to increase insurance coverage among low- and middle-income non-elderly adults. Additionally, an *employer mandate* required employers with 50 or more employees to offer affordable insurance coverage to employees and their dependents. Affordable coverage was defined as an employee's share of the single premium not exceeding 9.5% of their household income, with a minimum coverage of at least 60% of total health care costs. Failure to comply with this mandate subjected employers to a tax penalty if

their employees sought coverage through the Marketplace and received premium subsidies. Lastly, an *individual mandate* required nearly all individuals to maintain a minimum essential coverage or face a tax penalty, although this penalty was repealed in 2019.

Between 2013 and 2015, there was a historic increase in insurance coverage, with more than 15 million Americans gaining coverage when the major provisions of the ACA came into effect in 2014.[33,34] Frean and colleagues[35] quantified the impact of Marketplace premium subsidies, Medicaid expansion, and the individual mandate on the increased coverage rates during this period. They found that premium subsidies accounted for 40% of coverage gains, while the remaining 60% was attributed to Medicaid expansion. The individual mandate had a limited effect on coverage rates. However, the number of uninsured individuals began to rise from 26.9 million (10.0%) in 2016 to 29.2 million (10.8%) in 2019.[34] Experts have attributed this 2.3-million increase in the uninsured rate to policy changes implemented during the Trump administration, as discussed in section 2.5 of this review. These policy changes included the repeal of the individual mandate penalty, shortening of the open enrollment period, budget cuts to navigator enrollment assistance, and the expansion of short-term insurance plans.[36]

2.3.1.1 Medicaid Expansion

Prior to the implementation of the ACA, the Medicaid program had limited eligibility, primarily restricted to individuals with disabilities, low-income children, pregnant women, and extremely low-income parents.[37] The ACA expanded Medicaid eligibility to include low-income adults with household incomes up to 138% of the Federal Poverty Level (FPL). To support this expansion, enhanced federal funding fully covered Medicaid expansion during the first four years, decreasing to 90% thereafter. In June 2012, a U.S. Supreme Court decision granted states the option to choose whether to expand their Medicaid programs.[38] The Centers for Medicare and Medicaid Services did not impose a specific deadline for states to expand their Medicaid eligibility coverage. As of May 2023, 41 states have adopted Medicaid expansion, while 10 states, mostly located in the South, have not.[39] Individuals residing in non-expansion states who have incomes below 100% of the FPL fell in what was referred to as the “coverage gap”. This gap emerged because this specific low-income population was ineligible for both Medicaid coverage and premium subsidies in the ACA’s private Marketplace in non-expansion states and was likely unable to afford unsubsidized premiums. Estimates indicate that over 2 million low-

income Americans fell into this Medicaid coverage gap in 2019.[40] In non-expansion states, the median annual income limit for parents to qualify for Medicaid was set at 44% of the poverty level, equivalent to an annual income of $8,985 for a family of three in 2017. In these states, childless adults are mostly ineligible for Medicaid.

2.3.1.2 Nongroup Market Reforms and the Creation of the Health Insurance Exchanges

Before the enactment of the ACA, individual (non-group) market plans were less generous, with higher OOP costs and premiums compared to the ESI (group) plans.[11] Insurers in the individual market could also deny coverage or charge high premiums based on an individual's health status or pre-existing conditions, a practice known as medical underwriting. The ACA introduced regulations to the individual market, prohibiting this practice and implementing community ratings, whereby premiums could vary only based on age, geography, and tobacco use.

Building upon the MHPAEA, the ACA extended parity for mental health and substance use disorder (SUD) services to individual and small group plans. Additionally, the ACA classified mental health and SUD as essential health benefits, ensuring their coverage in Medicaid expansion plans, as well as in individual and small group markets. These measures aimed to improve access to mental health and substance use services, promote equitable coverage, and reduce disparities in care.

Starting in 2014, individuals, families, and small businesses could purchase ACA-compliant plans during an open enrollment period, either through the newly established ACA Marketplace or directly from insurers or brokers outside the Marketplace. The Marketplace provided a reformed platform for insurers to voluntarily compete based on lower premiums and comprehensive benefits, rather than avoiding individuals with high health care needs. To encourage insurers' participation and stabilize premiums given the uncertainty associated with the new risk pool, the ACA established three regulatory premium stabilizing programs: risk adjustment, reinsurance, and risk corridors.[41]

During the 2019 benefit year, 12 states operated their own state-based Marketplace (SBM) platforms, while 39 states relied on the federally facilitated Marketplace (FFM) platform, HealthCare.gov.[42] Within the individual market, consumers can purchase any of four-tiered

metal plans with varying premiums and actuarial values: bronze, silver, gold, and platinum (Table 2.1). The tier of the plan determines its cost, with higher-tier plans being more expensive but providing greater financial protection from out-of-pocket expenses.

Only plans purchased in the ACA Marketplace provide eligible beneficiaries with two types of subsidies. First, advance premium tax credits (APTCs) are available to individuals with incomes between 100%-400% of the federal poverty level (FPL) in Medicaid non-expansion states and between 138%-400% of the FPL in Medicaid expansion states. APTCs lower monthly premium costs by capping premiums as a percentage of household income on a sliding scale. The amount of tax credit is then calculated as the difference between the second lowest-cost silver plan in the beneficiary's local Marketplace (referred to as the benchmark plan) and the individual's income-based premium cap. Beneficiaries have the flexibility to enroll in the silver plan or apply the value of tax credits to other plans with lower or higher premiums.

The second type of subsidy offered in the ACA Marketplace is the cost-sharing reduction (CSR) subsidy, which lowers OOP costs, including deductibles, copayments, and coinsurance for individuals with household incomes up to 250% of the FPL. CSR subsidies are offered only through enrollment in a silver-level Marketplace plan and are scaled based on income. CSR subsidies increase the actuarial value of a silver plan from 70% to 94% for individuals earning less than 150% of the FPL, to 87% for individuals with income ranging from 150% to 200% of the FPL, and to 73% for individuals with incomes ranging from 200% to 250% of the FPL. In 2019, 87% of enrollees in the ACA Marketplace plans using the federal HealthCare.gov platform received APTCs, while 54% benefited from CSR subsidies.[42]

Table 2.1. Metal-tiered plans in the non-group insurance market

	Platinum	Gold	Silver	Bronze
Monthly premiums	$$$$	$$$	$$	$
Actuarial value (%)[a]	90	80	70	60
Income-based subsidies[b]	APTCs	APTCs	APTCs and CSRs	APTCs

SOURCE HealthCare.gov **NOTES** [a]The average amount a plan pays for covered services for all policyholders of the plan; the remainder is paid out-of-pocket by the beneficiary. [b]Only available for plans purchased on the ACA Marketplace
Abbreviations: APTCs, Advance premium tax credits; CSRs, Cost-sharing reduction subsidies

2.3.2 ACA's Provisions and Multimorbidity including Mental Illness

The ACA includes multiple provisions that are likely to have significant effects on patients with physical and mental comorbidities. First, patients with mental health conditions are likely to have low income and lack insurance coverage.[29,30,43,44] They also experienced the highest OOP cost burden prior to the ACA, exceeding other high-cost conditions.[28] Given the high prevalence of comorbid chronic medical conditions in individuals with mental illness, it is expected that this patient population will benefit from improved insurance coverage and financial protection against high OOP health care spending following ACA's insurance expansion, mental health parity extension to the non-group market, and the recognition of mental health care as an essential benefit.[45,46] Second, the ACA has promoted the adoption of healthcare delivery and financing models such as patient-centered medical homes and accountable care organizations. These models are increasingly implemented by the Medicaid program for quality improvement and cost-saving purposes, integrating behavioral and medical care within a collaborative care framework.[47] Third, the elimination of patients' cost-sharing for preventive care has the potential to enhance the quality and availability of preventive and screening services for patients with mental health conditions,[48] enabling early detection and management of diseases. Finally, the financial protection offered due to insurance coverage may contribute to lowering psychological distress, which can be particularly pronounced among patients with multimorbidity involving a mental illness.[49]

2.4 Empirical Evidence of the ACA Impacts on Mental Health Care

Numerous studies have examined the impact of the Affordable Care Act (ACA) on mental health care, with a particular emphasis on three key areas: coverage, access, and mental health outcomes.[32,50] This section provides a synthesis of published research that explores these domains. It was informed by a literature review conducted by the *Commonwealth Fund* on the role of the ACA reforms on mental health care in the decade following its enactment in 2010.[50]

2.4.1 Impact of the ACA on Mental Health Care Coverage and Access

Studies addressing coverage expansion among non-elderly individuals with mental health conditions have consistently reported an immediate increase in the rates of insurance coverage

following the ACA enactment.[24,32,51–56] For instance, using data from the National Health Interview Survey, Sherill and Gonzales[24] found that between 2012-2013 and 2015, there was a significant decrease in the uninsured rates among individuals with no mental illness, moderate mental illness, and severe mental illness by 6.2, 8.5, and 9.3 percentage points, respectively. Coverage gains were observed among racial and ethnic groups,[54] young adults,[55,56] non-elderly individuals in Medicaid expansion and non-expansion states,[52] and those with co-existing mental and substance use disorders.[51]

Despite the strong evidence of the broad increase in insurance coverage among individuals with mental health conditions, this was not always translated into improved access to mental health treatment and findings in this area have been mixed.[24,51,54] Sherill and Gonzales[24] found significant reductions in forgoing mental health care or prescription medications due to cost among individuals reporting severe mental illness, which is consistent with findings reported by Novak and colleagues.[53] However, there were no improvements observed in terms of having a usual source of care or seeing a mental health professional.[24] Young adults have experienced an increase in mental health treatment following the dependent coverage mandate compared to a slightly older control group.[56,57] Cook and colleagues[54] found that the receipt of any mental health service significantly increased only among White individuals in the first year of the ACA implementation. Pre-existing disparities in access to mental health care between Black and White individuals did not improve despite the observed gains in insurance coverage in both groups. Similarly, Saloner and colleagues[51] reported a small increase in treatment rates in 2014 among adults with mental health disorders, despite a sizable increase in coverage compared with the pre-ACA period.

Some researchers have suggested that the modest increase in access to mental health care compared to the larger gains in coverage expansion can be attributed to the *short-term post-ACA evaluation periods in much of the existing evidence, which may not provide enough time for individuals to understand their new benefits, search for providers, and change their healthcare-seeking behavior.*[58] Additionally, expanded insurance coverage may not lead to increased treatment rates if counteracted by barriers to access from the provider side. Compounded with the shortage of psychiatrists in the United States,[1] they tend to accept all insurance types at lower rates compared to medical doctors in other specialties.[59] This discrepancy is likely due to the

lower reimbursements that psychiatrists receive for the same types of services, which may disincentivize them from participating in insurance networks.[60] The limited accessibility to mental health providers and the likelihood that patients with mental illnesses have comorbid chronic conditions have increased the involvement of primary care providers in providing mental health care, as reflected in the increased prescribing of psychotropic medications by primary care physicians.[61]

Very limited research exists on coverage and access to behavioral health care in the ACA health insurance Marketplace, with most studies focusing primarily on analyzing the characteristics of Marketplace plans pertaining to mental health benefits rather than the utilization pattern of mental health services by consumers. Analyses of Marketplace plans in their first year found that insurers had extended mental health parity to individual market plans, as required by the ACA parity regulations and the essential benefit mandate. Behavioral health benefits were found to be as generous as medical/surgical services, and the benefits structure was similar to plans offered in the employer-sponsored group insurance market.[45,46] However, researchers cautioned that the observed generosity in mental health coverage might also be driven by the financial protections offered to insurers, such as risk adjustment, reinsurance, and risk corridors, which, if weakened or expired, might diminish parity gains. Furthermore, they found that Marketplace plans, especially in state-run Marketplaces, used narrower and tiered provider networks compared to employer-sponsored insurance (ESI) plans.[45] This may be a mechanism insurers employ to control costs by discouraging the enrollment of individuals with mental health conditions from their risk pool. These patients are considered to have a high cost of care and were previously denied coverage or charged higher premiums before the elimination of medical underwriting under the ACA.[45]

2.4.2 Impact of the ACA on Mental Health Outcomes

Because improving health outcomes is a goal of ACA insurance expansion, numerous studies evaluating ACA provisions include mental health-related outcomes, such as depression diagnosis, self-reported poor mental health days, and severe psychological distress. Low-income childless adults are a population that has gained much attention given their prior ineligibility to Medicaid and the large coverage gains they experienced following Medicaid expansion.[62] Research examining the mental health status of this population has reported a reduction in the

number of poor mental health days among individuals residing in expansion states compared to non-expansion states.[63,64] However, when stratified by the presence of chronic conditions, mental health improvement was only observed among childless adults with at least one co-existing comorbidity.[65] Similarly, low-income parents living in Medicaid expansion states had a significant reduction in severe psychological distress and improved affordability to pay medical bills, with no significant change in health care use.[66] One potential hypothesis explaining mental health improvements among low-income childless adults and parents following Medicaid expansion is the alleviation of financial insecurity, which is strongly associated with mental disorders, through affordable insurance coverage.[49] Baicker and colleagues[67] took advantage of the 2008 Oregon Health Insurance Experiment, which employed a lottery system to provide low-income adults in Oregon with Medicaid coverage. The findings revealed a significant reduction in undiagnosed depression, untreated depression, and unmet mental health care needs. Although the experiment predates the ACA, its robust design provides causal evidence supporting the crucial role of Medicaid coverage in improving mental health outcomes. Young adults with severe mental illness have also reported a significant decrease in unmet mental health needs due to cost[56] and improved self-reported mental health status[68] following the dependent coverage mandate, compared to slightly older young adults.

2.5 Financial Burden around the ACA and Population with Mental Health Needs

Clear evidence supports the financial protection that the ACA has conferred to low- and middle-income Americans against high OOP medical spending.[69–71] However, concerns remain regarding the financial difficulties faced by certain groups. For instance, individuals in the non-group market reported the highest financial burden compared to other types of insurance between 2013 and 2015, as indicated by the fraction of individuals who are members of families spending more than 10% of their income on medical expenses and premiums.[69] Although there was a significant 6.7 percentage point decline in financial burden among this group following the ACA's provisions enacted in 2014, more than one-third still experience a high financial burden. Another study by Liu and colleagues[71] found that, compared to individuals with high income who were ineligible for Marketplace subsidies (>400% FPL), those with low income who qualified for both premium and cost-sharing reduction subsidies experienced a 17% decrease in

OOP spending and a 30% lower probability of catastrophic spending in the four years following the ACA reforms. However, a similar effect was not observed among those eligible for premium subsidies only. Not surprisingly, Marketplace enrollees with mental health needs were found to experience a higher risk of financial strain relative to the privately insured or Medicaid-covered population.[72]

Despite ACA's success in providing financial protection, limited empirical research has focused on the financial burden specific to individuals with mental health needs, particularly in the period following ACA implementation. This literature gap highlights three key areas that have not been yet adequately addressed. First, individuals with mental health needs often have a high prevalence of comorbidity, resulting in increased health care utilization and costs.[6,17] *However, the impact of such complexity on the financial burden of patients with mental health needs and their families remains unclear.* One study predating the ACA reported a high financial burden among families of individuals with mental health needs, driven by high OOP spending on treating comorbid conditions and the low income of families.[4] Notably, treating mental health conditions itself did not significantly contribute to the financial burden, which aligns with findings on low mental health care spending, accounting for approximately 15% of the total health care spending, among adults with mental health needs.[4,17] Second, while studies have explored the financial burden related to comorbidities involving mental and physical conditions, they have predominantly focused on specific high-cost conditions such as cancer or cardiovascular diseases.[73,74] *The variation in financial burden across different chronic comorbidities in patients with mental health needs remains unexplored. Third, most studies evaluating the ACA's impact on financial burden among policy-relevant groups, or the financial burden associated with specific disease conditions have failed to concurrently assess the subjective and objective components of financial burden, despite being conceptually distinct and potentially yielding different results.*[75–77]

2.6 *Policy Context*: Changes to the ACA's Non-group Market during the Trump Administration

After the 2016 presidential election, President Trump called for a repeal of the ACA. Analyzing presidential communications published by the Washington Post from January 2017 to April 2019, Hatcher identified 662 misleading health-related statements made by President Trump, with 50 percent of them undermining the stability of the ACA and discussing its repeal.[78] Although attempts to repeal and replace the ACA were not successful following the political shift in 2017, the Trump administration introduced regulatory and policy changes that posed challenges to several ACA provisions, particularly those related to the non-group private market. These changes created much uncertainty about the future of the ACA and sought to erode some of the progress made under the law.[79–82]

Sections 2.6.1 through 2.6.3 of this literature review outline the policy changes and uncertainties surrounding the ACA components pertaining to the non-group private market between 2017 and 2019. These sections discuss the implications of such changes on market dynamics, including consumer enrollment, insurers' decisions about pricing and participation, and states' reactions to mitigate the effects of these changes. A visual representation of the timeline of these changes, along with other policies influencing mental health care coverage, is displayed in Figure 2.1.

2.6.1 Changes in the Individual Market Enrollment

Enrollment within the Marketplace grew from 8 to 12.7 million between 2014 and 2016, followed by a subsequent decline, reaching 11.4 million in 2019. Reduced enrollment was observed among states using the federally-facilitated platform (HealthCare.gov), while state-run exchanges experienced a more stable trend.[42] Several factors likely contributed to this decline, including the substantial funding cuts for advertising campaigns and the navigator enrollment assistance program, shortening of the open enrollment period starting in 2018 from 90 to 45 days, loosening restrictions on short-term plans, and reducing the penalty for non-compliance with the individual mandate to $0 (Figure 2.1). State-run exchanges outperformed federally facilitated exchanges by exerting more autonomy in operating their Marketplace platforms. They invested more in advertising and outreach programs, tailored enrollment marketing and assistance to their specific needs, extended open enrollment periods, and improved the consumer's online experience.[83]

When examining total enrollment both inside and outside the Marketplace, a decline in unsubsidized enrollment among those who were ineligible for premium tax credits was observed beginning in 2017, compared to relatively stable rates of subsidized enrollment. Nationally, between 2016 and 2019, unsubsidized enrollment decreased by 45% (2.8 million), likely due to policy changes outlined in sections 2.6.2 and 2.6.3, which introduced uncertainties in the individual market and resulted in increased premiums.[84] Subsidized individuals were insulated from the effects of premium increases on enrollment rates given the way subsidies were structured *(see section 2.3.1.2)*.

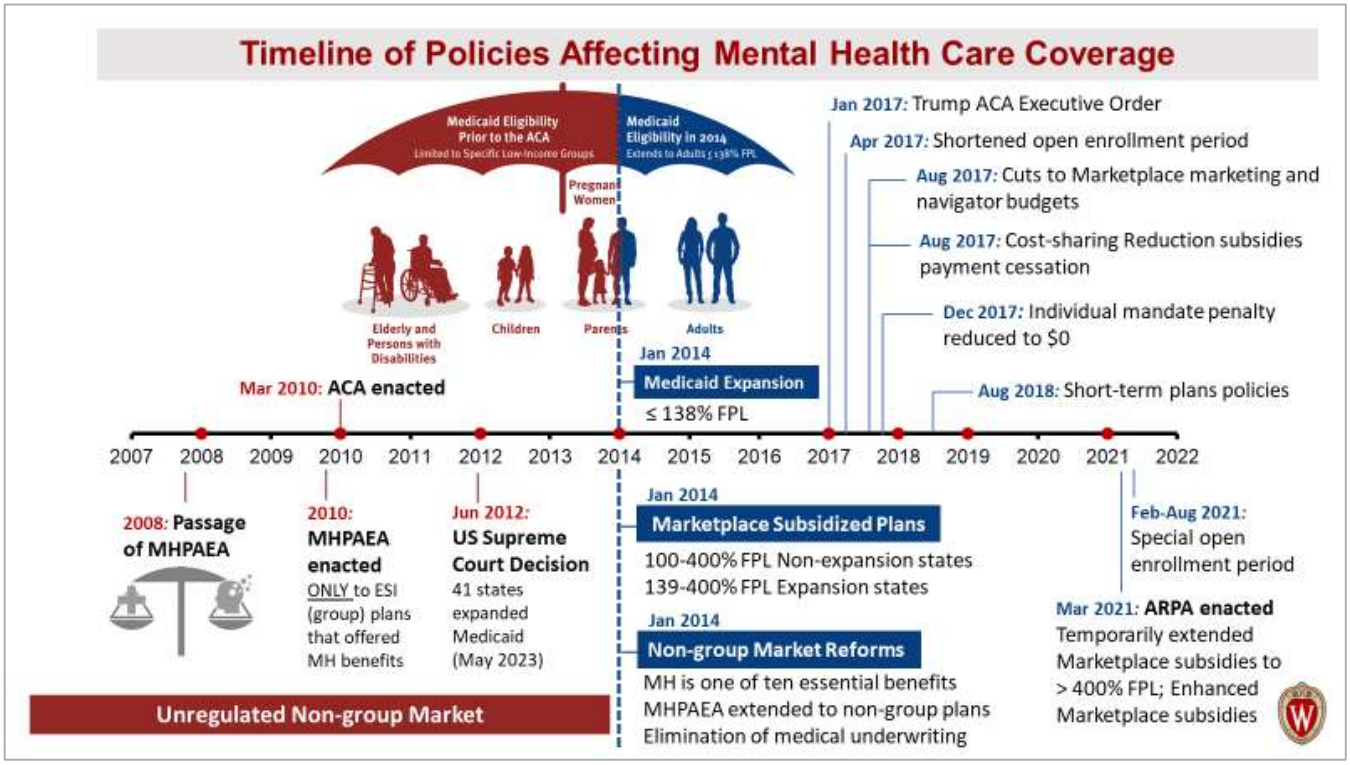

Figure 2.1. Timeline of policies affecting mental health care coverage, 2008-2021

SOURCE Author's analysis **NOTES** Unregulated non-group market: mental health benefits typically excluded or less generous than medical benefits; medical underwriting allowed. Medical underwriting: insurers can deny coverage or charge higher premiums to individuals with pre-existing conditions. As of May 2023, 10 states have not expanded Medicaid (Wyoming, Kansas, Texas, Wisconsin, Tennessee, Mississippi, Alabama, Georgia, South Carolina, and Florida). Trump's 2017 executive order set out interim procedures in anticipation of the repeal of the ACA. Abbreviations: ACA, Affordable Care Act; MHPAEA, Mental Health Parity and Addiction Equity Act; MH, mental health; ESI, employer-sponsored insurance; FPL, federal poverty level; ARPA, American Rescue Plan Act

2.6.2 Cessation of the Federal Cost-sharing Reduction (CSR) Payments

Under the Affordable Care Act (ACA), it was mandated that all silver plans in the Marketplace provide CSR subsidies to lower out-of-pocket (OOP) spending for beneficiaries with incomes below 250% of the Federal Poverty Level (FPL). The federal government made direct payments to insurers to reimburse for the CSRs offered to eligible beneficiaries. However, in October 2017, the Trump administration ended the CSR payment to insurers despite their legal obligation to offer CSR subsidies. Insurance companies had to submit their premium rates for the 2018 plan year in September 2017 amidst uncertainty regarding the decision on CSR payment cessation, which was announced a few days later. In most states, insurers anticipated this loss and conservatively increased the premiums, primarily for their silver plans on the Marketplace, a process known as *"Silver loading"*.

Several other uncertainties in 2017 contributed to the premium rate increases in the 2018 plans both on and off the Marketplace. These uncertainties included doubts about the enforcement of the individual mandate penalty, concerns about reduced enrollment due to cuts in marketing and navigator budgets, and the shortened open enrollment period. Additionally, these uncertainties prompted more insurers to exit the market, reducing competition and further driving up premium costs. Nationwide, the lowest-cost silver plan premiums, on average, increased by 29.7% in 2018, with significant variations across states. Insurers' participation also declined from an average of 3.7 to 3.0 per region between 2017 and 2018.[85]

The increase in premiums for silver plans resulted in an increase in the amount of tax credits since they are tied to the benchmark second lowest-cost silver plan. As a result, subsidized individuals enrolled in silver plans were insensitive to premium increases, and those enrolled in bronze or gold plans fared even better because higher tax credits were applied to plans that were not affected by the increased premiums. Unsubsidized individuals with incomes above 400% of the FPL could potentially avoid premium increases caused by CSR payment cessation by purchasing a non-silver plan. Nonetheless, many of them were priced out due to the surge in premiums in 2018, which was driven by other aforementioned uncertainties (Figure 2.1).[82,84–86]

2.6.3 Non-ACA Compliant Plans Expansion and the Individual Mandate Penalty Repeal

In October 2018, new federal regulations changed the permissible duration of short-term, limited duration (STLD) plans from three months to one year, with the option for policyholders to renew coverage for up to three years. STLD plans were originally designed to provide temporary health insurance for individuals experiencing coverage gaps such as job loss. Thus, they were non-renewable and exempt from ACA requirements. They did not meet the criteria for "minimum essential coverage" under the individual mandate, making policyholders subject to a tax penalty prior to repealing the individual mandate penalty. These plans typically do not cover pre-existing conditions, lack comprehensive coverage for essential health benefits, such as mental health and prescription drugs, and often have annual or lifetime dollar limits. Due to their limited coverage, STLD plans are much cheaper than ACA-compliant plans, creating an alternative competing market with lower premiums and reduced benefits.[87] Another change to the ACA implemented in 2019 was the reduction in the individual mandate tax penalty to $0, as part of the Tax Cuts and Jobs Act passed by Congress in December 2017.[80]

The expansion of STLD plans and the repeal of the individual mandate tax penalty were expected to disrupt the ACA individual market, as healthier and younger individuals would be more inclined to enroll in cheaper STLD plans or forgo coverage altogether. This shift in the risk pool was anticipated to increase premiums in the 2019 plan year. However, the individual market witnessed relative stability in 2019, partly because insurers overreacted to market uncertainties in 2018. In contrast to the sharp premium increases in 2018, the national premium of the lowest-cost silver plan remained steady in 2019 and even decreased slightly in some states. Moreover, more insurers competed in the market in 2019 compared to 2018.[85]

2.7 Empirical Evidence on the Impacts of the ACA Policy Changes during the Trump Administration

Courtemanche and colleagues[88] analyzed 2011-2019 data from the American Community Survey to examine the impact of the ACA on insurance coverage during the first three years of the Trump administration relative to 2016. They found that, while most of the initial ACA coverage gains were maintained between 2017 and 2019, the effects varied depending on the state's Medicaid expansion status. In states that did not expand Medicaid, where insurance

expansion relied more on individual market reforms, the probability of non-elderly adults having coverage decreased from 5 percentage points in 2016 to 3.8 percentage points in 2017 and 2018 and further declined to 3.6 percentage points in 2019. Conversely, in the Medicaid expansion states, coverage increased by 11 percentage points annually from 2016 to 2018, with a slight dip to 9.6 percentage points in 2019.

In another study, Griffith and colleagues[89] analyzed data from the Behavioral Risk Factor Surveillance System (BRFSS) and observed an increase of approximately one percentage point (equivalent to an estimated 2 million adults) in the rates of uninsurance and avoidance of care due to cost at the end of 2017 compared to 2016. This adverse impact was more pronounced among those with incomes less than 138% of the Federal Poverty Level (FPL) and among individuals residing in non-expansion states. However, contrary to these findings, Courtemanche and colleagues[90] analyzed the BRFSS data and reported that ACA's gains in access indicators, such as having any insurance coverage, having a primary care provider, experiencing cost barriers to care, and having a checkup in the past year, remained stable in 2017 and 2018 compared to 2016, with an improvement in self-reported health. *Nonetheless, little is known about the long-term effects of the ACA on access to mental health services and whether early gains in mental health care were sustained during the Trump administration.*

2.8 *Policy Context*: Changes to the ACA's Non-group Market during the Biden Administration

This section highlights non-group market policy changes during the Biden administration that are expected to affect mental health care coverage and affordability, especially after many Americans lost their employment benefits due to the COVID-19 public health emergency. Although this dissertation focuses on the period preceding the pandemic, describing these changes serves two purposes. First, it demonstrates the ongoing changes in the non-group market with political shifts and emphasizes its role as a safety net during economic downturns. Second, it sets the foundation for future research directions to guide ongoing non-group market reforms.

The Biden administration implemented several measures to improve access to affordable insurance coverage through the non-group market amidst the economic downturn caused by the COVID-19 pandemic (Figure 2.1). First, a 6-month special open enrollment period (SEP), running from February 15, 2021, to August 15, 2021, enabled consumers to newly enroll or change plans in the Marketplace.[91,92] Second, the American Rescue Plan Act (ARPA), signed

into law on March 11, 2021, by President Biden, enhanced Advance Premium Tax Credits (APTCs) for all Marketplace enrollees until the end of the 2022 calendar year.[92,93] The ARPA also extended APTC subsidies to individuals with household income >400% of the FPL who previously did not qualify for subsidies under the ACA and lowered premiums for individuals who already qualify for subsidies. Under the ARPA, premiums of the benchmark plans were capped at 8.5% of the household income.[93] Alongside these measures, the ARPA enhanced the budgets for advertising and outreach as well as the navigator program that assists consumers to sign up for coverage.[91] During the COVID-19 SEP, approximately 2.8 million people enrolled in Marketplace plans, with a larger proportion of individuals of color and those with incomes above 400% of the poverty level compared to previous years.[13] As of August 2021, there was a record-high enrollment of 12.2 million people with active policies in the ACA Marketplace.[13]

2.9 Summary of Research Gaps in the Literature

This literature review identifies the following key gaps that the dissertation aims to address:

I. ***Trends in mental health care access across reform-relevant income thresholds.*** Despite growing evidence of gains in mental health care coverage following the ACA, findings regarding access to mental health services have been inconsistent. Additionally, studies have primarily focused on subgroups targeted by specific ACA provisions (e.g., Medicaid population or young adults) or racial/ethnic minorities. No prior research has compared the changes in trends in mental health service utilization among non-elderly adults across income thresholds relevant to ACA provisions. Examining these changes over time is crucial for policymakers to ensure equitable access to mental health care among vulnerable groups. This is important given the strong association between poverty and poor mental health, which can be exacerbated by inaccessibility to needed care due to a lack of insurance or underinsurance.

II. ***Impact of increased coverage expansion and generosity on mental health services utilization and expenditure in the non-group market.*** Analyses of the characteristics of plans in ACA Marketplaces provided evidence of parity extension to mental health benefits on par with medical and surgical benefits. However, it is unknown how the increased coverage generosity of behavioral services has affected the utilization, spending, and affordability of mental health services among Marketplace enrollees. This is particularly important considering concerns about limited accessibility to mental health providers due to narrow and tiered Marketplace networks and the lack of evidence on the adequacy of primary care physicians to compensate for these limitations.

III. ***Long-term effects of ACA on mental health care.*** Limited empirical evidence exists on the ACA's impact over time on mental health care access and affordability, especially during the legislative and policy changes that took place under the Trump administration. Currently, only a few studies have examined the effects of the first three years of the Trump administration on coverage, access to care, and self-assessed health among the general population, with no specific focus on mental health care. This dissertation aims to address this research gap by spanning the period before the COVID-19 pandemic, which

includes the first three years of the Trump Administration. The long 6-year post-ACA period (2014 to 2019) permits the assessment of changes in mental health care with the political shift as well as the changes in healthcare-seeking behavior and health outcomes that might not be fully captured in earlier studies conducted in the initial years after the reform.

IV. ***Quasi-experimental evaluation of ACA's non-group market reforms on mental health care.*** Prior research employing robust quasi-experimental design has extensively been used in evaluating ACA provisions related to Medicaid expansion and dependent coverage mandate, likely because of the ease of constructing an appropriate counterfactual not affected by these provisions (i.e., non-Medicaid expansion and age group slightly above 26). However, studies evaluating the ACA's non-group market reforms were mostly observational, given their national introduction in all states at the same time, making it challenging to construct an appropriate control group. Evaluating the Marketplace and non-group market reforms using robust designs allows for better control of confounding factors and time-varying characteristics. This is particularly relevant to guide future reforms, given the significant role of the non-group market during times of economic and mental health crises, such as the COVID-19 pandemic.

V. ***Financial burden of physical and mental comorbidities in the post-reform era.*** Little is known about the financial burden experienced by individuals with mental illness following the ACA implementation. Studies often fail to address the complexity of mental health conditions, particularly those related to the number and nature of physical comorbidities that substantially drive the cost of care in this population. Additionally, it is uncommon for studies to simultaneously examine both subjective and objective measures of financial burden, despite their conceptual differences and relevance to understanding the full impact on patients.

CHAPTER 3: OBJECTIVES, RESEARCH QUESTIONS, AND HYPOTHESES

This chapter introduces the dissertation's three primary objectives. It presents the research question associated with each objective, identifies the outcome variables relevant to each question, and lists the corresponding hypotheses to be tested.

3.1 Objective 1: Trends in Mental Health Care Access across ACA Income Groups

This objective aims to assess national, population-level changes in mental health care access between 2011 and 2019 across income groups relevant to the Affordable Care Act (ACA) reforms in the nonelderly adult population. Specifically, this study aims to examine trends in mental health care access across three income groups: the lowest income group (≤ 138% of the federal poverty level) eligible for Medicaid, the low-to-middle income group (139%-400% of the FPL) eligible for Marketplace subsidies, and the high-income group (> 400% of the FPL) ineligible for financial assistance.

Research Question 1: To what extent has access to mental health care changed between 2011 and 2019 across income thresholds relevant to the ACA reforms?

Outcome Variables

I. Probability of 1+ mental health care encounter (ambulatory visit or psychotropic prescription fill)
II. Probability of 1+ psychotropic medication fill
III. Probability of 1+ mental health-related ambulatory visit (office-based or outpatient)

Hypotheses

H1: The probability of utilizing any mental health care service, mental health-related ambulatory visits, and psychotropic prescription medications has increased, especially among income groups <400% FPL

H2: The disparity in trends of utilizing any mental health care service, any mental health-related ambulatory visits, and any psychotropic prescriptions between the income groups targeted by the ACA and the high-income group decreased following the implementation of the ACA.

3.2 Objective 2: Impact of the ACA on Mental Health Care Access, Expenditure, and Affordability in the Nongroup Market

This objective aims to evaluate the impact of the ACA's health insurance Marketplace and non-group market reforms on mental health care access, expenditure, and affordability during the early years post-reform (2014-2016) and the Trump administration era (2017-2019). Using a quasi-experimental design, this study examines the combined effect of income-based Marketplace subsidies and various behavioral health reforms that modified mental health care benefits and provision within the non-group market.

Research Question 2: To what extent have access, expenditure, and affordability of mental health services changed among Marketplace-eligible individuals in the early and late periods following the ACA implementation, compared to counterparts with stable employer-sponsored insurance (ESI)?

Outcome Variables

I. Probability of 1+ mental health care encounter (ambulatory visit or psychotropic prescription fill)
II. Probability of 1+ mental health-related ambulatory visit
III. Probability of 1+ psychotropic medication fill
IV. Average number of mental health encounters, categorized by type of service
V. Average total spending on mental health care
VI. Average out-of-pocket (OOP) spending on mental health care
VII. Average total spending on mental health care, categorized by type of service

Hypotheses

H2a: The probability of any mental health care encounter, any ambulatory mental health visit, and any psychotropic prescription medication use has increased among the Marketplace-eligible group net of the change among the ESI control group

H2b: The level of use (measured by the average number of mental health ambulatory visits and psychotropic medication fills) has increased among the Marketplace-eligible group net of the change among the ESI control group

H2c: Net increase in average total spending on mental health care services among the Marketplace-eligible group

H2d: Net decrease in average OOP spending on mental health care services among the Marketplace-eligible group

H2e: Net changes will be especially pronounced in 2014-2016, relative to the pre-ACA period, and will continue to be sustained throughout 2017-2019

3.3 Objective 3: Financial Burden and Physical Comorbidities in Individuals with Mental Health Needs

This objective aims to examine the extent of association between financial burden and physical comorbidity among individuals with mental health needs in the post-ACA reform era.

Research Question 3: How does financial burden change across levels and specific diagnoses of physical comorbidity in individuals with mental health needs in the post-ACA period?

Outcome variables

Objective and subjective indicators of financial burden due to all-cause health care services use

Hypotheses

H3a: Subjective and objective financial burden of all-cause health care services use in individuals with mental health needs increase with the increase in the number of comorbid physical conditions

H3b: Subjective and objective financial burden of all-cause health care services use in individuals with mental health needs are strongly associated with comorbid high-cost conditions such as cancer, diabetes, and heart disease

CHAPTER 4: GENERAL APPROACH

This chapter provides an overview of the theoretical framework that guided the conceptualization of the dissertation objectives and informed the statistical analysis. It further includes a detailed description of the used dataset, the Medical Expenditure Panel Survey (MEPS), and outlines the process of constructing the analytic data file to address the three objectives of the dissertation. Specific methods relevant to each objective, including the construction of the analytic sample, study measures, and statistical analysis plan, are presented separately in subsequent chapters for each respective objective.

4.1 Theoretical Framework

This dissertation focuses on individuals with mental illness, particularly those who are socio-economically disadvantaged or have comorbid chronic conditions. Given the nature of the target population and the complex interaction between physical and mental health conditions, the conceptual framework that guided study objectives (Figure 4.1) and the selection of covariates for analyses was informed by: (1) the Gelberg-Andersen Behavioral Model for health services utilization among vulnerable populations, (2) conceptual models on the interaction between mental and physical illnesses,[16,94] and (3) barriers associated with mental health services use among the general population, as well as racial/ethnic minorities.[3,95–99]

The Gelberg-Andersen behavioral model expanded the Andersen's model of health care use by incorporating vulnerable domains, alongside the traditional predisposing, enabling, and need factors, that are known to influence access and use of health services among vulnerable groups.[100] This expanded model has been employed in prior research to predict and explain patterns of health care utilization among homeless individuals and those with mental health conditions.[99–101] The Andersen model, initially developed in the late 1960s, aimed to identify factors that lead to health care services use and assist the development of policies promoting equitable health care access.[102] According to the Andersen model, multiple factors can impact mental health care utilization and subsequently affect clinical and financial outcomes. Individual characteristics that influence the use of mental health services are categorized into predisposing factors, which increase the likelihood of service use but are not direct causes themselves; enabling factors, encompassing personal and community resources that either facilitate or

impede access to services; and need factors, representing functional and health problems that directly generate the necessity for services. The expanded Gelberg-Andersen model adds vulnerabilities specific to individuals with mental illnesses that have been identified as significant barriers to accessing mental health care. Examples for such vulnerabilities include receiving of public benefits (e.g., food stamps), experiencing functional and social disabilities, and English proficiency.[95,99] The model includes feedback loops that demonstrate how outcomes, in turn, affect subsequent enabling and need factors, as well as health behavior.

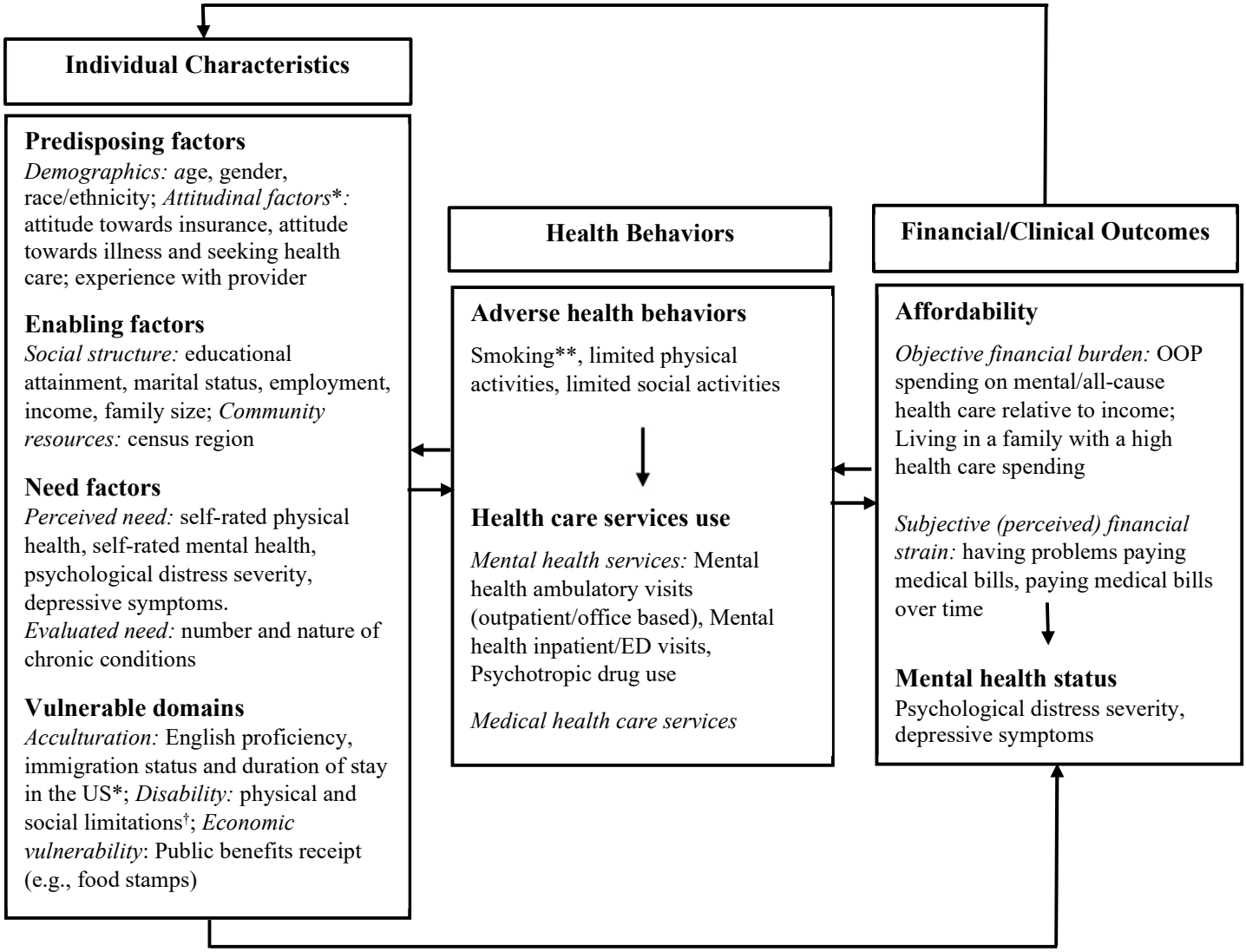

Figure 4.1. Conceptual framework for mental health services use

SOURCE Adapted from the Gelberg-Anderson Behavioral Model for health services use **NOTES** Choice of covariates for study objectives was based on the goals of each objective and extent of missing values among eligible study sample; *Variables excluded as information were not collected for some study years; **Variable excluded due to high percent of missing values; †Include social limitation, limitations performing activities of daily living or instrumental activities of daily living, difficulty performing certain physical activities like walking, climbing stairs, and bending, or limitations in work, housework, or school. Abbreviation: OOP, out-of-pocket.

4.2 Data

The data used to address the study objectives were extracted from the Medical Expenditure Panel Survey Household Component (MEPS-HC), a nationally representative survey of the US civilian non-institutionalized population sponsored by the Agency for Healthcare Research and Quality (AHRQ). Each year, the MEPS-HC samples a new panel from households that participated in the previous year's National Health Interview Survey. The selected households in each panel are interviewed five times over two years using computer-assisted personal interviews (Figure 4.2). Within each household, a single proxy respondent provides data on health care utilization, expenditure, sources of payments, health insurance coverage, health status, access to care, and socioeconomic and demographic characteristics for all household members. For each calendar year, the MEPS-HC full-year consolidated data file combines data from two consecutive overlapping panels with constructed weights to provide nationally representative annual estimates. Each MEPS-HC annual file provides a sample size of around 30,000 individuals, corresponding to approximately 15,000 household units.

MEPS-HC respondents report their physical and mental health conditions in verbatim text, which is then coded by professional coders according to the International Classification of Diseases, Ninth Revision (ICD-9) up until 2015, and Tenth Revision (ICD-10) starting in 2016. The coded conditions are available in the "Medical Conditions" files, which can be linked to the MEPS-HC and health care utilization event files. The event files include respondents' reported information on encounters with the healthcare system, such as office-based visits, outpatient visits, emergency department visits, hospital stays, and prescription medication fills. Self-reported health care events and associated costs are verified by interviewing a sample of medical providers and pharmacies with the respondents' permission. The comprehensive and reliable information on health care utilization and expenditure captured in MEPS has made it one of the most extensively used datasets in policy research to investigate the delivery and financing of health care in the United States.[103] Additionally, the reliability of self-reported data on mental health conditions[104] in MEPS and the oversampling of policy-relevant low-income subgroups[103] further support the appropriateness of using MEPS to address the research questions investigated in this dissertation. The data used relied on de-identified public use files from MEPS and are

considered exempt from review by the Institutional Review Board at the University of Wisconsin-Madison.

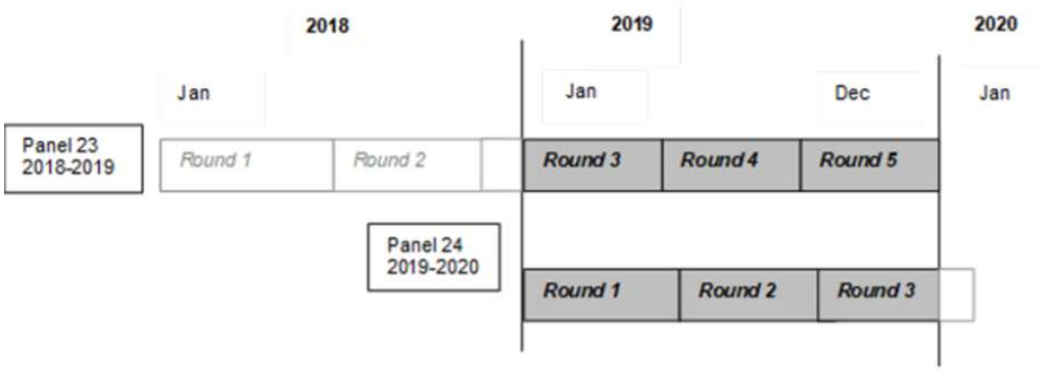

Figure 4.2. The Medical Expenditure Panel Survey overlapping panel design, 2018-19

To construct the analytic data file used to address the objectives of this dissertation, the MEPS-HC full-year consolidated files from 2011 to 2019 were linked to the Medical Conditions files and various event files, including Prescribed Medicines, Office-based Medical Provider Visits, Outpatient Visits, Hospital Inpatient Stays, and Emergency Room Visits. The events were restricted to those associated with a mental health diagnosis (*ICD-9* codes 291, 292, or 295–314; *ICD-10* codes F01-F99), offered by a mental health provider, or with a mental health-related reason. All events were aggregated at the person level for each calendar year. For each event type, four per-person variables were created to capture mental health care utilization and expenditure: an indicator flagging whether a person utilized the specific event in a given year, a count variable enumerating the annual frequency of event use (e.g., number of office-based visits), and total and out-of-pocket (OOP) costs associated with the event. Office-based and outpatient events were combined to create a measure for ambulatory mental health care utilization and spending. The analytic data file also included information on the demographic characteristics of the survey respondents, their health status, detailed insurance coverage variables, survey year, and measures for all-cause health care utilization events and associated total and OOP expenditures. Further details on the construction of the study measures and specific methods for each objective are provided in the respective methods sections in subsequent chapters.

MEPS survey weights and statistical survey commands were applied in all analyses to account for the complex survey design and to generate nationally representative estimates. Data

preparation, harmonization of study variables across years, descriptive statistics, and data visualization were performed using R for Windows (Version 4.1.3). All analytic modeling was conducted using Stata 17 (StataCorp, College Station, TX).

CHAPTER 5: TRENDS IN MENTAL HEALTHCARE ACCESS ACROSS ACA INCOME GROUPS

This study aims to analyze trends in mental health care access among the non-elderly adult population, focusing on three specific income thresholds relevant to the insurance expansion provisions of the Affordable Care Act (ACA). These income groups include individuals with income ≤ 138% of the federal poverty level (FPL), representing the income eligibility threshold for Medicaid following the ACA's Medicaid expansion; those with income ranging from 139% to 400% of the FPL, corresponding to the income range for subsidies in the ACA's health insurance Marketplaces; and those with high income exceeding 400% of the FPL, who were not affected by the ACA coverage expansion reforms during the study period.

5.1 METHODS

This study used linked cross-sectional data from the Medical Expenditure Panel Survey (MEPS) from 2011 to 2019. Section 4.2 provides a detailed description of the MEPS data and the construction of the analytic data file.

5.1.1 Analytic Sample

The final analytic sample comprised 145,438 non-elderly adults aged 18-64 (age group targeted by the ACA) surveyed between 2011 and 2019 (see flowchart for analytic sample selection, Figure 5.1). Observations were limited to respondents with a positive person weight and non-missing values on covariates, including an important confounder, the Kessler-6 (K-6) score, which is associated with both poverty level and mental health care use.[44] K6 is a validated brief scale asked as part of the self-administered questionnaire (SAQ) in MEPS and measures non-specific psychological distress.[105] It was missing for 13% of the eligible study sample, unlike complete or near complete cases on other study covariates (Appendix Table S1.1). A comparison between respondents with and without missing K6 scores reveals no notable differences in the distribution of most sociodemographic characteristics, ACA household income eligibility, or sources of insurance coverage (as shown in Appendix Table S1.2). However, respondents with a missing K6 score had a higher prevalence of mental health care use, reported more chronic conditions, and were more likely to self-identify as non-Hispanic Whites.

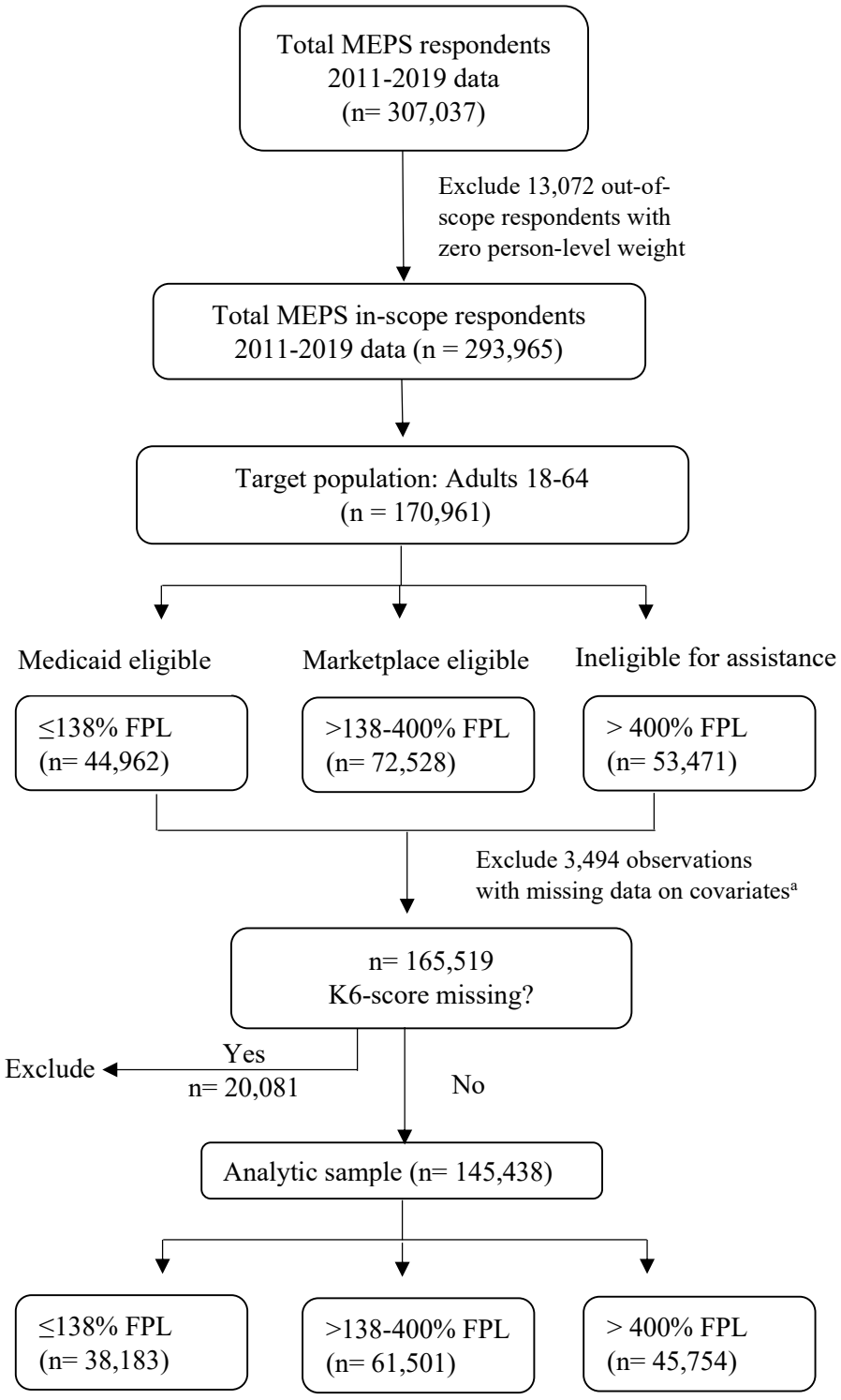

Figure 5.1. Flowchart of analytic sample selection

SOURCE The Medical Expenditure Panel Survey (MEPS) 2011-19 data. **NOTES** [a]Covariates and missing data are detailed in Appendix Table S1.1. Abbreviations: Abbreviations: K6, Kessler-6 score; FPL, Federal poverty level.

The annual MEPS data files were pooled to create three distinct periods: pre-ACA (2011-2013), early post-reform (2014-2016), and late post-reform (2016-2019). The sample was stratified based on the three income thresholds relevant to the ACA's insurance expansion eligibility: the lowest-income group eligible for Medicaid (≤ 138% FPL), the low-to-middle income group eligible for Marketplace premium subsidies (139%-400% FPL), and the high-income group ineligible for financial assistance during the study period (>400% FPL).

5.1.2 Mental Health Care Access

Mental health care access was assessed using three outcome measures: (1) the prevalence of any psychotropic medication use, (2) the prevalence of any ambulatory mental health visit, and (3) the prevalence of any mental health care encounter, defined as either an ambulatory visit or a psychotropic medication fill. Approximately 0.7% (n= 1,053) of respondents in the analytic sample had a record of an inpatient stay and/or emergency department visit associated with a mental health diagnosis. These events were excluded from the analysis because of the small number of observations.

Ambulatory mental health care visits were defined based on previous research as all office-based or outpatient hospital visits that met any of the following criteria: the main reason for the visit was psychotherapy or mental health treatment, the provider was coded as a psychiatrist, psychologist, social worker, or counselor; or a behavioral health diagnosis was associated with the visit (*ICD-9* codes 291, 292, or 295–314; *ICD-10* codes F01-F99).[106–108] These diagnostic codes encompass both mental and substance use disorders. Four classes of psychotropic medications were identified using the Multum Lexicon Classification system: (1) anxiolytics, sedatives, and hypnotics; (2) stimulants; (3) antidepressants; and (4) antipsychotics (see Appendix Table S1.3 for the Multum Lexicon's therapeutic sub-classification codes). The MEPS Prescribed Medicines files include only original prescriptions and refills purchased in outpatient settings at any pharmacy, including retail, mail order, and online. Psychotropic medications administered in an inpatient setting or outpatient clinic are not recorded in these files. Only prescription fills associated with a diagnosis of a mental health condition were included in the analysis, as some psychotropic medications have both on- and off-label uses for conditions other than mental health.

5.1.3 Statistical Analysis

The characteristics of respondents were summarized based on the ACA income eligibility groups before and after the implementation of the ACA. Additionally, changes in insurance coverage from pre- to post-ACA were examined descriptively. Self-reported monthly insurance indicators were used to assign individuals with at least 6 months of coverage into mutually exclusive groups based on the following hierarchy to account for multiple insurance sources in a year: employer-sponsored insurance, non-group insurance, other private insurance, Medicaid or dual eligible, Medicare only, and other public insurance.[44] Individuals with less than 6 months of coverage were considered "partially insured", and those lacking any source of coverage for the entire year were categorized as "uninsured".

Unadjusted trends in the three measures of mental health care access were analyzed using simple logistic regression and presented graphically. The model independent variables included indicators for the main effects of income groups and study periods, as well as their interaction (Equation 5.1). The interaction term allowed for the comparison of pre- to post-ACA trends in the Medicaid- and Marketplace-eligible groups with trends among the high-income group. The models were then adjusted for potential confounders, including age, sex, self-reported physical and mental health, severity of mental illness, marital status, race/ethnicity, educational attainment, employment status, receipt of government financial assistance (e.g., food stamps), number of chronic conditions, social or physical limitations, and residence region. The severity of mental illness was determined using the K6 summed score, categorizing respondents into three groups: no mental illness (0-4), moderate mental illness (5-12), and serious mental illness (13-24).[109,110]

The primary analysis was conducted using the entire sample of non-elderly adults (n=145,438). A secondary analysis focused on a subsample of individuals with more significant mental health care needs, defined as individuals reporting moderate to serious mental illness (K6 score >4) (n= 34,870). After estimating logistic regression models, Stata's predictive margins were used to recover the probability of mental health care outcomes, the pre-post trends in outcomes for each income group, and the disparities in trends between the Marketplace/Medicaid eligible groups and the high-income group not targeted by the ACA reforms.

Logit models will take the following generalized linear model form:

$$Pr(Y_i = 1 | Period_i, Income_i, X_i) = F(\beta_0 + \beta_1 Period_i + \beta_2 Income_i + \beta_3 Period_i * Income_i + \beta_4 X_i + \varepsilon_i) \quad (5.1)$$

Where:

F(.)	Logit link function
Y_i	Outcome for individual i
$Period_i$	a categorical variable for study periods[a] 0 (2011-2013, *pre-reform*) – *Referent* 1 (2014-2016, e*arly post-ACA*) 2 (2017-2019, *late post-ACA*)
$Income_i$	a categorical variable for income groups relevant to ACA policy reforms in relation to the federal poverty level (FPL)[a] 0 (> 400% FPL, *high income, ineligible for assistance*) – *Referent* 1 (139-400% FPL, *low-to-middle income, eligible for Marketplace subsidies)* 2 (≤ 138% FPL, *lowest income, eligible for Medicaid in expansion states*)
X_i	a vector of covariates
β_0	average Y_i for the high-income group in the pre-reform period
β_1	Δ Y_i in post-ACA period 1 (or post-ACA period 2) compared to pre-reform period for the referent high income group
β_2	Δ Y_i between Medicaid (or Marketplace-eligible) groups and the high-income group in the pre-reform period
β_3	Δ Y_i for Medicaid (or Marketplace-eligible groups) relative to the high-income (referent) group over time

[a]Indicators for levels of categorical variables were used in analyses
Standard errors were adjusted for the complex survey design and survey weights were applied to generate nationally representative estimates

5.2 RESULTS

Table 1.1 summarizes the characteristics of respondents categorized by income groups in the pre- and post-reform periods. Sociodemographic characteristics varied widely across income groups, although they remained relatively stable within each group over time. Compared to ineligible individuals for ACA financial assistance, Marketplace- and Medicaid-eligible groups were younger, less likely to be married, and had lower educational attainment. Unemployment rates were particularly high in these groups, reaching 23.3% and 57.9% in the pre-ACA period. Medicaid-eligible group had a higher proportion of females, Hispanic and Black individuals, non-English speakers, and residents of the South. Moreover, the Medicaid-eligible respondents

fared worse on all measures of health status, with approximately 40% experiencing moderate to severe mental illness (compared to 18% in the assistance-ineligible group and 27% in the Marketplace-eligible group). In the post-ACA period, the uninsured rates declined by more than one-third in the Marketplace-eligible group (from 20.8% to 13.4%) and the Medicaid-eligible group (from 35.7% to 21.8%), driven by increased non-group and Medicaid insurance coverage.

Regardless of the treatment modality, unadjusted rates of mental health care use were the highest among the Medicaid-eligible population, consistently surpassing the rates of other income groups throughout the study period (Figure 5.2 and Appendix Tables S1.4 and S1.5). On average, the crude rates of any mental health care encounter among the Medicaid-eligible group increased from 19.30% to 22.71% between the pre-ACA period (2011-13) and the late post-reform period (2017-19) (Appendix Table S1.5). During the same period, the rates for the assistance-ineligible and Marketplace-eligible groups were similar and increased from 14.56% to 17.11% and from 14.79% to 16.64%, respectively (Appendix Table S1.5). The increase in mental health care use was primarily driven by higher rates of ambulatory mental health visits following the implementation of the ACA. The rate of psychotropic medication use remained relatively stable across all groups during the study period. The unadjusted results also show that gaps in mental health care use between assistance-ineligible and ACA-targeted income appeared to be unaffected by the ACA implementation (Figure 5.2, Appendix Table S1.5).

When adjusting for potential confounders of the association between mental health care use and income-based policy eligibility, including health status covariates, the Medicaid eligible group exhibited the lowest rates of mental health care use both pre- and post-reform. For example, in the most recent years post-reform (2017-2019), 16.30% of the Medicaid-eligible group had any mental healthcare encounter, compared to 19.66% among the assistance-ineligible group (Table 5.2). Nonetheless, all three income groups experienced significantly increasing trends in having any mental health care encounter and any ambulatory mental health visits in both the early and late post-reform periods. For example, between the pre-ACA and late post-reform periods, the adjusted rates of any mental health care encounter increased by an average of 3.44 percentage points (pp) in the assistance-ineligible group, 2.30 pp in the Marketplace-eligible group, and 2.41 in the Medicaid eligible group (Table 5.2). A smaller increase in the trends of

psychotropic medication use was observed only among the assistance-ineligible and Marketplace-eligible populations (Table 5.2).

In terms of relative changes, the adjusted pre-post trends in both the Medicaid- and Marketplace-eligible groups were statistically no different from those experienced in the assistance-ineligible group. The only exception involved larger gains in ambulatory visit probabilities among the assistance-ineligible group in the late post-reform period by 3.70 pp compared to 2.19 pp and 1.97 pp in the Marketplace- and Medicaid-eligible groups, respectively (bottom panel of Table 5.2). This suggests potentially widening disparities in access to ambulatory visits for mental health care in the more recent years following the ACA. Similar but stronger patterns emerged when analyzing the subsample with high mental health care needs, as defined a priori in the analysis section (Table 5.3). The full regression output of the adjusted models for all the nonelderly population and the subsample with mental health needs is available in Appendix Table S1.6.

Table 5.1. Characteristics of non-elderly adults by ACA income eligibility

	Ineligible for assistance >400% FPL		Marketplace eligible >138-400% FPL		Medicaid eligible ≤138% FPL	
	Pre-ACA	Post-ACA	Pre-ACA	Post-ACA	Pre-ACA	Post-ACA
Sample size	15,741	30,013	24,112	37,389	15,902	22,281
US weighted population per year	67,551,501	72,034,528	70,444,607	62,061,502	33,619,722	27,414,260
Sample characteristics						
Age, mean (SD)	43.3 (13)	42.7 (13)	39.0 (12.8)	38.8 (13.2)	37.3 (13.5)	38.3 (13.6)
Age, %						
18-25	12.2	12.2	19.3	20.1	26.5	23.8
26-35	18.6	20.7	24.2	25.1	22.8	24.2
36-45	20.2	20.8	21.5	21.1	19.5	18.4
46-55	27.2	25.3	22.1	19.1	18.7	18.4
56-64	21.8	20.9	13.0	14.5	12.5	15.2
Female, %	48.9	48.9	51.3	51.4	56.6	58.1
Race/ethnicity, %						
Hispanic	8.4	10.6	19.6	22.0	25.5	24.9
Non-Hispanic White	75.2	71.2	61.1	55.9	47.5	45.9
Non-Hispanic Black	7.5	8.0	12.4	14.0	19.8	19.9
Non-Hispanic Other/mixed race	8.9	10.3	6.9	8.0	7.2	9.3
Region, %						
Northeast	20.8	19.5	16.1	14.6	15.0	15.0
Midwest	21.2	21.6	22.4	21.9	20.1	19.5
South	34.9	34.5	38.1	40.2	40.7	42.4
West	23.1	24.5	23.4	23.3	24.2	23.2
Marital status, %						
Married	66.9	64.8	50.3	47.0	30.8	28.5
Divorced/widowed/separated	10.9	10.3	17.1	16.5	23.2	23.7
Never married	22.2	25.0	32.6	36.5	46.0	47.8
Education, %						
Less than high school	3.7	4.0	12.3	12.9	27.7	26.9
High School	18.2	19.6	32.1	32.6	36.0	36.6
Some college	28.2	26.0	33.8	31.6	27.2	26.0
College or more	49.8	50.4	21.9	22.9	9.1	10.5

	Ineligible for assistance >400% FPL		Marketplace eligible >138-400% FPL		Medicaid eligible ≤138% FPL	
	Pre-ACA	Post-ACA	Pre-ACA	Post-ACA	Pre-ACA	Post-ACA
(Table 5.1. – Continued)						
Employment status, %						
Unemployed	15.9	13.3	23.3	22.4	57.9	55.5
Full-time (30+ hours)	74.4	77.3	64.5	65.5	27.9	30.1
Part-time (<30 hours)	9.8	9.4	12.2	12.0	14.2	14.4
Employer size, %						
Unemployed	15.9	13.3	23.3	22.4	57.9	55.5
Small (<50 employees)	39.5	41.2	43.5	44.9	29.5	32.1
Medium (50-99 employees)	10.7	10.4	9.5	9.4	4.4	4.5
Large (100+ employees)	33.9	35.0	23.7	23.3	8.1	8.0
Non-English interview, %	1.8	2.5	8.4	9.2	15.3	13.9
SNAP receipt, %	0.7	1.1	7.4	8.6	42.2	41.3
Number of chronic conditions, %						
None	44.2	46.4	50.1	50.4	48.2	45.4
One or two	41.2	40.4	36.2	36.0	33.4	34.0
Three or more	14.6	13.3	13.7	13.6	18.4	20.6
Self-reported physical health, %						
Excellent/very good	71.7	71.3	60.6	59.9	46.6	45.1
Good	21.9	22.5	27.3	27.7	30.2	29.9
Fair/Poor	6.4	6.2	12.1	12.4	23.2	25.0
Self-reported mental health, %						
Excellent/very good	79.6	78.8	70.8	68.5	57.4	54.1
Good	17.1	17.9	23.1	24.7	28.3	29.6
Fair/Poor	3.3	3.3	6.1	6.8	14.4	16.3
Physical or social limitations,[a] %	6.4	7.6	10.5	11.8	20.3	25.6
K6-score, %						
No mental illness (0-4)	81.9	84.3	73.2	78.0	60.5	64.7
Moderate mental illness (5-12)	15.9	14.0	21.6	18.1	27.5	25.5
Severe mental illness (13-24)	2.2	1.7	5.2	3.9	12.0	9.9
Insurance status, %						
Uninsured all year	6.2	4.0	20.8	13.4	35.7	21.8
Partial insurance (< 6 months)	1.5	1.2	4.7	4.4	6.9	6.1
ESI	83.9	83.4	58.8	56.1	14.4	12.8

	Ineligible for assistance >400% FPL		Marketplace eligible >138-400% FPL		Medicaid eligible ≤138% FPL	
	Pre-ACA	Post-ACA	Pre-ACA	Post-ACA	Pre-ACA	Post-ACA
(Table 5.1. – Continued)						
Non-group[b]	3.1	4.6	2.6	6.3	1.8	5.2
Medicaid[c]	0.7	1.8	6.1	11.2	30.7	42.7
Medicare only	0.3	0.5	1.6	1.9	3.3	3.7
Other[d]	4.3	4.5	5.5	6.7	7.3	7.8

SOURCE Author's analysis of the Medical Expenditure Panel Survey (MEPS) for the period from 2011-19. **NOTES** n =145,438 (US population 494,636,411). Means and frequencies were weighted to be representative of the noninstitutionalized US population. Pre-ACA, 2011-13; Post-ACA, 2014-19. [a]Includes social limitation, limitations performing activities of daily living or instrumental activities of daily living, difficulty performing certain physical activities like walking, climbing stairs, and bending, or limitations in work, housework, or school. [b]Includes non-group insurance obtained on and off the ACA Marketplaces. [c]Includes dual Medicaid and Medicare eligible. [d]Includes other public or private coverage. Abbreviations: ESI, employer-sponsored insurance; SNAP, Supplemental Nutrition Assistance Program (food stamps); ACA, Affordable Care Act; FPL, federal poverty level; SD, standard deviation; K6-score, Kessler-6 score.

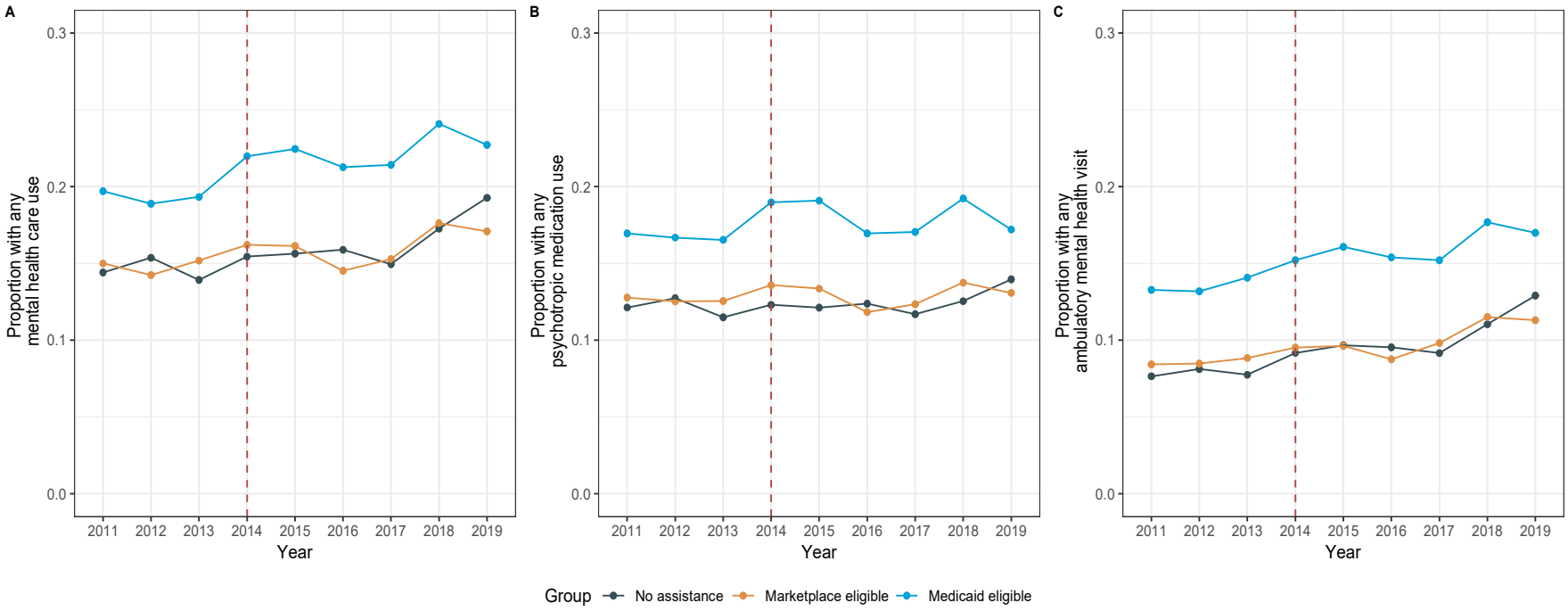

Figure 5.2. Unadjusted trends in mental health care use by ACA income eligibility

SOURCE Author's analysis of 2011-2019 data from the Medical Expenditure Panel Survey (MEPS). **NOTES** No assistance (> 400% FPL); Marketplace eligible (>138-400% FPL); Medicaid eligible (≤ 138% FPL)

Table 5.2. Adjusted trends in mental health care use by ACA income eligibility and type of service

	Any mental health care use			Any psychotropic medication use			Any mental health care ambulatory visit		
	Assistance ineligible	Marketplace eligible	Medicaid eligible	Assistance ineligible	Marketplace eligible	Medicaid eligible	Assistance ineligible	Marketplace eligible	Medicaid eligible
Pre, %	16.22*** [15.24,17.19]	14.90*** [14.07,15.74]	13.89*** [13.03,14.74]	13.62*** [12.72,14.52]	12.61*** [11.80,13.41]	11.82*** [11.01,12.64]	9.62*** [8.86,10.37]	8.78*** [8.21,9.36]	8.79*** [8.07,9.50]
Post1, %	17.79*** [16.89,18.70]	16.75*** [15.88,17.62]	15.37*** [14.39,16.36]	14.23*** [13.32,15.14]	13.86*** [13.00,14.71]	12.44*** [11.48,13.41]	11.62*** [10.84,12.40]	10.09*** [9.43,10.76]	9.90*** [9.14,10.66]
Post2, %	19.66*** [18.69,20.62]	17.20*** [16.43,17.96]	16.30*** [15.25,17.35]	15.15*** [14.20,16.11]	13.57*** [12.87,14.28]	12.24*** [11.34,13.15]	13.31*** [12.49,14.14]	10.97*** [10.36,11.57]	10.75*** [9.94,11.57]
Post1-Pre trend[a]	**1.58*** [0.28,2.87]	**1.85***** [0.89,2.81]	**1.48*** [0.28,2.69]	0.61 [-0.61,1.83]	**1.25**** [0.30,2.20]	0.62 [-0.56,1.79]	**2.01***** [0.98,3.03]	**1.31**** [0.46,2.16]	**1.11*** [0.20,2.03]
Post2-Pre trend[a]	**3.44***** [2.16,4.72]	**2.30***** [1.26,3.33]	**2.41***** [1.22,3.60]	**1.53*** [0.31,2.75]	**0.97*** [0.01,1.92]	0.42 [-0.64,1.48]	**3.70***** [2.60,4.80]	**2.19***** [1.40,2.98]	**1.97***** [1.01,2.93]
Post1-Pre trends difference[a]	[Reference]	0.27 [-1.28,1.83]	-0.09 [-1.85,1.67]	[Reference]	0.64 [-0.70,1.97]	0.01 [-1.73,1.74]	[Reference]	-0.69 [-2.11,0.72]	-0.89 [-2.27,0.49]
Post2-Pre trends difference[a]	[Reference]	-1.14 [-2.83,0.55]	-1.03 [-2.77,0.71]	[Reference]	-0.56 [-2.10,0.97]	-1.11 [-2.77,0.55]	[Reference]	**-1.51*** [-2.92,-0.10]	**-1.73*** [-3.17,-0.29]

SOURCE Author's analysis of 2011-2019 data from the Medical Expenditure Panel Survey (MEPS). **NOTES** n =145,438 (US population 494,636,411**).** [a]Percentage point. No assistance (> 400% FPL); Marketplace eligible (>138-400% FPL); Medicaid eligible (≤ 138% FPL). Pre: pre-ACA 2011-13; Post1: post-ACA 2014-16; Post2: post-ACA 2017-19. All estimates were adjusted for complex survey design. All models were adjusted for age, sex, race or ethnicity, marital status, Census region, language, educational attainment, receipt of food stamps, employment status, number of chronic conditions, self-rated physical and mental health, Kessler-6-score, and presence of physical or social limitations. 95% confidence intervals in brackets

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

Table 5.3. Adjusted trends in mental health care use by ACA income eligibility in individuals with mental health needs

	Any mental health care use			Any psychotropic medication use			Any mental health care ambulatory visit		
	Assistance ineligible	Marketplace eligible	Medicaid eligible	Assistance ineligible	Marketplace eligible	Medicaid eligible	Assistance ineligible	Marketplace eligible	Medicaid eligible
Pre, %	36.23*** [34.13,38.34]	34.32*** [32.59,36.04]	32.31*** [30.39,34.23]	31.79*** [29.82,33.75]	29.78*** [28.13,31.43]	28.74*** [26.81,30.66]	23.86*** [21.56,26.16]	22.37*** [20.83,23.91]	22.21*** [20.46,23.96]
Post1, %	40.84*** [38.45,43.23]	38.45*** [36.22,40.68]	34.45*** [32.27,36.62]	34.37*** [31.93,36.80]	33.39*** [31.11,35.67]	29.96*** [27.75,32.16]	30.71*** [28.24,33.17]	25.30*** [23.48,27.12]	24.21*** [22.20,26.21]
Post2, %	42.86*** [40.50,45.22]	38.71*** [36.64,40.79]	36.11*** [33.65,38.57]	34.16*** [31.68,36.65]	31.44*** [29.47,33.42]	29.53*** [27.34,31.71]	32.26*** [30.16,34.36]	27.26*** [25.39,29.13]	25.52*** [23.41,27.63]
Post1-Pre trend[a]	**4.60**** [1.82,7.38]	**4.14**** [1.48,6.79]	2.14 [-0.42,4.69]	2.58 [-0.30,5.45]	**3.61**** [0.88,6.33]	1.22 [-1.48,3.93]	**6.84***** [3.82,9.86]	**2.93*** [0.66,5.20]	2.00 [-0.27,4.26]
Post2-Pre trend[a]	**6.62***** [3.71,9.53]	**4.40***** [1.78,7.01]	**3.80**** [1.06,6.54]	2.37 [-0.62,5.37]	1.66 [-0.81,4.13]	0.79 [-1.79,3.38]	**8.40***** [5.35,11.45]	**4.89***** [2.53,7.25]	**3.31*** [0.76,5.86]
Post1-Pre trends difference[a]	[Reference]	-0.47 [-4.03,3.10]	-2.47 [-6.26,1.33]	[Reference]	1.03 [-2.60,4.66]	-1.36 [-5.38,2.67]	[Reference]	**-3.92*** [-7.62,-0.21]	**-4.85*** [-8.55,-1.14]
Post2-Pre trends difference[a]	[Reference]	-2.22 [-6.22,1.77]	-2.82 [-6.55,0.90]	[Reference]	-0.71 [-4.63,3.20]	-1.58 [-5.36,2.20]	[Reference]	-3.51 [-7.41,0.39]	**-5.09*** [-8.97,-1.21]

SOURCE Author's analysis of 2011-2019 data from the Medical Expenditure Panel Survey (MEPS). **NOTES** n = 34,870 (US population 113,616,336). [a]Percentage point. No assistance (> 400% FPL); Marketplace eligible (>138-400% FPL); Medicaid eligible (≤ 138% FPL). Pre: pre-ACA 2011-13; Post1: post-ACA 2014-16; Post2: post-ACA 2017-19; Mental health needs: K6 score >4. All estimates were adjusted for complex survey design. All models were adjusted for age, sex, race or ethnicity, marital status, Census region, language, educational attainment, receipt of food stamps, employment status, number of chronic conditions, self-rated physical and mental health, Kessler-6-score, and presence of physical or social limitations.
95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5.3 DISCUSSION

This study analyzed trends in mental health care access, focusing on income strata targeted by the ACA policy provisions. We hypothesized that there would be greater pre- to post-ACA increases in the rate of mental health care use among income groups eligible for Medicaid expansion and Marketplace subsidies compared to the high-income group ineligible for financial assistance. This is based on the higher mental health needs of the low- and middle-income groups and the anticipated improvement in access to affordable mental health care following ACA insurance expansion and behavioral health reforms. Our findings reveal short- and long-term improvements in mental health care use across all income groups following the implementation of the ACA in 2014, particularly in the rate of mental health ambulatory visits. These findings align with previous research demonstrating improvements in health care access among individuals with mental health needs in Medicaid-expansion states compared to non-expansion states.[52,111] Limited evidence, however, exists on mental health care access in the ACA Marketplace and findings in this area have been mixed. Despite the availability of subsidies and improved mental health benefits in non-group plans to comply with mental health parity, individuals with mental health needs in the ACA Marketplace still report higher financial strain when seeking mental or specialty care compared to those with employer-sponsored insurance (ESI) or Medicaid[72] (see section 2.4 for a summary of empirical research of the ACA's impact on mental health care coverage, access, and outcomes in the decade following its implementation).

The study findings also hint at a late divergence in trends of ambulatory mental health visits between the reform-targeted income groups and the assistance-ineligible group, signaling potentially widening disparities that are especially pronounced among individuals with moderate to severe mental illness. Previous research has shown that the ACA has substantially narrowed socioeconomic disparities with respect to insurance coverage, delayed or foregone care due to cost, and the presence of a usual source of care.[89,112,113] However, our findings suggest that these improvements may not have extended to mental health care, which is consistent with the access to care barriers reported by individuals with mental health needs. For example, analysis of 2014-17 data from the National Health Interview Survey found that Medicaid and Marketplace enrollees with moderate to severe psychological distress were likely to face difficulties in

connecting with the health care system, such as finding a provider, being turned down as a new patient, or experiencing provider refusals due to their insurance type.[72] These findings suggest that barriers beyond insurance coverage might impede Medicaid and Marketplace enrollees from seeking mental health care. One such barrier is the lower acceptance of Medicaid patients by providers, especially psychiatrists, due to low Medicaid reimbursement rates coupled with delayed reimbursement and administrative burden.[114,115] Moreover, mental health providers offices are more likely to be located in affluent urban neighborhoods making them geographically inaccessible to low-income high-need patients who rely more on outpatient facilities.[116]

One specific structural barrier to mental health care access in the non-group market is the narrow and tiered networks associated with low-premium plans, especially for mental health providers.[45,117–119] Consumers often make decisions based on premiums when selecting plans in the Marketplace and might not be fully aware of the network size.[120] This can lead them to enroll in plans that do not adequately meet their mental health care needs, resulting in financial strain when seeking out-of-network providers or causing them to forgo mental health treatment. Small provider network Marketplace plans also have a disproportionately higher enrollment of Hispanics and low-income individuals, which further limits access to needed care among these vulnerable groups.[121]

The widening disparities in mental health ambulatory visits observed in the late post-reform period (2017-19), especially among those with mental health needs, coincide with ACA policy changes during the Trump administration, which might signify challenges in accessing mental health ambulatory care that warrant further investigation. However, the cross-sectional design of the study and the limited mixed empirical evidence of the effect of changes during this period make it difficult to establish a causal link between specific policy changes and the observed disparities.[88–90]

A secondary finding of the analysis shows that the lowest income group eligible for Medicaid had the highest crude rates of mental health care use across all services. However, the adjusted rates among this group were the lowest compared with the other income groups. Unadjusted levels reflect the wide sociodemographic variability between income groups and the poorer health status of lower income groups rather than indicating better access to care. This

highlights the importance of controlling for health care needs and sociodemographic characteristics when comparing health care use or expenditure among different income groups or insurance types.[122]

5.3.1 Study Limitations

This study has several important limitations. The study results are descriptive and should not be interpreted as a causal effect of the ACA on mental health care access due to the wide variability between income groups and the inability to exclude other concurrent events that might have disproportionately affected mental health care access across income groups. Additionally, the findings are generalizable only to the non-institutionalized population. The MEPS does not capture information on homeless or institutionalized individuals (e.g., in nursing homes), a population known to have a high prevalence of serious mental illness.[123,124] Nonetheless, our findings contribute to the literature on changes in mental health care access in the post-ACA era.

5.3.2 Conclusions and Implications for Policy and Research

Overall, this study highlights an increase in mental health care use, primarily through ambulatory visits, among low- and middle-income non-elderly adults following ACA policy reforms. However, disparities in access to mental health care appear to persist or worsen compared with individuals with high incomes, especially among those with mental health needs. Given that Medicaid is the largest payor for mental health services, Medicaid expansion in states that have not expanded eligibility can increase insurance coverage and facilitate access to needed care among low-income individuals. Nonetheless, addressing structural barriers that limit access on the provider side and ensuring network adequacy of Marketplace plans are important to fully achieve the intended gains of the ACA reforms.

The scarcity of evidence regarding the impact of ACA's Marketplace subsidies and behavioral non-group market reforms on mental health care access motivated the second objective of this dissertation, which is discussed in Chapter 6. The third objective, covered in Chapter 7, delves into the subpopulation of non-elderly adults with mental health needs in the post-reform period to better understand the financial burden they experience, which can impede their ability to seek needed care.

CHAPTER 6: IMPACT OF THE ACA ON MENTAL HEALTH CARE ACCESS, EXPENDITURE, AND AFFORDABILITY IN THE NON-GROUP MARKET

The objective of this study is to assess the impact of the Affordable Care Act (ACA) on access to mental health care, expenditure patterns, and affordability of mental health services in the non-group market. Specifically, the analysis focuses on the impact of the ACA's Marketplace insurance coverage expansion and behavioral health reforms during two distinct periods: the first three years post-reform (2014-2016) and the subsequent period of the Trump administration (2017-2019).

6.1 METHODS

This study used linked cross-sectional data from the Medical Expenditure Panel Survey (MEPS) from 2011 to 2019. Section 4.2 provides a detailed description of the MEPS data and the construction of the analytic data file.

6.1.1 Study Design and Analytic Sample

The analysis employed a difference-in-differences (DID) design to evaluate the combined effects of the ACA's subsidized Marketplace coverage expansion and behavioral health reforms on mental health care access, expenditure, and affordability within the non-group market. The ACA implemented multiple behavioral health reforms aimed at impacting mental health care in the non-group market, including expanding mental health parity to non-group plans (previously exclusive to group plans), eliminating medical underwriting, and recognizing mental health as an essential benefit.

The DID design estimates the policy effect by examining the change (pre-post) in outcomes among a treatment group exposed to the policy, net of changes in the control groups unaffected by the policy. For this study, the treatment group comprised non-elderly adults aged 18-64, with household income ranging from 139% to 400% of the FPL, who had no or partial group health insurance and no public insurance throughout the year. These inclusion criteria and income threshold qualified individuals in the treatment group for subsidized plans in the health insurance Marketplace. Additionally, cost-sharing reduction subsidies were applied to the subset

of the treatment group with an income up to 250% of the FPL. The inclusion of individuals with partial group insurance in the treatment group enabled capturing those who became eligible to purchase Marketplace plans for part of the year after losing employment benefits.

The control group consisted of individuals within the same age and income ranges who maintained stable employer-sponsored insurance (ESI) coverage throughout the year. This approach is similar to a quasi-experimental study conducted by Goldman and colleagues, who estimated the early impact of the ACA's Marketplace on insurance coverage and access to care using longitudinal survey data from the MEPS.[125] However, longitudinal data have limitations in terms of sample size and only allow for evaluating the first year of the Marketplace, as data are collected from a panel over a period of two years. Given the focus of this study on mental health care use, which represents a small fraction of the target population, we relied on annual data files to assess the long-term effect of the ACA and ensure a sufficient sample size for analysis.

An ideal control group does not exist, given the nationwide implementation of health insurance Marketplaces at the same time. However, the selected control group approximates a counterfactual of what would have happened to the treatment group in the absence of the policy by accounting for secular trends in outcomes due to changes in the economy or behavioral health demand. Our selection of the control group was supported by previous research that showed a minimal effect of the ACA on individuals with ESI.[126–128] Moreover, ESI plans typically covered mental health services before the ACA,[129] and these benefits were subject to parity under the Mental Health Parity and Addiction Equity Act (MHPAEA) that went into full effect in 2010.[10] In contrast, mental health benefits in the individual market were limited and not subject to parity before the ACA's individual market reforms enacted in January 2014. Furthermore, prevalent medical underwriting practices in the individual market prior to the ACA made it challenging for individuals with pre-existing behavioral health conditions to find plans that met their needs. Many of them were likely denied coverage or charged higher premiums, which was reflected in the lower utilization of mental health services among individual market beneficiaries compared to those with ESI before the ACA.[11]

A pre-treatment period was defined as the period from 2011 to 2013, which preceded the establishment of the health insurance Marketplaces and the enactment of individual market

reforms that took effect in January 2014. Two post-treatment periods, early post-reform (2014-2016) and late post-reform (2017-2019), were constructed to capture the early effects of the ACA on study outcomes and the effects associated with the instability introduced in the individual market during the Trump administration. Years before 2011 were excluded to avoid confounding associated with two major events that could have differentially affected mental health care utilization among ESI and non-group privately insured individuals in the pre-period. The first event was the Great Recession, which was associated with poor mental well-being,[130] and an increased mental health services use and expenditure among individuals who retained access to ESI during this period.[131,132] The second event was the change in mental health benefits structure and/or dropping of mental health coverage limits by firms with 50+ employees in 2010 following the enactment of the MHPAEA.[133]

The flowchart in Figure 6.1 outlines the selection of the analytic sample for this objective. The final analytic sample included 55,918 respondents aged 18 to 64 years with no public insurance at any time during the year and income ranging from 139-400% of the FPL. This sample corresponds to 60,302,922 non-institutionalized US population. Of these respondents, 30,983 had stable ESI coverage for 12 months (control group), while 25,287 had income ranges that made them eligible for Marketplace plans (treatment group). Most individuals in the Marketplace-eligible group had no ESI coverage for the entire year (76.1%), whereas smaller proportions were covered by ESI for 1-5 months (8.7%) or 6-11 months (15.2%). Observations were restricted to respondents with positive person weight who were in-scope of the survey for the entire year and had complete data on study covariates. Missing values for covariates ranged from 0% to less than 1% of the eligible study sample (see Table S2.1).

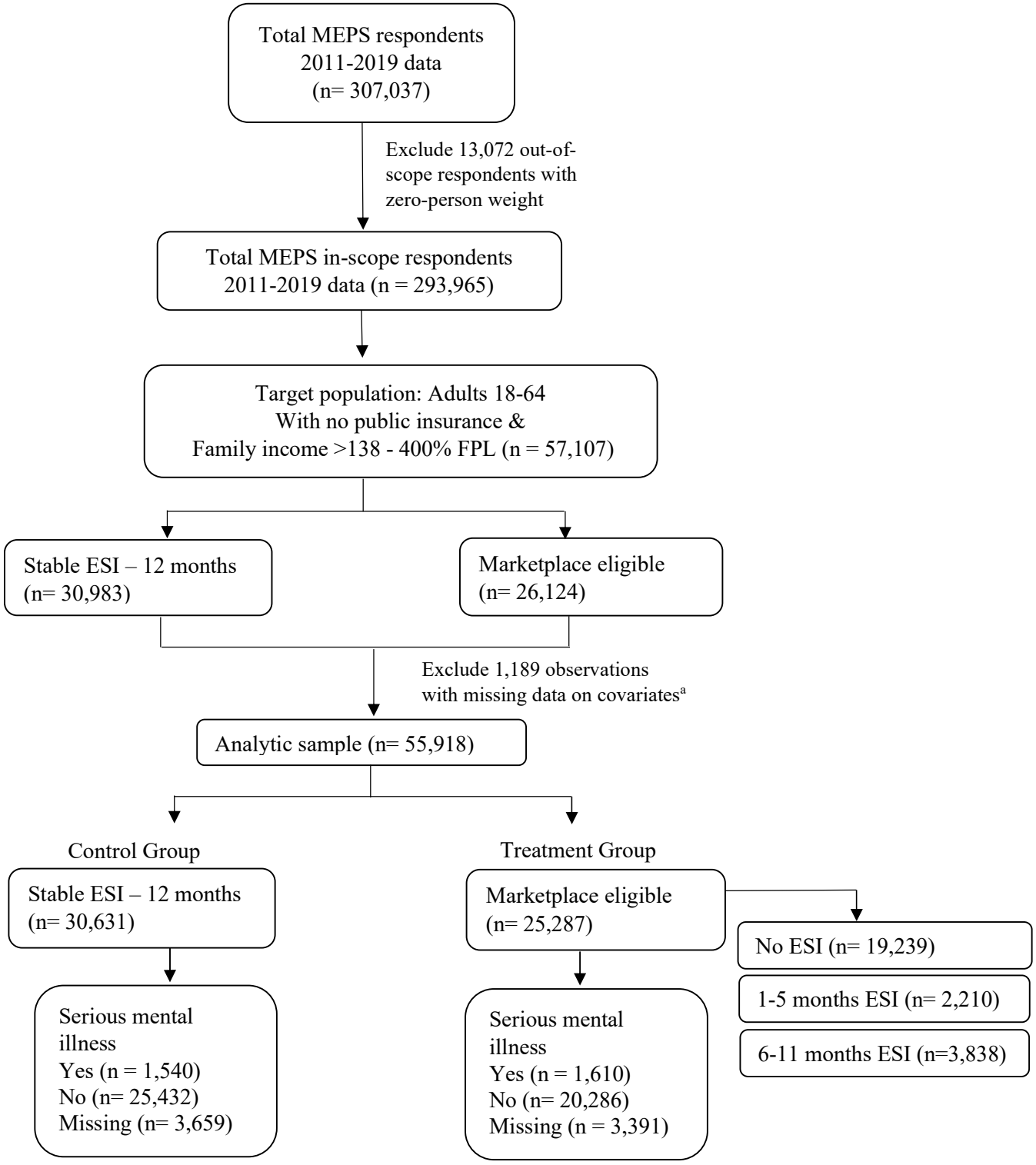

Figure 6.1. Flowchart of analytic sample selection

SOURCE The Medical Expenditure Panel Survey (MEPS) 2011-19 data. **NOTES** [a]Covariates and missing data are detailed in Appendix Table S2.1. Serious mental illness, Kessler-6 score 13-24. Abbreviations: ESI, Employer-sponsored insurance; FPL, Federal poverty level.

6.1.2 Mental Health Care Access, Expenditure, and Affordability

Mental health care access was examined separately for mental health-related ambulatory visits and psychotropic medication fills. For each outcome, the analysis investigated the annual probability of utilization (having at least one visit or fill), as well as the level of use (average number of visits or fills). Additionally, a global access measure "any mental health care use" was defined as any encounter of an ambulatory visit or psychotropic medication fill. Inpatient stays and emergency department visits associated with a mental health diagnosis were excluded from the analysis because of their small number in the analytic sample (n = 232, 0.45% of the population) and the associated high cost.

Ambulatory mental health visits were defined based on previous research as all office-based or outpatient hospital visits that met any of the following criteria: the main reason for the visit was psychotherapy or mental health treatment; the provider was coded as a psychiatrist, psychologist, social worker, or counselor; or a behavioral health diagnosis was associated with the visit (*ICD-9* codes 291, 292, or 295–314; *ICD-10* codes F01-F99).[106–108] These codes encompass both mental disorders and substance use disorders. Four classes of psychotropic medications were identified using the Multum Lexicon Classification system: (1) anxiolytics, sedatives, and hypnotics; (2) stimulants; (3) antidepressants; and (4) antipsychotics (see Appendix Table S1.3 for therapeutic sub-classification codes). Only prescription fills associated with a diagnosis of a mental health condition were included, as some psychotropic medications have both on- and off-label uses for conditions other than mental health.

Expenditure outcomes included total expenditure on any mental health care use (i.e., the combined total expenditure on psychotropic prescriptions and ambulatory mental health visits) and expenditure stratified by type of service. Total expenditure represents the sum of out-of-pocket (OOP) payments made by the patient and payments made by third-party payers, including all insurance plans reported. Affordability was assessed by examining the absolute dollar amount paid OOP by the patient, which included co-payments, co-insurance, deductible payments if not met, expenses for uncovered services, and the amount paid by patients who bypassed their insurance or lacked coverage. The MEPS lists OOP payments as a single amount without detailed specifications and this amount does not include health insurance premiums. To account for inflation, monetary

values were adjusted to 2019 US dollars using the Consumer Price Index for Medical Care (CPI-M).[134]

6.1.3 Statistical Analysis

Health care use and expenditure, as in the case of mental health care outcomes in this study, tend to be severely right skewed, with a large mass of zeros driven by many individuals reporting no usage or expenses and a small number of individuals incurring very high use and cost. Only 12.7% of respondents in the analytic sample reported at least one mental health care encounter. The highly skewed distribution of mental health ambulatory visits, psychotropic medication fills, and mental health care expenditure is illustrated in Appendix Figures S2.1-S2.6.

To appropriately address this distribution, two-part regression models were employed to model mental health care use and expenditure, following recommended econometric practices.[135,136] In the first part, a logit model estimated the probability of having at least one utilization event or positive (non-zero) spending. Simultaneously, in the second part, a generalized linear model (GLM) with a log link function and a gamma family was fitted to the subset of the sample with a positive outcome, enabling the estimation of the average level of use and spending among users. The estimates from both parts were combined to provide overall marginal average use or spending for the entire population. Two-part models also permit the identification of whether the policy affects the extensive margin (i.e., probability of use or spending estimated using logit models), intensive margin (i.e., the level of use or spending estimated using GLM models), or both.[135,136] This distinction is particularly of interest to the research question under investigation to better understand the impact of the ACA on mental health care in the non-group market.

All modes included indicators for the treatment, post-ACA period 1 (2014-16), and post-ACA period 2 (2017-19). The interaction terms between the treatment indicator and the indicators for each period represent the DID coefficients of interest, which estimate the early and long-term ACA effects on the study outcomes (as described in equation 6.1). Drawing on the theoretical framework presented in Section 4.1, the models were adjusted for variables likely to predict mental health service use as well as eligibility for ACA policy changes. These covariates included age, sex, race or ethnicity, marital status, census region, language, educational attainment, employment status, number of chronic conditions, self-rated physical and mental health, presence of physical or

social limitations, employment status, and family income relative to the poverty level. The two-part models employ the same set of covariates in both parts.

The interpretation of interaction terms, as in the case of difference-in-differences coefficients, using non-linear models is complex.[137,138] To appropriately measure the policy effect, we used Stata's margins to recover the average treatment effect on the treated (ATT) after estimating the nonlinear logit, GLM, and two-part models, as recommended by Deb and Norton.[136] Theoretically, the ATT is the difference between the expected value of the outcome variable in the treatment group (Marketplace eligible) in the post period and the counterfactual expected value of the outcome in the treatment group if they have not received the treatment. In the sample, we estimated this counterfactual from the pre-post changes in the control group (stable ESI).

DID two-part non-linear models take the following form:

$$Y_{it} = F(\beta_0 + \beta_1 Treat_i + \beta_2 PostACA1_i + \boldsymbol{\beta_3\, Treat_i * PostACA1_i} + \beta_4 PostACA2_i + \boldsymbol{\beta_5\, Treat_i * PostACA2_i} + \beta 6 X_i + \varepsilon_i) \quad (6.1)$$

Where:

F(.)	GLM link function (logit for probability of nonzero outcomes – binomial distribution; log for count/continuous outcomes – gamma distribution)
Y_i	Outcome for individual i
$Treat_i$	a dummy variable for treatment exposure (subsidized Marketplace plans and non-group market regulations) 0 (stable ESI insurance) – Control group 1 (Marketplace eligible) – Treatment group
$PostACA1_i$	a dummy variable for early post-reform period 0 (2011-2013) – Referent pre-reform 1 (2014-2016)
$PostACA2_i$	a dummy variable for late post-ACA period 0 (2011-2013) – Referent pre-reform 1 (2017-2019)
X_i	a vector of covariates
β_0	average Y_i for the control group in the pre-reform period
β_1	Δ Y_i between treatment and control groups in the pre-reform period
β_2	Δ Y_i between the pre-reform period and early post-reform for the control group
β_3	**DID estimate of the policy effects in early post-reform period**
β_4	Δ Y_i between the pre-reform period and late post-reform period for the control group
β_5	**DID estimate of the policy effect in late post-reform period**

Standard errors were adjusted for the complex survey design and survey weights were applied to generate nationally representative estimates

Less than 0.5% of the observations had extreme values for ambulatory visits, psychotropic medication fills, and mental health care spending. To prevent outliers from unduly influencing regression estimates and to avoid deleting potentially valid observations, extreme values were top-coded at the 99.6^{th} – 99.9^{th} percentiles, as illustrated in Appendix Figures S2.1-S2.6. This approach is consistent with previous research that estimated health care utilization and expenditure using MEPS, applying similar top-coding procedures.[136,139]

6.2 RESULTS

The characteristics of the treatment and control groups in the periods before and after the implementation of the ACA's major provisions are presented in Table 6.1. Compared to beneficiaries with stable ESI coverage, Marketplace-eligible individuals (treatment group) were younger, more likely to be male, Hispanic, never married, unemployed or employed in small firms, resided in the South, and had lower income and education levels. Self-reported physical and mental health and the presence of physical or social limitations were similar in both groups. However, the Marketplace-eligible group reported fewer chronic conditions. The sample composition of each group remained relatively stable throughout the study period and the observed changes were comparable across the control and treatment groups. The uninsured rate dropped by 25% (from 58.1% to 43.4%) in the treatment group in the post-ACA period, with 16.7% of Marketplace-eligible individuals gaining insurance through the ACA Marketplace. However, 43.4% still reported a lack of insurance coverage throughout the year (Table 6.1).

Table 6.2 and Figures 6.2-6.4 display the unadjusted trends in study outcomes by treatment status. The control group consistently exhibited higher rates of mental health care use compared to the treatment group throughout the study period (Figure 6.2A). A similar pattern was observed when trends were broken down by type of service, including any psychotropic medication fill and any mental health ambulatory visit (Figures 6.3A, 6.3B). The gap in the probability of use between the two groups, however, narrowed in the post-ACA periods, especially for the rate of ambulatory visits (Figure 6.3B).

Conversely, among those who reported some mental health care spending, the average total expenditure on mental health services increased in the treatment group, exceeding that of the control group, starting in 2014, when the ACA major reforms went into effect (Figure 6.2B, Table

6.2). Ambulatory visits accounted for the largest share of mental health care expenditure in both groups, exceeding the expenses associated with psychotropic medications (Table 6.2). Between the pre-ACA (2011-13) and the second post-reform periods (2017-19), the average number of ambulatory visits, among individuals seeking ambulatory mental health care, increased from 5.9 to 6.3 visits in the control group, while in the treatment group, it rose from 5.6 to 8.3 visits (Table 6.2). Out-of-pocket spending was generally stable across both groups during the study period, although the treatment group experienced spikes in 2014 and 2019 (Figure 6.2C).

On average, mental health care use and expenditure steadily increased over the two post-reform periods in the treatment group, while the control group exhibited a declining trend in post-period 1 (2014-2016) followed by an upward trend in post-period 2 (2017-2019) (Table 6.2). For example, in the pre-ACA period, 14.2% of the control group members reported at least one mental health care encounter, with an average total cost of $1,300. This percentage declined to 13.7% ($859) in post-period 1 and then increased to 14.6% ($1,160) in post-period 2. In contrast, during the same time frames, the treatment group demonstrated a steady increase in utilization rates and average costs, from 10.0% ($977) to 10.8% ($1,131) to 11.3% ($1,477) (Table 6.2).

Tables 6.3-6.5 display the adjusted pre-post changes and difference-in-differences (DID) estimates of the treatment effect on utilization and expenditure outcomes. The full list of linear coefficients for the two-part models can be found in Appendix Table S2.2.

ACA's impact on the extensive margin (i.e., probability of any mental health services use/spending). Table 6.3 shows that the rates for mental health care outcomes remained stable during post-period 1 compared to the pre-ACA period. However, a modest increase was observed in post-period 2, particularly in the probability of ambulatory mental health visits, which increased in the treatment group by 1.62 percentage points (pp) and in the control group by 0.99 pp compared to the pre-ACA period. On net, DID estimates indicate no significant effect of the ACA policy changes on the probability of any encounter of mental health care use (DID2 = 0.35 pp, 95% CI = -1.34, 2.03), any psychotropic medication fill (DID2 = 0.18 pp, 95% CI = -1.34, 1.69), or any ambulatory mental health visit (DID2 = 0.63 pp, 95%CI = -0.83, 2.09) (Table 6.3, bottom panel). Consequently, the probability of incurring any spending (Table 6.4) followed similar trends.

ACA's impact on the intensive margin (i.e., level of mental health services use/spending among the subpopulation with non-zero values). Table 6.3 shows that the levels of mental health service use remained stable during post-period 1 compared to the pre-ACA period. However, in post-period 2, individuals in the treatment group experienced an increase of 2.34 ambulatory mental health visits compared to the pre-period, while no change was observed in the control group. On net, the DID estimate in post-period 2 (2017-19) shows that ACA policy changes were associated with a sizeable increase of 1.64 (95% CI, -0.61, 3.89) ambulatory mental health visits, although this increase was not statistically significant (Table 6.3, bottom panel).

For spending outcomes (Tables 6.4, 6.5), compared to the pre-ACA period, both ambulatory and total mental health care spending declined in the control group in post-period 1, while they increased in the treatment group during post-period 2. On net, DID estimates show that policy changes were associated with increased total spending of $567.98 (95% CI, 197.89, 938.16) in 2011-13 and $569.12 (95% CI, 152.15, 986.08) in 2017-19 (Table 6.5). The increased total spending was not associated with a change in patients' OOP costs (DID1 = $88.63, 95% CI, -30.51, 207.76; DD2 = $56.93, 95% CI -72.79, 186.65) (Table 6.5). The increase in total mental health care spending was driven primarily by spending on ambulatory visits that increased by $762.19 (95% CI, 384.74, 1139.64) and $758.07 (95% CI, 288.38, 1227.75) in post-periods 1 and 2, respectively (Table 6.4).

Overall population average effect of the ACA on mental health service use. The joint marginal treatment effects of the logit and GLM models on the target population (not conditional on non-zero use/spending) are presented in the overall columns of Tables 6.3-6.5. At the population level, the DID estimates show no significant change in mental health care use or OOP mental health care spending. There was a very small increase in the average total spending on ambulatory mental health care by $53.22 per person (95% CI, 27.37, 79.07) in post-period 1 and $56.14 per person (95% CI, 19.51,92.76) in post-period 2 (Table 6.4).

Table 6.1. Characteristics of stable employer-sponsored and Marketplace-eligible beneficiaries, 2011-19

	Stable ESI (Control group)		Marketplace eligible (Treatment group)	
	Pre-ACA 2011-13	Post-ACA 2014-19	Pre-ACA 2011-13	Post-ACA 2014-19
Sample size	11,710	18,921	10,685	14,602
US weighted population per year	37,991,584	34,000,966	28,205,798	23,354,726
Sample characteristics				
Age, mean (SD)	40.4 (12.3)	39.8 (12.5)	36.9 (12.9)	37.2 (13.3)
Age, %				
18-25	14.0	15.1	25.8	26.5
26-35	24.0	25.8	25.3	24.3
36-45	24.6	24.0	19.1	19.2
46-55	23.9	21.1	19.3	17.3
56-64	13.5	14.0	10.5	12.7
Female, %	53.0	52.2	45.4	45.2
Race/ethnicity, %				
Hispanic	14.5	17.7	26.7	29.4
Non-Hispanic White	66.5	60.4	55.1	50.2
Non-Hispanic Black	12.1	13.7	11.2	12.6
Non-Hispanic Other	6.9	8.2	7.0	7.8
Region, %				
Northeast	17.1	15.2	12.7	12.1
Midwest	25.5	24.2	19.2	18.8
South	35.7	38.8	42.0	47.5
West	21.8	21.8	26.0	21.6
Marital Status, %				
Married	58.1	55.4	41.6	39.9
Divorced/widowed/separated	16.0	14.7	16.8	16.0
Never married	25.9	29.9	41.6	44.1
Education				
Less than high school	7.7	8.7	16.6	17.6
High School	30.9	31.4	32.4	33.1
Some college	34.6	32.0	33.3	29.7
College or more	26.8	27.9	17.6	19.6
Employment status, %				
Unemployed	14.4	13.3	24.3	22.4
Full-time (30+ hours)	76.8	78.7	59.6	63.4
Part-time (<30 hours)	8.8	8.0	16.0	14.2

	Stable ESI (Control group)		Marketplace eligible (Treatment group)	
	Pre-ACA 2011-13	Post-ACA 2014-19	Pre-ACA 2011-13	Post-ACA 2014-19
(Table 6.1-Continued)				
Employer size, %				
Unemployed	14.4	13.3	24.3	22.4
Small (<50 employees)	39.3	39.6	53.6	56.2
Medium (50-99 employees)	11.8	12.5	7.8	7.1
Large (100+ employees)	34.6	34.6	14.3	14.3
Family income relative to FPL, %				
139-250% FPL	35.3	32.6	57.9	54.0
251-400% FPL	64.7	67.4	42.1	46.0
Non-English interview	4.3	6.0	14.8	15.0
Number of chronic conditions, %				
None	47.5	49.8	59.5	58.7
One or two	39.0	38.1	32.2	31.9
Three or more	13.5	12.1	8.3	9.4
Perceived physical health, %				
Excellent/Very good	63.7	63.2	62.2	62.5
Good	27.1	27.7	26.9	27.3
Fair/Poor	9.2	9.1	10.9	10.3
Perceived mental health, %				
Excellent/Very good	73.8	72.7	72.3	70.2
Good	22.1	23.4	22.8	24.2
Fair/Poor	4.1	3.8	4.9	5.6
Physical or social limitations, %	7.2	6.7	6.6	7.6
Health insurance, %				
Uninsured all year	—[a]	—[a]	58.1	43.4
Any private insurance	100	100	41.9	56.6
Any employer-sponsored insurance (ESI)	100	100	26.4	27.8
ESI 1-5 months	—[a]	—[a]	9.6	9.5
ESI 6-11 months	—[a]	—[a]	16.8	18.3
Any Marketplace insurance	—[a]	0.1	—[a]	16.7
Any non-group insurance	0.3	0.3	8.2	5.2

SOURCE Author's analysis of the Medical Expenditure Panel Survey (MEPS) for the period from 2011-19. **NOTES** Analytic sample was restricted to adults 18-64, with no public insurance at any time of the year, and incomes above 138% and up to 400% of the federal poverty level. Members of the control group had stable employer-sponsored insurance coverage for the entire year. Members of the treatment group were uninsured the entire year, had partial employer-sponsored private insurance, or a non-group private insurance. Means and frequencies were weighted to be representative of the noninstitutionalized US population. Abbreviations: ESI, employer-sponsored insurance; ACA, Affordable Care Act; FPL, federal poverty level; SD, standard deviation. [a]Not applicable

Table 6.2. Unadjusted estimates of mental health care use and expenditure by study periods

	Stable ESI (Control group)			Marketplace-eligible (Treatment group)		
	Pre-ACA 2011-13	Post-ACA1 2014-16	PostACA2 2017-19	Pre-ACA 2011-13	Post-ACA1 2014-16	PostACA2 2017-19
Sample size	11,710	10,463	8,458	10,685	8,659	5,943
US weighted population per year	37,991,584	34,435,563	33,566,369	28,205,798	24,728,027	21,981,426
Mental health care use						
Any mental health care use, %	14.2	13.7	14.6	10.0	10.8	11.3
Any psychotropic medication fill, %	12.2	11.5	11.5	8.2	8.7	8.4
Psychotropic medication fills (if 1+), mean (SD)	7.9 (6.9)	7.7 (6.9)	7.3 (6.6)	7.4 (6.6)	8.1 (7.6)	8.0 (7.5)
Any ambulatory mental health care visit, %	7.7	7.4	8.7	5.5	6.4	7.4
Ambulatory mental health visits (if 1+), mean (SD)	5.9 (8.8)	5.3 (9)	6.3 (9.8)	5.6 (9.1)	6.5 (9.3)	8.3 (12.3)
Mental health care expenditure (if >$0), mean (SD)						
Total mental health care expenditure	1,300 (2,535)	895 (1,861)	1,160 (2,604)	977 (2,077)	1,131 (2,245)	1,477 (3,347)
Out-of-pocket mental health care expenditure	289 (540)	230 (607)	249 (578)	393 (798)	456 (1,106)	482 (1,308)
Total expenditure on psychotropic medications	770 (1,639)	619 (1,606)	683 (1,906)	592 (1,168)	652 (1,673)	602 (1,770)
Total expenditure on mental health ambulatory visits	1,165 (2,285)	703 (1194)	1,011 (1,888)	878 (1,798)	1,036 (1,738)	1,493 (2,889)

SOURCE Author's analysis of the Medical Expenditure Panel Survey (MEPS) for the period from 2011-19. **NOTES** Analytic sample was restricted to adults 18-64, with no public insurance at any time of the year, and incomes above 138% and up to 400% of the federal poverty level. Members of the control group had stable employer-sponsored insurance coverage for the entire year. Members of the treatment group were uninsured the entire year, had partial employer-sponsored private insurance, or a non-group private insurance. Means and frequencies were weighted to be representative of the noninstitutionalized US population. All monetary values are in 2019 US dollars. Abbreviations: ESI, employer-sponsored insurance; ACA, Affordable Care Act; SD, standard deviation.

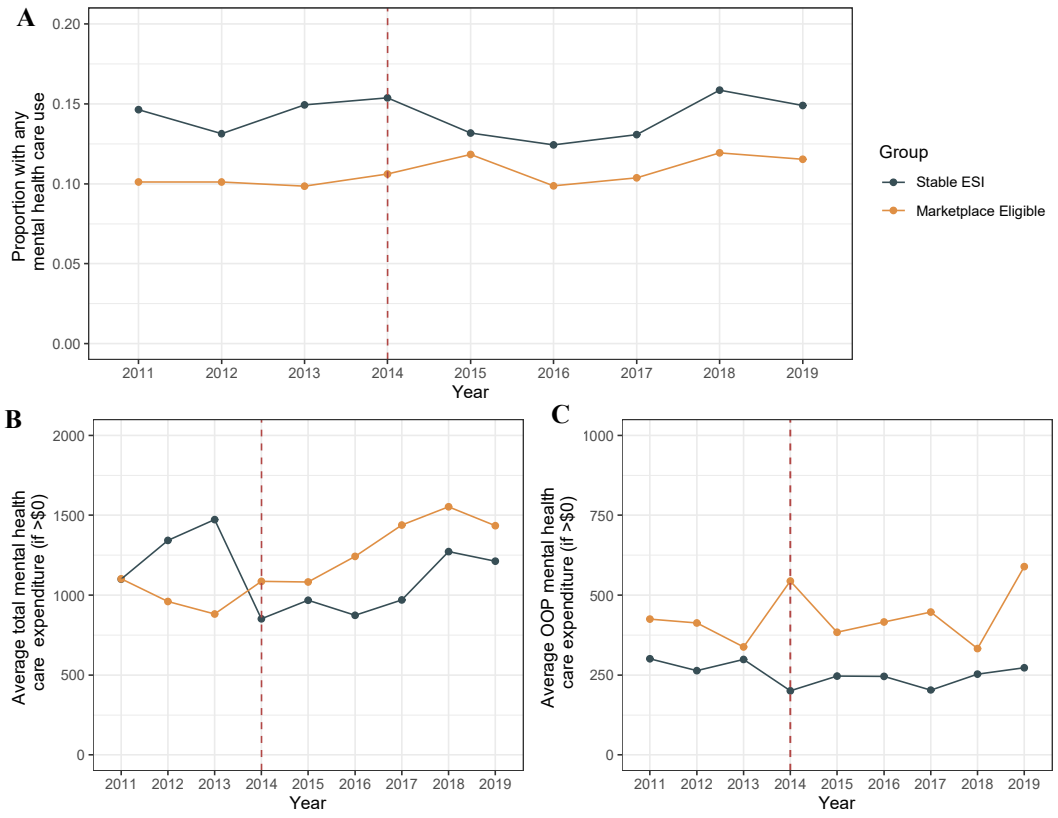

Figure 6.2. Observed annual trends of mental health care use and expenditure

SOURCE Author's analysis of 2011-2019 data from the Medical Expenditure Panel Survey (MEPS) **NOTES** Members of the stable ESI (control) group had employer-insurance coverage for the entire year. Members of the Marketplace eligible (treatment) group were uninsured for the entire year, had partial employer-sponsored insurance, or a non-group private insurance. All monetary values are in 2019 US dollars. Abbreviations: ESI, employer-sponsored insurance; OOP, out-of-pocket

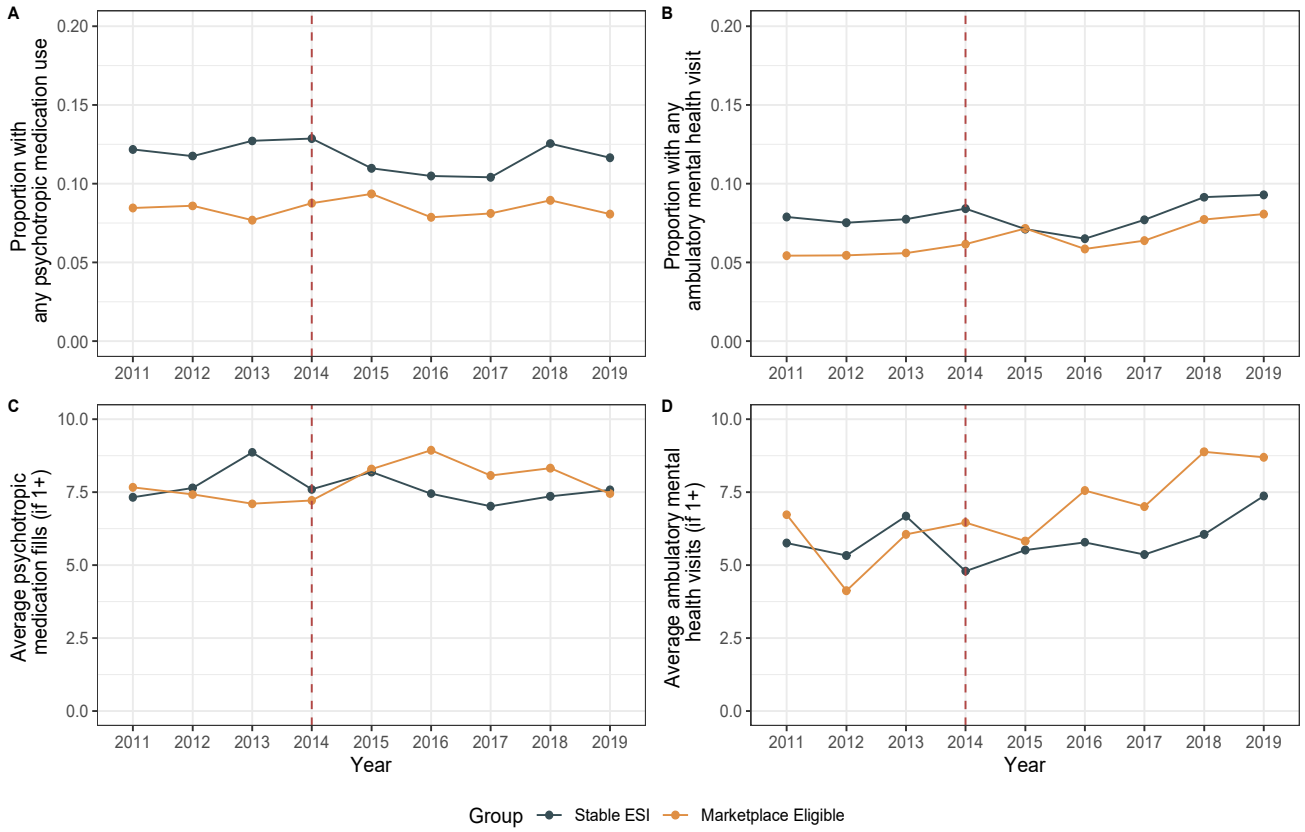

Figure 6.3. Observed annual trends of mental health care use by type of service

SOURCE Author's analysis of 2011-2019 data from the Medical Expenditure Panel Survey (MEPS) **NOTES** Abbreviations: ESI, employer-sponsored insurance

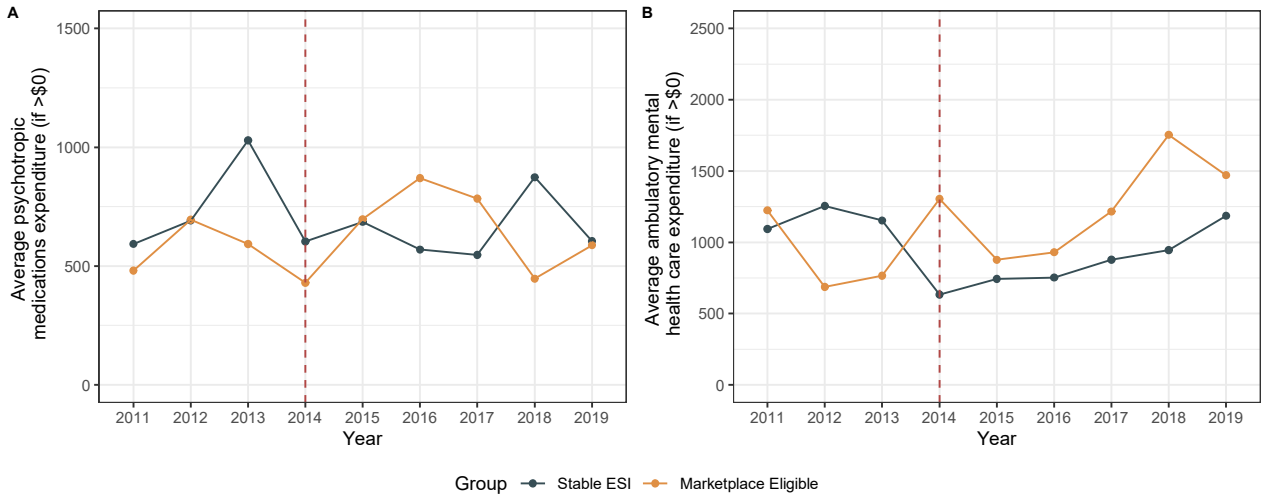

Figure 6.4. Observed annual trends of mental health care expenditure by type of service

SOURCE Author's analysis of 2011-2019 data from the Medical Expenditure Panel Survey (MEPS) **NOTES** All monetary values are in 2019 US dollars. Abbreviations: ESI, employer-sponsored insurance

Table 6.3. Adjusted changes in mental health care use overall and by type of service

	Any mental health care use[a]	Psychotropic medication use			Ambulatory mental health visits		
		Part I: Logit[a]	Part II: GLM	Overall	Part I: Logit[a]	Part II: GLM	Overall
Post1-Pre difference (Treated)	0.87 [-0.31,2.04]	0.56 [-0.50,1.62]	0.48 [-0.59,1.55]	0.08 [-0.04,0.20]	**0.94*** [0.03,1.86]	0.65 [-0.81,2.10]	0.09† [-0.01,0.19]
Post1-Pre difference (Control)	0.37 [-0.81,1.55]	0.16 [-0.93,1.26]	-0.23 [-1.04,0.58]	-0.01 [-0.12,0.10]	0.19 [-0.76,1.14]	-0.38 [-1.58,0.82]	-0.01 [-0.11,0.08]
DID1	0.50 [-1.07,2.07]	0.40 [-0.98,1.77]	0.71 [-0.64,2.05]	0.09 [-0.06,0.24]	0.75 [-0.49,2.00]	1.03 [-0.92,2.98]	0.10 [-0.03,0.24]
Post2-Pre difference (Treated)	1.29† [-0.05,2.63]	0.32 [-0.87,1.51]	0.43 [-0.62,1.49]	0.06 [-0.06,0.18]	**1.62**** [0.54,2.71]	**2.34**** [0.57,4.10]	**0.26**** [0.11,0.40]
Post2-Pre difference (Control)	0.94 [-0.20,2.08]	0.14 [-0.89,1.17]	-0.64† [-1.39,0.11]	-0.05 [-0.16,0.06]	**0.99*** [0.01,1.98]	0.70 [-0.72,2.11]	0.12† [-0.01,0.24]
DID2	0.35 [-1.34,2.03]	0.18 [-1.34,1.69]	1.08† [-0.19,2.34]	0.11 [-0.05,0.27]	0.63 [-0.83,2.09]	1.64 [-0.61,3.89]	0.14 [-0.05,0.33]
N	55,918	55,918	4,465	55,918	55,918	3,242	55,918

SOURCE Author's analysis of the Medical Expenditure Panel Survey, 2011-19 **NOTES** Results are from two-part models, the first part is a logit model estimating the probability of an event in the entire population and the second is a generalized linear model (GLM) estimating the level of event in the subset of the population with non-zero values. The overall column represents the joint marginal effect. [a]Differences are in percentage points. DD1 and DD2 are difference-in-differences estimates representing the average treatment effect on the treated (ATT) in post-reform periods 1 and 2 respectively. Pre: pre-ACA 2011-13; Post1: post-ACA 2014-16; Post2: post-ACA 2017-19. All estimates were adjusted for complex survey design. All models were adjusted for age, sex, race or ethnicity, marital status, Census region, language, educational attainment, employment status, number of chronic conditions, self-rated physical and mental health, presence of physical or social limitations, employment status, and family income relative to poverty level.
95% confidence intervals in brackets
† $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 6.4. Adjusted changes in total mental healthcare expenditure by type of service

	Total expenditure on psychotropic medications			Total expenditure on mental health ambulatory visits		
	Part I: Logit[a]	Part II: GLM	Overall	Part I: Logit[a]	Part II: GLM	Overall
Post1-Pre difference (Treated)	0.57 [-0.49,1.63]	-33.36 [-223.98,157.27]	0.35 [-15.90,16.60]	**0.92*** [0.02,1.83]	195.78 [-79.62,471.17]	**18.46*** [1.59,35.34]
Post1-Pre difference (Control)	0.17 [-0.92,1.27]	-145.39 [-354.98,64.21]	-12.29 [-33.06,8.48]	0.17 [-0.75,1.10]	**-566.41**** [-876.22,-256.61]	**-34.76**** [-56.66,-12.86]
DID1	0.40 [-0.97,1.77]	112.03 [-170.62,394.68]	12.64 [-13.92,39.19]	0.75 [-0.48,1.98]	**762.19**** [384.74,1139.64]	**53.22**** [27.37,79.07]
Post2-Pre difference (Treated)	0.33 [-0.86,1.52]	-74.90 [-275.66,125.86]	-4.28 [-21.46,12.90]	**1.86**** [0.79,2.93]	**525.88**** [190.92,860.83]	**52.11**** [26.29,77.93]
Post2-Pre difference (Control)	0.15 [-0.88,1.18]	-109.33 [-328.89,110.24]	-9.16 [-32.02,13.70]	**1.12*** [0.13,2.10]	-232.19 [-572.94,108.56]	-4.03 [-30.88,22.82]
DID2	0.18 [-1.33,1.69]	34.43 [-228.85,297.71]	4.88 [-21.38,31.13]	0.74 [-0.70,2.18]	**758.07**** [288.38,1227.75]	**56.14**** [19.51,92.76]
N	55,918	4,462	55,918	55,918	3,148	55,918

SOURCE Author's analysis of the Medical Expenditure Panel Survey, 2011-19 **NOTES** Results are from two-part models, the first part is a logit model estimating the probability of an event in the entire population and the second is a generalized linear model (GLM) estimating the level of event in the subset of the population with non-zero values. The overall column represents the joint marginal effect. [a]Differences are in percentage points. DD1 and DD2 are the difference-in-differences estimates representing the average treatment effect on the treated (ATT) in post-reform periods 1 and 2 respectively. Pre: pre-ACA 2011-13; Post1: post-ACA 2014-16; Post2: post-ACA 2017-19. All estimates were adjusted for complex survey design. All models were adjusted for age, sex, race or ethnicity, marital status, Census region, language, educational attainment, employment status, number of chronic conditions, self-rated physical and mental health, presence of physical or social limitations, employment status, and family income relative to poverty level.
95% confidence intervals in brackets
† $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 6.5. Adjusted changes in total and out-of-pocket mental health care expenditure

	Total mental health care expenditure			Out-of-pocket mental health care expenditure		
	Part I: Logit[a]	Part II: GLM	Overall	Part I: Logit[a]	Part II: GLM	Overall
Post1-Pre difference (Treated)	0.81 [-0.34,1.95]	107.70 [-129.83,345.24]	17.44 [-7.18,42.05]	0.50 [-0.62,1.62]	8.71 [-102.90,120.32]	2.65 [-8.22,13.51]
Post1-Pre difference (Control)	0.37 [-0.81,1.54]	**-460.28**** [-746.88,-173.68]	**-46.23**** [-79.90,-12.55]	0.09 [-1.07,1.26]	**-79.92**** [-131.21,-28.62]	**-8.04**** [-14.04,-2.04]
DID1	0.44 [-1.11,1.99]	**567.98**** [197.80,938.16]	**63.67**** [22.30,105.04]	0.41 [-1.05,1.87]	88.63 [-30.51,207.76]	10.69† [-1.17,22.55]
Post2-Pre difference (Treated)	**1.41*** [0.08,2.75]	**337.61*** [37.06,638.15]	**48.55**** [14.65,82.44]	1.10† [-0.13,2.33]	1.85 [-117.29,120.98]	4.51 [-7.49,16.51]
Post2-Pre difference (Control)	1.01† [-0.13,2.15]	-231.51 [-554.55,91.53]	-13.22 [-53.08,26.65]	0.52 [-0.60,1.64]	-55.08† [-114.65,4.49]	-4.45 [-11.69,2.79]
DID2	0.41 [-1.28,2.09]	**569.12**** [152.15,986.08]	**61.76*** [11.58,111.95]	0.58 [-1.00,2.16]	56.93 [-72.79,186.65]	8.96 [-4.88,22.80]
N	55,918	5,529	55,918	55,918	5,136	55,918

SOURCE Author's analysis of the Medical Expenditure Panel Survey, 2011-19. **NOTES** Results are from two-part models, the first part is a logit model estimating the probability of an event in the entire population and the second is a generalized linear model (GLM) estimating the level of event in the subset of the population with non-zero values. The overall column represents the joint marginal effect. [a]Differences are in percentage points. DD1 and DD2 are difference-in-differences estimates representing the average treatment effect on the treated (ATT) in post-reform periods 1 and 2 respectively. Pre: pre-ACA 2011-13; Post1: post-ACA 2014-16; Post2: post-ACA 2017-19. All estimates were adjusted for complex survey design. All models were adjusted for age, sex, race or ethnicity, marital status, Census region, language, educational attainment, employment status, number of chronic conditions, self-rated physical and mental health, presence of physical or social limitations, employment status, and family income relative to poverty level.
95% confidence intervals in brackets
† $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

6.3 DISCUSSION

This nationally representative study provides new evidence on the impact of multiple ACA provisions on access, expenditure, and affordability of mental health care in the non-group market. We evaluated the potential combined effects of ACA's Marketplace subsidies, expansion of the MHPAEA, elimination of medical underwriting practices, and the inclusion of mental health as an essential benefit. Overall, we found little evidence of increased probability of use of mental health care services. However, at the intensive margin, the analysis suggests an increase in total mental health care spending in the Marketplace-eligible group, primarily driven by a modest increase in ambulatory mental health visits, particularly in the later period following ACA implementation. This higher spending on mental health care was largely covered by third-party payers, with no significant change in patients' OOP spending. The hypothesized decrease in OOP cost-sharing was likely offset by the increased utilization of mental health care among individuals in the treatment group.

Several factors may explain the lack of improvement in the probability of accessing mental health care and the concentration of gains among individuals with existing utilization despite the policy changes under study. First, the analysis shows that only 17% of the Marketplace-eligible population purchased ACA Marketplace plans and a large proportion (40.3%) remained uninsured throughout the year. Lack of insurance coverage has been identified as a barrier to treatment among individuals in need of mental health care.[3] The low uptake of Marketplace insurance in our study aligns with prior research.[71,125,140] Uninsured individuals often cite cost as the main barrier to not signing up for non-group plans, despite substantial premium subsidies, and most report not being contacted or informed about available coverage options or the timing of the open enrollment period.[141–143] Second, even though insurers have improved mental health benefits structure in the non-group market to comply with the ACA regulations,[46] these plans frequently employed narrow and tiered networks, especially for mental health providers, that are likely to impede patients' access to mental health care.[45,119] It is suggested that insurers utilize such restricted mental health care networks as a cost-containing strategy given the high costs of treating patients with mental health needs.[45,119] Consumers in the non-group market often base their decisions on premiums when selecting Marketplace plans and might not be fully

informed about the network size.[120] Consequently, they may enroll in inadequate plans that do not meet their needs, leading to financial strain when seeking out-of-network providers or causing them to forego mental health treatment. The limited access due to narrow provider networks in Marketplace plans is exacerbated by the shortage of mental health providers and the low incentive for psychiatrists, who receive low reimbursements for time-intensive services, to participate in insurance networks.[59,60] As a result, only individuals with established mental health care access were likely to reap the benefits from the subsidies and behavioral health care reforms in the non-group market.

Our findings also suggest that the ACA primarily impacted ambulatory mental health visits and spending, with no meaningful effect on psychotropic medication use. This is likely because patients have access to psychotropic medications through their primary care providers (PCPs), who have become increasingly involved in delivering mental health care. PCPs account for most psychotropic medication prescriptions, particularly for common conditions such as depression and anxiety.[61,144,145] Another nationally representative study found that nearly 70% of mental health visits of patients to their usual PCPs resulted in a psychotropic medication prescription, with much lower rates of psychotherapy or referral to other physicians.[145] On the other hand, the elimination of the high cost share and treatment limits on specialty ambulatory mental health visits (e.g., to psychiatrists, psychologists, counselors, or social workers) following parity expansion to the non-group market potentially eased restrictions on access to these services. Patient preference for psychotherapy over pharmacological treatment might have also contributed to the observed treatment effect.[146] Our findings are consistent with research evaluating the impact of the MHPAEA on ESI plans, which demonstrated that the law successfully eliminated quantitative limits on behavioral health visits, leading to a modest increase in outpatient behavioral health care utilization.[147–150]

Furthermore, our study reveals increased utilization during the later period (2017-2019) following the ACA implementation, despite concerns about market instability during the Trump administration. Capping premiums based on income likely protected Marketplace-eligible individuals from the premium increases during this period (see section 2.3.1.2 for an overview of how tax subsidies are structured in the non-group market). Additionally, individuals likely need time to choose and enroll in health plans, understand their new benefits, and identify providers

who accept their insurance before they can utilize mental health services; hence, it is not surprising that the full effect of the ACA may not be realized in the early years following implementation.[151] Further research is needed to understand the impact of premium increases in the late post-reform period on mental health use in non-group plans outside the ACA Marketplaces, which were not eligible for premium subsidies or cost-sharing reductions.

6.3.1 Study Limitations

Several limitations should be considered when interpreting the findings of this study. First, the use of publicly available MEPS data, which lack geographic identifiers, prevents accounting for the Medicaid expansion status. The ACA Marketplace has played a more significant role in states that chose not to expand Medicaid coverage, and it is characterized by broader income eligibility (100-400% of the federal poverty level). The absence of geographic identifiers also prevents the adjustment for federal versus state-operated Marketplace plans. State-operated plans often offer generous funding for advertisement and outreach but are associated with restrictive mental health provider networks.[45,83] Second, income was used as a proxy for Marketplace insurance, but only a modest fraction of those deemed eligible for Marketplace plans purchased one. Third, all analyses in this study relied on cross-sectional observations, as the MEPS survey data do not allow for a longitudinal analysis beyond two calendar years. Finally, there is no ideal control group to assess the impact of the ACA on the non-group privately insured population, including those enrolled in Marketplace plans because the reforms were implemented nationwide at the same time. However, as mentioned earlier, individuals with stable employer-sponsored insurance coverage were minimally affected by these reforms and approximates a counterfactual.

6.3.2 Conclusions and Implications for Policy and Research

This study represents the first quasi-experimental investigation of the impact of the ACA's insurance expansion and behavioral health benefits reforms on mental health care access and affordability in the non-group market. Our findings suggest that the increase in mental health care utilization and expenditure was primarily observed among individuals who already had some level of use or spending (intensive margin), while there was no significant change in the probability of any use or spending (extensive margin).

To improve mental health care access in the non-group market, several key strategies should be considered. This includes increasing the affordability of Marketplace plans, enhancing

outreach efforts to assist eligible individuals enroll in plans that meet their needs, expanding mental health provider networks within the Marketplace plans, and incentivizing the participation of psychiatrists and non-physician providers. Furthermore, recognizing the important role of primary care as a gateway in mental health care access and the complex interaction between mental and chronic physical conditions, models integrating mental health services into primary care settings can improve access and quality of care for patients with behavioral health needs. A recent report has shown that only one-third of primary care practices in the United States have a mental health provider on their team, compared to more than 90% in some other high-income countries.[1]

Future research should assess the performance of the non-group market on mental health care access during the COVID-19 public health emergency. The pandemic has created an unprecedented increase in demand for mental health care, and the non-group market has offered an alternative insurance option for individuals who lost their employment benefits.[13] Additionally, the Biden administration introduced temporary changes to premium subsidies eligibility (see section 2.8), the effect of which on facilitating access to care are not clearly understood.[93]

CHAPTER 7: FINANCIAL BURDEN AND PHYSICAL COMORBIDITIES IN INDIVIDUALS WITH MENTAL HEALTH NEEDS

This chapter focuses on the third objective of this dissertation, which is to explore the relationship between financial burden and physical comorbidities among individuals with mental health needs in the post-ACA reform era. Specifically, this study investigates how both objective and subjective measures of financial burden change across levels and specific diagnoses of physical comorbidities during this period.

7.1 METHODS

This study used 2014-2019 data from the Medical Expenditure Panel Survey (MEPS) annual consolidated data files. Section 4.2 provides a detailed description of the MEPS data and the construction of the analytic data file.

7.1.1 Analytic Sample

The flowchart in Figure 7.1 outlines the selection process of the analytic sample for this objective. The study cohort consisted of nonelderly adults 18 to 64, the age range targeted by the ACA reforms, who were surveyed in the post-reform period between 2014 and 2019. The sample was further restricted to respondents with probable moderate-to-severe mental illness, defined as a Kessler-6 (K6) score > 4 or a Patient Health Questionnaire-2 (PHQ-2) score ≥ 3. The K6 is a validated brief screening scale of non-specific psychological distress, asked as part of the self-administered questionnaire in MEPS. It has demonstrated high precision in identifying individuals with mental health needs.[105] Respondents answer six questions on a 5-point Likert scale, rating the frequency of experiencing symptoms such as sadness, nervousness, restlessness, hopelessness, difficulty in performing daily activities, and feelings of worthlessness in the past 30 days. Scores ranging from 4 to 12 indicate moderate psychological distress, while scores from 13 to 24 indicate severe psychological distress.[109,110] The PHQ-2 is a 2-item depression screener with high sensitivity and specificity. It has a summed score ranging from 0 to 6, with a score of 3 or higher considered an optimal cut-off for heightened depressive symptoms.[152] To increase the sample size and generate stable and precise estimates, cross-sectional data from 2014 to 2019 were pooled. The final analytic sample included 20,601 respondents with positive person weight and non-

missing values for covariates. This sample corresponds to an estimated annual population of 35,228,631 individuals in the United States.

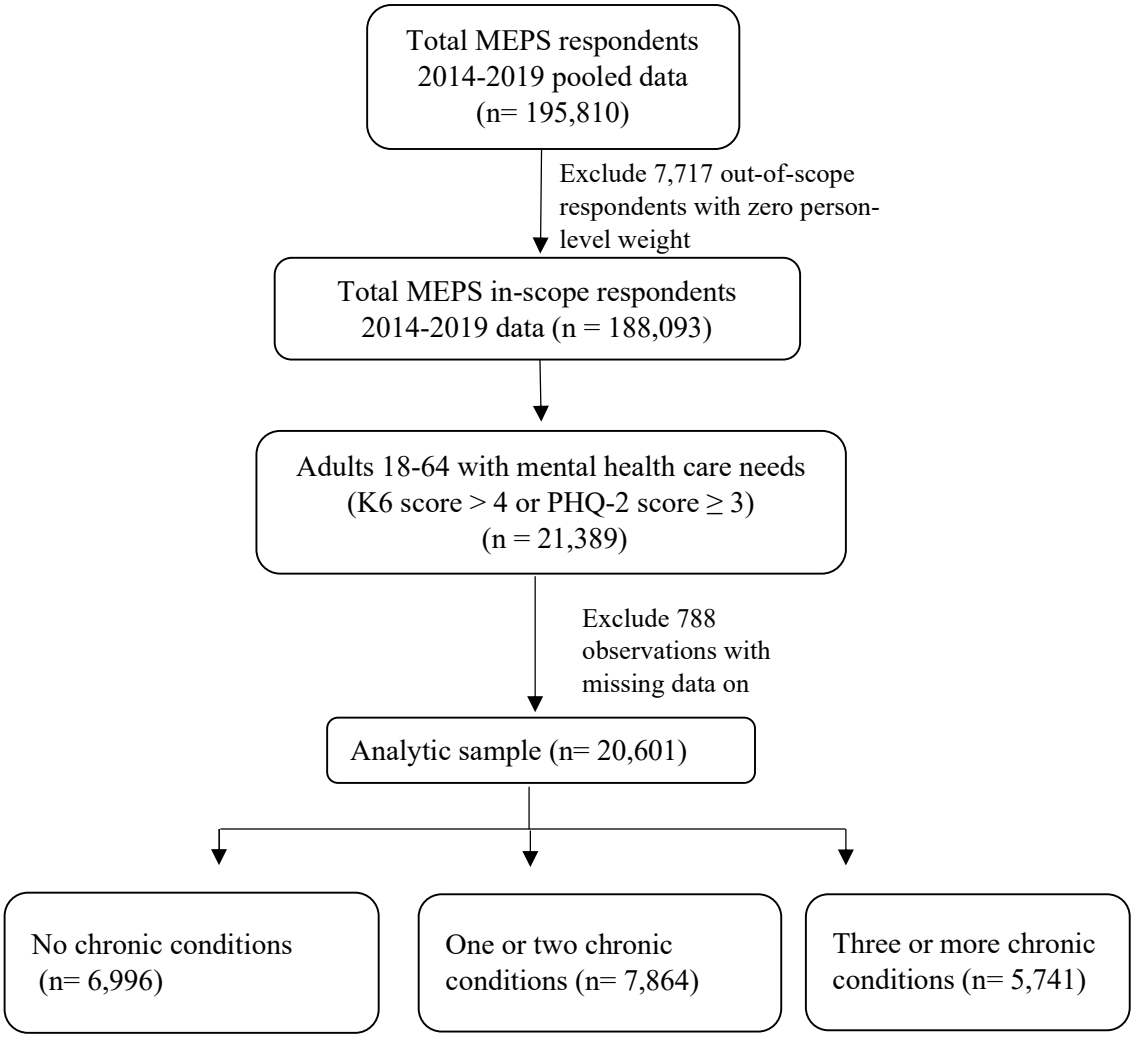

Figure 7.1. Flowchart of analytic sample selection

SOURCE Data are from the 2014-19 Medical Expenditure Panel Survey (MEPS) annual consolidated data files
NOTES Chronic conditions are based on MEPS priority conditions, including hypertension, heart disease, stroke, high cholesterol, diabetes, cancer, arthritis, and respiratory diseases. Abbreviations: K6, Kessler-6 score; PHQ-2, Patient Health Questionnaire-2

7.1.2 Physical Comorbidities

The primary independent variables of interest in this study were the number and specific diagnoses of comorbid chronic physical conditions. Mental and physical comorbidities were defined as the co-occurrence of mental and physical illnesses in an individual, irrespective of the chronological order or causal pathways linking them.[16] To identify concurrent physical comorbidities, eight indicators of whether an individual has a condition were used based on priority conditions in MEPS: hypertension, heart disease (including coronary heart disease, angina, myocardial infarction, and other unspecified heart disease), stroke, high cholesterol, diabetes, cancer, arthritis, and respiratory diseases (including chronic bronchitis, asthma, and emphysema). Priority conditions are self-reported by respondents who are asked whether a healthcare professional had ever diagnosed them with any of these conditions. These conditions are highly prevalent, costly, and policy-relevant, aligning with commonly reported comorbidities in patients with mental illness.[17]

The analytic sample was stratified into three categories based on the level of physical comorbidities: individuals without chronic comorbid conditions, those with one or two conditions, and those with three or more conditions. This classification is based on the distribution of comorbidities observed in the sample to ensure that each group has a sufficient sample size for analysis. A similar approach was employed to characterize comorbidities in the analytic samples of the other objectives within the dissertation.

7.1.3 Objective and Subjective Financial Burden

The financial burden of all-cause health care services use was assessed using subjective and objective indicators. Consistent with prior research, subjective financial burden was captured using two measures of medical debt that identified individuals living in families with at least one member who perceived financial difficulty with their medical care. High subjective financial burden was determined by affirmative responses to the following questions: “In the past 12 months did anyone in the family have problems paying or were unable to pay any medical bills?” and “Does anyone in your family currently have any medical bills that are being paid off over time?”.[153,154]

Objective financial burden was assessed using the ratio of combined all-cause out-of-pocket (OOP) spending for all family members in a calendar year to the annual family income. The OOP-to-income ratio was estimated at the family level, considering that all members of the family share the same financial resources and are affected by each other's health care costs. According to the Current Population Survey, a family unit was defined as two or more individuals related by blood or marriage, excluding unmarried partners and in-laws.[155] All-cause OOP expenditure included direct payments for services not covered by insurance, deductibles, and cost-sharing expenses associated with inpatient care, outpatient visits, emergency department visits, prescription drug use, and home health visits. Family income referred to the pre-tax total annual income reported by a household, with a floor of $100 imposed to account for families reporting very low or negative income.[156,157]

A high financial burden of health care spending was defined as an OOP-to-income ratio that exceeded a certain threshold. The commonly used thresholds include 5%, 10%, and 20%, with no consensus or guidance in the literature on the selection of a specific cut-off value.[69,71,157] Research has indicated that the standard widely used 10% cut-off might underestimate the objective financial burden in highly financially stressed families (e.g., families with low income who have children), and varying thresholds based on income correlated better with unmet health care needs due to cost.[158] In this study, objective financial burden was reported at the 5% and 10% thresholds. However, given the lack of evidence on what constitutes an appropriate cut-off for estimating objective financial burden in families with a member having a complex health condition and the unavailability of family income net of taxes in the MEPS dataset, the lower 5% threshold is suggested as a better indicator of objective financial burden among the target population. Each individual in the analytic sample was assigned their family-level objective financial burden. Monetary values were inflation-adjusted to 2019 US dollars using the Consumer Price Index (CPI) for family income and the Consumer Price Index for Medical Care (CPI-M) for OOP health care expenses.[134]

7.1.4 Statistical Analysis

All analyses were performed and reported at the individual level and are generalizable to non-institutionalized non-elderly adults with mental health needs. Sociodemographic characteristics, the prevalence of financial burden outcomes, health status measures, and

insurance coverage were descriptively summarized for the overall study population and stratified by the level of physical comorbidities. To assess the association between binary financial burden outcomes and chronic conditions, two logistic regression models were fitted for each outcome. In the first model, the main independent variable was the level of comorbidities, categorized as none, one or two, and three or more. In the second model, indicators for the eight investigated chronic diagnoses were included. All models were adjusted for age, sex, race/ethnicity, marital status, region, educational attainment, family income relative to the federal poverty level, Supplemental Nutrition Assistance Program (SNAP) receipt, employment status, self-rated physical and mental health, presence of social or physical limitations, mental illness severity, and source of insurance coverage. The study results were reported as the adjusted average marginal differences in the probability of having subjective or objective financial burden between those with multiple chronic conditions or with a specific diagnosis, relative to those without.

7.2 RESULTS

Of the 20,601 non-elderly respondents (representing approximately 35,228,631 individuals in the US) who reported probable mental health needs, 35.2% had no physical comorbidity, 39.4% reported one or two conditions, and 25.4% had three or more concurrent conditions. Table 7.1 shows that the most prevalent conditions were high blood pressure (33.6%), high cholesterol level (29.7%), and arthritis (29.7%). The study population was more likely to be female (56.9%) and non-Hispanic White (63.9%), with an average age of 40.4 (± 13.4 years). Older respondents tended to have more chronic conditions than younger respondents. In contrast to respondents with only mental health needs and no comorbid conditions, those reporting three or more physical comorbidities experienced substantially worse physical and mental health, higher rates of serious mental illness (48.3% vs. 26.4%, respectively), and more physical and social limitations (62.9% vs. 9.6%, respectively). Nearly 90% of the study population had insurance coverage, primarily through employer-sponsored insurance (47.4%) and Medicaid (22.2%) (Table 7.1).

On average, 20.6% of respondents reported difficulties in paying medical bills, and 26.8% were paying their medical bills over an extended period (Table 7.1). However, these rates were notably higher among individuals with three or more physical comorbidities, exceeding 30%. Similarly, the prevalence of objective financial burden increased with the number of

comorbidities. Among respondents with three or more conditions, 28.9% lived in families with an OOP-to-income ratio higher than 5%, and 15.6% exceeded the 10% financial burden threshold. These rates were more than double those observed in individuals with only mental health needs and no physical comorbidities (12.8% and 5.9%, respectively).

The adjusted regression models (Figure 7.2 and Appendix Table S3.1) demonstrate a stepwise increase in financial burden outcomes with the number of physical comorbidities. Among individuals reporting only mental health needs, 16.92% were part of families experiencing problems paying their medical bills. This rate increased by 3.45 [95% CI, 1.96, 4.95] percentage points (pp) with one or two physical comorbidities and by 8.13 [95% CI, 6.02, 10.24] pp with three or more comorbidities, after adjusting for key demographic and insurance confounders. Similar patterns were observed for the probability of paying medical bills over time and living in families with an OOP-to-income ratio greater than 5%.

Specific conditions exhibited varying associations with subjective and objective financial burden. The adjusted marginal increase in the probability of financial burden outcomes when having a specific diagnosis relative to not having that condition is presented in Figure 7.3 (see Appendix Table S3.2 for the full regression output). The presence of cancer was associated with the most pronounced increase in perceived difficulty when paying medical bills and resorting to extended payment plans (3.97 [95% CI, 1.26, 6.67] pp and 3.35 [95% CI 0.45, 6.24] pp, respectively), followed by arthritis (2.96 [95% CI, 1.15, 4.76] pp and 2.39 [95% CI, 0.25, 4.53] pp, respectively), and heart disease (2.92 [95% CI, 1.13, 4.72] pp and 2.38 [95% CI, -0.27,5.04] pp, respectively). Conversely, diabetes substantially increased the probability of objective financial burden at the 5% threshold by 4.71 [95% CI, 2.51, 6.91] pp, followed by heart disease (2.76 [95% CI 0.95, 4.57] pp) and cancer (2.58 [95% CI, 0.17, 5.00] pp). Arthritis was significantly associated with only perceived subjective financial burden, whereas diabetes and high cholesterol levels were significantly associated with only objective financial burden.

Table 7.1. Characteristics of non-elderly adults with mental health needs by level of chronic physical conditions, 2014-19

	No chronic conditions	One or two conditions	Three or more conditions	Overall
Sample size	6,996	7,864	5,741	20,601
US weighted population per year	12,388,812	13,877,458	8,962,361	35,228,631
Health care financial burden, %				
Family has problems paying medical bills	14.3	20.1	30.3	20.6
Family pays medical bills over time	21.3	26.9	34.2	26.8
OOP burden > 10% family income	5.9	9.1	15.6	9.6
OOP burden > 5% family income	12.8	18.3	28.9	19.0
Sample characteristics				
Age, mean (SD)	32.4 (10.9)	40.7 (12.6)	51.1 (9.8)	40.4 (13.4)
Age, %				
18-25	32.4	15.1	2.0	17.8
26-35	34.6	22.9	7.1	23.0
36-45	18.2	23.4	15.9	19.7
46-55	10.8	22.4	33.9	21.2
56-64	4.0	16.2	41.2	18.3
Female	55.6	57.3	58.1	56.9
Race/ethnicity, %				
Hispanic	17.2	14.0	11.3	14.5
Non-Hispanic White	59.8	65.5	67.1	63.9
Non-Hispanic Black	11.2	11.7	14.0	12.1
Non-Hispanic Other/mixed race	11.8	8.7	7.6	9.5
Region, %				
Northeast	15.0	15.8	15.4	15.4
Midwest	21.6	23.1	22.9	22.5
South	35.4	35.9	43.1	37.6
West	28.0	25.2	18.6	24.5
Marital status, %				
Married	36.3	42.9	44.4	41.0
Divorced/widowed/separated	10.3	21.4	36.8	21.4
Never married	53.4	35.7	18.7	37.6
Education, %				
Less than high school	13.1	12.9	18.9	14.5
High School	26.6	28.4	34.9	29.4
Some college	28.4	30.6	29.7	29.6
College or more	31.9	28.1	16.5	26.5
Employment status, %				
Unemployed	26.8	32.9	59.0	37.4
Full-time (30+ hours)	57.4	55.2	32.8	50.3
Part-time (<30 hours)	15.8	11.8	8.2	12.3
Employer size, %				
Unemployed	26.8	32.9	59.0	37.4
Small (<50 employees)	42.5	36.4	22.7	35.1
Medium (50-99 employees)	9.0	7.7	4.3	7.3
Large (100+ employees)	21.7	23.0	14.1	20.2
Family income relative to FPL, %				
≤ 138%	35.2	34.8	25.0	32.5
139-400%	41.8	39.3	36.3	39.4
> 400%	23.0	25.9	38.6	28.1

	No chronic conditions	One or two conditions	Three or more conditions	Overall
(Table 7.1-Continued)				
Average family OOP spending (SD), $	1,468 (2,821)	1,809 (3,278)	1,916 (3,229)	1,716 (3,117)
Average family income (SD), $	76,466 (70,497)	70,152 (66,301)	52,223 (53,175)	67,811 (65,488)
Self-reported physical health, %				
Excellent/very good	61.9	37.8	14.2	40.3
Good	27.9	37.0	31.0	32.3
Fair/Poor	10.2	25.2	54.8	27.5
Self-reported mental health, %				
Excellent/very good	57.5	41.4	27.5	43.6
Good	29.5	37.0	38.0	34.6
Fair/Poor	13.0	21.5	34.5	21.8
Serious mental illness,[b] %	26.4	32.2	48.3	34.3
Physical or social limitations,[c] %	9.6	27.8	62.9	30.4
Any mental health service use,[d] %	28.0	40.4	54.0	39.5
Chronic conditions diagnoses, %				
High blood pressure	—[a]	33.1	80.6	33.6
High cholesterol	—[a]	27.2	74.7	29.7
Stroke	—[a]	1.4	14.3	4.2
Heart disease	—[a]	10.9	43.3	15.3
Respiratory disease	—[a]	25.8	43.4	21.2
Cancer	—[a]	6.6	21.0	7.9
Diabetes	—[a]	5.1	38.1	11.7
Arthritis	—[a]	28.1	73.4	29.7
Insurance status, %				
Uninsured all year	12.8	9.7	6.8	10.1
Partial insurance (< 6 months)	4.8	4.0	3.3	4.1
Employer-sponsored	52.4	50.7	35.5	47.4
Non-group[e]	5.0	5.5	5.3	5.3
Medicaid[f]	15.8	21.1	32.7	22.2
Medicare only	0.5	3.0	11.6	4.3
Other coverage[g]	8.7	6.0	4.8	6.7

SOURCE Author's analysis of pooled 2014-19 data from the Medical Expenditure Panel Survey (MEPS). **NOTES** Analytic sample represents adults 18-64 years with either moderate to severe psychological distress (Kessler-6 score >4) or heightened depressive symptoms (PHQ-2 score ≥ 3). All monetary values are in 2019 US dollars and rounded to the nearest whole number. All values are weighted to be nationally representative. Abbreviations: OOP, out-of-pocket healthcare expenditure; SNAP, Supplemental Nutrition Assistance Program; FPL, Federal Poverty Level; SD, standard deviation. [a]Not applicable. [b]Defined as Kessler-6 score ≥ 13 or PHQ-2 score ≥ 3. [c]Includes social limitation, limitations performing activities of daily living or instrumental activities of daily living, difficulty performing certain physical activities like walking, climbing stairs, and bending, or limitations in work, housework, or school. [d]Includes any use of psychotropic medications, mental health-related ambulatory or ER visits, or inpatient stays. [e]Includes non-group insurance obtained on and off the ACA Marketplaces. [f]Includes dual Medicaid and Medicare eligible. [g]Includes other public or private coverage.

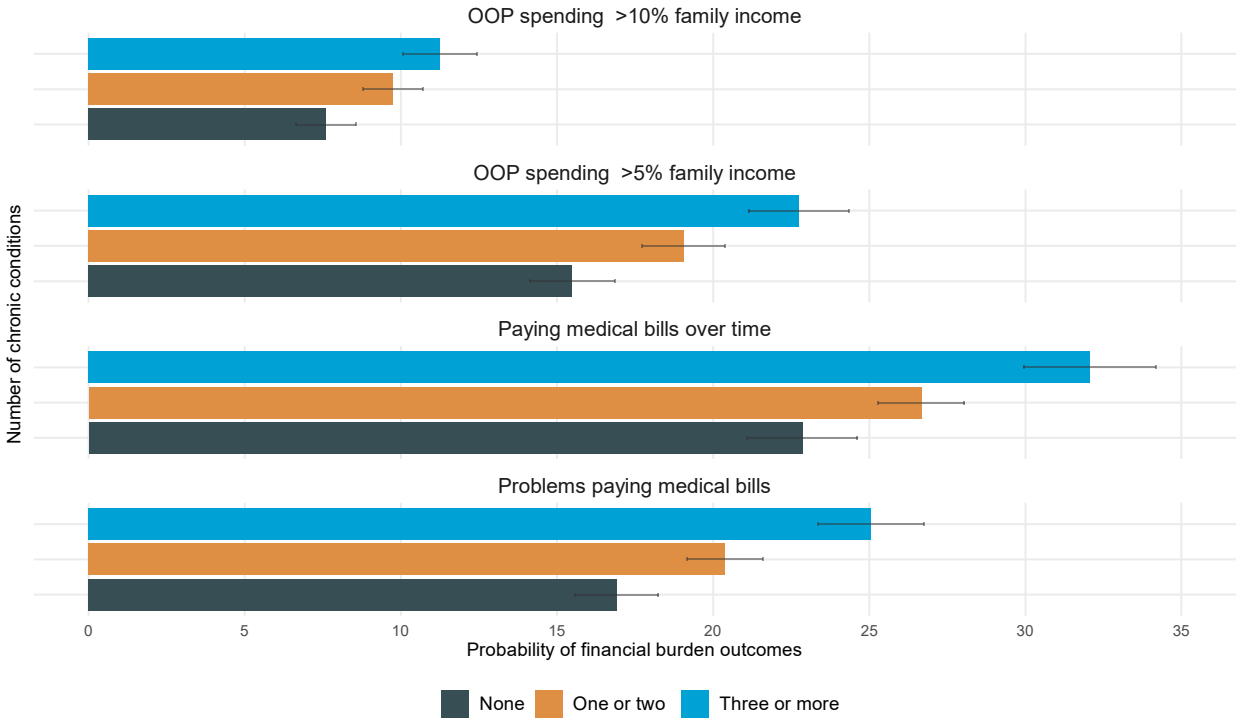

Figure 7.2. Adjusted probability of financial burden outcomes by number of chronic conditions in non-elderly adults with mental health needs

SOURCE Author's analysis of 2014-2019 pooled data from the Medical Expenditure Panel Survey (MEPS) **NOTES** All models were adjusted for age, sex, race/ethnicity, marital status, region, educational attainment, family income relative to federal poverty level, Supplemental Nutrition Assistance Program (SNAP) receipt, employment status, self-rated physical and mental health, presence of social or physical limitations, mental illness severity, and source of insurance coverage. Estimates of the marginal increase in predicted probability for one or two conditions and three or more conditions relative to having no chronic conditions were all statistically significant (displayed in Appendix Table S3.1). OOP, out-of-pocket.

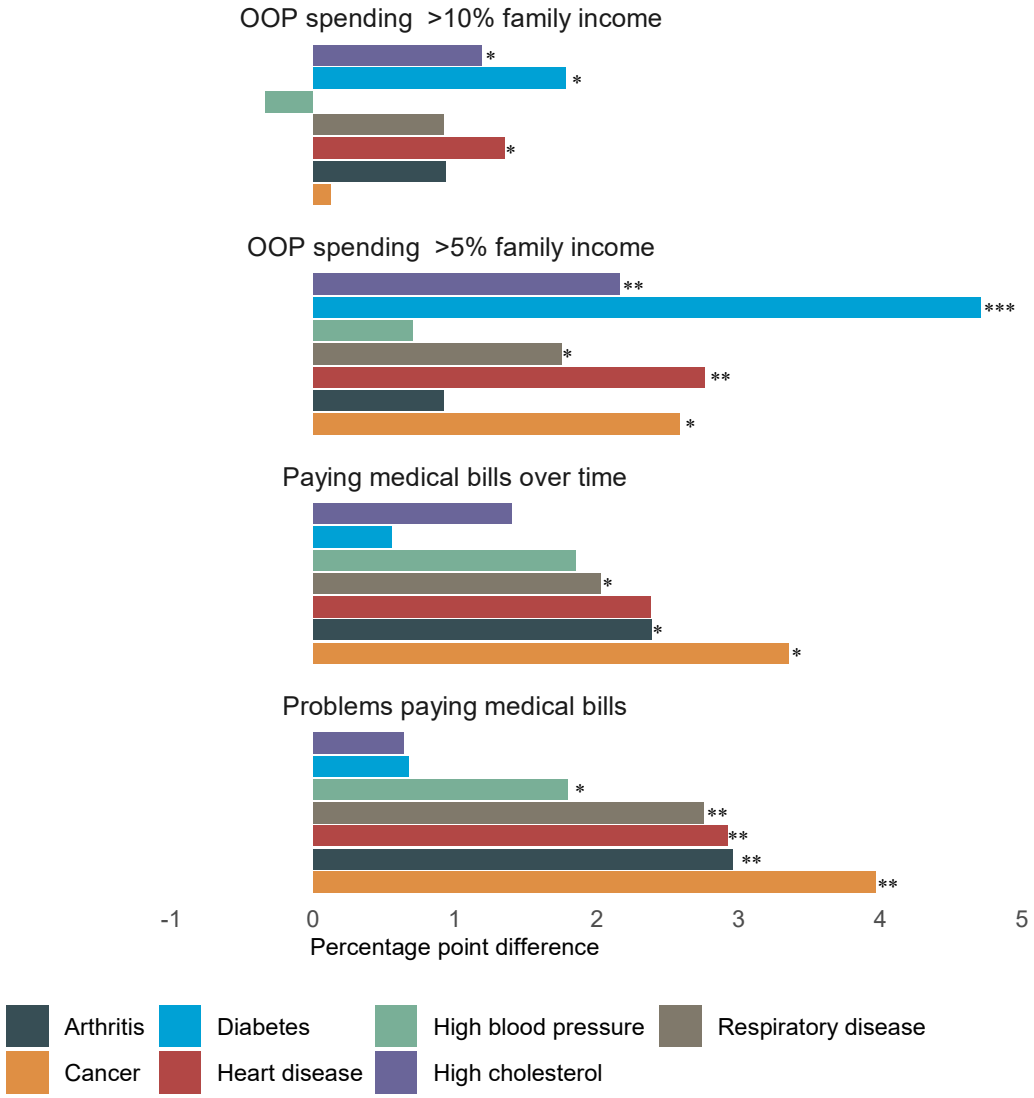

Figure 7.3. Adjusted percentage points change in financial burden outcomes by chronic condition diagnoses in non-elderly adults with mental health needs

SOURCE Author's analysis of 2014-2019 pooled data from the Medical Expenditure Panel Survey (MEPS) **NOTES** Stroke was excluded (not significant in all models). Each bar represents the marginal increase in the probability of financial burden outcomes when having a specific diagnosis relative to not having that condition. All models were adjusted for other chronic conditions, age, sex, race/ethnicity, marital status, region, educational attainment, family income relative to federal poverty level, Supplemental Nutrition Assistance Program (SNAP) receipt, employment status, self-rated physical and mental health, presence of social or physical limitations, mental illness severity, and source of insurance coverage. Full model results are in Appendix Table S3.2. OOP, out-of-pocket. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

7.3 DISCUSSION

Our findings underscore the relationship between mental health, physical comorbidities, and financial burden. Among non-elderly adults with mental health needs, approximately 65% reported at least one chronic physical comorbidity and 25% reported three or more. Individuals with mental health needs face significant financial strain despite a high rate of insurance coverage. Those with multiple physical comorbidities experience a disproportionately higher financial burden, both subjectively and objectively, compared to those with fewer or no comorbidities. This is likely attributed to the substantial health care resource utilization and associated costs reported in patients with physical and mental comorbidities, primarily driven by the expenses of treating physical conditions.[5,6] Research involving different populations, such as all non-elderly adults and the privately insured, has also highlighted a strong association between worsening financial outcomes and the number of chronic conditions.[159,160] Our results suggest that despite the reformed health insurance under the ACA, the needs of individuals with mental health conditions are still not adequately met, and they are likely to be underinsured. Financial burden can result in medical debt, deferring or forgoing essential medical care, and worrying about the financial situation, which can compromise health outcomes in this vulnerable patient group.[161]

Our findings also suggest varying associations between specific chronic conditions and measures of subjective and objective financial burden. Cancer was associated with the highest perceived financial difficulty and a moderate increase in objective burden. In contrast, arthritis was mainly associated with a high subjective burden, whereas diabetes was substantially associated with only an objective burden. The literature provides a plausible explanation for these discrepancies. The subjective perception of financial debt is influenced by factors that extend beyond an individual's current financial circumstances, such as expectations of financial distress and personality traits, which were not observed in our models. Individuals concerned about their future economic situation or those with a high internal locus of control (i.e., perceiving their lives to be shaped by their actions rather than external factors) are more likely to report a higher subjective burden.[75] Conditions like cancer and arthritis are associated with high health care costs, poor quality of life, and worsened mental health status, which undermine a person's ability to work and increase stress regarding family finances.[161,162] The psychosocial economic burden associated with poor quality of life[163] and high indirect costs, such as caregiving,[164] for patients

with complex or disabling conditions likely contribute to the high perceived subjective burden in families of patients with cancer or arthritis. On the other hand, the economic impact of diabetes seems to primarily manifest either through direct costs, such as medical out-of-pocket expenses, or the loss of income due to a compromised ability to work. Wang *et al.* found discordance between objective and subjective measures of financial burden among families of patients with atherosclerotic cardiovascular disease in the post-ACA period. Approximately, 37% of families experienced either objective or subjective financial burden, but only 5% overlapped in both measures. Subjective burden was more prevalent in this population and was associated with a higher likelihood of forgoing medical care than objective burden.[77] Thus, relying solely on either measure is inadequate to accurately capture financial hardship and cost-related care deferrals.

7.3.1 Study Limitations

This study has several limitations. First, two single-item questions were used to evaluate subjective financial burden associated with health care use, which, although correlate with forgoing medical care,[77,165] may not capture all domains of subjective burden. The use of a validated scale, currently unavailable in MEPS, is warranted to comprehensively assess subjective financial burden. Second, the estimation of the objective financial burden relied on pre-tax reported family income. The use of disposable (tax-adjusted) family income[166] or post-subsistence income (excluding food-related expenses)[77,153,167] is recommended to better approximate families' financial resources when estimating objective financial burden. However, neither measure can be directly estimated in MEPS. As a result, our measure of objective financial burden is likely conservative, and the lower 5% threshold is suggested as a better estimate of the percentage of adults living in families experiencing financial hardship. Finally, the bidirectional association between an individual's physical and mental health and financial stability, along with the cross-sectional design of this study, limits our ability to draw causal conclusions from the analyses. Household debt and economic distress act as barriers to accessing essential health care and can adversely affect physical and mental health. Similarly, poor mental health and a high number of comorbidities are associated with increased health care use, which can adversely impact the financial well-being of families. Further research is needed to understand these causal pathways and their relative importance to inform policies and guide the development of targeted interventions.

7.3.2 Conclusions and Policy Implications

To our knowledge, this is the first study to characterize the financial burden in individuals with mental health needs, while considering the role of physical comorbidities using both subjective and objective measures. Individuals with mental health needs have a high burden of physical comorbidities, which substantially increases their financial burden when seeking medical care. Specific conditions associated with high health care costs or that compromise quality of life and productivity, such as cancer, diabetes, heart disease, and arthritis, are significantly associated with a high financial burden in individuals with mental health needs, although their relative importance differs when considering subjective and objective measures of burden.

These findings have important implications for health care providers, policymakers, and payers. Recognizing the already high financial burden faced by individuals with mental health needs, which is further exacerbated by the presence of physical comorbidities, it is critical to develop comprehensive and integrated healthcare approaches that address the intertwined mental and physical health needs of this high-cost segment of the US population. Integrated care models have the potential to reduce resource utilization, improve the quality of care, and consequently mitigate the financial and disease burden.[168] Additionally, redesigning insurance benefit structures may enhance the affordability of care for these patients. Previous research has shown that even minimal cost sharing, as low as $1 to $5, is associated with reduced health care utilization and individuals foregoing necessary care, particularly among low-income individuals who are more vulnerable to financial strain than those with higher incomes.[169] Given the high prevalence of comorbid mental and physical health conditions among low-income individuals, who are also more likely to report serious mental health conditions,[170] capping cost-sharing and deductibles for these individuals can help alleviate financial strain, facilitate access to care, and improve health outcomes.

CHAPTER 8: CONCLUSIONS

This dissertation examined changes in mental health care access following the implementation of the Affordable Care Act's (ACA) major provisions in 2014. It focuses on vulnerable patient groups that encompass socioeconomically disadvantaged individuals, known to have a high prevalence of mental health conditions, and those with physical and mental comorbidities, known to face significant costs of care.

To investigate the changes in mental health care associated with ACA reforms, the first objective analyzed population-level trends in mental health care from 2011 to 2019, considering three income thresholds relevant to ACA policy provisions. These thresholds include individuals with income ≤ 138% of the federal poverty level (FPL) eligible for Medicaid, those with income ranging from 139% to 400% of the FPL, eligible for Marketplace subsidies, and those with high income exceeding 400% of the FPL, ineligible for ACA financial assistance during the study period. Additionally, a subgroup analysis focused on the population with mental health needs, defined as moderate-to-severe psychological distress, during the same period. The second objective examined the impact of the ACA on the non-group market by conducting a difference-in-differences analysis. This analysis compared the low- to middle-income population (139% to 400% of the FPL) potentially eligible for ACA Marketplace subsidies with a comparable income group having stable employer-sponsored insurance (ESI) and minimally impacted by the ACA changes. The third objective focused on individuals with mental health needs and explored the association between the financial burden of all-cause medical care and physical comorbidities. This objective utilized subjective and objective measures of financial burden.

The findings of the first objective reveal an increased probability of mental health care utilization, primarily through ambulatory visits, among low- and middle-income non-elderly adults following the ACA reforms. However, disparities in access to mental health ambulatory visits persisted or worsened compared with high-income individuals. These disparities were more pronounced in the subsample of the population with high mental health care needs. The results of the second objective suggest that the ACA's Marketplace subsidies and behavioral health care reforms in the non-group market increased mental health care utilization and expenditure, particularly in the late post-ACA reform period. The increased use was primarily driven by

ambulatory mental health visits rather than psychotropic medication use. However, these improvements were observed only among individuals who already had some level of utilization or spending, with no significant evidence of changes in the probability of mental health care access among the Marketplace-eligible population. The third objective revealed a high burden of physical comorbidities among individuals with mental health needs, significantly increasing both the objective and subjective financial burden measures of all-cause medical care. Although most of these individuals have some form of insurance coverage, primarily through Medicaid or ESI, the high financial burden suggests that they are likely underinsured and unable to afford their medical expenses. Furthermore, subjective and objective measures of financial burden exhibited different associations with various diseases. Cancer was highly associated with subjective financial burden, while also moderately increasing objective burden. Arthritis was only significantly associated with subjective measures, whereas diabetes was only significantly associated with objective financial burden. These findings suggest that relying solely on either measure is inadequate to accurately capture financial hardship and cost-related care deferrals.

Overall, these findings demonstrate some improvements in mental health care access among historically underserved groups following the ACA implementation. However, they emphasize the persistent barriers that vulnerable patient groups face when seeking mental health care. The divergent trends in ambulatory visits between ACA-targeted income groups and high-income individuals, along with the lack of a significant effect of the ACA on mental health care access probabilities in the Marketplace-eligible group, may indicate underlying structural barriers to access. In light of the literature, these barriers can be partially explained by affordability issues, particularly among individuals in the non-group market, or – as supported by the findings of the third objective – among those with mental and physical comorbidities regardless of the source of insurance coverage.

Structural barriers also extend beyond insurance coverage and encompass challenges related to provider availability. The shortage of mental health providers, coupled with low reimbursement rates and administrative burdens, disincentivizes providers from accepting insurance, especially Medicaid. Additionally, mental health provider offices are more likely to be located in affluent neighborhoods, further impeding access to care for low-income individuals with significant mental health care needs. Moreover, Marketplace plans, particularly those with

lower premiums, often employ narrow and tiered networks of mental health providers, which consumers are generally unaware of when signing up for insurance.

Since individuals with mental health conditions are likely to attribute their unmet mental health care needs to structural barriers, addressing these barriers may facilitate access to mental health care. Enhancing affordability can be achieved by expanding Medicaid eligibility in states that have not yet expanded their Medicaid programs and restructuring Medicaid and Marketplace plan benefits, especially for patients experiencing a high financial burden, such as those with comorbidities. On the provider side, it is critical to address the shortage of mental health providers and incentivize them to treat low-income patients. This might be achieved by increasing Medicaid reimbursement rates for mental health providers, expanding federal and state loan repayment programs for mental health professionals to practice in underserved areas, and integrating mental health care specialists in primary care. Currently, only one-third of primary care practices in the United States have a mental health provider, compared to more than 90% in some other high-income countries. Given the complex interaction between mental and physical conditions, models that integrate mental health services into primary care have the potential to improve access to and quality of care for patients with behavioral health needs while enabling care coordination. Medicaid has recently taken steps to support this integrated care by reimbursing interprofessional consultations, which facilitates collaboration between primary and mental health care providers.

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APPENDIX

Supplemental Materials for Chapter 5

Trends in Mental Health Care Access across ACA Income Groups (Objective 1)

Table S1.1. Missing values on covariates among eligible study sample

Variable	Missing, n	Missing, %
Age	0	0
Female	0	0
Race/ethnicity	0	0
Number of chronic conditions	0	0
Interview language	0	0
Marital status	6	0
Employment status	361	0.21
Perceived physical health	580	0.34
Perceived mental health	621	0.36
Region	823	0.48
Physical or social limitation	1,184	0.69
Educational attainment	1,459	0.85
SNAP receipt	2,217	1.30
K6-score	22,261	13.02
n	170,961	

Table S1.2. Characteristics of respondents with and without missing K6-score

	Not missing K6	Missing K6
Sample size	145,438	20,081
US weighted population per year	164,878,804	22,857,485
Mental health care use and spending		
Any mental health care use, %	16.7	12.9
Any psychotropic medication fill, %	13.5	10.1
Psychotropic medication fills (if 1+), mean (SD)	8.6 (8)	7.9 (7.7)
Any ambulatory mental health care visit, %	10.5	8.2
Ambulatory mental health visits (if 1+), mean (SD)	8.1 (14.3)	7.8 (14.6)
Total mental health care expenditure (if >0$), mean (SD)	1,587 (3,682)	1,564 (3,735)
Total expenditure on psychotropic medications (if >0$), mean (SD)	875 (2,173)	839 (2,111)
Total expenditure on mental health ambulatory visits (if >0$), mean (SD)	1,405 (3,600)	1,434 (3,893)
Sample characteristics		
Age, mean (SD)	40.4 (13.3)	40.0 (13.7)
Age, %		
18-25	17.5	20.7
26-35	22.5	19.8
36-45	20.6	20.1
46-55	22.4	22.7
56-64	17.1	16.8
Female, %	51.4	48.2
Race/ethnicity, %		
Hispanic	17.0	19.6
Non-Hispanic White	62.1	56.6
Non-Hispanic Black	12.2	13.4
Non-Hispanic other/mixed race	8.7	10.4
Region, %		
Northeast	17.1	21.6
Midwest	21.4	18.6
South	37.8	34.9
West	23.7	24.9
Marital status, %		
Married	52.2	52.1
Divorced/widowed/separated	15.3	12.6
Never married	32.5	35.3
Education, %		
Less than high school	11.5	13.6
High School	27.5	29.5
Some college	28.9	27.3
College or more	32.1	29.5
Employment status, %		
Unemployed	25.1	26.9
Full-time (30+ hours)	63.5	62.8

Part-time (<30 hours)	11.4	10.3
Employer size, %		
Unemployed	25.1	26.9
Small (<50 employees)	40.4	40.3
Medium (50-99 employees)	9.0	8.4
Large (100+ employees)	25.5	24.4
Non-English interview, %	7.1	8.9
SNAP receipt, %	11.1	9.8
Household income relative to FPL, %		
Ineligible for assistance (> 400%)	42.8	44.4
Marketplace eligible (139-400%)	39.3	39.3
Medicaid eligible (≤138%)	17.9	16.3
Number of chronic conditions, %		
None	47.6	52.7
One or two	37.6	34.8
Three or more	14.7	12.4
Self-reported physical health, %		
Excellent/very good	62.4	62.3
Good	25.7	26.1
Fair/Poor	11.9	11.6
Self-reported mental health, %		
Excellent/very good	71.0	69.7
Good	22.2	23.9
Fair/Poor	6.8	6.4
Physical or social limitations	11.7	10.8
Insurance status, %		
Uninsured all year	13.2	14.0
Partial insurance <6 months	3.5	3.9
ESI	60.6	59.0
Nongroup	4.4	4.9
Medicaid	11.1	11.1
Medicare only	1.5	1.5
Other	5.7	5.6

SOURCE Author's analysis of the Medical Expenditure Panel Survey (MEPS) for the period from 2011-19 **NOTES** Means and frequencies were weighted to be representative of the noninstitutionalized US population. Pre-ACA, 2011-13; Post-ACA, 2014-19. Abbreviations: ESI, employer-sponsored insurance; ACA, Affordable Care Act; FPL, federal poverty level; SD, standard deviation; K6-score, Kessler-6 score.

Table S1.3. Multum Lexicon therapeutic sub-classification codes for psychotropic medications

Multum Lexicon's therapeutic sub-classification (TCnSn) variable was used to identify four classes of psychotropic medication based on the following codes

Psychotropic therapeutic class	TCnSn[a] code
Anxiolytics, sedative, hypnotics	67
CNS stimulants	71
Antidepressants	249
Antipsychotics	251

SOURCE MEPS Prescribed Medicines files documentation **NOTES** [a]Includes: TC1S1, TC1S2, TC1S3, TC2S1, TC2S2, and TC3S1. Therapeutic sub-classification codes were consistent across years of the study period (2011-19)

Table S1.4. Unadjusted annual trends in mental health care use by ACA income groups

Household income relative to FPL	Year	Any mental health care use		Any psychotropic medication use		Any ambulatory mental health visit	
		Proportion	SE	Proportion	SE	Proportion	SE
Assistance ineligible (>400% FPL)	2011	0.1440	0.0064	0.1212	0.0059	0.0765	0.0048
	2012	0.1536	0.0080	0.1274	0.0070	0.0812	0.0054
	2013	0.1392	0.0079	0.1149	0.0071	0.0774	0.0058
	2014	0.1543	0.0070	0.1230	0.0068	0.0917	0.0058
	2015	0.1563	0.0071	0.1212	0.0070	0.0967	0.0055
	2016	0.1588	0.0080	0.1237	0.0073	0.0953	0.0061
	2017	0.1494	0.0072	0.1168	0.0066	0.0915	0.0053
	2018	0.1726	0.0070	0.1254	0.0065	0.1103	0.0057
	2019	0.1927	0.0075	0.1396	0.0072	0.1290	0.0062
Marketplace eligible (>138-400% FPL)	2011	0.1499	0.0061	0.1277	0.0058	0.0842	0.0046
	2012	0.1424	0.0063	0.1252	0.0058	0.0847	0.0048
	2013	0.1518	0.0067	0.1255	0.0062	0.0883	0.0048
	2014	0.1620	0.0076	0.1358	0.0070	0.0952	0.0059
	2015	0.1614	0.0062	0.1336	0.0060	0.0963	0.0050
	2016	0.1451	0.0065	0.1183	0.0063	0.0875	0.0046
	2017	0.1528	0.0062	0.1234	0.0060	0.0981	0.0052
	2018	0.1761	0.0065	0.1374	0.0058	0.1151	0.0054
	2019	0.1708	0.0069	0.1307	0.0062	0.1130	0.0058
Medicaid eligible (≤138% FPL)	2011	0.1970	0.0087	0.1695	0.0083	0.1327	0.0074
	2012	0.1888	0.0088	0.1668	0.0089	0.1318	0.0077
	2013	0.1932	0.0090	0.1653	0.0082	0.1406	0.0083
	2014	0.2198	0.0104	0.1897	0.0103	0.1521	0.0090
	2015	0.2245	0.0120	0.1908	0.0110	0.1607	0.0111
	2016	0.2126	0.0094	0.1695	0.0084	0.1539	0.0079
	2017	0.2141	0.0096	0.1704	0.0087	0.1520	0.0080
	2018	0.2408	0.0121	0.1922	0.0107	0.1768	0.0104
	2019	0.2271	0.0122	0.1720	0.0106	0.1698	0.0105

SOURCE Author's analysis of 2011-19 data from the Medical Expenditure Panel Survey (MEPS)
Abbreviations: SE, Standard error; FPL, Federal Poverty Level

Table S1.5. Unadjusted trends in mental health care use by ACA income eligibility

	Any mental health care use			Any psychotropic medication use			Any mental health care ambulatory visit		
	Assistance ineligible	Marketplace eligible	Medicaid eligible	Assistance ineligible	Marketplace eligible	Medicaid eligible	Assistance ineligible	Marketplace eligible	Medicaid eligible
Pre, %	14.56*** [13.53,15.60]	14.79*** [13.89,15.70]	19.30*** [18.03,20.56]	12.12*** [11.18,13.05]	12.61*** [11.75,13.48]	16.72*** [15.49,17.95]	7.84*** [7.10,8.57]	8.57*** [7.94,9.20]	13.50*** [12.37,14.63]
Post1, %	15.65*** [14.65,16.66]	15.63*** [14.71,16.56]	21.91*** [20.41,23.41]	12.26*** [11.30,13.22]	12.94*** [12.04,13.83]	18.37*** [16.90,19.85]	9.46*** [8.68,10.24]	9.31*** [8.61,10.00]	15.55*** [14.31,16.80]
Post2, %	17.11*** [16.11,18.10]	16.64*** [15.81,17.48]	22.71*** [21.17,24.25]	12.70*** [11.73,13.66]	13.04*** [12.28,13.81]	17.82*** [16.46,19.19]	10.98*** [10.22,11.75]	10.86*** [10.21,11.50]	16.58*** [15.33,17.84]
Post1-Pre trend[a]	1.09 [-0.39,2.57]	0.84 [-0.18,1.86]	2.61** [0.92,4.31]	0.15 [-1.23,1.52]	0.32 [-0.68,1.33]	1.66 [-0.05,3.36]	1.63** [0.56,2.69]	0.73 [-0.17,1.64]	2.05** [0.57,3.54]
Post2-Pre trend[a]	2.54*** [1.11,3.97]	1.85** [0.61,3.09]	3.41*** [1.47,5.36]	0.58 [-0.75,1.91]	0.43 [-0.72,1.59]	1.10 [-0.68,2.89]	3.15*** [2.07,4.23]	2.29*** [1.40,3.17]	3.09*** [1.42,4.75]
Post1-Pre trends difference[a]	[Reference]	-0.25 [-1.99,1.48]	1.52 [-0.73,3.78]	[Reference]	0.18 [-1.32,1.68]	1.51 [-0.77,3.79]	[Reference]	-0.89 [-2.34,0.56]	0.43 [-1.39,2.24]
Post2-Pre trends difference[a]	[Reference]	-0.69 [-2.59,1.20]	0.87 [-1.49,3.24]	[Reference]	-0.15 [-1.85,1.55]	0.52 [-1.68,2.72]	[Reference]	-0.86 [-2.30,0.58]	-0.06 [-2.03,1.90]

SOURCE Author's analysis of 2011-2019 data from the Medical Expenditure Panel Survey (MEPS). **NOTES** n =145,438 (US population 494,636,411). [a]Percentage point. No assistance (> 400% FPL); Marketplace eligible (>138-400% FPL); Medicaid eligible (≤ 138% FPL). Pre: pre-ACA 2011-13; Post1: post-ACA 2014-16; Post2: post-ACA 2017-19. All estimates were adjusted for complex survey design. All models were adjusted for age, sex, race or ethnicity, marital status, Census region, language, educational attainment, receipt of food stamps, employment status, number of chronic conditions, self-rated physical and mental health, Kessler-6-score, and presence of physical or social limitations.

95% confidence intervals in brackets

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

Table S1.6. Adjusted logistic regression output of mental health care use among non-elderly adults

	All nonelderly adult population n =145,438 (N = 494,636,411)						Nonelderly adults with mental health care needs[a] n = 34,870 (US population 113,616,336)					
	Any mental health care use		Any psychotropic medication fill		Any mental health ambulatory visit		Any mental health care use		Any psychotropic medication fill		Any mental health ambulatory visit	
	OR	**SE**	**OR**	**SE**	**OR**	**SE**	**OR**	**SE**	**OR**	**SE**	**OR**	**SE**
>138-400% FPL (Ref: >400% FPL)	0.88*	(0.05)	0.89	(0.05)	0.88	(0.06)	0.90	(0.07)	0.89	(0.07)	0.90	(0.08)
≤ 138% FPL	0.79***	(0.05)	0.81**	(0.06)	0.88	(0.07)	0.80**	(0.07)	0.83*	(0.07)	0.89	(0.09)
PostACA1 2014-19 (Ref: PreACA)	1.16*	(0.07)	1.07	(0.07)	1.30***	(0.09)	1.28**	(0.10)	1.16	(0.10)	1.53***	(0.15)
postACA2 2017-19	1.36***	(0.08)	1.18*	(0.08)	1.58***	(0.11)	1.43***	(0.11)	1.15	(0.10)	1.67***	(0.16)
>138-400 FPL # postACA1 2014-16	1.04	(0.08)	1.08	(0.08)	0.93	(0.09)	0.98	(0.10)	1.07	(0.11)	0.80	(0.10)
>138-400 FPL # postACA2 2017-19	0.92	(0.07)	0.95	(0.08)	0.86	(0.08)	0.89	(0.10)	0.96	(0.11)	0.83	(0.10)
≤ 138 FPL # postACA1 2014-16	1.01	(0.09)	1.01	(0.10)	0.90	(0.09)	0.88	(0.09)	0.93	(0.11)	0.75*	(0.09)
≤ 138 FPL # postACA2 2017-19	0.94	(0.08)	0.89	(0.09)	0.83	(0.08)	0.87	(0.09)	0.92	(0.10)	0.75*	(0.09)
Age (years)	0.99***	(0.00)	1.00	(0.00)	0.98***	(0.00)	0.99**	(0.00)	1.00	(0.00)	0.99***	(0.00)
Female (Ref: Male)	1.91***	(0.05)	2.03***	(0.06)	1.49***	(0.05)	1.85***	(0.07)	1.88***	(0.08)	1.40***	(0.06)
Hispanic (Ref: non-Hispanic White)	0.54***	(0.02)	0.48***	(0.02)	0.69***	(0.03)	0.65***	(0.04)	0.58***	(0.04)	0.81***	(0.05)
Non-Hispanic Black	0.32***	(0.01)	0.26***	(0.01)	0.47***	(0.02)	0.37***	(0.02)	0.31***	(0.02)	0.55***	(0.03)
Non-Hispanic Other	0.38***	(0.02)	0.33***	(0.02)	0.50***	(0.03)	0.41***	(0.03)	0.39***	(0.03)	0.54***	(0.04)
Div/Wid/Sep (Ref: Married)	1.31***	(0.05)	1.22***	(0.05)	1.55***	(0.07)	1.23***	(0.06)	1.15**	(0.05)	1.46***	(0.07)
Never Married	1.15***	(0.04)	1.09*	(0.04)	1.33***	(0.05)	1.07	(0.05)	0.98	(0.05)	1.24***	(0.06)
Midwest (Ref: Northeast)	1.04	(0.05)	1.13**	(0.05)	0.87*	(0.05)	0.97	(0.06)	1.10	(0.07)	0.80***	(0.05)
South	0.95	(0.04)	1.08	(0.04)	0.78***	(0.04)	0.90	(0.05)	1.01	(0.06)	0.74***	(0.05)
West	0.92	(0.05)	0.86*	(0.05)	0.89*	(0.05)	0.85*	(0.06)	0.85*	(0.06)	0.81**	(0.06)
Spanish/Other (Ref: English)	0.39***	(0.03)	0.37***	(0.03)	0.47***	(0.04)	0.40***	(0.04)	0.39***	(0.04)	0.51***	(0.05)
High school (Ref: Less than high school)	1.18***	(0.06)	1.22***	(0.06)	1.19***	(0.06)	1.18**	(0.07)	1.24***	(0.08)	1.22**	(0.07)
Some college	1.51***	(0.08)	1.53***	(0.08)	1.52***	(0.08)	1.50***	(0.10)	1.53***	(0.11)	1.51***	(0.10)
College or more	1.88***	(0.10)	1.65***	(0.09)	2.27***	(0.13)	1.86***	(0.13)	1.65***	(0.11)	2.18***	(0.16)
SNAP receipt	1.14**	(0.05)	1.15**	(0.05)	1.16***	(0.05)	1.19**	(0.06)	1.17**	(0.06)	1.23***	(0.07)
One or two chronic conditions (Ref: None)	1.68***	(0.05)	1.78***	(0.06)	1.47***	(0.05)	1.55***	(0.07)	1.65***	(0.08)	1.32***	(0.06)
Three or more	2.49***	(0.11)	2.66***	(0.13)	1.76***	(0.09)	2.09***	(0.13)	2.22***	(0.15)	1.44***	(0.09)
Good perceived physical health (Ref: Excellent/very good)	0.86***	(0.03)	0.88***	(0.03)	0.82***	(0.03)	0.85**	(0.04)	0.90*	(0.05)	0.83***	(0.04)
Fair/Poor perceived physical health	0.72***	(0.03)	0.75***	(0.04)	0.60***	(0.03)	0.67***	(0.04)	0.71***	(0.04)	0.58***	(0.04)
Good perceived mental health (Ref: Excellent/very good)	2.45***	(0.08)	2.40***	(0.08)	2.52***	(0.10)	2.04***	(0.10)	2.02***	(0.10)	2.06***	(0.12)

Fair/Poor perceived mental health	5.69***	(0.24)	5.18***	(0.25)	6.50***	(0.32)	4.64***	(0.26)	4.26***	(0.25)	5.15***	(0.34)
Physical or social limitations	1.79***	(0.07)	1.71***	(0.07)	1.93***	(0.08)	1.81***	(0.08)	1.66***	(0.07)	1.90***	(0.10)
Moderate mental illness (K6 score, 4-12)[b]	2.54***	(0.07)	2.56***	(0.08)	2.56***	(0.07)						
Severe mental illness (K6 score, 13-24)	4.71***	(0.23)	4.54***	(0.22)	4.83***	(0.26)	1.93***	(0.09)	1.85***	(0.08)	1.99***	(0.10)
Full-time employed (30+) (Ref: Unemployed)	0.79***	(0.03)	0.78***	(0.03)	0.75***	(0.03)	0.73***	(0.03)	0.74***	(0.04)	0.72***	(0.04)
Part-time employed (<30)	1.01	(0.04)	0.95	(0.04)	1.02	(0.05)	0.90	(0.05)	0.84**	(0.06)	0.94	(0.06)

SOURCE Author's analysis of 2011-19 data from the Medical Expenditure Panel Survey (MEPS) NOTES [a] Mental health care needs include individuals with Kessler-6 score (4-24); [b] Reference (no mental illness for all population models and moderate mental illness for population with mental health care need models)
Abbreviations: SE, Standard error; OR, Odds ratio; FPL, Federal Poverty Level

Supplemental Materials for Chapter 6

Impact of the ACA on Mental Health Care Access, Expenditure, and Affordability in the Non-group Market (Objective 2)

Table S2.1. Missing values on covariates among eligible study sample

Variable	Missing, n	Missing, %
Age	0	0
Female	0	0
Race/ethnicity	0	0
Number of chronic conditions	0	0
Income relative to FPL	0	0
Interview language	0	0
Marital status	3	0.01
Employment Status	110	0.19
Perceived physical health	166	0.29
Perceived mental health	177	0.31
Region	216	0.38
Physical or social limitations	401	0.70
Educations	556	0.97
n	57,107	

Box, violin, and scatter plots of the distribution of outcome variables in the analytic sample

A small number of respondents reported receiving mental health services while associated payments for those services were zero (3 respondents for psychotropic medication fills and 94 for ambulatory mental health visits). Zero-dollar events in MEPS can occur for several reasons, including situations where care is provided for free, instances of bad debt, follow-up events with no charge, or events that are part of a flat fee. All zero-dollar events were included in the analysis of mental health care use.

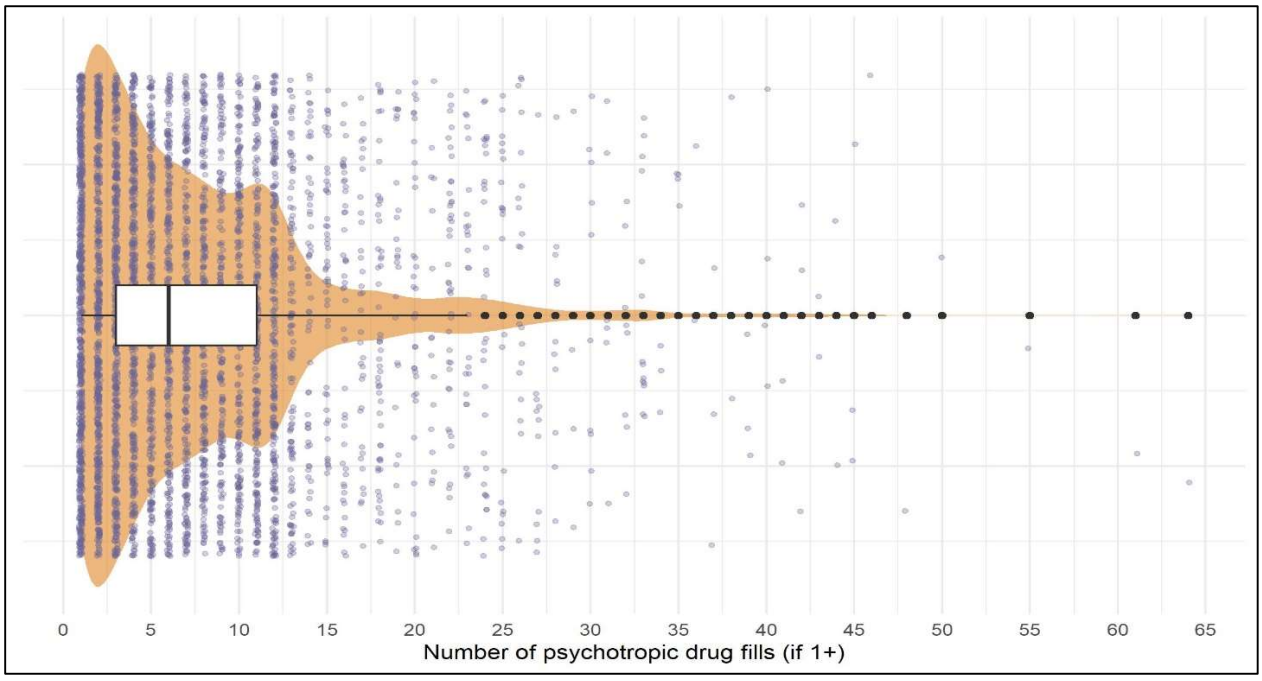

Figure S2.1. Distribution of psychotropic drug fills among individuals with at least one fill (n=4,465)

Six observations (0.13%, 99.8th percentile) were top coded at 45 fills

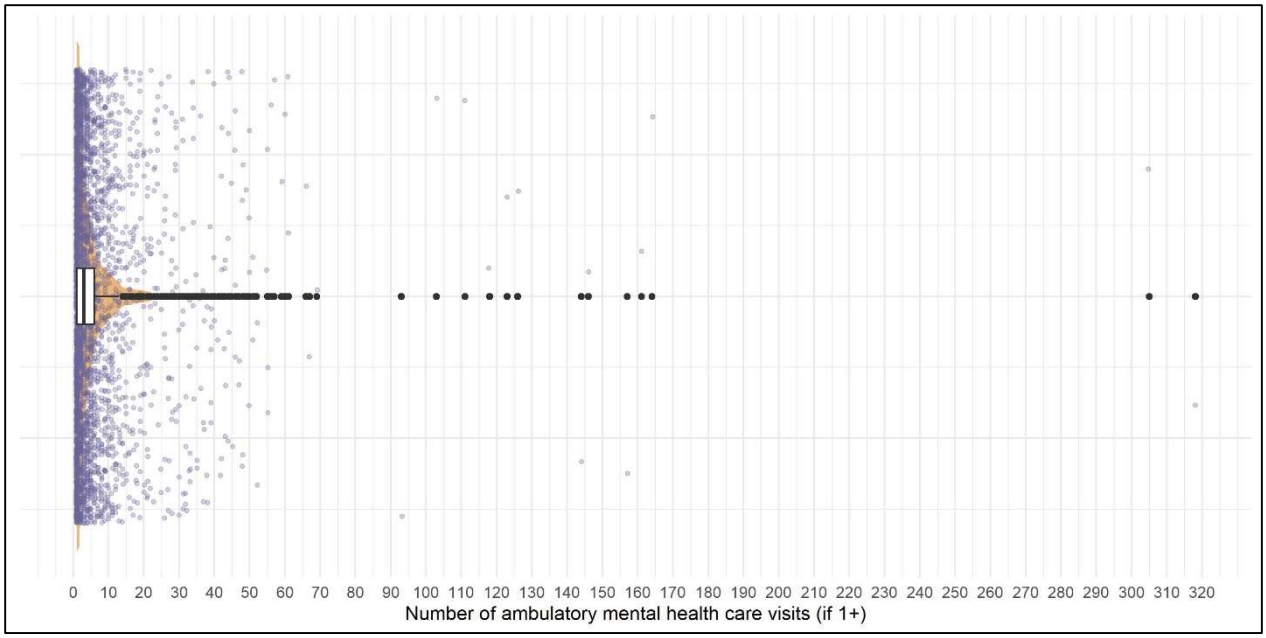

Figure S2.2. Distribution of ambulatory mental health care visits among individuals with at least one visit (n=3,242)

Thirteen observations (0.40%, ~ 99.6th percentile) were top coded at 70 visits

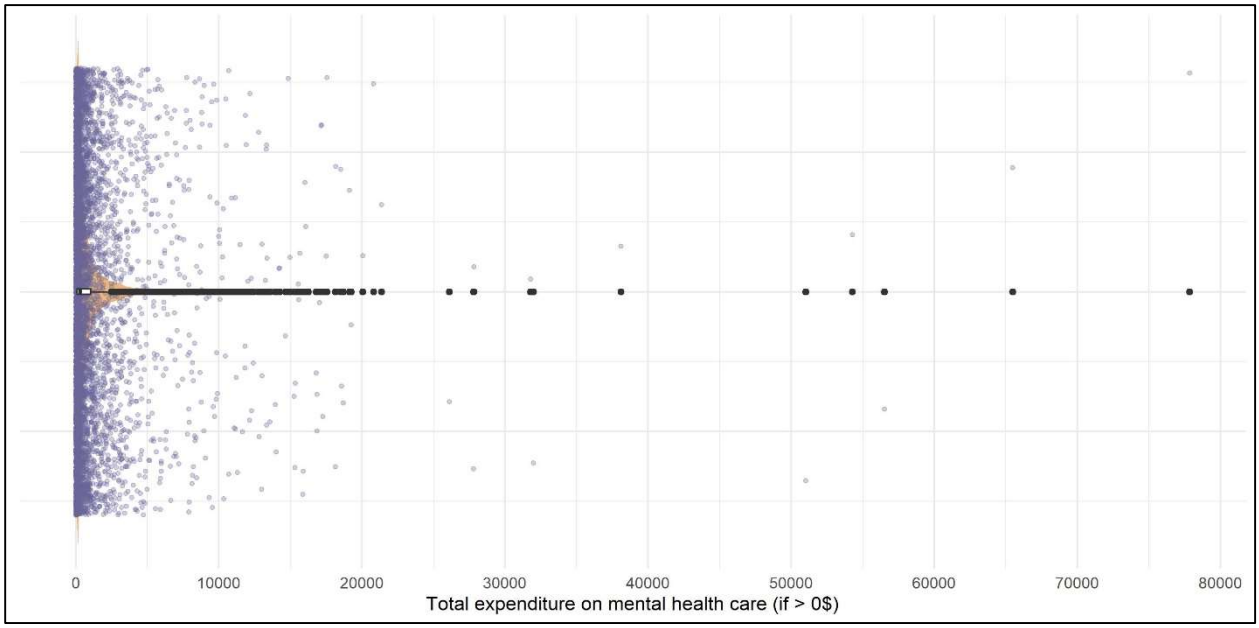

Figure S2.3. Distribution of total expenditure on mental health care (ambulatory visits and psychotropic prescriptions) among individuals with any expenditure (n = 5,529)

Eight observations (0.14%, ~99.9th percentile) were top coded at $30,000

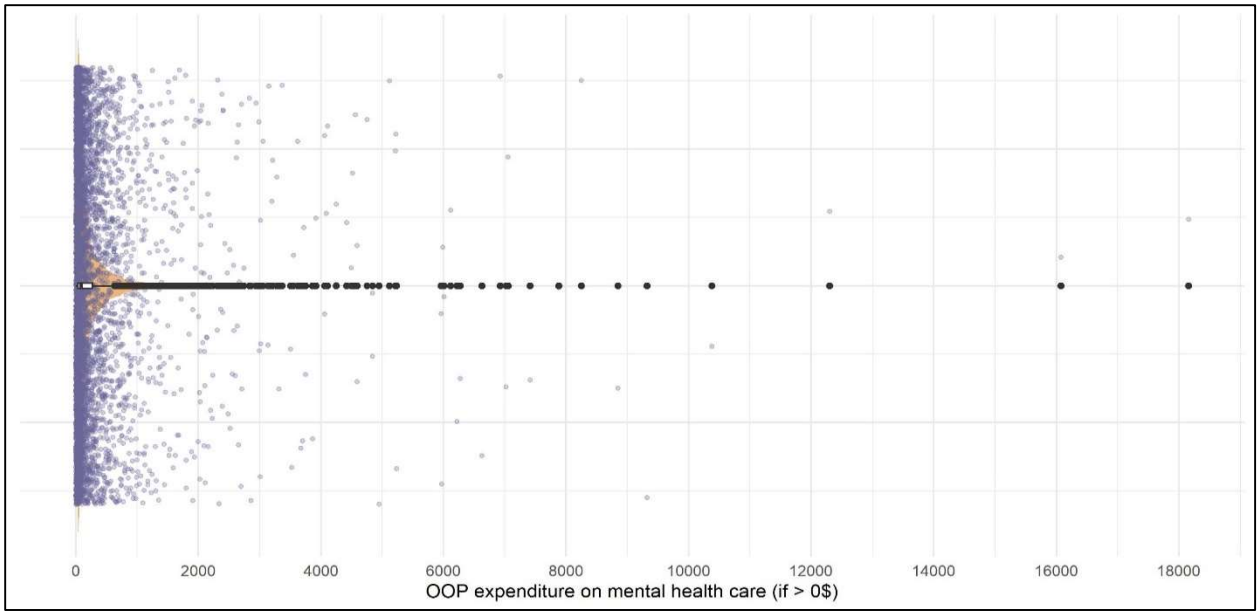

Figure S2.4. Distribution of out-of-pocket expenditure (OOP) on mental health care (ambulatory visits and psychotropic prescriptions) among individuals with any OOP expenditure (n = 5,136)

Seven observations (0.14%, ~99.8th percentile) were top coded at $8000

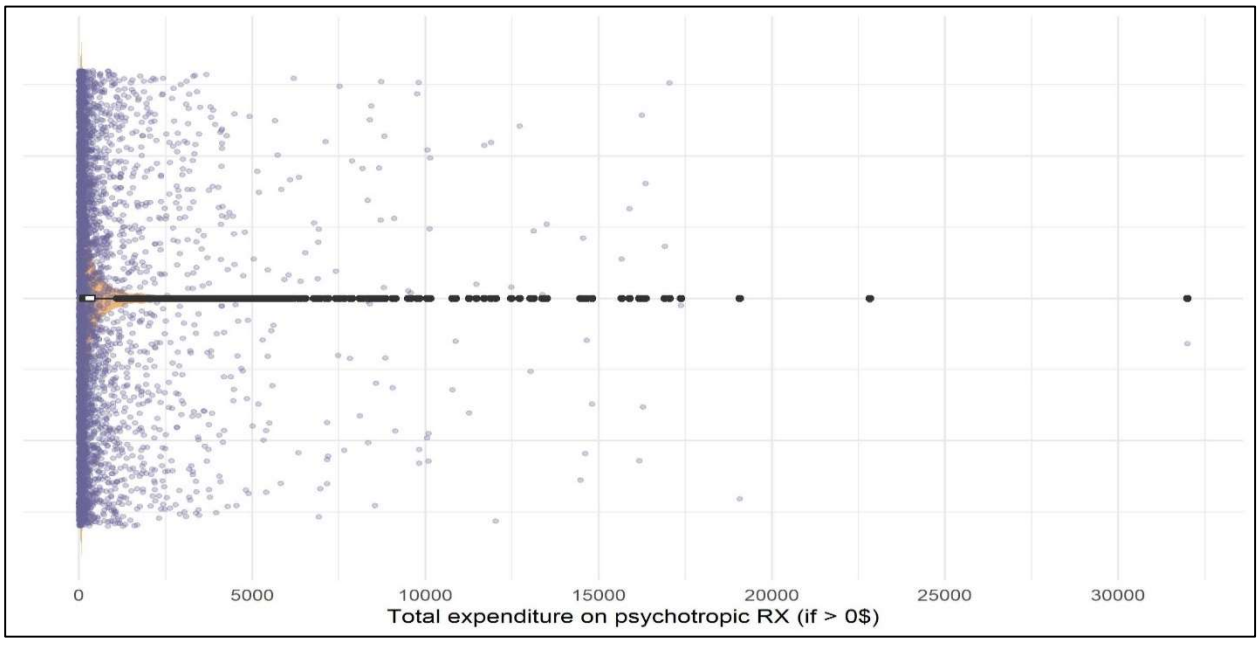

Figure S2.5. Distribution of total expenditure on psychotropic prescription fills among individuals with any spending (n = 4,462)

Five observations (0.11%, ~99.9th percentile) were top coded at $17,000 for the total expenditure on psychotropic prescriptions

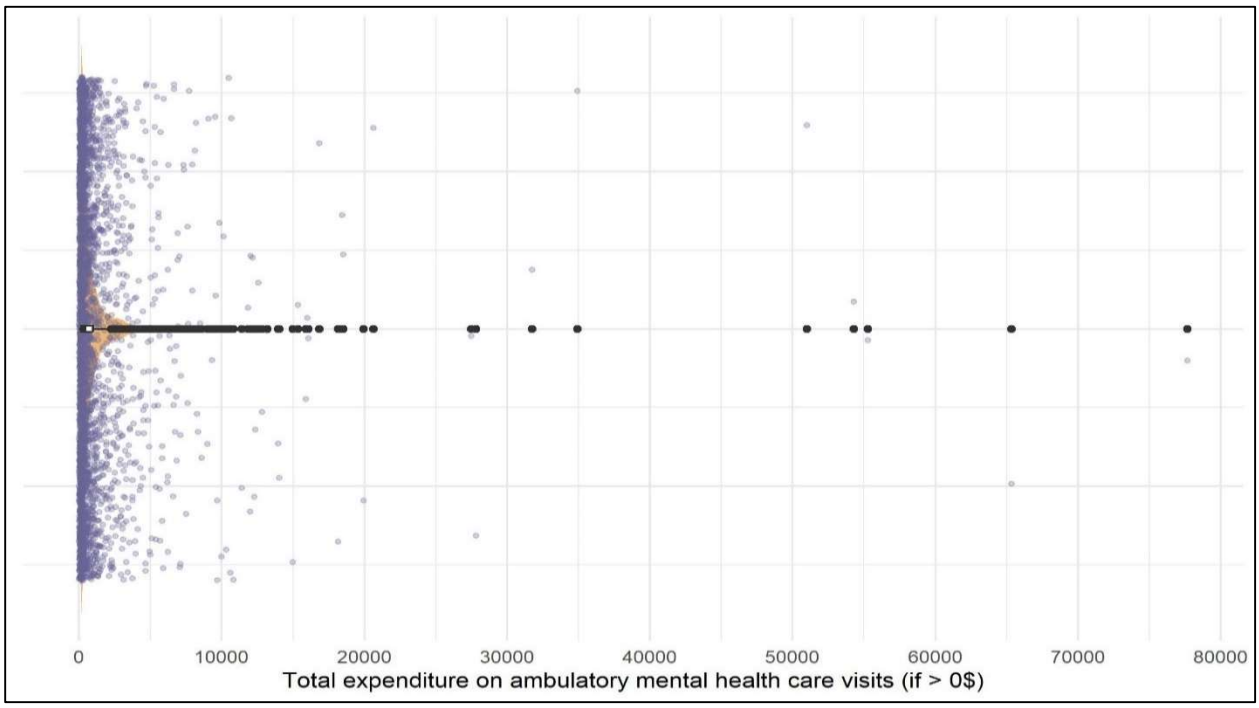

Figure S2.6. Distribution of total expenditure on ambulatory mental health care visits among individuals with any spending (n = 3,148)

Ten observations (0.32%, ~99.7th percentile) were top coded at $20,000 for the total expenditure on ambulatory mental health care visits

Table S2.2 Two-part model coefficients of mental health care use and expenditure overall and by type of service

	Any mental health care use	Psychotropic medication fills	Mental health ambulatory visits	Total mental health care expenditure	OOP mental health care expenditure	Total expenditure on psychotropic medications	Total expenditure on mental health ambulatory visits
Part I: Logit							
Treatment, Marketplace eligible (Ref: Control, Stable ESI)	-0.22**	-0.25**	-0.29**	-0.24**	-0.25**	-0.25**	-0.35**
	(0.06)	(0.07)	(0.08)	(0.07)	(0.07)	(0.07)	(0.08)
PostACA1 2014-16 (Ref: PreACA 2011-13)	0.04	0.02	0.03	0.04	0.01	0.02	0.03
	(0.07)	(0.08)	(0.09)	(0.07)	(0.07)	(0.08)	(0.08)
PostACA2 2017-19 (Ref: PreACA 2011-13)	0.11	0.02	0.16*	0.11†	0.06	0.02	0.18*
	(0.07)	(0.07)	(0.08)	(0.07)	(0.07)	(0.07)	(0.08)
Treatment # PostACA1	0.07	0.07	0.16	0.06	0.06	0.07	0.17
	(0.10)	(0.10)	(0.12)	(0.10)	(0.10)	(0.10)	(0.12)
Treatment # PostACA2	0.06	0.03	0.15	0.07	0.09	0.03	0.18
	(0.10)	(0.12)	(0.13)	(0.10)	(0.10)	(0.12)	(0.13)
Age	-0.01**	-0.00†	-0.02**	-0.01**	-0.01**	-0.00†	-0.02**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Female (Ref: Male)	0.85**	0.93**	0.61**	0.85**	0.89**	0.93**	0.62**
	(0.04)	(0.05)	(0.06)	(0.04)	(0.05)	(0.05)	(0.06)
Hispanic (Ref: Non-Hispanic White)	-0.75**	-0.96**	-0.45**	-0.76**	-0.83**	-0.96**	-0.48**
	(0.07)	(0.08)	(0.08)	(0.07)	(0.07)	(0.08)	(0.08)
Non-Hispanic Black	-1.56**	-1.85**	-1.13**	-1.58**	-1.67**	-1.85**	-1.15**
	(0.07)	(0.08)	(0.09)	(0.07)	(0.08)	(0.08)	(0.09)
Non-Hispanic Other/Multiple Races	-1.10**	-1.19**	-0.89**	-1.11**	-1.15**	-1.19**	-0.91**
	(0.10)	(0.11)	(0.11)	(0.10)	(0.10)	(0.11)	(0.11)
Divorced/Widowed/Separated (Ref: Married)	0.28**	0.22**	0.36**	0.28**	0.27**	0.22**	0.35**
	(0.06)	(0.06)	(0.08)	(0.06)	(0.06)	(0.06)	(0.08)
Never Married	0.08	-0.01	0.24**	0.08	0.08	-0.01	0.23**
	(0.05)	(0.06)	(0.07)	(0.05)	(0.06)	(0.06)	(0.06)
Midwest (Ref: Northeast)	0.16†	0.24*	0.06	0.16†	0.13	0.24*	0.04
	(0.08)	(0.09)	(0.08)	(0.09)	(0.09)	(0.09)	(0.09)
South	0.16†	0.28**	-0.01	0.17*	0.15†	0.28**	-0.01
	(0.08)	(0.09)	(0.08)	(0.08)	(0.09)	(0.09)	(0.08)
West	0.09	0.04	0.14	0.10	0.04	0.04	0.15
	(0.09)	(0.11)	(0.09)	(0.10)	(0.10)	(0.11)	(0.10)
Spanish/Other (Ref: English interview language)	-1.09**	-1.14**	-1.04**	-1.09**	-1.04**	-1.14**	-1.02**
	(0.12)	(0.13)	(0.13)	(0.12)	(0.12)	(0.13)	(0.13)
High school (Ref: Less than high school)	0.27**	0.26*	0.18	0.28**	0.30**	0.26*	0.19†
	(0.09)	(0.11)	(0.11)	(0.10)	(0.10)	(0.11)	(0.11)
Some college	0.56**	0.55**	0.59**	0.56**	0.59**	0.55**	0.60**

	(0.09)	(0.11)	(0.12)	(0.10)	(0.10)	(0.11)	(0.12)
College or more	0.76**	0.59**	0.91**	0.76**	0.79**	0.59**	0.92**
	(0.10)	(0.11)	(0.12)	(0.10)	(0.11)	(0.11)	(0.12)
One or two conditions (Ref: No chronic conditions)	0.49**	0.55**	0.34**	0.50**	0.50**	0.55**	0.35**
	(0.05)	(0.06)	(0.06)	(0.05)	(0.05)	(0.06)	(0.06)
Three or more	0.93**	1.03**	0.54**	0.94**	0.91**	1.02**	0.56**
	(0.08)	(0.09)	(0.09)	(0.08)	(0.08)	(0.09)	(0.10)
Good perceived physical health (Ref: Excellent/ very good)	-0.05	-0.01	-0.13*	-0.06	-0.05	-0.01	-0.14*
	(0.05)	(0.06)	(0.06)	(0.05)	(0.05)	(0.06)	(0.06)
Fair/Poor perceived physical health	-0.07	-0.04	-0.27**	-0.07	-0.09	-0.04	-0.28**
	(0.08)	(0.09)	(0.09)	(0.08)	(0.08)	(0.09)	(0.09)
Good perceived mental health (Ref: Excellent/ very good)	1.00**	0.97**	1.09**	1.00**	1.01**	0.97**	1.10**
	(0.05)	(0.05)	(0.07)	(0.05)	(0.05)	(0.05)	(0.07)
Fair/Poor	2.11**	2.11**	2.41**	2.12**	2.12**	2.11**	2.41**
	(0.08)	(0.09)	(0.09)	(0.08)	(0.08)	(0.09)	(0.09)
Physical or social limitations (Ref: no limitations)	0.60**	0.53**	0.77**	0.59**	0.57**	0.53**	0.75**
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)
Full-time employed (30+ hrs.) (Ref: unemployed)	-0.03	-0.05	-0.12	-0.03	-0.01	-0.05	-0.12
	(0.06)	(0.07)	(0.07)	(0.06)	(0.07)	(0.07)	(0.07)
Part-time employed (<30 hrs.)	0.03	-0.11	0.03	0.03	0.01	-0.11	0.04
	(0.08)	(0.09)	(0.09)	(0.08)	(0.08)	(0.09)	(0.09)
FPL 251-400% (Ref: 139-250% FPL)	0.06	-0.00	0.09†	0.06	0.06	0.00	0.09
	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)	(0.06)	(0.05)
Constant	-3.23**	-3.56**	-3.33**	-3.24**	-3.36**	-3.56**	-3.35**
	(0.17)	(0.19)	(0.18)	(0.17)	(0.18)	(0.19)	(0.18)
Part II: GLM							
Treatment, Marketplace eligible (Ref: Control, Stable ESI)		-0.13*	-0.12	-0.52**	0.19*	-0.39**	-0.46**
		(0.06)	(0.10)	(0.10)	(0.10)	(0.12)	(0.12)
PostACA1 2014-16 (Ref: PreACA 2011-13)		-0.03	-0.06	-0.32**	-0.26**	-0.17	-0.51**
		(0.05)	(0.09)	(0.10)	(0.09)	(0.13)	(0.13)
PostACA2 2017-19 (Ref: PreACA 2011-13)		-0.08†	0.10	-0.14	-0.16†	-0.12	-0.17
		(0.05)	(0.10)	(0.10)	(0.09)	(0.13)	(0.13)
Treatment # PostACA1		0.09	0.16	0.43**	0.28†	0.12	0.70**
		(0.09)	(0.16)	(0.15)	(0.15)	(0.20)	(0.17)
Treatment # PostACA2		0.14	0.23	0.43**	0.17	-0.00	0.62**
		(0.08)	(0.15)	(0.15)	(0.16)	(0.19)	(0.18)
Age		0.00	-0.00	-0.01*	-0.01*	-0.01*	-0.00
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Female (Ref: Male)		-0.02	0.02	-0.07	-0.16*	-0.04	-0.10
		(0.04)	(0.06)	(0.07)	(0.07)	(0.08)	(0.08)
Hispanic (Ref: Non-Hispanic White)		-0.06	-0.08	-0.11	-0.12	-0.17	-0.02
		(0.07)	(0.09)	(0.10)	(0.11)	(0.12)	(0.11)
Non-Hispanic Black		-0.28**	-0.01	-0.16	-0.43**	-0.35*	0.10
		(0.07)	(0.10)	(0.11)	(0.12)	(0.17)	(0.11)
Non-Hispanic Other/Multiple races		-0.21*	-0.37**	-0.30	-0.53**	-0.34	-0.27*

	(0.08)	(0.11)	(0.21)	(0.11)	(0.35)	(0.14)
Divorced/Widowed/Separated (Ref: Married)	0.11*	0.12	0.14	0.01	0.19	-0.01
	(0.05)	(0.07)	(0.09)	(0.08)	(0.12)	(0.08)
Never Married	0.06	0.30**	0.30**	0.26**	0.14	0.29**
	(0.05)	(0.07)	(0.08)	(0.08)	(0.12)	(0.09)
Midwest (Ref: Northeast)	0.03	-0.13	0.02	0.22*	0.05	0.01
	(0.06)	(0.09)	(0.10)	(0.10)	(0.14)	(0.10)
South	0.07	-0.25**	-0.01	0.23*	0.08	-0.10
	(0.05)	(0.09)	(0.10)	(0.09)	(0.13)	(0.10)
West	0.05	-0.01	0.20†	0.36**	0.20	0.13
	(0.06)	(0.09)	(0.11)	(0.12)	(0.17)	(0.10)
Spanish/Other (Ref: English interview language)	-0.43**	0.13	0.09	0.03	-0.44	0.33†
	(0.11)	(0.18)	(0.19)	(0.24)	(0.32)	(0.20)
High school (Ref: Less than high school)	0.06	-0.09	0.17	-0.13	0.24	0.08
	(0.07)	(0.15)	(0.14)	(0.16)	(0.18)	(0.15)
Some college	0.12†	0.03	0.33*	0.13	0.40*	0.17
	(0.07)	(0.13)	(0.14)	(0.15)	(0.19)	(0.13)
College or more	0.16*	0.31*	0.51**	0.40*	0.48*	0.42**
	(0.07)	(0.14)	(0.14)	(0.16)	(0.19)	(0.15)
One or two conditions (Ref: No chronic conditions)	0.04	0.03	-0.07	-0.12	0.04	-0.10
	(0.04)	(0.06)	(0.07)	(0.07)	(0.10)	(0.08)
Three or more	0.04	-0.11	-0.03	-0.16	0.12	-0.09
	(0.05)	(0.10)	(0.11)	(0.11)	(0.13)	(0.13)
Good perceived physical health (Ref: Excellent/ very good)	0.04	0.03	0.05	-0.04	0.03	0.12
	(0.04)	(0.07)	(0.08)	(0.07)	(0.09)	(0.09)
Fair/Poor perceived physical health	0.02	-0.20*	-0.17†	-0.28**	-0.07	-0.18†
	(0.05)	(0.09)	(0.09)	(0.10)	(0.12)	(0.10)
Good perceived mental health (Ref: Excellent/ very good)	0.13**	0.34**	0.30**	0.36**	0.22*	0.22**
	(0.03)	(0.06)	(0.07)	(0.07)	(0.09)	(0.08)
Fair/Poor	0.37**	0.77**	0.93**	0.95**	0.68**	0.69**
	(0.05)	(0.08)	(0.09)	(0.10)	(0.11)	(0.11)
Physical or social limitations	0.18**	0.26**	0.44**	0.44**	0.43**	0.34**
	(0.04)	(0.08)	(0.09)	(0.09)	(0.13)	(0.09)
Full-time employed (30+ hrs.) (Ref: unemployed)	-0.12*	-0.19*	-0.32**	-0.15†	-0.25*	-0.30**
	(0.05)	(0.08)	(0.08)	(0.08)	(0.11)	(0.09)
Part-time employed (<30 hrs.)	-0.12*	0.22*	-0.19†	0.02	-0.27*	-0.03
	(0.06)	(0.11)	(0.11)	(0.11)	(0.13)	(0.11)
FPL 251-400% (Ref: 139-250% FPL)	-0.01	0.04	0.05	0.06	0.03	0.11
	(0.03)	(0.06)	(0.07)	(0.06)	(0.08)	(0.07)
Constant	1.79**	1.45**	7.03**	5.50**	6.49**	6.76**
	(0.11)	(0.21)	(0.26)	(0.26)	(0.32)	(0.26)

Standard errors in parentheses; † $p < 0.10$, * $p < 0.05$, **$p < 0.0$l

Supplemental Materials for Chapter 7

Financial Burden and Physical Comorbidities in Individuals with Mental Health Needs (Objective 3)

Table S3.1. Average marginal change in the probability of financial burden outcomes in non-elderly adults with mental health needs by number of chronic conditions

	Subjective financial burden				Objective financial burden			
	Problems paying medical bills		Paying medical bills over time		OOP > 10% family income		OOP > 5% family income	
	PP	95% CI	PP	95% CI	PP	95% CI	PP	95% CI
One or two (Ref: no chronic conditions)	3.45***	[1.96,4.95]	3.81***	[1.84,5.79]	2.14**	[0.85,3.42]	3.57***	[1.75,5.38]
Three or more	8.13***	[6.02,10.24]	9.20***	[6.27,12.12]	3.65***	[2.01,5.29]	7.25***	[5.06,9.44]
26-35 (Ref: age 18-25)	-0.74	[-3.53,2.05]	0.02	[-2.95,3.00]	0.05	[-1.65,1.76]	-1.76	[-4.34,0.81]
36-45	-0.76	[-3.51,1.99]	-1.43	[-4.68,1.83]	0.69	[-1.24,2.61]	1.17	[-1.63,3.97]
46-55	-2.77	[-5.57,0.03]	-3.58*	[-6.90,-0.26]	0.23	[-1.67,2.12]	-0.22	[-2.99,2.55]
56-64	-4.62**	[-7.53,-1.72]	-7.58***	[-11.07,-4.09]	0.75	[-1.27,2.78]	2.32	[-0.85,5.50]
Female (Ref: male)	2.62***	[1.27,3.97]	3.02***	[1.60,4.45]	1.43**	[0.55,2.30]	2.41***	[1.21,3.62]
Hispanic (Ref: Non-Hispanic White)	-2.92**	[-5.06,-0.78]	-4.78***	[-7.44,-2.12]	-4.49***	[-5.82,-3.16]	-6.82***	[-8.66,-4.98]
Non-Hispanic Black	-2.47*	[-4.43,-0.51]	-5.32***	[-7.73,-2.91]	-4.63***	[-5.99,-3.27]	-8.39***	[-10.40,-6.37]
Non-Hispanic Other	-4.10**	[-6.68,-1.52]	-5.94***	[-9.05,-2.83]	-2.81**	[-4.68,-0.95]	-6.91***	[-9.48,-4.33]
Divorced/Widowed/Separated (Ref: Married)	1.88	[-0.02,3.79]	-3.62**	[-5.96,-1.28]	-0.71	[-2.04,0.63]	-1.84*	[-3.66,-0.01]
Never Married	-1.67	[-3.53,0.18]	-6.88***	[-9.12,-4.65]	1.00	[-0.49,2.49]	-0.35	[-2.35,1.65]
Midwest (Ref: Northeast)	-0.38	[-3.43,2.68]	4.84**	[1.20,8.47]	1.70	[-0.17,3.57]	2.03	[-0.42,4.48]
South	-0.68	[-3.18,1.82]	3.43	[-0.01,6.87]	1.51	[-0.28,3.29]	0.44	[-1.79,2.68]
West	-4.91***	[-7.36,-2.47]	-1.35	[-4.80,2.10]	0.82	[-1.02,2.67]	0.09	[-2.37,2.54]
High school (Ref: Less than high school)	2.69*	[0.49,4.90]	2.59	[-0.05,5.24]	-0.13	[-1.36,1.09]	0.53	[-1.42,2.47]
Some college	1.82	[-0.59,4.23]	3.73**	[1.01,6.45]	1.27	[-0.15,2.69]	2.84**	[0.90,4.78]
College or more	-3.80**	[-6.37,-1.23]	-5.52***	[-8.58,-2.45]	2.49*	[0.56,4.42]	6.30***	[3.83,8.78]
>138-400 FPL (Ref: >400% FPL)	11.52***	[9.34,13.69]	9.98***	[7.58,12.38]	4.61***	[3.74,5.49]	9.45***	[7.83,11.07]
≤ 138 FPL	7.51***	[4.91,10.11]	4.18**	[1.14,7.21]	19.38***	[17.12,21.63]	24.89***	[22.13,27.64]
SNAP receipt	1.83	[-0.26,3.92]	-2.17	[-4.58,0.24]	-2.12***	[-3.34,-0.91]	-4.49***	[-6.10,-2.87]
Full-time (30+) (Ref: unemployed)	3.16***	[1.35,4.97]	3.00**	[0.96,5.05]	-5.79***	[-6.98,-4.59]	-7.20***	[-8.86,-5.54]
Part-time (<30)	1.46	[-0.67,3.58]	3.20*	[0.64,5.76]	-3.83***	[-5.48,-2.18]	-3.23*	[-5.70,-0.77]
Good (Ref: physical health excellent/very good)	2.44*	[0.53,4.34]	4.12***	[2.05,6.19]	0.86	[-0.41,2.13]	-1.09	[-2.95,0.78]
Fair/Poor	6.04***	[3.94,8.15]	7.37***	[4.62,10.13]	2.54**	[0.90,4.19]	3.03*	[0.47,5.58]
Good (Ref: mental health excellent/ very good)	0.55	[-1.14,2.23]	-1.10	[-3.01,0.81]	0.22	[-1.14,1.58]	1.59	[-0.10,3.29]
Fair/Poor	3.14*	[0.69,5.58]	-0.89	[-3.53,1.75]	0.46	[-0.92,1.84]	1.50	[-0.37,3.38]
Physical or social limitations	7.05***	[4.89,9.20]	4.25***	[1.99,6.51]	2.84***	[1.41,4.28]	6.27***	[4.05,8.48]
SMI (Ref: moderate mental illness)	2.95***	[1.48,4.43]	2.91**	[1.13,4.69]	0.82	[-0.20,1.83]	1.47*	[0.12,2.81]

Uninsured (Ref: ESI)	8.97***	[6.03,11.91]	-2.27	[-5.37,0.83]	2.57*	[0.26,4.88]	1.55	[-1.26,4.36]
Partial insured < 6 months	14.05***	[9.38,18.71]	3.35	[-1.30,8.00]	0.04	[-3.52,3.61]	-1.58	[-5.57,2.40]
Nongroup	2.35	[-1.21,5.90]	0.76	[-3.18,4.71]	5.47***	[2.31,8.62]	5.28**	[1.65,8.91]
Medicaid	-6.84***	[-8.79,-4.89]	-13.02***	[-15.32,-10.71]	-6.67***	[-8.30,-5.03]	-11.8***	[-13.90,-9.73]
Medicare only	7.37***	[3.44,11.29]	6.87**	[2.33,11.41]	-1.02	[-3.50,1.46]	-3.36*	[-6.64,-0.09]
Other	-1.96	[-5.15,1.23]	-8.16***	[-11.84,-4.48]	-1.61	[-3.88,0.66]	-3.55*	[-6.51,-0.58]

SOURCE Author's analysis of 2014-19 pooled data from the Medical Expenditure Panel Survey (MEPS). **NOTES** PP, percentage points; SMI, serious mental illness SNAP, supplemental nutrition assistance program; ESI, employer-sponsored insurance. 95% confidence intervals in brackets * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table S3.2. Average marginal change in the probability of financial burden outcomes in non-elderly adults with mental health needs by type of chronic conditions

	Subjective financial burden				Objective financial burden			
	Problems paying medical bills		Paying medical bills over time		OOP > 10% family income		OOP > 5% family income	
	PP	95% CI	PP	95% CI	PP	95% CI	PP	95% CI
High blood pressure	1.79*	[0.11,3.47]	1.85	[-0.28,3.99]	-0.34	[-1.55,0.88]	0.70	[-0.90,2.29]
High cholesterol	0.64	[-1.07,2.36]	1.40	[-0.56,3.35]	1.19*	[0.02,2.36]	2.16**	[0.58,3.74]
Stroke	0.92	[-2.36,4.21]	1.90	[-2.42,6.22]	-0.20	[-2.25,1.86]	-1.27	[-4.13,1.58]
Heart disease	2.92**	[1.13,4.72]	2.38	[-0.27,5.04]	1.35*	[0.03,2.66]	2.76**	[0.95,4.57]
Respiratory disease	2.75**	[1.05,4.45]	2.03*	[0.04,4.01]	0.92	[-0.40,2.23]	1.75*	[0.11,3.40]
Cancer	3.97**	[1.26,6.67]	3.35*	[0.45,6.24]	0.12	[-1.45,1.70]	2.58*	[0.17,5.00]
Diabetes	0.67	[-1.48,2.81]	0.55	[-2.01,3.10]	1.78*	[0.20,3.37]	4.71***	[2.51,6.91]
Arthritis	2.96**	[1.15,4.76]	2.39*	[0.25,4.53]	0.93	[-0.27,2.12]	0.92	[-0.77,2.62]
26-35 (Ref: age 18-25)	-0.60	[-3.39,2.19]	0.15	[-2.83,3.13]	0.23	[-1.43,1.89]	-1.59	[-4.15,0.96]
36-45	-0.39	[-3.14,2.36]	-0.99	[-4.22,2.24]	1.11	[-0.78,3.00]	1.58	[-1.23,4.39]
46-55	-2.44	[-5.31,0.42]	-3.05	[-6.35,0.25]	0.56	[-1.25,2.38]	-0.03	[-2.77,2.72]
56-64	-4.49**	[-7.51,-1.48]	-7.12***	[-10.63,-3.62]	1.01	[-0.96,2.99]	2.23	[-0.96,5.43]
Female (Ref: male)	2.31***	[1.00,3.63]	2.87***	[1.44,4.29]	1.34**	[0.44,2.24]	2.36***	[1.14,3.58]
Hispanic (Ref: Non-Hispanic White)	-2.63*	[-4.79,-0.47]	-4.66***	[-7.32,-2.00]	-4.58***	[-5.91,-3.26]	-6.99***	[-8.83,-5.16]
Non-Hispanic Black	-2.33*	[-4.33,-0.33]	-5.24***	[-7.70,-2.78]	-4.60***	[-5.96,-3.24]	-8.36***	[-10.37,-6.35]
Non-Hispanic Other	-4.05**	[-6.61,-1.48]	-5.90***	[-9.00,-2.80]	-2.90**	[-4.76,-1.03]	-7.07***	[-9.63,-4.51]
Divorced/Widowed/Separated (Ref: Married)	1.72	[-0.17,3.62]	-3.70**	[-6.06,-1.35]	-0.71	[-2.06,0.65]	-1.83	[-3.68,0.02]
Never Married	-1.61	[-3.46,0.24]	-6.86***	[-9.11,-4.61]	1.05	[-0.42,2.53]	-0.31	[-2.29,1.68]
Midwest (Ref: Northeast)	-0.47	[-3.53,2.58]	4.77*	[1.13,8.42]	1.66	[-0.19,3.52]	1.97	[-0.49,4.44]
South	-0.72	[-3.21,1.77]	3.40	[-0.03,6.83]	1.49	[-0.28,3.26]	0.38	[-1.87,2.63]
West	-4.90***	[-7.34,-2.46]	-1.40	[-4.86,2.05]	0.85	[-0.98,2.69]	0.16	[-2.32,2.63]
High school (Ref: less than high school)	2.71*	[0.50,4.92]	2.63	[-0.02,5.28]	-0.11	[-1.34,1.12]	0.60	[-1.36,2.56]
Some college	1.80	[-0.60,4.19]	3.77**	[1.05,6.50]	1.26	[-0.15,2.67]	2.85**	[0.91,4.78]
College or more	-3.75**	[-6.33,-1.16]	-5.52***	[-8.59,-2.45]	2.46*	[0.53,4.39]	6.28***	[3.82,8.74]
>138-400 FPL (Ref: >400% FPL)	11.55***	[9.36,13.74]	10.00***	[7.60,12.40]	4.59***	[3.71,5.47]	9.47***	[7.85,11.09]
≤ 138 FPL	7.47***	[4.87,10.08]	4.13**	[1.08,7.17]	19.40***	[17.14,21.65]	24.96***	[22.22,27.70]
SNAP receipt	1.69	[-0.41,3.78]	-2.20	[-4.63,0.23]	-2.13***	[-3.34,-0.93]	-4.54***	[-6.14,-2.93]
Full-time (30+) (Ref: unemployed)	3.33***	[1.52,5.13]	3.15**	[1.09,5.22]	-5.68***	[-6.88,-4.48]	-6.96***	[-8.63,-5.29]
Part-time (<30)	1.61	[-0.54,3.75]	3.32*	[0.72,5.91]	-3.82***	[-5.48,-2.16]	-3.10*	[-5.58,-0.63]
Good (Ref: (Ref: physical health excellent/ very good)	2.63**	[0.75,4.52]	4.46***	[2.40,6.53]	1.02	[-0.25,2.29]	-0.99	[-2.85,0.87]
Fair/Poor	5.92***	[3.81,8.03]	7.67***	[4.90,10.44]	2.53**	[0.86,4.20]	2.70*	[0.12,5.28]
Good (Ref: mental health excellent/ very good)	0.59	[-1.08,2.27]	-1.08	[-3.00,0.84]	0.23	[-1.13,1.59]	1.68	[-0.02,3.37]
Fair/Poor	3.15*	[0.71,5.58]	-0.91	[-3.56,1.75]	0.48	[-0.90,1.87]	1.61	[-0.28,3.51]
Physical or social limitations	6.71***	[4.53,8.89]	4.22***	[1.91,6.53]	2.82***	[1.38,4.27]	6.28***	[4.05,8.50]

Serious mental illness	2.88***	[1.41,4.35]	2.92**	[1.14,4.69]	0.82	[-0.19,1.83]	1.45*	[0.11,2.79]
Uninsured (Ref: ESI)	8.98***	[6.06,11.90]	-2.34	[-5.41,0.73]	2.60*	[0.29,4.90]	1.67	[-1.14,4.48]
Partial insured < 6 months	14.05***	[9.38,18.72]	3.30	[-1.36,7.95]	0.10	[-3.45,3.65]	-1.56	[-5.52,2.40]
Nongroup	2.30	[-1.24,5.83]	0.70	[-3.23,4.64]	5.53***	[2.42,8.64]	5.33**	[1.75,8.92]
Medicaid	-6.89***	[-8.83,-4.94]	-13.03***	[-15.34,-10.72]	-6.67***	[-8.29,-5.05]	-11.83***	[-13.91,-9.74]
Medicare only	6.89***	[2.95,10.84]	6.53**	[1.95,11.10]	-1.22	[-3.67,1.23]	-3.78*	[-7.05,-0.51]
Other	-1.91	[-5.12,1.30]	-8.16***	[-11.84,-4.48]	-1.51	[-3.78,0.76]	-3.44*	[-6.38,-0.50]

SOURCE Author's analysis of 2014-19 pooled data from the Medical Expenditure Panel Survey (MEPS). **NOTES** PP, percentage points; SMI, serious mental illness SNAP, supplemental nutrition assistance program; ESI, employer-sponsored insurance. 95% confidence intervals in brackets * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$