

THE AFFORDABLE CARE ACT AND ADULTS WITH SERIOUS PSYCHOLOGICAL  
DISTRESS: IMPACTS ON INSURANCE TYPE, HEALTH SERVICE USE, AND HEALTH  
CARE ACCESS DURING IMPLEMENTATION

By

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## **ABSTRACT OF THE DISSERTATION**

The Affordable Care Act and adults with serious psychological distress: Impacts on insurance type, health service use, and health care access during implementation.

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**Background:** Individuals with serious psychological distress (SPD) are significantly more likely to be uninsured or covered by Medicaid, and less likely to have private insurance than individuals with no psychological distress (NPD). They are in worse health and have greater health care needs relative to individuals with NPD, and they are more likely to have difficulties accessing all types of health care. The Affordable Care Act (ACA) sought to improve access to health care primarily through expanding health insurance coverage, which individuals with SPD often lack. Few studies have examined changes in health insurance status, health services use and access to health care among the SPD population during the time of ACA implementation. **Specific aims:** The goal of this dissertation is to observe changes to health insurance, health services use, and barriers to health care among individuals with serious psychological distress (SPD) during the time frame of the implementation of the Affordable Care Act (ACA) using the Medical Expenditure Panel Survey. This study aims to answer the following questions: 1a.) “How did health insurance coverage among individuals with SPD shift during ACA implementation?” 1b.) “Did health insurance coverage among individuals with mild-to-moderate psychological distress (MMPD) and no psychological distress (NPD) shift in a similar manner?” 2.) “How did the use of health services shift during ACA implementation among those with SPD and NPD?” 3a.) “How did need for health care and barriers to access of health care change during ACA implementation for individuals with SPD?” 3b.) “Did individuals with MMPD and NPD observe similar changes?”. **Methods:** Mental illness is measured using the Kessler 6 (K6) scale of non-specific psychological distress scale. A score of  $\geq 13$  is severe psychological distress (SPD), 12 to 8 is

mild to moderate psychological distress (MMPD), and  $\leq 7$  is no psychological distress (NPD). Pooled cross-sectional data from the 2011-2016 Integrated Public Use Microdata Series IPUMS Medical Expenditure Panel Survey is analyzed. Individuals included in the sample had a score on the K6, an income  $\leq 399\%$  of the federal poverty level and are between the ages of 27 and 64. Descriptive statistics were conducted using 2-sided t-tests for differences in proportions in categorical variables, and adjusted Wald tests for continuous variables. To address study aims 1a & 1b, multinomial probit regression was performed to assess differences in the proportion of individuals in each insurance category in each year of ACA implementation. To address specific aim 2, four health service outcomes were assessed in each year of ACA implementation (2011-2016) including emergency room use, hospitalizations, outpatient/office-based visits, and prescriptions. Analysis of health service use was conducted using a two-part hurdle model, where the first part of the model predicted the likelihood of utilizing each type of health service (i.e. emergency room, hospital discharges, outpatient/office-based visits or prescriptions), and the second part predicted the amount of health service use conditional upon any utilization. The combined model predicted expected utilization based on the likelihood of service use and the amount. To address specific aims 3a and 3b, access to health care outcomes include the need for health care, the unmet need for health care, and having a usual place of care. The probability of accessing health care in each year during ACA implementation (2012-2016) was compared to the reference year (2011) within each psychological distress group using logistic regression models, and marginal effects were reported.

**Results:** Individuals with SPD did not see significant changes in enrollment in private insurance in any year relative to 2011, although they did observe a 3 and 3.4 percentage point increase in enrollment in private insurance in 2014 and 2015, respectively. Individuals with SPD do not have a higher likelihood of enrollment in Medicaid until 2015 (8.6 percentage points,  $p < 0.001$ ) relative to 2011 and this remains elevated in 2016 (9 percentage points,  $p < 0.001$ ). However, the

uninsured rate for these individuals began to decline in 2014 and was 14.9 percentage points lower relative to 2011 by 2016 for those with SPD ( $p<0.001$ ). Among individuals with SPD, the likelihood of having an ER visit is higher in the 2014-2016 time period than in 2011, with a 7.7 percentage point increase by 2016 ( $p<0.05$ ). Similarly, the likelihood of having a prescription medication is higher in 2015 than in 2011 (4 percentage points,  $p<0.05$ ). The number of hospital discharges for individuals with SPD, conditioned upon having any, increased in 2016 relative to 2011 (0.6 discharges,  $p<0.01$ ). Outpatient/office-based visits, conditioned on having any, increased in 2014 & 2015 relative to 2011 (2014: 2.6 visits,  $p<0.1$ ; 2015: 2.5 visits,  $p<0.1$ ). Among individuals with SPD, the expected utilization is statistically significant and higher for hospital discharges in 2016 (0.12 discharges,  $p<0.1$ ), outpatient/office-based visits in 2014 (2.4 visits,  $p<0.05$ ) & 2015 (2.6 visits,  $p<0.1$ ), and prescriptions in 2015 (4.4 prescriptions,  $p<0.1$ ) relative to 2011. Each year during the time frame of ACA implementation (2012-2016) is associated with a lower probability of needing health care relative to 2011 for individuals with SPD, although this association is only statistically significant in 2013 (-6.6 percentage points,  $p<0.05$ ). The unmet need for health care seems to have increased during ACA implementation for individuals with SPD. They experience a significant increased unmet need in 2013 (5.8 percentage points,  $p<0.05$ ) and 2015 (5.1 percentage points,  $p<0.1$ ). Not having a usual place of care is generally higher in each year relative to 2011. For individuals with SPD, there are only statistically significant increases in not having a usual place of care in 2012 (4.2 percentage points,  $p<0.1$ ) and 2013 (8.1 percentage points,  $p<0.01$ ).

## ACKNOWLEDGEMENT

The path I took to arrive at the decision to pursue a PhD was wandering. There was a period of my life where I was sure that I did not want to pursue doctoral work. After completing my master's degree, I moved around, got married, worked in government, academia, and finally industry where I realized what I wanted to do with my career. Ultimately, I determined that to reach my career objectives I needed to pursue doctoral work. I chose to go to Rutgers because they offered a program that I could fit into my life which consisted of a full-time job, a marriage, and eventually children. I am incredibly grateful to have been able to complete my doctoral degree and still maintain all the other pieces of my life because of the program Rutgers offered. However, it has been one of the most challenging things I have ever done.

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## INTRODUCTION

The goal of this dissertation is to observe changes to health insurance, healthcare service use, and barriers to health care among individuals with serious psychological distress (SPD) during the time frame of the implementation of the Affordable Care Act (ACA) using the Medical Expenditure Panel Survey. The three chapters of this study aim to answer the following questions:

Chapter 1: How did health insurance coverage among individuals with SPD shift during ACA implementation? Did health insurance coverage among individuals with mild-to-moderate psychological distress (MMPD) and no psychological distress (NPD) shift in a similar manner?

Chapter 2: How did the use of health services shift during ACA implementation among those with SPD and NPD?

Chapter 3: How did need for health care and barriers to access of health care change during ACA implementation for individuals with SPD? Did individuals with MMPD and NPD experience similar changes?

The following section introduces characteristics of individuals with SPD and mental illness, and outlines patterns of health insurance coverage, health service use, and barriers to health care access for these individuals. It concludes with a description of ACA provisions that may have influenced these outcomes and mental health status and the rationale for further research.

### *Characteristics of individuals with mental illness and SPD*

Mental health issues are widely prevalent among non-elderly adults (age 18-64) in the United States, with 38.5% of adults in the US reporting at least one or more days where their mental health was not good in the past month [1]. In an analysis of the 2011 National Survey on

Drug Use and Health (NSDUH) approximately 25% of respondents had a mental illness, and 6.6% reported symptoms of serious mental illness. These respondents were more likely to be young, female, non-Hispanic whites, uninsured or covered by Medicaid, unemployed, have lower educational attainment, lower family income, and worse health compared to respondents who reported no mental illness [2].

Serious psychological distress (SPD) exists among a subgroup of individuals with moderate to severe mental illness. It is defined as “a mental health problem severe enough to cause moderate-to-serious impairment in social, occupational, or school functioning and require treatment” [3]. Most studies report that approximately 3.1% to 3.8% of Americans experienced SPD in the past 30 days [3-5]. Several studies have demonstrated that a higher percentage of women are afflicted with this condition than men, and it is most prevalent in those considered to be middle aged (35-64 years) [4]. Additionally, individuals with SPD are more likely to be unmarried, have lower educational attainment, and have a range of comorbid conditions [3, 4, 6]. Furthermore, individuals with family incomes below the federal poverty limit (FPL) have four times higher prevalence of SPD than individuals with family incomes greater than or equal to 200% of the FPL [4]. Similarly, Weissman and colleagues report that as income increases, the age-adjusted percentage of adults with serious psychological distress decreases [3].

There is some ambiguity regarding the prevalence of SPD among minorities relative to non-Hispanic white adults. Pratt et al. found that among individuals 18-44 years old, there were no significant differences in prevalence rates of SPD by race and ethnicity [4]. However, other work reports that after adjusting for age, Hispanics and non-Hispanic blacks have significantly higher rates of SPD relative to non-Hispanic whites. SPD was most prevalent in low-income individuals in each race and ethnicity relative to those with incomes  $\geq 200\%$  FPL [3]. Further complicating the relationship between SPD and race/ethnicity is that some research has

demonstrated that prevalence of SPD was higher among poor non-Hispanic white adults (9.2%) than in poor Hispanic adults (6.4%) [4]. Although SPD is more prevalent in non-Hispanic whites than minorities, non-Hispanic blacks and Hispanics report worse access to medical treatment for their mental illness compared to non-Hispanic whites. Hispanics and non-Hispanic blacks with SPD are less likely to visit a primary care physician than non-Hispanic whites with SPD, and among those who do, only 18-19% went to treat their mental health condition, compared to 24% of non-Hispanic whites [7].

Adults with SPD are more likely to have a range of comorbidities and overall poor health compared to persons without SPD. Adjusting for age, 44% of adults with SPD were likely to report being in poor or fair health compared to only 11% of adults without SPD [4]. Compared to adults without SPD, adults with SPD are more likely to have a diagnosis of heart or lung disease, diabetes, stroke, or arthritis. Adults with SPD are also more likely to report functional limitations, such as requiring assistance with activities of daily living, compared to those without SPD [3, 4]. Individuals with asthma are twice as likely to experience SPD as those without asthma [8], as are individuals with diabetes [9]. The coexistence of these conditions with SPD results in higher mortality rates, decreased quality of life, and increased health service utilization [8, 9].

#### *Health insurance and SPD*

Health insurance and its characteristics appear to be associated with the severity of mental illness. Alang et al. found that among disabled individuals with SPD, those who were uninsured had higher levels of distress than those with insurance. Additionally, individuals with SPD who had public insurance had lower levels of distress than individuals with SPD covered by private insurance. These differences in psychological distress may in part be caused by financial strain associated with obtaining care, which is minimized among those with public insurance because cost sharing tends to be lower and benefits tend to be more generous than private insurance [10]. This is consistent with existing research that has found that

among the mentally ill, those with public insurance reported having the best access to care [11]. Although individuals with private insurance or Medicaid are more likely to report seeking treatment for their mental illness than those who are uninsured, the majority do not seek treatment (61.5% and 51.7% respectively) [2].

People with SPD are more likely to be uninsured than those without SPD and have difficulties obtaining needed care [1, 12, 13]. Between 1999 and 2010, 20-26% of people with serious mental illness were uninsured compared to 17-21% of people without mental illness [11]. Overall, individuals with SPD are half as likely to report having any type of insurance compared to those without SPD [14]. Prior to the implementation of the ACA, SPD individuals covered by Medicaid were more likely to have SPD compared to other insurance types [12], and individuals with SPD were less likely to report having a usual place of care compared to those without SPD [5]. The most prominent and distinguishing trend throughout the literature on individuals with SPD is that people of lower socioeconomic status (SES) are more likely to experience SPD than individuals of higher socioeconomic status [4, 15, 16]. Lower income individuals are more likely to experience SPD compared to higher income individuals regardless of race or gender [17], although some research suggests that low income seems to be a significant risk factor for SPD among women of reproductive age [18]. It is believed that the lack of financial stability among people with lower SES produces higher stress levels when faced with difficult life events, such as a disruption in employment, and SPD develops as a consequence [17]. Therefore, expansion of public insurance programs such as Medicaid may substantially decrease the uninsured rate and increase access to care among individuals with SPD.

#### *Health services use and SPD*

Individuals with SPD are high utilizers of health services. They are more likely to report seeing a health care professional in the past six months than individuals without SPD and are three times as likely to report having 10 or more visits in the past year [4]. Prior to the

implementation of the Affordable Care Act (ACA), people with SPD were more likely to have office, emergency department, inpatient, home health visits, and prescriptions relative to individuals without SPD. This utilization translates into \$1,735 higher total expenditures compared with individuals without SPD in 2007 dollars [6]. Young adults with SPD are approximately twice as likely to utilize the emergency department compared with young adults without SPD. Low-income young adults with SPD were 1.23 times more likely to utilize the emergency department [19]. Individuals with SPD frequently use health services that are costly, and accordingly would benefit from improved health insurance that covers preventative and wellness services.

Adults with SPD are more likely to use any health services than adults without SPD, however they are also more likely to exhibit non-adherence to *mental health care* [12]. SPD is associated with missed appointments, poor response to treatment, reduced likelihood of seeing preventative services or engaging in a healthy life style [4, 20]. The percentage of individuals with SPD who have seen a *mental health* professional in the past year is low and declining, from 41.8% in 2012 to 34.2% in 2015 [5]. Furthermore, less than half of adults with SPD report receiving mental health treatment [14]. In an analysis by Farr and colleagues, 50% of women of reproductive age with SPD received treatment for an emotional or mental health issue. Women who are Hispanic, have less than a high school education, are students or retired, younger, or did not have health insurance are the least likely to receive treatment [18]. In light of this, even with expanded access to health insurance and improved quality of insurance, individuals with SPD face barriers related to their condition that impede successful access to treatment.

#### *Barriers to health care for people with SPD*

Psychosocial factors, including anxiety, denial, social norms, and values, uniquely impact care-seeking behavior of individuals with SPD. Lauver's Theory of Care-Seeking Behaviors states that all of these factors influence whether an individual decides to seek care [17]. Of the

emotional states that comprise SPD, patients with SPD who report high levels of hopelessness are less likely to seek medical care, while those who report feeling exhausted were more likely to seek care [21]. Furthermore, individuals with SPD may actually struggle to identify changes in their health and have difficulty judging when to see a doctor [22], as well as struggle to describe their medical history [4, 23]. The social stigma related to having a mental health condition, combined with many physicians' lack of knowledge regarding how to identify mental health issues may cause successful management of mental health conditions to be obstructed [24, 25]. Health care avoidance behaviors among individuals with SPD are significant barriers to proper use of health services. Ye and colleagues established that individuals with SPD are more likely to avoid going to the doctor when they expect they should, and more likely to admit that they avoid seeing a doctor due to fear of having a serious illness compared to individuals without SPD [17]. Sex, age, insurance status, having a usual source of care, and self-reported health status were significant predictors of health care avoidance among those with SPD, however family income and education were not [17]. Taken together, these studies suggest that policies aimed at improving access to insurance and the cost of care may not be sufficient to improve utilization of care for individuals with mental health conditions, unlike other chronic illnesses.

Costs represent the primary barrier to health care among all individuals in the United States, regardless of mental health status [2, 6]. However, a greater proportion of adults with SPD report delays in health care, lack of money for health care, and insufficient funds for mental health care than those without SPD [12]. Cost as a reported barrier to health care is substantial among individuals with mental illness regardless of insurance status. Unsurprisingly, 64% of those who are uninsured report cost as a barrier, followed by 30% of those with private insurance. Of those with public insurance, 18.2% report cost as a barrier [11]. Individuals with SPD are four times as likely to have not received needed medical treatment due to cost compared to those without SPD. However, since the implementation of Medicaid expansions and insurance

marketplaces with the ACA (2014), the percentage of people with SPD reporting this barrier is decreasing [5].

*ACA and other policy provisions addressing individuals with mental health conditions*

The Affordable Care Act (ACA) was established in part to address gaps in access and affordability of health care for individuals with mental health conditions. The primary method by which the ACA intended to improve access for these individuals was through the Medicaid expansions. Prior to the implementation of the ACA, Medicaid eligibility required that individuals must be low-income (below 100% of the FPL) and fit “categorical eligibility” criteria, including being a child, pregnant woman, or disabled [26]. The intent of the ACA was to require states to extend these eligibility criteria to include all adults with family incomes below 138% of FPL. However, in 2012 the Supreme Court ruled that the ACA could not require states to expand Medicaid eligibility criteria. This allowed states to determine participation in the Medicaid expansion, and as of May 2020, 14 states had chosen not to participate (KFF, <https://www.kff.org/health-reform/slide/current-status-of-the-medicaid-expansion-decision/>). This created what has become known as the “coverage gap”. In states that did not expand Medicaid, the individuals who fall into the coverage gap are adults with children between 100-138% FPL and childless adults below 138% FPL [27].

In addition to expanding insurance coverage, another key component of the ACA requires insurance to cover several important health benefits, including mental health care. The Essential Health Benefit (EHB) provision of the ACA requires all non-grandfathered plans in individual and small group markets, as well as in states expanding Medicaid, to cover the following health care services [28, 29]:

- ambulatory patient services
- emergency services

- hospitalization
- maternity and newborn care
- mental health and substance use disorder services
- prescription drugs
- rehabilitative and habilitative services and devices
- laboratory services
- preventive and wellness services and chronic disease management
- pediatric services, including oral and vision care

While requiring insurance plans to cover these benefits, the Department of Health and Human Services (HHS) allows the states to determine details regarding to what extent these services must be covered. As a result, there is significant variation in the quality of coverage for the EHB from state to state [28]. Furthermore, only states expanding Medicaid must include these benefits in their Medicaid plans. States that did not expand Medicaid may not include mental health services as part of their Medicaid plans, leaving individuals in these states who do qualify for Medicaid with potentially significant gaps in access to mental health care.

Finally, the ACA, state, and federal legislation, attempt to ensure access to, and affordability of, mental health care through mental health parity legislation. In 2008 the Mental Health Parity and Addiction Equity Act (MHPAEA) was passed by the federal government. This legislation mandated that if an insurance plan chose to offer mental health benefits, they must cover them at the same level that they would provide for medical and surgical benefits [30]. The ACA extended this legislation to plans subject to EHB coverage. State level parity legislation also predated the MHPAEA and put in place similar provisions. A systematic review of the literature regarding the impact of parity legislation on access to care, financial protection, appropriate utilization, quality

of care, diagnosis of mental illness, morbidity and mortality, and quality of life, found that parity legislation did provide financial protection for individuals in need of mental health care, and was associated with appropriate levels of service utilization [31]. The authors concluded that the more comprehensive the benefits required by the parity legislation, the more positive the effect [31].

#### *Effects of the ACA on individuals with mental health conditions*

Research is beginning to emerge regarding the impact of the ACA on individuals with mental health conditions. Novak et al. looked at the National Health Interview Survey from 2011-2016 to assess the ACA's impact on individuals with mental health issues in terms of insurance coverage and access to care. They found that the rate of uninsurance among individuals with mental health issues dropped from 32% in 2011 to 15% after ACA implementation. Individuals also reported lower rates of delaying access to care and ability to afford mental health care. They found that low-income individuals also benefited significantly from the implementation of the ACA, however they are less likely to report improvements in insurance, more likely to delay accessing to care, and report more difficulties affording care relative to their higher income counterparts with SPD, indicating that even within the population with SPD, disparities remain [32]. Low income (<200% FPL) adults with mental illness have lower rates of uninsurance and higher rates of private insurance and Medicaid coverage after ACA implementation in 2014 relative to 2011-2013 [33]. Evidence from Kozloff and colleagues report that private coverage for young adults with mental health conditions increased by 11.7 percentage points among young adults (age 19-25) relative to older adults with mental health conditions (26-34) after the ACA's dependent coverage provision expansion [34].

After the recession of 2008, individuals with and without SPD were increasingly more likely to experience cost barriers to treatment, and this trend reverses for both groups in 2014. However, the percentage of people without SPD who reported having insufficient funds reverts to levels observed in 2006 but the percentage of people with SPD reporting cost barriers remains

elevated, providing early evidence that the ACA may not have sufficiently reduced cost barriers for people with SPD or that they may not have had a complete economic recovery from the 2008 recession [15]. Additionally, unmet mental health needs due to cost decreased significantly for young adults with moderate to severe mental health conditions relative to older adults after the ACA dependent coverage provision implementation, but not for those with mild mental health issues [34].

The RAND health insurance experiment demonstrates that mental health care is almost three times as responsive to insurance generosity as other types of health care, and the moral hazard of insurance is stronger for mental health care than other types of healthcare [35]. Research evaluating how this applies to the ACA's impact on health services use in individuals with mental health conditions mostly comes from research on the dependent coverage expansion. Among individuals with possible mental health conditions, young adults (age 18-25) experienced a 5.32 percentage point increase after the dependent coverage expansion relative to older adults (26-35) in terms of mental health service utilization. Overall, this was a 17% increase in utilization of mental health services in young adults post dependent coverage expansion. Young adults are also more likely to have these services paid for by private insurance and less likely to be uninsured compared to older adults post-expansion. In the overall sample of individuals with and without possible mental health conditions, there was only a 1.32 percentage point increase in use of mental health services among young adults compared to older adults after the implementation of the provision [36].

The dependent coverage provision is associated with a 5.8% increase in inpatient visits for psychiatric disorders [37] and an 8.4% relative increase in behavioral health (including substance use disorder) inpatient admissions [38] in young adults affected by the provision compared to older adults who are not. Emergency department utilization for mental health services among younger adults relative to older adults does not seem to be significantly impacted

by the ACA expansion, with one study reporting no change in visits [37] and another reporting only slight increases [38]. The dependent coverage provision is associated with moderate increases in outpatient mental health treatment on a monthly basis among young adults (19-25) with mental health conditions compared to older adults (26-34) [34].

#### *ACA effects on mental health status*

Effects of the insurance expansions resulting from the ACA on mental health status are generally positive. Medicaid expansion was associated with improvements in self-reported depression and fewer poor mental health days among childless adults with chronic conditions, however no such improvements were identified among individuals without chronic conditions [39]. In addition to this finding, Sommers et al. found that ACA expansion in two southern states was associated with improvements in self-reported depression in all low-income individuals [40]. Young adults experience a small improvement in overall score on the SF-12 after the ACA dependent coverage expansion. Young adult males experience a 2-percentage point decrease in the likelihood of screening positive for SPD after the coverage expansion compared to older males. Among young women, there is 4 percentage point decrease in positive screens for depression after the ACA coverage expansion [41]. Additionally, the percentage of young adults with mental health issues who report their overall health as fair or poor decreased after the implementation of the dependent coverage [34].

#### *Rationale for additional research on low-income adults with mental health conditions*

As data from the ACA becomes available, the literature on its short- and long-term impacts will continue to increase. To date, much of the research on the impacts of the ACA on adults with mental health issues is focused on the effects of the dependent care provision because this provision of the ACA was implemented earlier than the rest of the ACA. Despite the advancement of research in this population, there is little research that explicitly

focuses on the impacts of the ACA on individuals with SPD that were not impacted by the dependent care provision (i.e. age 27-64).

Most of the research that has been conducted on the effects of the ACA on individuals with SPD has focused on changes in rates of uninsurance, however shifting of insurance types among this population is less defined. Prior to the implementation of the ACA, Garfield and colleagues estimated that about a third of those with severe mental health disorders who are uninsured would be covered by the Medicaid expansion, and be less likely to take up private insurance than those without mental health disorders [13]. To my knowledge, no work to confirm this prediction has been published.

There is also an interesting contradiction within the existing literature regarding insurance coverage and health services use among people with SPD that I hope to shed more light on with this work. There is a fairly consistent theme throughout the literature where individuals with SPD report higher rates of uninsurance and more difficulties accessing care than individuals who do not have SPD, however they also report higher rates of health service utilization. It is not clear what exactly drives this discrepancy in the literature. While I don't believe that my data source is structured so that I can address this question directly, I do hope that the covariates in my models in each chapter will provide some insights into significant factors that drive health services use among individuals with SPD.

Further, there is conflicting evidence regarding the impact of health insurance expansions on changes in the type of health services use. Among certain populations, expansions seem to be associated with an increase in hospitalizations, while in other populations there is a decrease. Some studies report that expansions are associated with an increase in emergency department visits while others cannot provide conclusive evidence. The reason for health insurance expansions is to improve access to affordable health care for patients, reduce the use of high cost care, such as emergency room visits, and increase the utilization of lower cost care, such as

outpatient visits, in the hopes of reducing overall health care costs to the system.

However, whether this is what happens among the general population as a result is not clear, and even less so for people with SPD. This work will contribute to the literature by adding information regarding the impacts that health insurance expansions have on the type of health insurance individuals with SPD enroll in. Furthermore, the type of health services used by individuals with SPD during ACA implementation, and changes to barriers to health care in this population will be documented.

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## CHAPTER 1

### TRENDS IN HEALTH INSURANCE STATUS OF LOW-INCOME INDIVIDUALS WITH SEVERE PSYCHOLOGICAL DISTRESS RELATIVE TO THOSE WITHOUT SEVERE PSYCHOLOGICAL DISTRESS FOLLOWING THE IMPLEMENTATION OF THE AFFORDABLE CARE ACT

#### Abstract

**Background:** Individuals with serious psychological distress (SPD) are significantly more likely to be uninsured or Medicaid-insured than individuals without SPD. The Affordable Care Act (ACA) reduced the uninsured rate in the United States, including those with SPD. While it is well known that the uninsured rate for individuals with SPD decreased after the ACA was enacted, less is known about whether these individuals enrolled in public or private insurance, and if they enrolled at higher or lower rates in the same insurance categories as individuals without SPD. This study aims to provide insight into the type of insurance coverage individuals with SPD enrolled in after the implementation of the ACA, and factors associated with enrollment.

**Methods:** Pooled cross-sectional data from the Integrated Public Use Microdata Series (IPUMS) Medical Expenditure Panel Survey (MEPS) in the years 2011- 2016 is used for analysis. In this paper, SPD is operationally defined as a score of  $\geq 13$  on the Kessler 6 scale of non-specific psychological distress. A score of 12 to 8 is considered mild to moderate psychological distress (MMPD), and  $\leq 7$  is no psychological distress (NPD). Data from the 2011-2016 Integrated Public Use Microdata Series IPUMS Medical Expenditure Panel Survey was analyzed. Individuals included in the sample had a score on the K6, an income  $\leq 399\%$  of the federal poverty level and are between the ages of 27 and 64. Descriptive statistics were conducted using 2-sided t-tests for differences in proportions in categorical variables, and adjusted Wald tests for continuous variables. Multinomial logistic regression is performed to assess differences in the proportion of

individuals in each insurance category in the years before and after the ACA insurance expansions.

**Results:** Private insurance: Individuals with SPD experience no significant changes in enrollment in private insurance relative to 2011, although they experienced a non-significant increase of 3 and 3.4 percentage points in private insurance in 2014 and 2015, respectively. Individuals with MMPD do not experience significant differences in enrolment in private insurance any year relative to 2011. Individuals with NPD experience significant increases in enrollment in private insurance in 2015 and 2016 (2.4 percentage points (PP)  $p<0.05$ , and 1.9 PP,  $p<0.1$  respectively). Medicaid: Individuals with MMPD or NPD increase their enrollment in Medicaid in 2014 (vs. 2011) and this increase persists until 2016 (2014 – MMPD: 4.6 PP,  $p<0.001$ , NPD: 4.6 PP,  $p<0.001$ ; 2015 – MMPD: 8.2 PP,  $p<0.001$ , NPD: 6.3 PP,  $p<0.001$ ; 2016 – 8 PP,  $p<0.001$ , NPD: 7.6 PP,  $p<0.001$ ; 2016 – MMPD: 8 PP,  $p<0.001$ , NPD: 7.6 PP,  $p<0.001$ ). Individuals with SPD do not have a higher likelihood of enrollment in Medicaid until 2015 (8.6 PP,  $p<0.001$ ) and this remains elevated in 2016 (9 PP,  $p<0.001$ ). Uninsured: All psychological distress groups experience statistically significant decreases in the probability of being uninsured relative to 2011 from 2014-2016, ranging from 10.2 PP in for those with NPD to 14.9 PP for those with SPD ( $p<0.001$  for all groups). Medicare: Individuals with NPD do not experience any significant increases in the probability of enrollment in Medicare during the study period. Individuals with MMPD and SPD do experience increases beginning in 2014 (MMPD: 3.5 PP,  $p<0.001$ ; SPD: 9.1 PP,  $p<0.001$ ) and remain statistically significant into 2016 for individuals with SPD (14.9 PP,  $p<0.001$  for both 2015 & 2016).

**Conclusion:** There are modest increases in private insurance enrollment over the years of ACA implementation for individuals with NPD, and no change in enrollment among individuals with MMPD or SPD. Most individuals benefited from a lower likelihood of being uninsured after ACA implementation, however the magnitude of the observed benefit was greater for individuals

with SPD than those with MMPD or NPD. Individuals with SPD experience an increased probability of Medicaid enrollment during ACA implementation, as did each of the other PD groups.

## Introduction

Enacted in 2010, key provisions of the Affordable Care Act (ACA) increased access to health insurance by expanding eligibility for Medicaid, by creating health insurance marketplaces, and through the dependent coverage provision [1, 2]. Due to a Supreme Court decision that ruled the Federal government could not force states to expand Medicaid eligibility requirements, many states did not follow through with the Medicaid expansion. In states that did, the income eligibility threshold was increased to as much as 138% of the Federal Poverty Limit (FPL), and childless adults became eligible for Medicaid. The health insurance marketplaces allow individuals without employer sponsored insurance (ESI) to pool risk and purchase insurance individually with subsidized premiums for low-income individuals who fall between 100% and 399% of the FPL. Finally, the dependent coverage provision allows young adults to stay on their parent's health insurance until they are 26 years old. Through these provisions, the ACA has significantly decreased the uninsured rate[3-5].

The Medicaid expansions and creation of the marketplaces/subsidies aimed, in part, to benefit low-income individuals, who disproportionately suffer from mental health conditions [1]. Serious psychological distress (SPD) exists among a subgroup of individuals with moderate to severe mental illness. It is defined as “a mental health problem severe enough to cause moderate-to-serious impairment in social, occupational, or school functioning and require treatment” [6]. The Kessler screening scale (K6) for psychological distress is widely used to identify individuals with SPD. A score of 13 or greater on the K6 classifies a person as having SPD. A study of individuals with serious psychological distress (SPD) using the National Health Interview Survey (NHIS) conducted prior to the ACA finds that about 25% of individuals with SPD are covered by Medicaid compared to 6% of individuals without SPD [7]. Another study, from the Behavioral Risk Factor Surveillance System (BRFSS) survey, finds that prior to the ACA individuals with SPD are less likely to report having any insurance compared to those without SPD (OR: 0.59,

95% CI: 0.51-0.68) [8]. Additionally, adults with severe mental disorders are less likely to have private insurance relative to individuals without severe mental disorders (38.4% vs. 66.2%\*; \* $p < 0.001$ ). Given that individuals with SPD are more likely to be uninsured, low-income, and to be covered by Medicaid than those without SPD, the effect of the ACA insurance expansions on those with SPD may differ from those without SPD.

Early estimates from the NHIS indicate that the percentage of adults with SPD who were uninsured decreased between 2012 and the first 9 months of 2015, with a corresponding increase in private insurance coverage [9]. Another analysis of NHIS indicates that the years after the implementation of the ACA were associated with significant reductions in the likelihood of being uninsured for those with SPD [3]. Most of the existing literature regarding the ACA insurance expansions and individuals with SPD looks at changes in the uninsured rate in this population, however it does not assess what kinds of insurance individuals with SPD enroll in during ACA implementation. This is important because on average, 70% of physicians accept new Medicaid patients whereas 85% of providers accept new privately insured patients [10]. Given that a significant percentage of people with SPD tend to be covered by Medicaid relative to people with NPD [7], existing disparities in health care utilization and access may be perpetuated rather than alleviated. Further, there is a lack of literature that excludes individuals who may be taking advantage of other components of the ACA, specifically the dependent coverage provision, rather than the Medicaid expansions and health insurance exchanges.

The aim of this paper is to assess how low- to middle- income people with SPD, who were not eligible for the young adult expansion and were not eligible for Medicare based on their age, benefited from the expansion of Medicaid and private insurance over the 2011 to 2016 time period. Additionally, the effects of these insurance expansions on people with SPD will be assessed in the context of people with no psychological distress (NPD), or mild to moderate psychological distress (MMPD) to understand if the enrollment in insurance type among those

with SPD is part of a larger trend among all low- to middle- income individuals between the ages of 27 and 64, or if people with SPD demonstrate different patterns of enrollment.

### **Conceptual framework**

McLeroy et al. developed an ecological model consisting of both individual and social environmental factors as targets for health promotion activities. The “Ecological model for health promotion” articulates that health behaviors are determined by intrapersonal factors, interpersonal processes and primary groups, institutional factors, community factors, and public policy[11]. To be most effective, the model suggests that the most effective public health interventions will target activities at each level in order to improve individual and public health. Accordingly, the ACA exists as public policy intervention that aims to improve health and health behaviors, particularly the health behavior of insurance enrollment primarily through the expansion of health insurance. Among the many provisions of the ACA, it attempts to improve health and health behaviors at the intrapersonal level by providing premium subsidies to low-income individuals for the purchase of health insurance and requiring plans cover a minimum level of health insurance benefits to encourage appropriate health care seeking behaviors. Further, one mechanism by which the ACA attempts to promote prevention and wellness at the community level is by establishing a Prevention and Public Health Fund to provide grants to states for prevention activities, such as disease screenings and immunizations. Additionally, one way it attempts to improve health quality and system performance at the institutional level is by investing in health information technology [12]. This study is an assessment of how individuals with SPD react to this expansion of insurance by assessing how enrollment in various types of insurance shifts over the time frame of ACA implementation. The ecological framework described above provides a framework for the selection of covariates available in the dataset that fall into the categories of determinants of health behaviors described by the authors. In addition, research regarding behaviors of enrollment in private insurance and Medicaid among individuals

with SPD contribute to the selection of covariates for this analysis. Given the aims of insurance expansions within the ACA, and therefore the influence of the ACA as a public policy on health behaviors, the outcome of interest is the insurance status, and the primary covariate of interest is the year indicator. Assessment of yearly insurance status for individuals with SPD will provide insight into how individuals with SPD moved between insurance types over the timeframe of ACA implementation. A review of the literature identified several factors that influence enrollment in both private insurance and Medicaid, and are related to the ecological model for health promotion outlined by McLeroy et, al. These consist of common intrapersonal factors such as age, gender, race/ethnicity, educational status, income level, nativity status, and physical health status, interpersonal factors such as marital status, and community factors such as region, all of which are selected as covariates for this analysis.

*Public policy and insurance enrollment for individuals with SPD*

Enrollment in insurance among individuals with SPD varies by insurance type. Research regarding the enrollment in private insurance among individuals with SPD alone is not available, however Zuvekas (2015) looks at take-up of private insurance among individuals with a mental disorder, defined as a person having a score greater than 2 on the PHQ-2 depression symptom checklist (indicating probable depressive disorder) or a score of 13 or greater on the K6 scale[13]. Rates of private insurance coverage among individuals with a mental health disorder are significantly lower when compared with those who do not have a mental health disorder. However, when individuals with mental health disorders are offered private health insurance, they are just as likely to enroll in the insurance as their counterparts without mental health issues [13]. Unemployment explains a significant amount of the difference in private insurance coverage between those with and without mental disorders because those with mental health disorders are more likely to be unemployed and therefore are less likely to be eligible for employer sponsored health insurance[13]. Since mental health status has very little impact on the take-up of private

health insurance and take-up is a component of enrollment, factors that contribute to take-up of private health insurance for individuals without SPD are applied to this analysis and described in detail in the covariates section.

Enrollment in Medicaid among individuals with SPD is different than private insurance. Eligibility for Medicaid is income-dependent, and the income threshold varies by state. Although the ACA Medicaid expansions attempted to set a minimum threshold for all states to adhere to, the lack of Medicaid expansions in some states means that variability in income thresholds remain. Individuals with SPD report facing greater barriers to insurance access. People with SPD are more likely to be low-income, are more likely to be disabled, and therefore more likely to be covered by Medicaid relative to those without SPD [7, 14]. While assessing the effect of Medicaid expansions on enrollment in Medicaid among those with SPD compared to those without, Gonzales, et al. find that those with SPD are more likely to enroll in Medicaid than those who are in very similar circumstances without SPD, regardless of barriers to enrolling in insurance that may be a result of their mental health condition.

*Intrapersonal, interpersonal, and community factors and insurance enrollment*

Educational status is correlated with enrollment in both private insurance and Medicaid, where a high percentage of individuals covered by Medicaid tend to have low educational attainment and a high percentage of individuals with private insurance have higher educational attainment [15]. Income level is a defining characteristic of Medicaid enrollment, where individuals below a certain income threshold (which varies over time and across states) are eligible to enroll in Medicaid. Thus, people with higher income levels are more likely to have private insurance. Income level, even among a low-income sample, plays an important role in shaping insurance status and health service utilization. Therefore, the rationale for the income stratification in the present study is that different provisions of the ACA target different parts of the low-income spectrum. For example, the Medicaid expansion was aimed at providing

insurance coverage for low-income adults from 0-138% of the federal poverty limit (FPL), whereas the exchanges provide subsidies for low-income individuals whose incomes are low, but too high to be eligible for Medicaid (139-250% FPL). Therefore, one would expect that low-income adults with mental health issues and income below 100% FPL would be more likely to be enrolling in Medicaid than individuals with income above 100% of FPL, and individuals with incomes from 138-399% FPL to be more likely to enroll in the insurance exchanges than poor individuals. Adults who live in states that did not expand Medicaid will fall into the “coverage gap” described as those with incomes 100-138% FPL who would have been eligible for Medicaid had the state expanded insurance previously and may constitute a substantial portion of the uninsured.

Physical health status, age, gender, race/ethnicity, and nativity status are significant intrapersonal factors related to insurance status. Physical health status is established as a predictor of insurance status among individuals with SPD because comorbid conditions increase the need for health care services and individuals with SPD have high rates of comorbidities [6, 7]. Race/ethnicity has been used as a rough proxy for lived experiences such as access to resources, which influence an individual’s interpretation of physical symptoms [3]. Nativity status also serves as an important factor related to insurance status because some permanent residents, non-permanent residents, and undocumented immigrants are not eligible for Medicaid. Age and gender are also considered intrapersonal factors that may influence insurance status.

An intrapersonal factor that has been omitted from this analysis is employment status. Employment status is a strong predictor of private insurance because private insurance is usually offered through employers. Therefore, employment status is not included in this analysis because it has the potential to confound the primary outcome of this study.

Marital status and census region are respectively considered interpersonal and community factors. Married individuals are more likely to be enrolled in private insurance because they have

better access to it through a spouse [13]. Census region is considered as a community factor and is a significant covariate of interest in the analysis due to the different degrees to which states in each region implemented the ACA as well as historically large differences in insurance coverage type across regions.

## **Data and Methods**

### *Data*

Data from the Integrated Public Use Microdata Series (IPUMS), Medical Expenditure Panel Series (MEPS) was extracted and analyzed for this analysis. MEPS is a nationally representative set of longitudinal surveys of families and individuals, as well as medical providers and employers. The survey is designed to understand health insurance, health care service utilization, and the costs associated with use of those services. There are multiple components to the MEPS. The two major components are the Household Component (HC) and the Insurance Component (IC). ([https://meps.ahrq.gov/mepsweb/about\\_meps/survey\\_back.jsp](https://meps.ahrq.gov/mepsweb/about_meps/survey_back.jsp)).

The HC is nationally representative of the US civilian noninstitutionalized population. It collects information on each family member regarding demographics, health condition and status, use of medical services, charges and sources of payment, access to care, satisfaction with care, health insurance coverage, income, and employment. A new panel of households are selected each year from a subset of families that participated in the prior year's nationally representative NHIS. Each household is interviewed five times (rounds) over the course of two years. This allows researchers to examine the data either longitudinally across 2 years, or cross-sectionally using an overlapping panel design to produce annual estimates. While many variables are collected at each round (e.g. employment status), the validated instruments that address the self-reported health status of each respondent in the household are only collected once a year. These variables are contained in the Self-Administered Questionnaire (SAQ) and most frequently are

collected during rounds 2 and 4 for each individual

([https://meps.ahrq.gov/mepsweb/survey\\_comp/hc\\_data\\_collection.jsp](https://meps.ahrq.gov/mepsweb/survey_comp/hc_data_collection.jsp)).

IPUMS is part of the Minnesota Population Center at the University of Minnesota and provides “census and survey data integrated across time and space”

(<https://www.ipums.org/whatIsIPUMS.shtml>). For MEPS, IPUMS has taken data from the HC and recoded the variables so that all variable names across years are the same, allowing researchers to simply select the variables and years that they would like to use for their analysis and download an integrated data file for research. The cross-sectional files from IPUMS MEPS were pooled for this analysis, using years 2011-2016.

#### *Mental health status*

The K6 has been used in the MEPS since 2004 [4] and is administered in the SAQ. The K6 questionnaire assesses the frequency of non-specific psychological distress within past 30 days. It has six domains that ask individuals how frequently they have experienced any of the following in the past 30 days: 1. So sad that nothing could cheer you up; 2. Nervous; 3. Restless or fidgety; 4. Hopeless; 5. That everything was an effort; and 6. Worthless [4, 5]. Based on their responses, individuals are assigned a composite score ranging from 0 to 24. If an individual scores 13 or greater they are considered to be in serious psychological distress (SPD) [61]. K6 scores from 8-12 are considered to be acceptable cut points to classify individuals with mild to moderate psychological distress, although they are not widely used [7]. As a result, SPD can be characterized as “a subset of mental health issues severe enough to cause moderate-to-serious impairment in social, occupational and school functioning and to require treatment” [3]. Therefore, individuals in this analysis were classified as having SPD if they had a K6 score  $\geq 13$ , mild- to moderate- psychological distress (MMPD) with scores of 12-8 (inclusive), and no psychological distress (NPD) with a score of 7 or less.

#### *Sample*

The sample was limited to individuals who were:

- Eligible to take the SAQ with a positive sample weight (SAQWEIGHT )
- Between ages 27 and 64
- Family income between 0-399% of the federal poverty limit (FPL)
- A valid response on the Kessler 6 (K6) variable

The variables that were used to determine if an individual was able to take the SAQ are the IPUMS MEPS variables SAQELIG and SAQWEIGHT. SAQELIG indicates whether an individual is ineligible to take the SAQ at the time of the interview round, meaning if there was no record of the person in the round, if they were deceased or institutionalized, if they had moved out of the US or to a military facility, if their disposition status was inapplicable, or if they were under 18 years of age they were ineligible to take the SAQ. SAQWEIGHT accounts for eligibility to take the SAQ and whether an individual takes the SAQ, adjusting the weights for non-response. Participants are administered the SAQ in rounds 2 and 4 of their MEPS panel.

The sample was restricted to individuals between ages 27 and 64 years to exclude individuals who may be taking advantage of other components of the ACA, specifically the dependent coverage provision, rather than the Medicaid expansions and health insurance exchanges. Individuals age 65 and older were excluded because the ACA did not extend insurance coverage through Medicare, therefore these individuals should not experience many changes in their insurance type related to the ACA. The sample was further restricted to individuals with family incomes lower than 399% of the federal poverty limit because the expansion of Medicaid and the subsidies for the private insurance exchanges were designed to primarily benefit those that fall into that income bracket. Therefore, people with an income that is 400% of the FPL and over were excluded from the analysis.

### *Outcome variables*

The outcome variable of interest is insurance status at the time the SAQ was taken, which includes four categories: private/exchange, Medicare/dual (Medicare), Medicaid/other public, and

uninsured. Insurance status in the MEPS is based on interviewee self-report. Note that the sample may include certain disabled non-elderly adults who can be eligible for Medicare. Insurance status was reported for each month of the year; therefore an individual's insurance status was selected by the insurance status reported in the same month that the SAQ was taken.

Several steps were taken in the development of the insurance status categories. The original intent of this work was to look at exchange coverage separately from private insurance. However, the enrollment in exchange insurance in this population was so small the sample size was insufficient for analysis (2.2% of the full sample, and 1% of the SPD sample). Final insurance status categories were determined by running a series of goodness-of-fit tests (Independence of Irrelevant Alternatives, IIA) to determine the appropriate combination of insurance status categories to provide the model with the best fit determined by insignificant F statistics [16, 17]. Based on these tests, the six categories of private/exchange, Medicare, Medicaid, dual Medicare/Medicare, other public (e.g. TRICARE) and uninsured were collapsed into four categories: private/exchange, Medicare/dual (Medicare), Medicaid/other public, and uninsured.

### *Covariates*

Several covariates were included in the analysis based on previous literature on insurance enrollment, when conceptualized as a health behavior, as described in the conceptual framework. To assess the role of public policy (i.e., ACA enactment) on insurance enrollment, the primary covariate of interest is the year indicator variable. A categorical variable indicating the year an individual completed the SAQ was generated and is the primary covariate of interest in the analysis. If the ACA impacts insurance enrollment, there should be a decrease in uninsured individuals in the year the insurance expansions take effect (2014) and in the following years, and a simultaneous increase in insurance enrollment in other categories.

To assess the role of intrapersonal factors on health insurance enrollment, income categories were created based on ACA income eligibility requirements for the exchanges or Medicaid using the IPUMS MEPS variable POVLEV, which is a continuous variable of income as a percentage of the federal poverty level. The income brackets are defined by that variable as poor (<100% FPL, those eligible for Medicaid prior to the ACA), near poor (100-138% FPL, those who were eligible for Medicaid after the expansion through the ACA), low-income, and middle-income (139-199% & 200-399% FPL respectively, those who were eligible for subsidies on the exchanges).

Race and ethnicity were combined into a composite race/ethnicity variable and categories were condensed into the following as a result of a lack of sample size in more granular categories (e.g. pacific islanders). The groups with smaller sample sizes fall into the “Other Race/Ethnicity” category, while the remainder are categorized as "White, non-Hispanic" (ref), "Black, non-Hispanic", and "Hispanic".

IPUMS MEPS contains many educational status variables that were inconsistently administered over the time frame of this study. The one variable that was consistently administered was educational attainment, and the original categories were condensed into the following four: Bachelor’s degree or more (ref); Some college, no bachelor’s; High school or GED; Less than high school.

Age was included as a categorical variable, rather than a continuous one, with the following categories: 27-36 (ref), 37-46, 47-56, and 57-64. Please see Appendix 1 for details regarding the measures representing the intrapersonal factors of nativity status, gender, physical health, and the interpersonal factor of marital status.

To assess the role of community factors on health insurance enrollment, The four Census regions are (1) the Northeast (used as a reference category in the regression analysis since it is the

region with the most states that implemented the ACA to the fullest extent, including expanding Medicaid and creating state based insurance marketplaces), (2) the Midwest, (3) the South (the region that consists of the most states with weak implementation of the ACA, including minimal or no Medicaid expansions and use of federal insurance marketplaces), and (4) the West.

### *Analysis*

The full sample was stratified by psychological distress (PD) group (SPD, MMPD and NPD), and a series of bivariate descriptive analyses (2-sided t-tests for categorical variables and adjusted Wald tests for continuous variables) were carried out to describe the underlying characteristics and need for health care in each PD group relative to those with SPD. The differences between these groups provides context for how these characteristics that influence enrollment in insurance type differ by psychological distress status relative to those with SPD.

Multinomial regression was selected as the appropriate method of analysis for the SPD and full samples. This method of analysis was selected to allow for a comparison of enrollment over the time frame of ACA implementation between the SPD group and other PD groups by interacting the year indicator variable with psychological distress status in the analysis of the full sample. The multinomial regression also allows for the same analysis in the SPD sample only, which allows the covariates in the analysis to be controlled for at the mean of the SPD sample rather than the full sample, providing a clearer picture of changes in insurance enrollment among those with SPD.

The multinomial logit (mlogit) regressions failed tests of the Independence of Irrelevant Alternatives specification test in the subpopulation of people with SPD. However, multinomial probit (mprobit) regression models fit this subpopulation very well. For the full sample, both mlogit and mprobit fit equally well so mprobit was used for consistency. All models are weighted to adjust for the sampling design using the SAQ weight and adjusted for the impact of the sample

design clustering and stratification on the estimates of variance and standard errors. The SPD model was fit using the following specification:

$\text{Prob}(\text{Insurance status}=j \mid X_i) = \int_{-\infty}^{X_i' B_j} \phi(z) dz$ , where

$$X_i' B_j = \beta_{0ij} + \beta_1 \text{Year indicator}_{ij} + \beta_2 \text{Region}_{ij} + \beta_3 \text{Poverty level}_{ij} + \beta_4 \text{Gender}_{ij} + \beta_5 \text{Age category}_{ij} + \beta_6 \text{Race/ethnicity}_{ij} + \beta_7 \text{Marital Status}_{ij} + \beta_8 \text{Education}_{ij} + \beta_9 \text{Nativity status}_{ij} + \beta_{10} \text{SF-12 Physical health}_{ij} + e_{ij}$$

A similar model was fit on the full sample that included the interaction of year with psychological distress status (SPD, MMPD, NPD) in order to determine the marginal effects of year on the probability of insurance status for each level of psychological distress category. Results reported in this chapter for the MMPD and NPD groups related to insurance status are from the marginal effects of this interaction term rather than a stratified analysis.

Both descriptive statistics and regression models are adjusted for the stratified and clustered design of the MEPS using STATA's SVY commands in STATA 15. The weighted percentage in each category of individuals with SPD are compared to the weighted percentage of those with NPD, as well as those with MMPD using the svy: proportion command. In the descriptive analysis, Lincom and test post-estimation commands were used to calculate p-values for categorical and continuous variables, respectively, and mprobit was utilized to conduct the regression analyses[17].

### *Sensitivity analysis*

Sensitivity analyses are conducted to understand if changing some of the inclusion criteria results in an increase in the likelihood of private insurance coverage. First, the age restriction was lowered to 18 to see if adding younger people to the analysis would significantly increase the probability of individuals with SPD having private insurance from 2014 onwards. Next, the income restriction is lifted to include the upper income group (>400% FPL).

Additionally, the model is re-run with both restrictions lifted. No substantial differences between the four models are observed that would indicate age or income was a factor in the enrollment in Medicaid vs. private insurance for those with SPD. Finally, the main regression analyses are run on the SPD sample and full sample, where 2013 is used as the reference year instead of 2011. The results of both models in the sensitivity analysis are almost the same as the results of the original models for every insurance category.

## **Results and Discussion**

### *Sample description*

Table 1 describes the sociodemographic characteristics of the full sample stratified by psychological distress group. Bivariate analyses comparing the SPD group to the NPD and MMPD groups separately, are presented. About 7% of the full sample has SPD, 10.2% have MMPD, and the remainder have NPD. A higher percentage of people with SPD are poor relative to the other psychological distress groups (SPD: 39.9%, MMPD: 29.7%, NPD:16.8%,  $p<0.01$ ). There is a higher percentage of older individuals (55-64 years) in the SPD sample relative to the other psychological distress groups, and a higher percentage of females in the SPD group relative to the NPD group. A lower percentage of people with SPD are Black, non-Hispanic or Hispanic relative to those with NPD, and the SPD group has a higher percentage of whites. A higher percentage of people with SPD are either widowed, divorced, or separated relative to the other PD groups. Furthermore, the SPD group had less education and lower SF-12 scores (physical functioning) than the other PD groups. Finally, Table 1 shows that over the 2011-2016 study period the SPD group has a lower percentage of individuals on private insurance, and higher percentages covered by Medicaid and Medicare insurance relative to the other PD groups. Interestingly, the SPD group has a lower percentage of individuals who are uninsured relative to the NPD and MMPD groups. Overall, people with SPD, MMPD, and NPD seem to fall on a continuum where the demographic characteristics of individuals with MMPD fall between those

with SPD and NPD, but there are fewer (or weaker) statistically significant differences between those with SPD and MMPD relative to those with SPD and NPD.

**Table 1: Descriptive characteristics by psychological distress status**

<b>Weighted %</b>		<b>SPD</b> <b>N = 3,902</b> <b>(6.97%)</b>	<b>MMPD</b> <b>N= 5,675</b> <b>(10.21%)</b>	<b>NPD</b> <b>N= 46,031</b> <b>(82.82%)</b>
<b>Year</b>				
	2011	17.8	18.5	16.6
	2012	19.6	18.1	16.9***
	2013	19.4	16.8^^	17.0***
	2014	15.8	16.5	16.8
	2015	14.6	15.1	16.7***
	2016	12.8	15.0^^	16.0***
<b>Region</b>				
	Northeast	15.2	16.7	15.7
	Midwest	22.6	21.0	21.2
	South	40.7	38.8	39.2
	West	21.5	23.6	23.9
<b>Poverty level</b>				
	Middle income (200-399% FPL)	29.8	40.1^^^	57.0***
	Low income (138-199% FPL)	17.2	17.7	17.0
	Near poor (100-137% FPL)	13.2	12.5	9.2***
	Poor (less than 100% FPL)	39.9	29.7^^^	16.8***
<b>Gender</b>				
	Male	39.1	40.1	48.1***
	Female	60.9	59.9	51.9***
<b>Age</b>				
	27-34	17.4	21.9^^^	26.2***
	35-44	24.8	25.0	28.1***
	45-54	29.2	26.9^	25.4***
	55-64	28.5	26.2^	20.3***
<b>Race/Ethnicity</b>				
	White, non-Hispanic	64.5	61.9^^	55.5***
	Black, non-Hispanic	12.8	14.3^^^	14.9***
	Hispanic	16.1	15.6	22.5***
	Other Race/Ethnicity	6.7	8.2^^	7.4

<b>Marital</b>				
Married	37.3	41.9 <sup>^^</sup>	55.0 <sup>***</sup>	
Widowed	5.0	4.9	2.2 <sup>***</sup>	
Divorced	25.4	20.8 <sup>^^</sup>	15.0 <sup>***</sup>	
Separated	6.9	5.8 <sup>^^</sup>	3.4 <sup>***</sup>	
Never married	25.4	27.3	24.5	
<b>Education</b>				
Bachelor's degree or more	14.6	20.3 <sup>^^</sup>	26.3 <sup>***</sup>	
Some college, no bachelor's	27.1	26.0	25.2 <sup>*</sup>	
High school	35.1	33.8	31.3 <sup>***</sup>	
Less than high school	23.1	20.0 <sup>^^</sup>	17.2 <sup>***</sup>	
<b>Nativity status</b>				
Born in US	86.3	83.5 <sup>^^</sup>	75.8 <sup>***</sup>	
Not Born US	13.7	16.5 <sup>^^</sup>	24.2 <sup>***</sup>	
<b>SF-12 physical health,</b>	38.6	43.3 <sup>^^</sup>	51.2 <sup>***</sup>	
mean (SE)	(0.1)	(0.3)	(0.3)	
<b>Insurance status</b>				
Private/Exchange	27.0	39.4 <sup>^^</sup>	57.1 <sup>***</sup>	
Medicaid/Other public	30.3	23.1 <sup>^^</sup>	13.4 <sup>***</sup>	
Medicare	18.9	12.8 <sup>^^</sup>	3.1 <sup>***</sup>	
Uninsured	23.8	24.7 <sup>^^</sup>	26.5 <sup>***</sup>	
<b>Total family income, mean</b>	\$27,347.66	\$32,133.11 <sup>^^</sup>	\$42,475.68 <sup>***</sup>	
<b>(SE)</b>	(410.2)	(568.4)	(566.7)	

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1 (SPD vs. NPD)

<sup>^^</sup> p<0.01, <sup>^^</sup> p<0.05, <sup>^</sup> p<0.1 (SPD vs. MMPD)

SPD: Serious psychological distress; MMPD: Mild- to Moderate- psychological distress; NPD: No psychological distress

SE: Standard error

### *Regression analysis*

#### Census region of residence

Tables 2 and 3 display the multinomial probit regression results of the probability of enrollment in each insurance type for individuals with SPD and the full sample, respectively.

They show that census region of residence is associated with the probability of enrollment in

Medicaid and of being uninsured for individuals with SPD and the full sample. Individuals residing in Midwest, South, and West regions with SPD have a lower probability of enrollment in Medicaid relative to individuals residing in the Northeast. Individuals with SPD residing in the South have the lowest likelihood of being covered by Medicaid or other public insurance and are 21.8 percentage points ( $p<0.01$ ) less likely to be covered by Medicaid or other public insurance than residents of the Northeast (Table 2) region. People with SPD are more likely to be uninsured in all regions relative to those in the Northeast. In the South, the probability of being uninsured is 21.4 percentage points ( $p<0.01$ ) higher than the Northeast, whereas the Midwest and West have a 9.7 and 6.7 percentage point ( $p<0.01$  for each) higher probability of being uninsured relative to the Northeast (Table 2). In the full sample, people in the South have a 13.3-percentage point ( $p<0.01$ ) lower probability of being enrolled in Medicaid relative to the Northeast, and almost a 12.6-percentage point higher probability of being uninsured ( $p<0.01$ ). Also notable is that the Midwest and West have a 4-5 percentage points higher probability of being uninsured than the Northeast ( $p<0.01$  for each) (Table 3).

### Income

All lower income groups are significantly less likely to be on private insurance compared to those with middle-income, and more likely to be covered by Medicaid (Tables 2 & 3). For individuals with SPD, lower income brackets are anywhere from 14.5 to 36 percentage points ( $p<0.01$  for each bracket) less likely to be covered by private insurance than middle income individuals with SPD, with those in the “Poor” income bracket having the lowest likelihood of being covered. In the full sample the pattern is similar, but the range and magnitude are much smaller (2 to 4.6 percentage points,  $p<0.01$  for each bracket). The low-income and poor income categories are significantly more likely to be uninsured relative to the middle-income group among individuals with SPD (5.5 ( $p<0.05$ ) and 9.6 ( $p<0.01$ ) percentage points respectively), and all three lower income categories have a greater likelihood of being uninsured in the full sample

(Low income: 10.6; Near poor: 12.8; Poor: 17.1; percentage points,  $p < 0.01$  for each bracket vs. middle income). The magnitude of the marginal effects in each insurance category among individuals with SPD are smaller than the full sample, which indicates that although income does predict insurance status in this population, it is not as strong of a predictor among individuals with SPD as it is in the broader population.

### Age

Individuals in the older age categories are less likely to be covered by Medicaid than those in the younger category (27-34 years) among individuals with SPD and when the analysis is expanded to include all PD groups (Tables 2 & 3). The oldest age category is the least likely to be enrolled in Medicaid relative to the reference group. Individuals with SPD who are aged 55-64 have a 15.9-percentage point ( $p < 0.01$ ) lower probability of enrollment in Medicaid than individuals who are aged 27-34, and the same individuals in the full sample have -6.6 percentage point ( $p < 0.01$ ) lower probability of enrollment. Individuals in the older age categories are more likely to be covered by Medicare than those in the younger category (27-34 years) among individuals with SPD and when the analysis is expanded to include all PD groups (Tables 2 & 3). The oldest individuals with SPD have a 22-percentage point ( $p < 0.01$ ) higher likelihood of being enrolled in Medicare relative to the reference group, while those aged 35-44 have a 7.5 percentage point ( $p < 0.01$ ) higher likelihood of enrollment. The pattern is similar in the full sample, but the magnitude of the differences is smaller, with the oldest age group having a 6.8 percentage point ( $p < 0.01$ ) higher likelihood of enrollment and the younger age group only having a 2-percentage point ( $p < 0.01$ ) higher likelihood of enrollment in Medicare relative to the reference group. These results are aligned with the idea that older individuals tend to be more likely to have comorbid conditions that may make them disabled and therefore eligible for Medicare. Younger individuals tend to be earlier in their careers and may face less job stability, be unmarried, or be raising children, all of which minimize their access to private insurance

relative to older individuals. All age groups in both samples are significantly less likely to be uninsured than the 27-34 group except for the 35-44 age group in the SPD sample (ranges, SPD: -6.4 to -8.1 percentage points,  $p<0.05$ ; full sample: -1.7 to -5.6 percentage points,  $p<0.01$ ).

### Race and ethnicity

Among individuals with SPD, non-Hispanic Blacks, Hispanics, and other race/ethnicity are significantly less likely to be on private insurance than whites (-4.5 percentage points  $p<0.05$ , -7.5 percentage points  $p<0.01$ , -8 percentage points  $p<0.05$ , respectively). Non-Hispanic Blacks are more likely to be covered by Medicaid (10.7 percentage points,  $p<0.01$ ) and less likely to be covered by Medicare (-4.6 percentage points,  $p<0.05$ ) than whites. There are no statistically significant differences in the likelihood of being uninsured between racial/ethnic groups (Table 2). In contrast, in the full sample, non-Hispanic Blacks and Hispanics are less likely to be on private insurance than non-Hispanic whites (-3.8 percentage points  $p<0.01$ , -7.7 percentage points  $p<0.01$ , respectively), and non-Hispanic Blacks are more likely to be covered by Medicaid than non-Hispanic whites (5.7 percentage points,  $p<0.01$ ). Finally, non-Hispanic Black are less likely to be uninsured than non-Hispanic whites (-1.7 percentage points,  $p<0.05$ ), and Hispanics are more likely to be uninsured than non-Hispanic whites (8.8 percentage points,  $p<0.01$ ) (Table 3).

### Education

Among individuals with SPD, lower levels of educational attainment are associated with a significantly lower likelihood of private insurance relative to those with a bachelor's degree or higher (Some college: -5.2 percentage points  $p<0.1$ ; high school: -8.6 percentage points  $p<0.01$ ; less than high school: -14 percentage points  $p<0.01$ ). Similarly, lower levels of education are associated with higher likelihood of being covered by Medicaid (high school: 5.4 percentage points  $p<0.1$ ; less than high school: -14 percentage points  $p<0.01$ ). Among individuals with SPD, only those with a high school degree or GED were significantly more likely to be uninsured than

those with a bachelor's degree or higher (6 percentage points,  $p < 0.05$ ) (Table 2). Similar effects are observed when the analysis is expanded to the full sample, but the magnitude of the effects is greater. In the full sample, having a high school degree or less is significantly associated with a lower probability of being covered by private insurance (-23.5 percentage points,  $p < 0.01$ ), and a higher probability of being on Medicaid (7.8 percentage points,  $p < 0.01$ ), Medicare (2.4 percentage points,  $p < 0.01$ ), and of being uninsured (13.3 percentage points,  $p < 0.01$ ) relative to having a bachelor's degree or higher (Table 3).

The results of this analysis are consistent with assessments of similar individuals with mental health issues prior to the implementation of the ACA, where people with mental health disorders had significantly higher poverty rates, lower levels of education, lower physical health status, and higher rates of Medicaid enrollment than people without mental disorders [7, 13]. As a result, individuals with mental health disorders had significantly higher needs for insurance and health care services than those without mental health disorders prior to the ACA [13]. The descriptive analyses of the present study indicate that the needs of individuals with SPD continue to be higher than those without SPD throughout the time of ACA implementation. This study also reflects the fact that health care needs in the context of mental health severity falls on a continuum, where individuals with MMPD seem to have needs that fall somewhere between those with SPD and NPD, rather than behaving more like one group or the other.

### *Insurance enrollment*

#### Private insurance/exchange:

There seems to be a slight downward trend in enrollment in private insurance in the full sample that is insignificant in 2012 and significant in 2013 (-1.6 percentage points,  $p < 0.1$ ) relative to 2011 (Table 3). In 2014 through 2016 that trend seems to reverse, with significant increases in enrollment in 2015 (2 percentage points,  $p < 0.05$ ) and 2016 (1.4 percentage points,

$p < 0.1$ ) relative to 2011. This is not the case for individuals with SPD where there is no change in private insurance enrollment over the timeframe of ACA implementation (Table 2). This suggests that those with SPD did not enroll in private insurance at higher rates after the ACA insurance expansions took effect compared with 2011, but the full sample did. To assess the differential effects of the time trend on PD status, Figure 1 displays the trends in insurance coverage for each year during ACA implementation relative to 2011. When the year indicator is interacted with psychological distress status, the increase in enrollment in private insurance in 2015 (2.4 percentage points,  $p < 0.05$ ) and 2016 (1.9 percentage points,  $p < 0.1$ ) is coming from the NPD group, and there are no statistically significant changes in private insurance enrollment in the MMPD or SPD groups from 2013 through 2016, relative to 2011.

### Medicaid

Enrollment in Medicaid began to increase for the full sample when the expansions started in 2014. The increase is steady between 2014 and 2016, with a 4.2 percentage point ( $p < 0.01$ ) increase in 2014, a 6.4 percentage point ( $p < 0.01$ ) increase in 2015, and a 7.5-percentage point ( $p < 0.01$ ) increase in the probability of enrollment in Medicaid in 2016 relative to 2011 (Table 3). However, individuals with SPD did not experience statistically significant increases in enrollment in Medicaid until 2015 (8.8 percentage points,  $p < 0.01$ ; Table 2). This is further demonstrated by Figure 2, which looks at the percentage point change in the likelihood of enrollment in Medicaid relative to 2011 in each year by psychological distress group. For the NPD and MMPD groups, Medicaid enrollment picks up immediately in 2014. The SPD group experiences an increase in Medicaid enrollment in 2014, but it is not statistically significant. However, in 2015 and 2016 those with SPD begin to enroll in Medicaid (2015: 8.6 percentage points  $p < 0.01$ ; 2016: 9.9 percentage points  $p < 0.01$ ; relative to 2011), and the gains in the probability of enrollment in Medicaid for these individuals meet or exceed the gains in the probability of enrollment in Medicaid in the other PD groups in 2015 and 2016. A sensitivity analysis was conducted where

2013 is used as the reference year, and the same pattern of enrollment emerges. This suggests that although individuals with SPD did not immediately enroll in Medicaid after the ACA insurance expansions, eventually they experienced greater gains in Medicaid enrollment than individuals with MMPD or NPD.

### Uninsured

In the full sample, the uninsured rate dropped relative to 2011 beginning in 2014 (-5.7 percentage points,  $p<0.01$ ) through 2016, with the probability of being uninsured dropping by almost 11 percentage points in 2016 relative to 2011 ( $p<0.01$ ) (Table 3). In Table 2 the likelihood of being uninsured for individuals with SPD is almost 15 percentage points lower in 2016 relative to 2011 ( $p<0.01$ ). Figure 3 shows that the percentage point change in the likelihood of being uninsured in 2014, 2015, and 2016 relative to 2011 is significantly different for all psychological distress groups, but that the magnitude of the changes for those with SPD is greater than the other groups (2014 – NPD: -5.5 percentage points  $p<0.01$ , MMPD: -4.9 percentage points  $p<0.1$ , SPD: -9.1 percentage points  $p<0.01$ ; 2015 – NPD: -9.2 percentage points  $p<0.01$ , MMPD: -11 percentage points  $p<0.01$ , SPD: -15 percentage points  $p<0.01$ ; 2016 – NPD: -10.2 percentage points  $p<0.01$ , MMPD: -11.3 percentage points  $p<0.01$ , SPD: -14 percentage points  $p<0.01$ ).

### Medicare:

Although adults eligible for Medicare due to age were out of scope for this analysis, the likelihood of Medicare enrollment does seem to increase over the 2012-2016 timeframe relative to 2011 for the full sample (2012: 0.6 percentage points  $p<0.1$ ; 2016: 1.6 percentage points  $p<0.01$ , Table 3) and for those with SPD (2012: 3.3 percentage points NS; 2016: 7.2 percentage points  $p<0.01$ ) (Table 2). Those who are eligible for Medicare in this study are individuals who have been legally disabled for more than 2 years and have 10 years of work history. When the time trend is broken down by SPD status, this enrollment appears to be mostly from those with

MMPD or SPD. This may be a further indication that those with SPD and MMPD generally have worse physical health than those with NPD, which is observed in the SF-12 physical component scores (Table 1), or that they may be eligible for Medicare directly as a result of being disabled due to a mental disorder.

### *Discussion*

The results of this analysis demonstrate patterns of insurance enrollment among individuals with SPD that differ from patterns of enrollment in the population at large during ACA implementation. Individuals with SPD did not significantly enroll in private insurance, whereas the broader population did. All individuals significantly increased enrollment in Medicaid after ACA implementation, however enrollment among individuals with SPD is delayed until 2015, at which point the magnitude of enrollment is higher than the rest of the population. All individuals are significantly less likely to be uninsured after ACA implementation, but the magnitude of the likelihood of being uninsured is greater for individuals with SPD. Finally, there are small increases in the likelihood of enrollment in Medicare after ACA implementation among individuals with SPD, but not in the overall population.

### Private Insurance

As demonstrated in Table 2, the probability of enrollment in private/exchange insurance among individuals with SPD remained stable throughout ACA implementation, with no significant changes in enrollment in any year relative to 2011. This contrasts with research by Cohen and Zammitti, which finds that in the first year and a half after ACA implementation private insurance coverage among the SPD population went from 28% in 2013 to 38% in the first 9 months of 2015 [9]. However, Frean, et al., demonstrate that enrollment changes in private insurance for all individuals after ACA implementation was minimal in 2014 [1]. This aligns with the findings in Table 3 where enrollment in private/exchange insurance increased by two-tenths

of a percentage point in 2014 relative to 2011 in the general population. Further, Frean et al. estimates that 40% of the gains in insurance coverage from the ACA in 2014 can be attributed to premium subsidies issued for insurance purchased on the exchanges, indicating that enrollment in the exchanges was more modest than anticipated. In the present study, an insufficient number of individuals enrolled in insurance through the exchanges for analysis (1% of those with SPD and 2.2% of the full sample; data not shown). Frean et al. posits that enrollment in the exchanges would increase in 2015 and 2016, and Table 3 demonstrates an increase in enrollment in private insurance/exchanges of 2 and 1.4 percentage points respectively, although this increase cannot be exclusively attributed to the exchanges.

A major concern of opponents of the ACA was that expansion of public insurance would “crowd out” private insurance, also known as “the notion that public insurance expansions simply erode private insurance coverage, rather than providing coverage to those otherwise uninsured” [18]. As recently as 2008, in an analysis of public insurance expansions that occurred in the late 1990s and early 2000s, estimates of crowd-out were placed at around 60%. That is, the number of privately insured individuals falls by about 60% as much as the number of publicly insured individuals rises.

Although the assessment of crowd-out was not the objective of this study, the number of privately insured individuals stayed nearly constant over the course of the study, and some psychological distress groups saw an increase in the privately insured. Meanwhile, the likelihood of being uninsured dropped in all PD groups, and the likelihood of being enrolled in Medicaid increased. This suggests that regardless of PD group, the time frame of ACA implementation is associated with a decreasing likelihood of being uninsured and an increasing likelihood of enrollment in public insurance, without substantially changing net private enrollment. This finding reflects much of the literature assessing the impacts of the ACA on private insurance crowd-out, which finds the ACA is not associated with crowd out.

## Medicaid

Frean et. al., find that increases in enrollment in Medicaid are not only a result of newly eligible individuals enrolling, but are also the result of what is known as a “woodwork” effect, where a large portion of individuals who already met the eligibility requirements for Medicaid prior to the Medicaid expansions signed up for Medicaid after ACA implementation [1]. While not an explicit public policy goal of the ACA, this effect demonstrates the success of the ACA in encouraging enrollment in Medicaid. The “woodwork” effect in addition to the expansion of Medicaid eligibility requirements may explain the bulk of the increases in Medicaid enrollment in all PD groups (Figure 2). Although all PD groups have significantly greater enrollment in Medicaid in 2014 and later relative to 2011, the magnitude of the effect observed in the SPD group is greater than the others. The previous state-level expansions of Medicaid have demonstrated that adults symptomatic of psychological distress have a stronger response to the expansion of Medicaid than those without psychological distress. While this effect is observed in the present study, enrollment in Medicaid is delayed relative to other psychological distress groups, where the increase in 2014 for those with SPD is not statistically significant relative to 2011 but is in 2015 and 2016. This finding has not been previously reported to my knowledge and may indicate that people with SPD face significant barriers that delayed their enrollment in new insurance options during the initial portion of ACA implementation. These barriers may be related to the fact that people with SPD report being more likely to forgo care due to cost [7], more likely to experience delays in receiving care and are more likely to change their usual place of care due to insurance reasons, than those without SPD [19]. Additionally, individuals with SPD are more likely to exhibit health care avoidance behaviors, such as not visiting a doctor even when they suspect they should[20].

## Uninsured

Saloner and colleagues are one of the first to assess the impacts of the ACA on insurance status for individuals with mental disorders, comparing changes in the uninsured rates from 2011-2013 to 2014. They find that the uninsured rate dropped by 5.1 percentage points for those with mental disorders in the first year after ACA implementation, with most of the gain in insurance coverage coming from Medicaid [21]. Table 2 demonstrates a larger drop in the likelihood of being uninsured in the first year of ACA implementation (2014) among individuals with SPD, with a 9.1 percentage point drop in 2014 and the likelihood of being enrolled in Medicaid increasing by 1.8 percentage points, while the likelihood of being enrolled in private coverage did not change. The likelihood of being uninsured for people with SPD dropped even further in 2015 and 2016 (14.9 percentage points in both years). This larger drop is aligned with the findings of multiple studies that find that individuals with mental health conditions or SPD are significantly less likely to be uninsured after the implementation of the ACA .

Regardless of mental health status, the ACA significantly lowered the uninsured rate nationally. The probability of having insurance in Medicaid expansion states range from 5.9 percentage points to 15.3 percentage points post-ACA implementation. In non-Medicaid expansion states, the probability of having insurance is also estimated to have increased by 2.8 to 7.3 percentage points [4]. Table 3 demonstrates that likelihood of being uninsured dropped by 10.6 percentage points in all states, which is in the range of the increases in the probability of insurance observed in previous studies.

## Medicare

Adults with SPD are more likely to have a range of comorbidities compared to persons without SPD. These include having a diagnosis of heart or lung disease, diabetes, stroke, or arthritis. Adults with SPD are also more likely to report functional limitations, such as requiring

assistance with activities of daily living, compared to those without SPD [6, 7]. Given the physical limitations associated with SPD, it is very possible that these individuals are more likely to be disabled than those without SPD. Furthermore, mental disorders may also qualify these individuals for Medicare. Thus, individuals with SPD are enrolling in Medicare when they decide to enroll in insurance, as is observed in Table 2. Figure 4 also highlights that this effect extends to people with MMPD, but not those with NPD. It is not altogether clear as to why this increase in enrollment seems to be associated with the timeframe of the ACA implementation. It is possible that the “woodwork” effect described by Frean, et al. regarding increases in Medicaid enrollment applies here as well [1]. Additionally, Kennedy and colleagues have found that Medicare and Medicaid enrollment among working age adults who are disabled has been steadily increasing since 1998. It is very possible that the effects of the year indicator on Medicare enrollment in this study is simply a continuation of a trend in Medicare enrollment among working-age disabled adults that started 16 years before the implementation of the ACA.

### *Limitations*

Several limitations effected this study. First, insufficient enrollment in exchange insurance among the full sample and SPD groups led to a small sample size and prevented the analysis of those in the exchanges as a separate group, and no inferences can be made about this group. However, this is an interesting finding on its own, and substantiates previous research that concludes that the impact of the exchanges on the enrollment of private insurance was lower than expected. Additional years of data would allow for a separate analysis to assess enrollment in the exchanges over a longer timeframe.

Similarly, the size of the SPD sample was small enough that it may have limited the statistical power of the analysis, therefore inferences made from the results of this group should be viewed cautiously.

Additionally, almost all data from MEPS used in this analysis is self-reported. This means that there may be inaccuracies in reporting of insurance status if the MEPS interviewer is unable to validate that status through an insurance card, leading to under- or over-reporting of each insurance status. Finally, this study is a simple pre-post design without comparison groups and thus does not control for other policies that may have influenced the take-up of insurance that were unrelated to the ACA in the time period after the ACA was implemented (for example, the expansion of employer-sponsored insurance coverage to same-sex couples on the federal level in 2015). Furthermore, the effects of Medicaid coverage may be diluted since the sample includes individuals who live in Medicaid expansion and non-expansion states. A similar analysis conducted either in a different dataset, or by a researcher with the ability to access the state variables from MEPS would allow for a more complex study design (e.g. a difference-in-differences approach) that a may be able to address the impacts of the ACA more clearly.

**Table 2: Multinomial probit regression of probability of insurance status of individuals with serious psychological distress; marginal effects (ME) and standard errors (SE) reported.**

N=3,964		Private/Exchange	Medicaid/Other public	Medicare	Uninsured
		ME (SE)	ME (SE)	ME (SE)	ME (SE)
<b>Year</b>					
	2011	ref	Ref	ref	ref
	2012	0.016 (0.025)	-0.035 (0.025)	0.015 (0.016)	0.004 (0.025)
	2013	0.005 (0.027)	0.003 (0.028)	0.033 (0.020)	-0.041 (0.026)
	2014	0.000 (0.027)	0.018 (0.029)	0.073*** (0.025)	-0.091*** (0.027)
	2015	0.003 (0.028)	0.088*** (0.031)	0.058** (0.023)	-0.149*** (0.022)
	2016	-0.020 (0.023)	0.098*** (0.030)	0.072*** (0.027)	-0.149*** (0.025)
<b>Region</b>					
	Northeast	ref	Ref	ref	ref
	Midwest	0.093** (0.036)	-0.081** (0.036)	-0.108*** (0.028)	0.096*** (0.027)
	South	0.044 (0.033)	-0.218*** (0.034)	-0.040 (0.029)	0.214*** (0.023)
	West	0.072** (0.034)	-0.038 (0.038)	-0.101*** (0.028)	0.067*** (0.025)
<b>Poverty level</b>					
	Middle income (200-399% FPL)	ref	Ref	ref	ref
	Low income (138-199% FPL)	-0.145*** (0.027)	0.041* (0.022)	0.048** (0.022)	0.055** (0.023)
	Near poor (100-138% FPL)	-0.281*** (0.028)	0.123*** (0.035)	0.137*** (0.027)	0.021 (0.025)
	Poor (less than 100% FPL)	-0.360*** (0.023)	0.205*** (0.023)	0.060*** (0.018)	0.096*** (0.022)
<b>Gender</b>					
	Male	ref	Ref	ref	ref
	Female	0.030* (0.017)	0.042** (0.017)	-0.019 (0.016)	-0.054*** (0.019)
<b>Age category</b>					
	27-34	ref	Ref	ref	ref
	35-44	0.018 (0.026)	-0.056** (0.028)	0.075*** (0.017)	-0.038 (0.029)
	45-54	-0.003 (0.025)	-0.099*** (0.031)	0.166*** (0.022)	-0.064** (0.031)
	55-64	0.021 (0.029)	-0.159*** (0.032)	0.220*** (0.024)	-0.081** (0.033)
<b>Race/Ethnicity</b>					
	White, non-Hispanic	ref	Ref	ref	ref

Black, non-Hispanic	-0.045** (0.023)	0.107*** (0.029)	-0.046** (0.019)	-0.015 (0.026)
Hispanic	-0.075*** (0.026)	0.034 (0.029)	0.004 (0.027)	0.037 (0.028)
Other Race/Ethnicity	-0.080** (0.034)	0.049 (0.043)	0.047 (0.041)	-0.017 (0.036)
<b>Marital status</b>				
Married	ref	Ref	ref	ref
Widowed	-0.192*** (0.041)	0.145*** (0.049)	0.040 (0.040)	0.006 (0.038)
Divorced	-0.138*** (0.025)	0.064** (0.026)	0.056** (0.022)	0.017 (0.023)
Separated	-0.092** (0.040)	0.065* (0.036)	0.032 (0.030)	-0.005 (0.031)
Never Married	-0.141*** (0.027)	0.023 (0.027)	0.078*** (0.024)	0.040* (0.023)
<b>Education</b>				
Bachelor's degree or higher	ref	Ref	ref	ref
Some college, no bachelor's degree	-0.052* (0.031)	0.039 (0.030)	-0.013 (0.033)	0.026 (0.028)
High school or GED	-0.086*** (0.026)	0.054* (0.029)	-0.028 (0.029)	0.060** (0.026)
Less than high school	-0.140*** (0.029)	0.144*** (0.030)	-0.016 (0.034)	0.011 (0.030)
<b>Nativity status</b>				
Born in the US	ref	Ref	ref	ref
Not born in the US	0.014 (0.027)	-0.035 (0.027)	-0.075*** (0.021)	0.095*** (0.031)
<b>SF-12 Physical Health Component</b>	0.002*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	0.003*** (0.001)

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\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 3: Multinomial probit regression of probability of insurance status of individuals in the full sample; marginal effects (ME) and standard errors (SE) reported.**

N=55,608		Private/Exchange	Medicaid/other public	Medicare	Uninsured
		ME (SE)	ME (SE)	ME (SE)	ME (SE)
<b>Year</b>					
	2011	ref	ref	ref	ref
	2012	-0.009 (0.008)	-0.001 (0.005)	0.001 (0.003)	0.009 (0.007)
	2013	-0.016* (0.009)	0.000 (0.005)	0.006* (0.003)	0.010 (0.009)
	2014	0.002 (0.010)	0.042*** (0.008)	0.013*** (0.003)	-0.057*** (0.010)
	2015	0.020** (0.009)	0.064*** (0.008)	0.013*** (0.003)	-0.097*** (0.009)
	2016	0.014* (0.009)	0.075*** (0.008)	0.016*** (0.004)	-0.106*** (0.009)
<b>Region</b>					
	Northeast	ref	ref	ref	ref
	Midwest	0.039** (0.016)	-0.075*** (0.010)	-0.019*** (0.005)	0.055*** (0.012)
	South	0.024 (0.015)	-0.133*** (0.010)	-0.017*** (0.005)	0.126*** (0.013)
	West	0.013 (0.014)	-0.027** (0.013)	-0.026*** (0.005)	0.040*** (0.013)
<b>Poverty level</b>					
	Middle income (200-399% FPL)	ref	ref	ref	ref
	Low income (138-199% FPL)	-0.197*** (0.009)	0.068*** (0.006)	0.023*** (0.003)	0.106*** (0.007)
	Near poor (100-137% FPL)	-0.319*** (0.012)	0.143*** (0.009)	0.049*** (0.004)	0.128*** (0.009)
	Poor (less than 100% FPL)	-0.458*** (0.008)	0.245*** (0.010)	0.042*** (0.003)	0.171*** (0.008)
<b>Gender</b>					
	Male	ref	ref	ref	ref
	Female	0.027*** (0.005)	0.043*** (0.004)	-0.010*** (0.003)	-0.061*** (0.005)
<b>Age category</b>					
	27-34	ref	ref	ref	ref
	35-44	0.031*** (0.009)	-0.034*** (0.007)	0.020*** (0.003)	-0.017** (0.008)
	45-54	0.040*** (0.009)	-0.048*** (0.007)	0.043*** (0.003)	-0.036*** (0.008)
	55-64	0.053*** (0.010)	-0.066*** (0.007)	0.068*** (0.004)	-0.056*** (0.009)

**Race/Ethnicity**

White, non-Hispanic	ref	ref	ref	ref
Black, non-Hispanic	-0.038*** (0.008)	0.057*** (0.007)	-0.002 (0.003)	-0.017** (0.007)
Hispanic	-0.077*** (0.011)	-0.005 (0.008)	-0.006 (0.004)	0.088*** (0.011)
Other Race/Ethnicity	0.002 (0.016)	0.010 (0.010)	0.011* (0.006)	-0.023 (0.015)

**Marital status**

Married	ref	ref	ref	ref
Widowed	-0.094*** (0.018)	0.018 (0.012)	0.039*** (0.008)	0.038** (0.016)
Divorced	-0.111*** (0.009)	0.026*** (0.006)	0.024*** (0.003)	0.061*** (0.009)
Separated	-0.089*** (0.016)	0.030*** (0.009)	0.011** (0.004)	0.048*** (0.015)
Never Married	-0.125*** (0.008)	0.019*** (0.006)	0.040*** (0.004)	0.066*** (0.007)

**Education**

Bachelor's degree or higher	ref	ref	ref	ref
Some college, no bachelor's degree	-0.097*** (0.008)	0.029*** (0.006)	0.008** (0.003)	0.061*** (0.007)
High school or GED	-0.134*** (0.009)	0.040*** (0.006)	0.008** (0.003)	0.086*** (0.008)
Less than high school	-0.235*** (0.010)	0.078*** (0.008)	0.024*** (0.004)	0.133*** (0.010)

**Nativity status**

Born in the US	ref	ref	ref	ref
Not born in the US	-0.074*** (0.010)	-0.007 (0.007)	-0.026*** (0.003)	0.106*** (0.010)
<b>SF-12 Physical Health Component</b>	0.003*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	0.002*** (0.000)

**Psychological Distress  
Category**

	NPD	ref	ref	ref	ref
	MMPD	-0.062*** (0.009)	0.030*** (0.006)	0.032*** (0.004)	-0.000 (0.009)
	SPD	-0.117*** (0.013)	0.071*** (0.009)	0.047*** (0.006)	-0.001 (0.010)

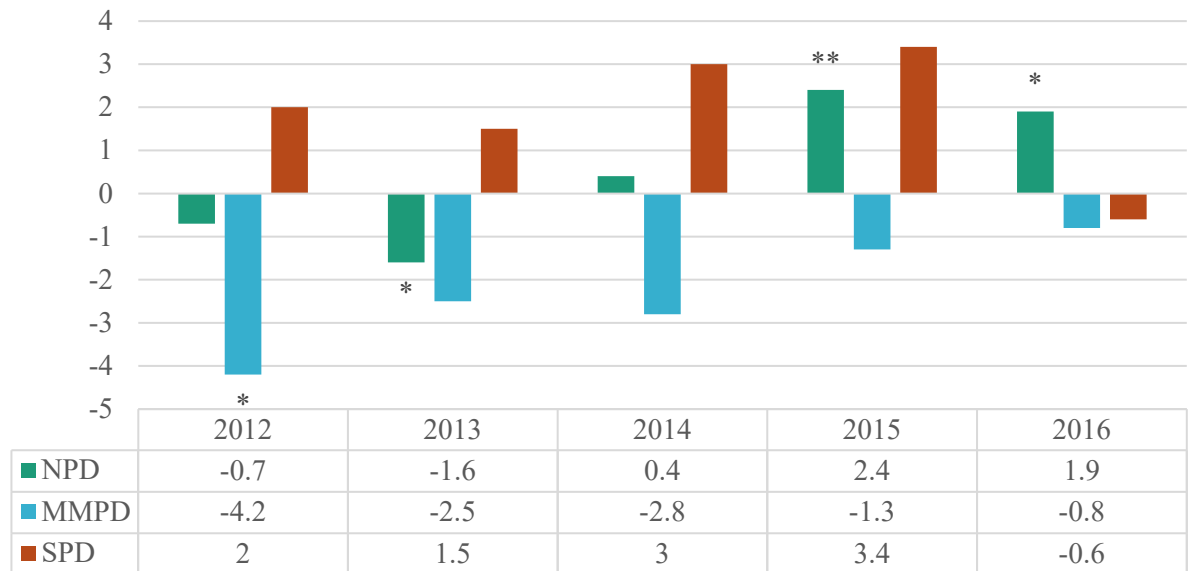
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\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

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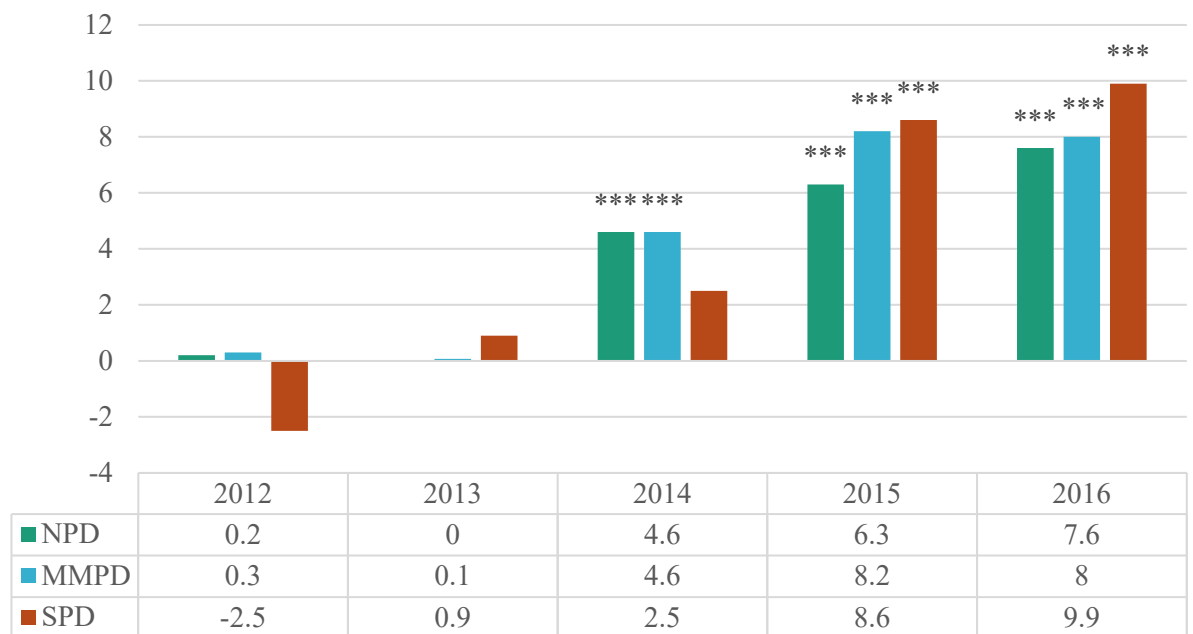
NPD: No psychological distress; MMPD: Mild- to Moderate- psychological distress; SPD: Serious psychological distress;

Figure 1: Percentage point change in likelihood of enrollment in private insurance relative to 2011, marginal effects reported



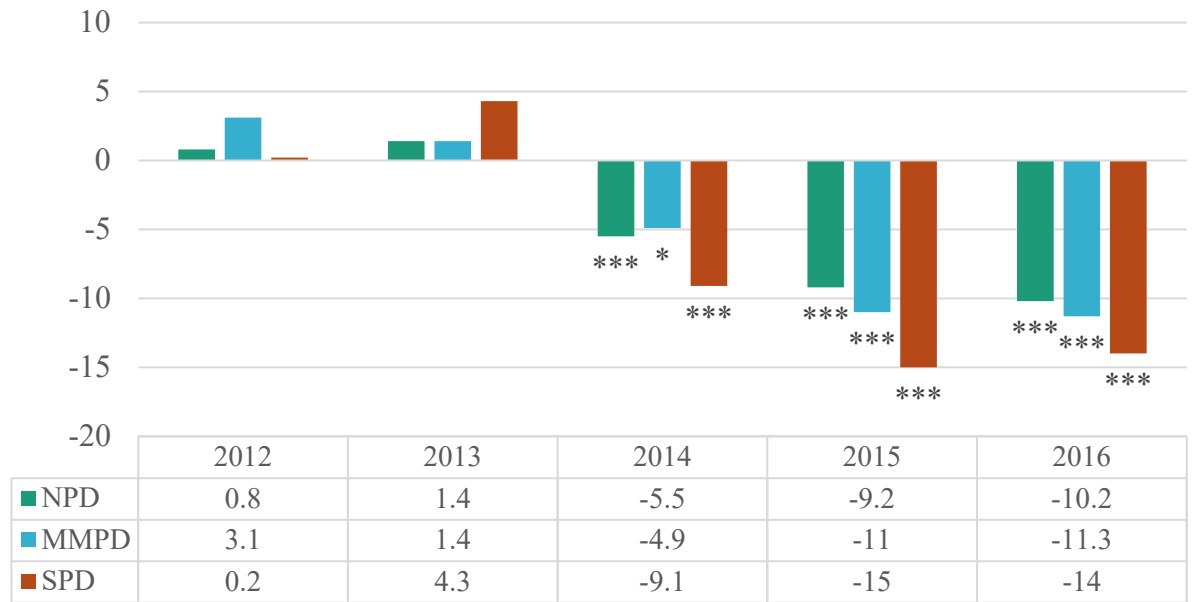
Includes effects of year indicator coefficient plus the coefficient of the interaction of the year indicator with PD status \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Figure 2: Percentage point change in likelihood of enrollment in Medicaid relative to 2011, marginal effects reported



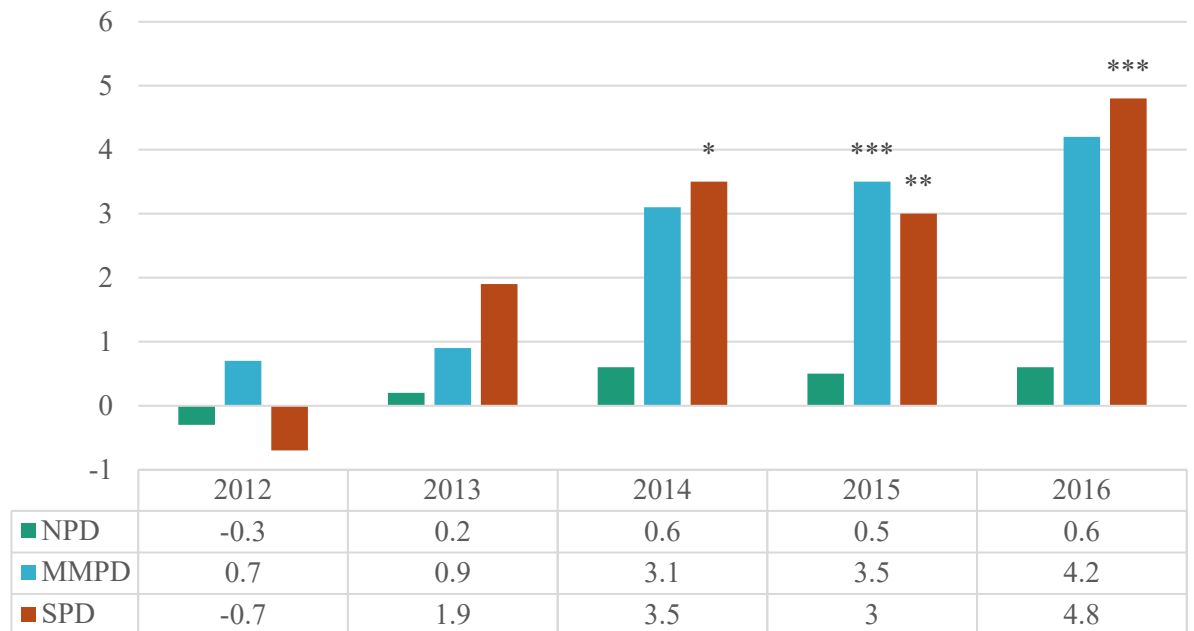
Includes effects of year indicator coefficient plus the coefficient of the interaction of the year indicator with PD status \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Figure 3: Percentage point change in likelihood of being uninsured relative to 2011, marginal effects reported



Includes effects of year indicator coefficient plus the coefficient of the interaction of the year indicator with PD status \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Figure 4: Percentage point change in likelihood of enrollment in Medicare relative to 2011, marginal effects reported



Includes effects of year indicator coefficient plus the coefficient of the interaction of the year indicator with PD status \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## **Conclusion**

There are modest increases in the enrollment of private insurance over the years of ACA implementation when mental health status is controlled for, and no change in enrollment among individuals with SPD. Regardless of PD status, most individuals benefited from a lower likelihood of being uninsured after ACA implementation, however the magnitude of this benefit seems to be greater for individuals with SPD than the rest of the sample. The reduction in the likelihood of being uninsured is coupled with increases in the probability of Medicaid enrollment. Individuals with SPD saw increases in the probability of Medicaid enrollment over the timeframe of ACA implementation, as did each of the other PD groups. After an initial delay in enrollment in Medicaid among individuals with SPD, the gains in enrollment by 2016 are similar to individuals in other psychological distress groups.

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**Appendix 1 – Description of variables by conceptual framework**

<b>All variables originated in the MEPs Household Component</b>			
<b>Variable type</b>	<b>Variable name</b>	<b>Variable Description</b>	<b>Scale</b>
Dependent	INSSTAT3	Insurance status. This variable was constructed using several variables from IPUMS MEPS. IPUMS MEPS reports insurance variables monthly. This means an individual can have 12 insurance statuses reported in a year. Therefore, the choice was made to select the insurance status that the individual reported at the same time they reported their Kessler 6 score to reflect a person's insurance status at the time they may have reported being in psychological distress. I coded each category of insurance as being selected in the same month as the SAQ was taken (using IPUMS MEPS variable ADCMPM) or not and created 5 new variables based on the following categories: Private Insurance, Exchange, Medicaid, Other public, and Uninsured. I then created another variable, INSSTAT, to establish a categorical variable that represents the insurance status of an individual in the month that they took the SAQ. After looking at the frequencies for this variable I realized that the sample size for the Exchange category was too small. Additionally, I ran IIA tests to assess the best combination of insurance categories that provided the best model fit. Based on this information created the variable INSSTAT3	1 Private Insurance 2 Medicaid 3 Medicare 4 Uninsured
Independent/ Cohort defining	K6CAT	This variable was constructed from the IPUMS MEPS variable K6SUM, which is the summary score from the Kessler 6 questionnaire, reported in the Self-Administered Questionnaire (SAQ). K6CAT was created to define patients as having no psychological distress ( $K6SUM \leq 7$ ), mild to moderate psychological distress ( $8 \leq K6SUM \leq 12$ ), or serious psychological distress ( $K6SUM \leq 13$ ). I have used this variable to create my psychological distress subpopulations, but I may revise my	1 No psychological distress (NPD) 2 Mild to moderate psychological distress (MMPD) 3 Severe psychological distress (SPD)

		models to include it as part of an interaction term with the full cohort.	
<b>Public policy factors</b>			
Independent	YEARIND	A single categorical year indicator variable constructed from the IPUMS MEPS variable YEAR to identify which year an individual reported their data in.	1 2011 (ref) 2 2012 3 2013 4 2014 5 2015 6 2016
<b>Intrapersonal factors</b>			
Independent	AGECAT	Categorical age variable constructed from the linear variable AGE from IPUMS MEPS	1 27-36 (ref) 2 37-46 3 47-56 4 57-64
Independent	RACE/ETHNICITY	Reconstructed the RACEA and HISPYN variables from IPUMS MEPS to consolidate the race categories and combine them with the ethnicity categories.	1 "White, non-Hispanic" (ref) 2 "Black, non-Hispanic" 3 "Hispanic" 4 "Other Race/Ethnicity"
Independent	EDUCATION	There are several education variables in IPUMS MEPS, however they were inconsistently administered throughout the time frame that I am studying. One variable, educational attainment or EDUC, was administered in all years, hence I selected this one. This variable was reconstructed and condensed to create 4 broader categories of educational attainment, rather than the 30 categories in the original variable	1 Bachelor's degree or more (ref) 2 Some college, no bachelor's 3 High school or GED 4 Less than high school
Independent	SEX	Gender, male or female	
Independent	POVLEV	The IPUMS MEPS variable for poverty category. This variable takes the linear variable for family income and creates a categorical variable, classifying respondents according to their family income as a percentage of the Federal Poverty Level (FPL)	1 Negative or poor (LT 100% poverty line) 2 Near poor (100-138% poverty line) 3 Low income (138-199% poverty line) 4 Middle income (200-399% poverty line) 5 High income (GE 400% poverty line)
Independent	PCS	Physical Health Component from the SF-12.	Continuous variable

Independent	NATSTAT	Nativity status or USBORN in IPUMS MEPS. This variable was reconstructed to simplify the number of categories so that they simply describe whether an individual was born as a US citizen or not (regardless of if they were born in the US, US territories, overseas military base, etc.)	0 Born in the US (ref) 1 Not born in the US
<b>Interpersonal factors</b>			
Independent	MARRIED	IPUMS MEPS variable is MARSTAT, or marital status. I recoded the variable to address the missing values.	1 Married (ref) 2 Widowed 3 Divorced 4 Separated 5 Never married
<b>Community factors</b>			
Independent	REGION	IPUMS MEPS variable is REGIONMEPS. I recoded the variable to address the missing values.	1 Northeast (ref) 2 Midwest 3 South 4 West

## CHAPTER 2

### CHANGES IN HEALTH SERVICES USE FOLLOWING AFFORDABLE CARE ACT IMPLEMENTATION (2011-2016) FOR INDIVIDUALS WITH SERIOUS PSYCHOLOGICAL DISTRESS IN THE UNITED STATES

#### Abstract

**Background:** Individuals with serious psychological distress (SPD) are in worse health and have greater health care needs relative to individuals with no psychological distress (NPD). They are more likely to have difficulties accessing all types of health care relative to those with NPD for several reasons including, but not limited to, being more likely to exhibit health care avoidance behaviors, being unable to tell when care is needed, and being uninsured. The Affordable Care Act (ACA) expands access to health insurance, which may result in increased health services use. This study aims to assess how different types of health services use shifted among individuals with SPD and NPD during the time of ACA implementation and if the magnitude of the shifts in services are similar.

**Methods:** Pooled cross-sectional data from the Integrated Public Use Microdata Series (IPUMS) Medical Expenditure Panel Survey (MEPS) is used for analysis. Four health service outcomes are assessed in each year of ACA implementation (2011-2016) including emergency room use, hospitalizations, outpatient/office-based visits, and prescription fills. A series of bivariate analyses (2-sided t-tests) are conducted to test for differences in resource use between individuals with SPD and NPD during the 2011-2016 period. Psychological distress is defined by the Kessler 6 (K6) questionnaire. A score of 13 or more classifies an individual as having SPD, and a score of 7 or less classifies an individual as having NPD. Individuals with mild-to-moderate psychological distress (K6 score of 8-12) are excluded from the analysis. Analysis of health services use is conducted using a two-part hurdle model, where the first part of the model predicts the likelihood

of utilizing each type of health service (i.e. emergency room, hospital discharges, outpatient/office-based visits or prescription fills), and the second part predicts the amount of health services use conditional upon any use. The combined model predicts expected utilization given the likelihood of utilization.

**Results:** Among individuals with SPD, the likelihood of having an ER visit is higher in the 2014-2016 period than in 2011. Similarly, the likelihood of having a prescription medication fill is higher in 2016 than in 2011. The number of hospital discharges, conditioned upon having any, increased in 2016 relative to 2011. Outpatient/office-based visits, conditioned on having any, increased in 2014 and 2015 relative to 2011. Among individuals with SPD, the expected utilization is statistically significant and higher for hospital discharges in 2016, outpatient/office-based visits in 2014 and 2015, and prescription fills in 2015 relative to 2011. For individuals with NPD, the likelihood of having a hospital discharge in 2015 or a prescription fill in 2015 and 2016 went down relative to 2011, and the likelihood of having an outpatient/office-based visit in 2014 went up. The number of visits, conditioned on having any, increased for ER visits in 2015, hospital discharges in 2014 and 2015, and outpatient/office-based visits in 2014 and 2015 relative to 2011. Expected utilization is significantly higher for ER visits in 2014 and outpatient/office-based visits in 2014 and 2015, and significantly lower for prescription fills in 2014 and 2016 relative to 2011.

**Conclusion:** During ACA implementation, expected health services use differs between individuals with SPD and NPD in terms of hospital discharges, ER visits, and prescription fills. Individuals with SPD have significantly higher expected utilization of hospital discharges and prescription fills after the ACA insurance expansion relative to 2011, whereas individuals with NPD have significantly higher expected utilization of ER visits and significantly lower expected utilization of prescription fills. Both groups have significantly higher expected utilization of outpatient/office-based visits.



## Introduction

Serious psychological distress (SPD) exists among a subgroup of individuals with moderate to severe mental illness. It is defined as “a mental health problem severe enough to cause moderate-to-serious impairment in social, occupational, or school functioning and require treatment”. People with serious psychological distress, defined by a score on the Kessler 6 questionnaire of 13 or higher, have significantly greater health care needs than individuals with no psychological distress (NPD). Individuals with SPD are more likely to have serious health conditions such as chronic obstructive pulmonary disease (COPD), heart disease, and diabetes compared to individuals with NPD [1]. Furthermore, a higher proportion of individuals with SPD report fair or poor health relative to individuals with NPD [2]. A higher proportion of individuals with SPD report being unable to afford health care and lower proportions report having had a routine check-up in the past 12 months [3]. These individuals have higher rates of health services use, including use of resources that tend to be higher cost (i.e. emergency room visits and inpatient visits) [1, 4-6]. Individuals with SPD are also less likely to be insured, and this in combination with difficulties affording and accessing routine care, may explain their reliance on emergency departments as a usual source of care [5, 7]. Expanding health insurance coverage may improve access to community-based care and reduce the use of emergency department and inpatient hospital visits among individuals with SPD.

The Affordable Care Act (ACA) is the most recent policy initiative to expand health insurance coverage. It does so by expanding eligibility for Medicaid, creating insurance marketplaces where low-income individuals can purchase insurance with subsidized premiums, and by expanding coverage for young adults [7]. Furthermore, the ACA improves the quality of insurance benefits by requiring each plan to meet a minimum level of benefits through the essential health benefits provision. This provision requires coverage for prescription drugs, preventative care, and treatment of mental health and substance abuse issues [8], all of which are

important services for individuals with SPD. There is a lack of information regarding the response of individuals with SPD towards health services use in the face of the ACA insurance expansions. It is possible that trends in resource use among individuals with SPD follow similar trends to those with NPD during the timeframe of ACA implementation, but the magnitude of change may be different. In response, this study aims to assess the direction and magnitude of changes in health services use and in both psychological distress groups to fill in this gap.

I hypothesize that individuals with SPD face a variety of psychosocial barriers related to care-seeking behaviors that individuals with NPD either do not face or do not face with the same intensity. Lauver's Theory of Care-Seeking Behaviors states that a number of psychosocial factors, including anxiety, denial, social norms, and values influence whether an individual decides to seek care [9]. All these factors uniquely impact individuals with SPD. Among individuals with SPD, those who report high levels of hopelessness are less likely to seek medical care than individuals without SPD [10]. Also, those who report exhaustion were more likely to seek care than individuals without SPD [10]. Furthermore, individuals with SPD may struggle to identify changes in their health and have difficulty judging when to see a doctor [10], and adults with SPD may struggle to describe their medical history [5, 11]. Many physicians lack the knowledge regarding how to identify mental health issues, and the social stigma related to having a mental health condition may further inhibit successful management of mental health conditions [3, 12-14]. Health care avoidance behaviors are exhibited more frequently in individuals with SPD, contributing to lower use of mental health services [15], although they use other health services at higher rate than those with NPD [1, 3-6]. Individuals with SPD are more likely than individuals with NPD to avoid going to the doctor when they feel they should, and more likely to admit avoiding going to a doctor due to a fear of diagnosing serious illness [15]. The psychosocial barriers highlighted here significantly impact health services use among people with mental health conditions. The ACA was not designed to address these psychosocial factors

specifically, so improvements in health services use among this population associated with the ACA may be blunted by psychosocial barriers such as difficulties in judging when to see the doctor, or higher levels of health care avoidance behaviors relative to those with NPD. As a result, a smaller magnitude of health service use may be observed for individuals with SPD, specifically for non-urgent services such as outpatient/office-based visits and prescription fills, rather than for urgent services such as ER visits.

Better insurance coverage through the ACA may have two effects on health services use. First, it may drive individuals to use less expensive forms of health care and to seek preventative care, because these are commonly covered services and more people are insured as a result of the ACA [16-18]. Second, it may also initiate a temporary increase in demand for all types of health care because of what is known as pent-up demand. Pent-up demand for health services tends to be defined as “initial utilization caused by foregoing or delaying care while uninsured or underinsured” [19]. Prior to ACA implementation, Glied and Ma [20] estimated that the ACA would lead to nominal increases in health services use. They predicted that use of all types of services would increase, including emergency room use, and that these increases would vary significantly by state. Additionally, they projected the number of additional visits by the population expected to gain insurance under the ACA. They predicted that the newly insured will drive increases in the use of both primary care services (through the population gaining insurance in the marketplace exchanges) and in emergency room use (through the population gaining Medicaid coverage) [20]. Some of this increase may be explained by pent-up demand that exists due to an unmet need for health services, specifically for services that are non-urgent. Potential pent-up demand may be observed in non-urgent services such as outpatient/office-based visits and prescription fills due to mandatory coverage of wellness and preventative services through the ACA. Additionally, it is possible that a slight increase in hospitalizations and ER visits may be observed as a result of individuals gaining insurance coverage through the ACA. The results of

Chapter 1 of this dissertation indicate that individuals with SPD saw significant gains in insurance coverage through Medicaid, and several other studies indicate that the ACA significantly increased enrollment in private insurance and Medicaid for all individuals [17]. Whether or not health services use among individuals with SPD changed according to Glied and Ma's predictions during ACA implementation remains an outstanding question.

The aim of this chapter is to assess the impacts of the ACA on individuals with SPD who did not benefit from the dependent care provision, were too young to be eligible for Medicare without being disabled (i.e. individuals between the ages of 27 and 64) and are low to middle income. The trends in use of different types of health services (ER visits, hospital discharges, outpatient/office-based visits, and prescriptions) will be assessed over time for individuals with SPD to determine if the likelihood of accessing each type of care changes. Conditional on utilizing care, the amount of care used in each year will also be assessed. An assessment of health services use in same age individuals with no psychological distress (NPD) will evaluate whether results are reflective of a larger national trend or specific to those with SPD.

## **Background**

### *Differences in health services use between individuals with SPD and with NPD*

Individuals with SPD are significant users of health services despite dealing with unique psychosocial barriers to health services use, such as increased health care avoidance behaviors and difficulties judging when to seek health care [10, 15]. They are twice as likely to use the emergency room as individuals with NPD [12]. They are more likely to report having at least 10 or more doctor visits in a 12 month period and are more likely to have seen a health care provider in the last 6 months compared to adults with NPD [1]. Furthermore, they are more likely to receive medication or treatment from a health professional for an emotional problem than individuals with NPD, but they are not more likely to receive a routine check-up [5]. In 2007,

individuals with SPD had on average 3 more office-based visits, 0.27 more emergency department visits, 0.84 more inpatient visits, 2.93 more home health visits, and 8.13 more prescriptions than individuals with NPD [4]. As a result of high volume and high cost health services use, individuals with SPD put a substantial burden on the health care system. They may benefit significantly from expanded access to health insurance and improved health insurance benefits by potentially shifting their use of health services from high to low cost services and facilitating access to preventative services. However, given the psychosocial barriers to health care that they face, individuals with SPD may not necessarily change their health services use under improved health insurance in a substantive way.

#### *Health insurance and the Affordable Care Act*

The Affordable Care Act (ACA) expands access to health insurance by expanding eligibility for Medicaid, by creating health insurance marketplaces, and through the dependent coverage provision. Due to a Supreme Court decision that ruled that the Federal government could not force states to expand Medicaid eligibility requirements, many states did not. In states that did, the income eligibility threshold was increased to 138% of the Federal Poverty Level (FPL), and childless adults became eligible for Medicaid. The health insurance marketplaces allow individuals without employer sponsored insurance (ESI) to pool risk and purchase insurance individually, with subsidized premiums for low-income individuals who fall between 100% and 399% of the federal poverty level (FPL). Additionally, the marketplaces contain cost-sharing subsidy plans for individuals with family incomes of 138-250% of FPL. Finally, the dependent coverage provision allows young adults to stay on their parent's health insurance until they are 26 years old. Through these provisions, the ACA has significantly decreased the uninsured rate [16-18]. The expansion of health insurance is coupled with measures to improve the quality of health insurance, primarily through the essential benefits package. The essential benefits package requires that many insurance plans cover ten health benefits that previously

were not always included in health insurance plans. These benefits include, but are not limited to, treatment for mental health conditions and substance abuse disorders, preventative care and wellness care, prescription drugs, and zero cost-sharing for many services (<https://www.healthcare.gov/coverage/what-marketplace-plans-cover/>).

Health insurance expansions prior to the ACA have resulted in health services use reflective of pent-up demand. Several studies have looked at pent-up demand coming from public insurance expansions on the state and national level and each found that after an initial period of increased utilization, use of services dropped off [19, 21]. For example, in 2009, Wisconsin expanded public insurance to low-income childless adults. During the first year of enrollment they saw a 29% increase in the number of out-patient visits, a 46% increase in ER visits, and a 59% decline in hospital stays [22]. There is little research available that provides an assessment of pent-up demand as a result of the ACA insurance expansions.

#### *Health services use among people with SPD and the ACA*

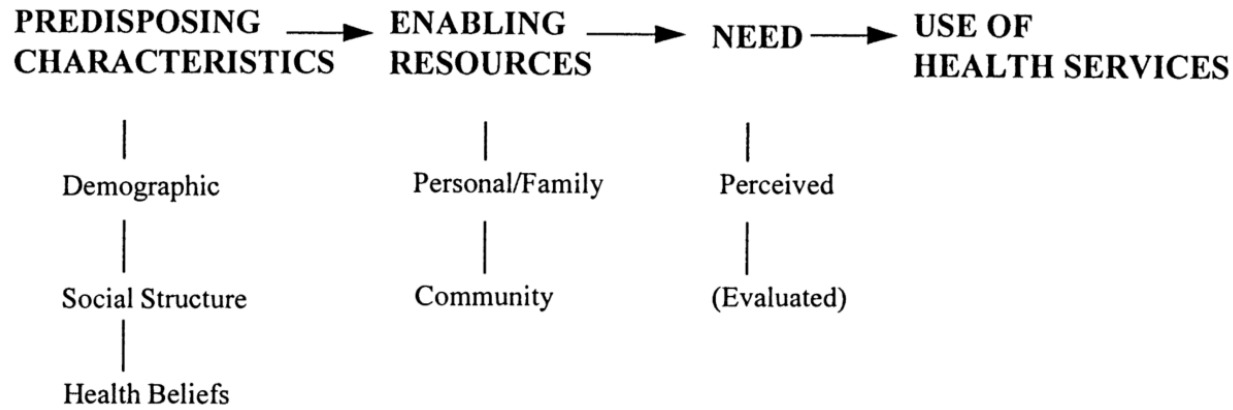
Evidence from the ACA regarding health services use among people with SPD is limited. In an analysis of individuals with SPD who participated in the National Health Interview Survey (NHIS) from January 2012 through September 2015, the percentage of individuals with SPD and with NPD who sought care from any healthcare provider remained stable, and individuals with SPD were more likely to seek care than those with NPD. Notably, the same study shows the percentage of individuals with SPD who spoke with a mental health care provider declined from 2012 to the first nine months of 2015 [23]. Most of the available literature regarding changes in health services use on the national level is based on evidence from the dependent coverage expansion of the ACA. One study compared those impacted by the young adult expansion (i.e. individuals aged 19-25) with a similar group of slightly older adults (age 26-34) that were not affected by the provision. The authors found that after implementation there was a modest increase in outpatient mental health treatment among those aged 19-25, which is similar to those

in the older age group [24]. Similarly, Saloner, et al. found that after the implementation of the dependent care provision, mental health treatment increased by 5.3 percentage points for those aged 19-25 relative to those aged 26-34 [25]. Although both studies assess the use of mental health services by young adults relative to slightly older adults, they do not limit the population of interest to individuals with SPD. There is little if any data looking at how working age adults with SPD changed their health services use in association with ACA implementation. Understanding the changes in health services use among adults with SPD is important because many provisions of the ACA, including the Medicaid expansions, private insurance exchanges, and the essential health benefits provision were expected to benefit them.

### **Conceptual framework**

The Andersen Behavioral Model of Health Services Use informed the selection of the independent variables associated with the selected outcomes of health services use [26]. The initial version of the Andersen model posited that three factors were central to the use of health services: predisposing characteristics that influence the use of services including demographics, social structure, and health beliefs; resources that enable or impede health care use; and the perceived or evaluated need for health care (Figure 1, [26]). Although this model has been modified many times since its inception, for the purposes of this analysis the original version of the model published in the 1960s is used as a framework for the selection of independent variables. The rationale for selecting this older model is that subsequent versions of the model elaborate on the three factors central to the original model. This level of detail is too granular given the variables available in the data used for this analysis. Therefore, a high-level conceptual framework that identifies factors that influence health services use more broadly is appropriate given the large national policy under review in this analysis, in addition to the nature of the dataset.

**Figure 1. Andersen Behavioral Model of Health Services Utilization [27]**



For the purposes of this analysis, predisposing characteristics selected include age category, gender, race/ethnicity, and region. Enabling resources include year indicator, nativity status, marital status, poverty level, education status, and insurance status. Finally, self-reported health status has been included as a measure to account for the underlying need for health care.

#### *Predisposing characteristics*

Age category is included as a covariate because health care needs vary throughout life, with younger age groups being less predisposed to using health services than older age groups. Gender predisposes individuals to need certain types of health services or may require an individual to utilize health care more frequently. Furthermore, race/ethnicity may predispose an individual to systemic disparities in access to health care that influence use of health care, and type of health use.

Census region is also a significant covariate of interest in the analysis due to the different degrees to which states in each region implemented the ACA. The Northeast region contains the most states that fully implemented the ACA, including expanding Medicaid and creating state-based insurance marketplaces. In contrast, the South consists of the most states with weak implementation of the ACA, including minimal or no Medicaid expansions and use of federal insurance marketplaces.

### *Enabling resources*

The year indicator is considered an enabling resource because it serves as a surrogate for the presence or absence of the ACA insurance expansions, and the provisions of the ACA enable individuals to access health insurance and health care. Nativity status is selected as an enabling resource because United States citizenship may provide an individual with better access to health insurance through employment and Medicaid and thus health care, although some non-citizens are able to access these health insurance resources. Similarly, marital status also impacts an individuals' access to health insurance through a spouse and thus their ability to use health care. Additionally, in many cases being married provides family resources that enable individuals to use health care by coordinating and facilitating health care.

Poverty level, even among a low-income cohort, plays an important role in insurance status and health services use. Poverty level shapes the social and community environments an individual participates in and affects the type of social support individuals receive in terms of accessing health care. Additionally, poverty level influences the type of health insurance one has access to, and the ability to pay for health care. Income categories for this analysis were created based on ACA marketplace exchange and Medicaid income eligibility requirements. The rationale for this stratification is that different provisions of the ACA were targeted at different parts of the low-income spectrum. For example, the Medicaid expansion was aimed at providing insurance coverage for low-income adults from 0-138% of the federal poverty level, whereas the exchanges provide subsidies for low-income individuals whose incomes are low but too high to be Medicaid eligible. Education status is commonly included as a covariate in research regarding health services [28, 29]. According to the Grossman model, education makes individuals more efficient producers of health because they have more health knowledge and are more efficient in using existing resources in health production [30]. Both poverty level and education are correlated with insurance type, which mediates use of health services [29, 31].

Insurance status is also included as a covariate because it plays a role in the likelihood of utilizing certain health services over others. For example, individuals with Medicaid are 1.5 times more likely to use the emergency department for routine health care than individuals with private insurance [28]. Given that Chapter 1 of this dissertation identifies a large increase in individuals with SPD covered by Medicaid during the time of ACA implementation, it is important to control for insurance status when trying to assess changes in resource use during that time frame.

### *Need*

Individuals with SPD tend to have worse health status than those with NPD. They are at least twice as likely to have ever been diagnosed with heart or lung disease, diabetes, arthritis, or stroke than individuals with NPD. They are also substantially more likely to smoke or be obese than individuals with NPD. Furthermore, individuals with SPD are more likely to have functional limitations than those without. Due in part to their poor health status, individuals with SPD are high utilizers of health care [2]. Therefore, health status may be a significant predictor of health resource use and should be controlled for in the analysis.

## **Data and Methods**

The research questions addressed by this analysis are: Were adults with SPD more likely to use health services over time during the period of ACA implementation than they were prior to ACA implementation? How did their resource use change in the context of working age adults with NPD? If working age adults in both psychological distress groups were more likely to use health services over time, how much more did they use? To answer these questions, cross-sectional data pooled between 2011 and 2016 (inclusive) was used in this analysis. A two-part hurdle model assessed the likelihood of health services use in each year in the first part and the number of visits conditional on having at least one in the second part. The combined model assessed the expected utilization given the likelihood of health services use in a given year. These

models were conducted in both psychological distress group and allow for a descriptive assessment of similarities and differences between groups.

### *Data*

Data from the Integrated Public Use Microdata Series (IPUMS) Medical Expenditure Panel Series (MEPS) is extracted and analyzed. This dataset is utilized throughout this dissertation. Please see Chapter 1 for a detailed description of the data source.

### *Mental health status*

The Kessler 6 (K6) questionnaire was used to categorize individuals by psychological distress status. Please see Chapter 1 for a detailed description of the K6. Individuals were classified as having SPD if they had a K6 score  $\geq 13$ , and NPD with a score of 7 or less. For the purposes of this chapter, those with MMPD were omitted from the analysis to provide a clear contrast in terms of health services use for those with the most severe forms of psychological distress and those without any psychological distress.

### *Sample*

The sample included individuals eligible to take the self-administered questionnaire (SAQ) with a positive sample weight, and who were between ages 27 and 64, and had family income between 0-399% of the FPL. They also had a valid response on the Kessler 6 (K6) variable, and a K6 score greater than or equal to 13 for the SPD sample, or less than or equal to 7 for the NPD sample. Based on these criteria, the SPD sample size is 3,902 and the NPD sample size is 51,706. The sample is defined in the same manner throughout this dissertation. Please see Chapter 1 for a detailed description of the sample.

### *Outcomes*

The primary outcomes of interest for this analysis were four different types of health services use (HSU). HSU was classified as the total number of each of the following in the survey

year: emergency department visits, hospital discharges, outpatient visits and office-based visits, and number of prescription fills. Each of these outcomes were count data and are based on household reports. Number of prescription fills were the number of prescriptions that were prescribed and purchased in a survey year. Please see Appendix 1 for details regarding the description and structure of these outcomes.

### *Covariates*

Several covariates were included in the analysis based on the factors described in the Anderson Behavioral Model of Healthcare Services Utilization, and the rationale for the selection of covariates is described in detail in the conceptual framework section of this chapter. The covariates include predisposing characteristics including age, race/ethnicity, gender, and region; enabling factors including education, year indicator, marital status, nativity status, poverty level, and insurance status; and need, using the physical component score (PCS) of the SF-12 to establish self-reported health status. Please see Appendix 1 for details regarding the structure of each covariate.

### *Analytic Approach*

Analysis of health services use was conducted using a two-part hurdle model, where the first part of the model predicted the likelihood of utilizing each type of health service (i.e. emergency room, hospital discharges, outpatient/office-based visits or prescription fills), and the second part predicted the amount of health services used conditional upon any use. The first part of the hurdle model employed a logit model to predict the probability of any health services use by type (emergency department, hospital discharges, outpatient hospital visits/office-based visits) by individual  $i$ . The model was fit using the following specifications:

$$\text{Log(prob HSU}/((1\text{-prob HSU}) = \beta_{0ij} + \beta_1 \text{Year indicator}_{ij} + \beta_2 \text{Race}_{ij} + \beta_3 \text{Ethnicity}_{ij} + \beta_4 \text{Gender}_{ij} + \beta_5 \text{Age category}_{ij} + \beta_6 \text{Marital Status}_{ij} + \beta_7 \text{Education}_{ij} + \beta_9 \text{Region}_{ij} + \beta_{10} \text{Nativity status}_{ij} + \beta_{11} \text{SF-12 Physical health}_{ij} + \beta_{12} \text{Poverty level}_{ij} + \beta_{12} \text{Insurance status}_{ij} + e_{ij}$$

The second part of the hurdle model predicted the level of health services use, conditional on there being any service use, by individual  $i$  for each type of HSU. A zero-truncated negative binomial model using the same regressors as in Part 1 of the model was employed using the Stata 15 command `TNBREG`.

The combined effects were calculated using the methodology described by Deb, Norton and Manning [32], and generated results for the expected utilization of each outcome. The logit and zero-truncated negative binomial models were refitted without adjustments to the maximum-likelihood standard errors with the `SUEST` command, which produced a regression table with coefficients and standard errors of the combined equations. The ‘expression’ option for the `margins` command was used with the conditional mean of the outcome, which produces the combined marginal effects for the hurdle model.

The benefit of this modelling approach is that it captures three important components of health services use: the likelihood of using resources at all, the amount of resources used in the event that the number of visits is greater than or equal to one, and the unconditional expectation of total resource use (i.e. expected utilization).

As mentioned previously, the ACA improves upon health insurance in two major ways, by expanding the accessibility of health insurance and by improving the quality of health insurance benefits. The analytic approach described above captures changes in use associated with the provisions of the ACA that improve the quality of insurance benefits, but the ability to assess the association of the changes in HSU with the expansion of insurance is limited given that insurance status is a covariate in the analysis. Since amount and type of health services use is associated with insurance type, removing insurance status as a covariate would confound the results. Therefore, the association of the overall effects of the ACA on HSU, and the number of visits for each type of health service, conditional upon the likelihood of use for each year, was predicted to

descriptively assess outcomes with or without the ACA insurance expansions. In the first scenario (with insurance expansions) the original hurdle model was run, and the average marginal effects were calculated to provide the predicted number of visits in each year. In the second scenario (no insurance expansion), the average marginal effects were calculated where the mean values for insurance status in years 2014-2016 were held at the mean values of insurance status in 2013, and the number of visits was predicted. This provides an indication of differences in utilization in the presence and absence of the ACA insurance expansions and can provide insight into whether expansion marginal effects trend in the same direction as the effects of the improvements in the quality of insurance.

Descriptive statistics were calculated to assess the proportion of individuals using services and the mean and range of the number of visits (conditional on use), stratified by SPD and NPD. A series of bivariate descriptive analyses (2-sided t-tests for categorical variables) were carried out to describe differences in the proportion of individuals in each psychological distress group who use any health services, as well as the differences in the amount of resources they use.

## Results and Discussion

### 1. Descriptive statistics

Table 1 shows the unadjusted proportion of individuals using services, the mean number of services conditioned on use, and the range of any HSU, ER visits, office-based/outpatient visits, and prescription fills for the cohort, stratified by psychological distress status. The mean proportion of individuals with any HSU for individuals with SPD is significantly higher than for those with NPD and appears to be driven by a high mean use of prescription medications. People with NPD also seem to have much of their mean overall resource use driven by prescription drugs, followed by outpatient/office-based visits. The proportion of individuals with SPD utilizing all types of health services is significantly higher than those with NPD.

Conditional use of ER visits is statistically different between groups at the  $p < 0.1$  significance level, and the conditional use of hospital discharges is statistically different at the  $p < 0.01$  significance level. However, in terms of practical differences between groups, those with SPD have only about half a visit more for each type of HSU than individuals with NPD. This contrasts with the conditional use means for the number of outpatient/office-based visits and prescription fills, where individuals with SPD use more than twice the amount of resources than those with NPD ( $p < 0.01$  for each outcome).

For both groups, there is little to no change in the likelihood of using any health services or in the amount of resources used, conditional on use, in each year from 2012 to 2016 relative to 2011 (data not shown). The exception being in 2015, where people with SPD who used health services had 7.4 more visits than those who used resources in 2011. This effect held in the combined model as well.

Table 2 provides a snapshot of the regression models for each outcome. It indicates whether the marginal effects significantly increased (+) or decreased (-) after the ACA insurance expansions, and in which years (2014-2016).

**Table 1: Proportion of individuals using health services and amount of services used**

Variable	Proportion using services	SPD N=3,902	Range, conditional on utilization		Proportion using services	NPD N=51,706	Range, conditional on utilization	
		Mean number of visits conditional on use (SE)	Min.	Max.		Mean number of visits conditional on use (SE)	Min.	Max.
Any health services use in a year	92.5%***	54.23 (1.4)***	1	426	73.2%	19.3 (0.29)	1	460
Emergency room visits in a year	35.11%***	1.9 (0.06)*	1	22	12.7%	1.4 (0.02)	1	24
Outpatient or office-based visits in a year	86.55%***	15 (0.72)***	1	370	66.3%	6.7 (0.12)	1	337
Hospital discharges in a year	16.9%***	1.62 (0.08)***	1	8	5.9%	1.25 (0.02)	1	17
Prescription fills in a year	87.4%***	41.4 (0.98)***	1	344	58.3%	15.85 (0.28)	1	433

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1 vs. NPD

**Table 2: Summary of statistically significant results from 2014-2016 relative to 2011 by outcome†**

HSU Outcome	SPD			NPD		
	Logit model	Truncated NB model	Expected Utilization	Logit model	Truncated NB model	Expected Utilization
<b>ER</b>	2014: +*** 2015: +*** 2016: +**	NS	NS	NS	2014: +***	2014: +***
<b>Hospital</b>	NS	2016: +**	2016: +*	2015: -**	2014: +*** 2015: +***	NS
<b>Outpatient/ office-based</b>	NS	2014: +* 2015: +*	2014: +*** 2015: +*	2014: +*	2014: +*** 2015: +***	2014: +*** 2015: +***
<b>Rx</b>	2015: +**	NS	2015: +*	2014: -* 2015: -*** 2016: -***	NS	2014: -** 2016: -**

† (+) = increase from 2011; (-) = decrease from 2011; NS = No significant results

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 2. Emergency room use

### 2.1 Results

Table 3 shows the marginal effects of the multivariate logistic regression, truncated negative binomial regression, and hurdle models for those with SPD and NPD for emergency room use. As previously stated, it is possible that the expansion of health insurance and improvements in health insurance benefits may have given individuals better access to primary and preventative care, therefore a decrease in the likelihood of using the ER and the number of visits in both groups after the ACA is fully implemented in 2014 would be expected. However, in each year from 2013 through 2016 people with SPD are significantly more likely to go to the ER

relative to 2011 (percentage point increase; 2013: 4.6,  $p<0.1$ ; 2014: 10.2,  $p<0.01$ ; 2015: 11.9,  $p<0.01$ ; 2016: 7.7,  $p<0.05$ ). The number of ER visits among those who use the ER trends lower throughout the 2013-2016 period, although this trend is not statistically significant. Therefore, the expected utilization related to ER use from 2012 through 2016 is not significantly different from 2011. Although statistically insignificant, there does seem to be an increase in the expected utilization of going to the ER, particularly in 2014 and 2015 relative to 2011 (2014: 0.09 visits, NS; 2015: 0.15 visits, NS).

People with NPD see no change in the likelihood of using the ER from 2012-2016 relative to 2011, yet there is a significant increase in ER visit frequency among those who use the ER between 2012-2014 relative to 2011 (2012: 0.07 visits,  $p<0.1$ ; 2013: 0.11 visits,  $p<0.05$ ; 2014: 0.16,  $p<0.01$ ). The increase in ER visit frequency drops off in 2015 and 2016 relative to 2014 (2015: 0.05 visits,  $p<0.01$  vs. 2014, 2016: 0.06 visits,  $p<0.01$ ), suggesting that the implementation of the ACA may be associated with slowing down and possibly reversing an increasing trend of ER use among individuals with NPD. Additionally, among individuals with NPD, individuals with lower levels of education are more likely to use the ER than those with a bachelor's degree or higher. The size and direction of the marginal effects for ER use among individuals with NPD are similar to those with SPD, although the marginal effects for individuals with SPD were not statistically significant. Notably, individuals with SPD and without insurance are equally as likely to go to the ER as people with SPD covered by private insurance. However, individuals with SPD and covered by Medicare or Medicaid are more likely to go to the ER than those with private insurance.

Table 3 estimates the changes in ER use associated with improvements in insurance coverage associated with the ACA but cannot estimate the changes in ER use associated with the ACA insurance expansions. Therefore, Figure 2 shows the predicted number of ER visits based on the marginal effects of the expected utilization in Table 3 for both psychological distress

groups. This prediction is made in two scenarios, one that reflects how the ACA was implemented and another where insurance status is held at the level observed in 2013 for 2014, 2015, and 2016 (i.e. “without” the ACA insurance expansion). Overall, the number of visits increases after 2012 for those with SPD. In the scenario with the insurance expansions, the predicted number of ER visits for people with SPD is descriptively higher than the predicted scenario without the insurance expansions. Individuals with NPD do not observe an increase in the number of ER visits. In fact, the number of visits stays relatively flat from year to year and does not seem to be substantially different between the two predicted scenarios.

## *2.2 Discussion*

The results of this analysis add another piece of the puzzle to the growing literature regarding changes in ER use during ACA implementation. It provides the first evidence, to my knowledge, regarding changes in ER use among individuals with SPD. These results indicate that people with SPD are more likely to go to the ER over the time of ACA implementation than they were in 2011, but they did not have more visits if they went to the ER. Whereas individuals with NPD were not more likely to go to the ER, but the number of visits they had conditional on having at least one, increased in each year up to 2015. According to the National Ambulatory Medical Care Survey, during the timeframe of ACA implementation there was an increase in visits to the emergency room nationally [33]. The total annual number of ER visits jumped from approximately 136,000 visits in 2011 to 145,000 in 2016 in the selected hospitals surveyed. Additionally, Nikpay et al. demonstrate that the expansion of Medicaid as a result of the ACA is associated with an increase of 2.5 more visits per 1,000 people in Medicaid expansion states relative to states that did not expand Medicaid [34]. The results of the present study do not align clearly with these findings, but they do indicate that it is possible that in the face of expanded health insurance, people with SPD consume ER resources differently than people with NPD. Individuals with SPD tend to have difficulties judging when to go to the doctor, have difficulties

affording health care, and go for routine check-up in lower proportions than individuals without SPD [3, 15]. The combination of these factors may mean that when individuals with SPD gain insurance, they have a difficult time judging when to use it and may not have a usual place of care, so they go to the emergency room for non-urgent care because they can now afford to seek care but do not know where to go.

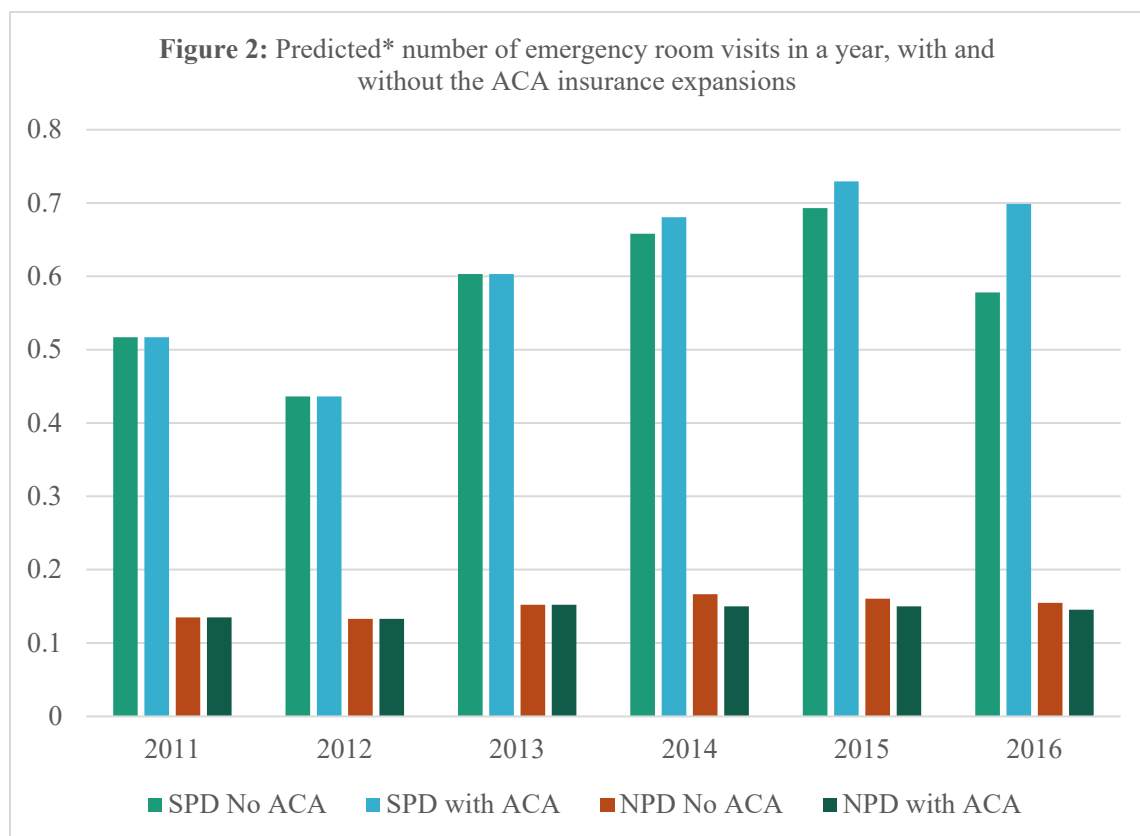
**Table 3: Emergency Room Visits**

Variable ME (SE) reported	SPD			NPD		
	Logit model N=3,902	Truncated NB model N=1,365	Expected Utilization N=3,902	Logit model N=51,706	Truncated NB model N=7,317	Expected Utilization N=51,706
<b>Year</b>						
2011	ref	ref	ref	ref	ref	ref
2012	-0.002 (0.027)	-0.367 (0.194)	-0.114 (0.073)	-0.007 (0.007)	0.073* (0.042)	0.001 (0.011)
2013	0.046* (0.027)	-0.053 (0.213)	0.075 (0.084)	0.005 (0.006)	0.111** (0.046)	0.022* (0.011)
2014	0.102*** (0.031)	-0.294 (0.2)	0.090 (0.081)	0.005 (0.006)	0.158*** (0.048)	0.029*** (0.011)
2015	0.119*** (0.035)	-0.207 (0.198)	0.156 (0.096)	0.006 (0.007)	0.051 (0.046)	0.015 (0.012)
2016	0.077** (0.033)	-0.306 (0.193)	0.042 (0.089)	0.005 (0.007)	0.059 (0.042)	0.015 (0.012)
<b>Region</b>						
Northeast	ref	ref	ref	ref	ref	Ref
Midwest	-0.029 (0.042)	-0.402** (0.199)	-0.205* (0.122)	0.007 (0.008)	0.087 (0.054)	0.024* (0.014)
South	-0.029 (0.038)	-0.354* (0.186)	-0.189 (0.12)	-0.01 (0.008)	0.04 (0.043)	-0.009 (0.013)
West	-0.060 (0.038)	-0.523** (0.212)	-0.3** (0.122)	-0.032*** (0.008)	0.007 (0.047)	-0.044*** (0.013)
<b>Poverty level</b>						
Middle income (200-399% FPL)	ref	ref	ref	ref	ref	ref
Low income (139-199% FPL)	0.026 (0.03)	0.333 (0.205)	0.16* (0.092)	0.018*** (0.006)	0.028 (0.043)	0.03*** (0.011)
Near poor (100- 138% FPL)	0.033 (0.035)	0.141 (0.202)	0.106 (0.087)	0.02*** (0.008)	-0.048 (0.048)	0.021* (0.012)
Poor (less than 100% FPL)	0.049* (0.027)	0.206 (0.136)	0.158*** (0.055)	0.036*** (0.007)	0.06 (0.042)	0.06*** (0.012)
<b>Gender</b>						
Male	ref	ref	ref	ref	ref	ref
Female	0.052** (0.021)	0.254** (0.107)	0.181*** (0.051)	0.028*** (0.004)	0.092*** (0.027)	0.053*** (0.007)
<b>Age category</b>						
27-34	ref	ref	ref	ref	ref	ref
35-44	-0.012 (0.030)	0.005 (0.205)	-0.021 (0.098)	-0.021*** (0.006)	-0.073 * (0.044)	-0.043*** (0.011)
45-54	-0.057* (0.03)	-0.105 (0.216)	-0.146 (0.099)	-0.038*** (0.007)	-0.065 (0.047)	-0.066*** (0.013)

55-64	-0.107*** (0.033)	-0.259 (0.199)	-0.287*** (0.097)	-0.056*** (0.007)	-0.147*** (0.044)	-.102*** (0.012)
<b>Race/Ethnicity</b>						
White, non-Hispanic	ref	ref	ref	ref	ref	Ref
Black, non-Hispanic	0.027 (0.024)	-0.129 (0.135)	0.001 (0.065)	0.027*** (0.006)	-0.02 (0.032)	0.035*** (0.01)
Hispanic	-0.005 (0.03)	-0.17 (0.147)	-0.068 (0.075)	0.006 (0.007)	-0.01 (0.047)	0.007 (0.013)
Other race/ethnicity	-0.02 (0.048)	0.116 (0.33)	.0003 (0.14)	-0.009 (0.01)	0.04 (0.073)	-0.008 (0.018)
<b>Marital status</b>						
Married	ref	ref	ref	ref	ref	Ref
Widowed	0.089 (0.055)	0.033 (0.198)	0.164 (0.119)	0.033*** (0.013)	0.049 (0.071)	0.054** (0.022)
Divorced	0.089*** (0.03)	0.281* (0.161)	0.267*** (0.076)	0.036*** (0.007)	0.072* (0.039)	0.062*** (0.011)
Separated	0.063 (0.045)	0.308 (0.181)	0.226* (0.124)	0.043*** (0.01)	0.041 (0.061)	0.066*** (0.018)
Never Married	-0.012 (0.027)	0.141 (0.112)	0.023 (0.060)	0.007 (0.005)	0.044 (0.038)	0.016* (0.009)
<b>Education</b>						
Bachelor's degree or higher	ref	ref	ref	ref	ref	ref
Some college, no bachelor's degree	0.016 (0.041)	-0.036 (0.208)	0.020 (0.101)	0.02*** (0.006)	0.052 (0.049)	0.036*** (0.012)
High school or GED	0.015 (0.035)	-0.272 (0.196)	-0.065 (0.083)	0.019*** (0.006)	0.014 (0.042)	0.029*** (0.01)
Less than high school	0.022 (0.037)	-0.301 (0.195)	-0.064 (0.092)	0.02*** (0.007)	-0.007 (0.047)	0.027** (0.012)
<b>Nativity status</b>						
Born in the US	ref	ref	ref	ref	ref	ref
Not born in the US	-0.053* (0.031)	-0.16 (0.155)	-0.148* (0.081)	-0.047*** (0.006)	-0.047 (0.058)	-.007*** (0.011)
<b>SF-12 Physical Health Component</b>						
	-0.004*** (0.001)	-0.011 (0.004)	-0.012*** (0.002)	-0.004*** (0.0002)	-0.013*** (0.005)	-0.008*** (0.0004)
<b>Insurance status</b>						
Private/exchange	ref	ref	ref	ref	ref	ref
Medicaid/Other public	0.078*** (0.032)	0.294** (0.145)	0.245*** (0.072)	0.052*** (0.007)	0.18 (0.037)	0.101*** (0.016)
Medicare	0.078*** (0.038)	0.324** (0.179)	0.256*** (0.093)	0.066*** (0.012)	0.238** (0.103)	0.133*** (0.026)

Uninsured	-0.01 (0.03)	-0.03 (0.158)	-0.025 (0.065)	-0.011** (0.005)	0.092** (0.042)	-0.004 (0.008)
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Statistical significance from reference category: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



\*Predicted number of visits conditional on any use is based on expected utilization in Table 3.

### 3. Hospital discharges

#### 3.1 Results

In Table 4, the proportion of individuals with any hospital discharge in both psychological distress groups does not significantly change relative to 2011, except in 2015 for those with NPD (-0.005 visits,  $p < 0.05$ ). However, in both psychological distress groups the number of discharges conditional on having at least one discharge indicates that individuals who do use the hospital are using it more frequently after the ACA insurance expansions. Individuals with SPD observe increases in hospital discharges in 2014, which continue to go up and becomes statistically significant in 2016 (0.06 visits,  $p < 0.01$  vs. 2011).

For individuals with NPD, the number of hospital discharges are statistically significantly higher in 2014 and 2015 compared to 2011 (2014: 0.1 visits,  $p < 0.01$ ; 2015: 0.2 visits,  $p < 0.01$ ) and are no longer statistically significant in 2016 (0.06 visits, NS). To assess if the significant effects in 2014 and 2015 may be an indicator of pent-up demand, a sensitivity check was conducted to see if they are statistically different from the marginal effects observed in 2016. The drop in the number of hospital discharges in 2016 is statistically different from 2014 but not 2015. Limited sample size in the truncated negative binomial regression model may explain the lack of statistical significance between 2015 and 2016. This drop may indicate the possible realization of pent-up demand, similar to what has been observed under previous insurance expansions [19, 21]

Figure 3 displays the number of hospital discharges (conditional on having any) by year based on the expected utilization in Table 4, as well as predicted utilization without the ACA insurance expansions for both psychological distress groups. The number of discharges is slightly higher in both groups with the ACA after 2013 than without the ACA, and the total number of discharges for people with SPD in both scenarios jumps significantly in 2016. Given that number

of hospital discharges has limitations in what it can convey about a hospital stay (e.g. does not provide information on length of stay or readmissions), to supplement Figure 3, Figure 4 displays predictions regarding the percentage of people with a hospital discharge with and without the ACA based on the multivariable logit model in Table 4. The total proportion of individuals with a hospital discharge fluctuates after 2014 for individuals with SPD and remains relatively stable for those with NPD, in both scenarios.

### *3.2 Discussion*

The magnitude of the difference between the predicted number of hospital discharges without the ACA insurance expansions and the predicted number of hospital discharges with the ACA insurance expansions for people with SPD is seemingly larger than for people with NPD (Figure 3) for several reasons. First, people with SPD have higher overall health care needs relative to those with NPD. The first chapter of this dissertation establishes that in the cohort used in this analysis, individuals with SPD have lower self-reported physical health than individuals with NPD. Higher health care needs among individuals with SPD is also well established in the literature [1, 2]. The number of discharges among individuals with NPD increases slightly in the scenario with the ACA insurance expansions compared to the scenario without the expansions after 2013. However, the difference between the actual and predicted scenarios for individuals with SPD is larger than the difference for those with NPD, possibly reflecting the higher health care needs of individuals with SPD. Another reason for this large difference between the two scenarios among individuals with SPD could be a result of higher rates of Medicaid enrollment after the ACA insurance expansions. This is supported by research that demonstrates that the Medicaid expansions are associated with a 20% increase in Medicaid covered hospital discharges [34], and Chapter 1 of this dissertation finds that individuals with SPD enrolled in Medicaid at high rates after the ACA insurance expansions.

Table 4: Hospital discharges

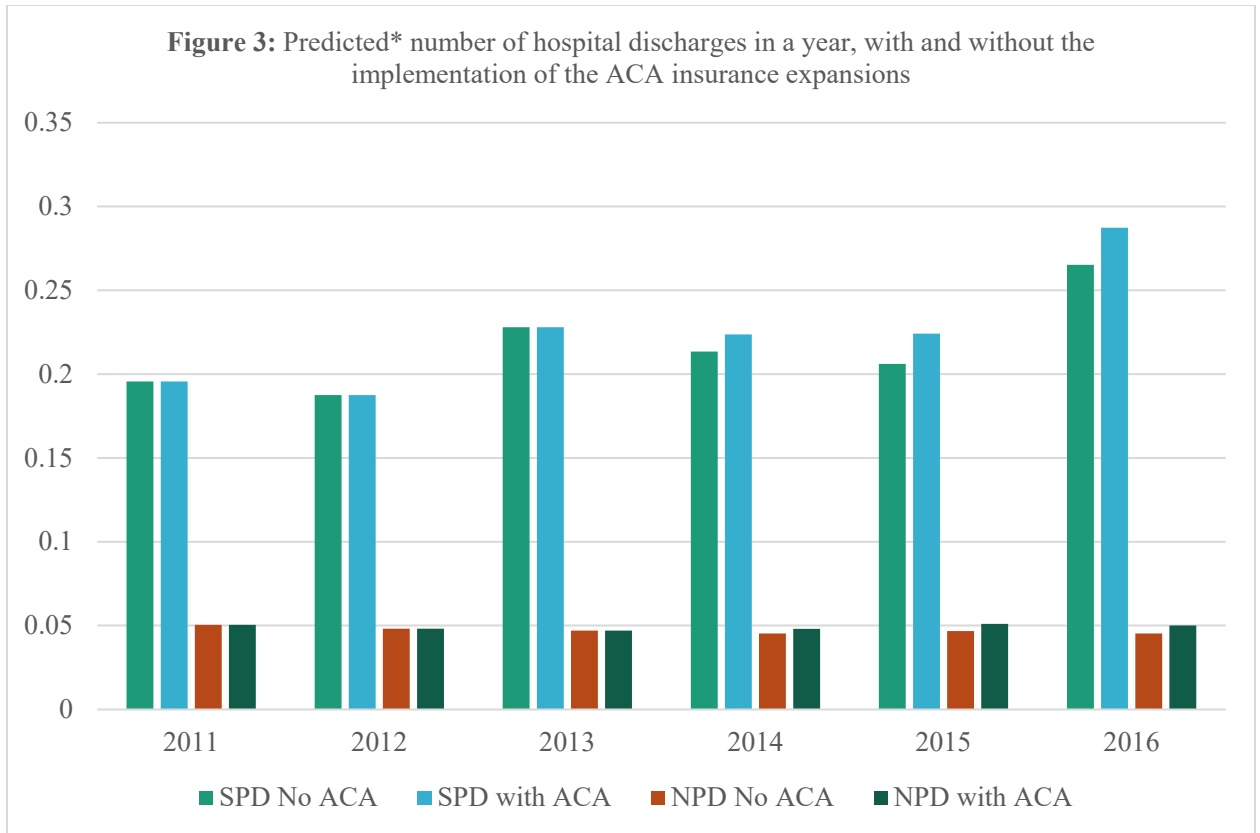
Variable ME (SE) reported	SPD			NPD		
	Logit model N=3,902	Truncated NB model N=653	Expected utilization N=3,902	Logit model N=51,706	Truncated NB model N=3,322	Expected utilization N=51,706
<b>Year</b>						
2011	ref	Ref	ref	ref	ref	ref
2012	-0.009 (0.023)	-0.022 (0.127)	-0.017 (0.038)	-0.002 (0.004)	0.082** (0.037)	0.004 (0.006)
2013	-0.002 (0.025)	0.219 (0.169)	0.034 (0.046)	-0.005 (0.004)	0.059 (0.04)	-0.002 (0.005)
2014	0.001 (0.027)	0.027 (0.142)	0.006 (0.044)	-0.005 (0.004)	0.144*** (0.048)	0.003 (0.006)
2015	-0.029 (0.028)	0.366 (0.24)	0.01 (0.052)	-0.005** (0.004)	0.156*** (0.052)	-0.002 (0.007)
2016	0.012 (0.029)	0.572** (0.282)	0.122* (0.065)	-0.001 (0.005)	0.059 (0.041)	0.003 (0.007)
<b>Region</b>						
Northeast	ref	Ref	ref	ref	ref	ref
Midwest	-0.074** (0.033)	-0.23 (0.199)	-0.166*** (0.063)	-0.003 (0.005)	0.038 (0.049)	-0.001 (0.007)
South	-0.055* (0.033)	-0.224 (0.179)	-0.136** (0.065)	-0.003 (0.005)	0.011 (0.044)	-0.003 (0.007)
West	-0.071** (0.034)	-0.225 (0.195)	-0.161** (0.071)	-0.014*** (0.005)	-0.005 (0.05)	-0.018** (0.008)
<b>Poverty level</b>						
Middle income (200-399% FPL)	ref	Ref	ref	ref	ref	ref
Low income (139-199% FPL)	0.016 (0.025)	0.287 (0.182)	0.073* (0.043)	0.006 (0.004)	-0.032 (0.042)	0.006 (0.006)
Near poor (100- 138% FPL)	0.039 (0.025)	0.130 (0.201)	0.084* (0.05)	0.008* (0.005)	0.012 (0.06)	0.011* (0.007)
Poor (less than 100% FPL)	0.016 (0.019)	0.044 (0.152)	0.031 (0.03)	0.022*** (0.004)	-0.035 (0.041)	0.025*** (0.005)
<b>Gender</b>						
Male	ref	Ref	ref	ref	ref	ref
Female	0.002 (0.016)	-0.094 (0.125)	-0.013 (0.03)	0.034*** (0.002)	0.05 (0.035)	0.045*** (0.004)
<b>Age category</b>						
27-34	ref	Ref	Ref	ref	ref	ref
35-44	-0.003 (0.024)	-0.179 (0.248)	-0.037 (0.051)	-0.034*** (0.004)	0.064* (0.036)	-0.035*** (0.006)
45-54	-0.025 (0.026)	0.02 (0.29)	-0.039 (0.058)	-0.036*** (0.004)	0.164*** (0.05)	-0.031*** (0.007)

55-64	-0.018 (0.026)	-0.193 (0.256)	-0.063 (0.053)	-0.036*** (0.005)	0.15*** (0.045)	-0.032*** (0.007)
<b>Race</b>						
White, non-Hispanic	ref	Ref	Ref	ref	ref	ref
Black, non-Hispanic	-0.003 0.018	-0.027 (0.136)	-0.010 (0.039)	0.006* (0.003)	0.03 (0.041)	0.01* (0.005)
Hispanic	-0.039** (0.019)	-0.087 (0.149)	-0.075** (0.036)	0.004 (0.004)	0.013 (0.058)	0.006 (0.006)
Other race/ethnicity	-0.053** 0.026	0.081 (0.366)	-0.075 (0.054)	-0.006 (0.005)	-0.103** (0.043)	-0.013* (0.007)
<b>Marital status</b>						
Married	ref	Ref	ref	ref	ref	ref
Widowed	0.055 (0.038)	0.208 (0.282)	0.136 (0.084)	-0.006 (0.005)	-0.03 (0.079)	-0.0003 (0.011)
Divorced	0.01 (0.021)	0.011 (0.168)	0.019 (0.047)	-0.008* (0.004)	-0.007 (0.04)	-0.01* (0.006)
Separated	0.045 (0.034)	-0.321 (0.201)	0.008 (0.052)	-0.001 (0.007)	0.038 (0.067)	0.002 (0.011)
Never Married	-0.009 (0.02)	-0.174 (0.162)	-0.042 (0.04)	-0.019*** (0.003)	0.01 (0.04)	-0.023*** (0.005)
<b>Education</b>						
Bachelor's degree or higher	ref	Ref	Ref	ref	ref	ref
Some college, no bachelor's degree	-0.006 (0.031)	0.288 (0.191)	0.042 (0.054)	0.002 (0.005)	-0.033 (0.046)	0.001 (0.007)
High school or GED	-0.01 (0.026)	0.172 (0.196)	0.016 (0.046)	-0.006 (0.004)	0.028 (0.045)	-0.006 (0.006)
Less than high school	-0.038 (0.027)	0.327 (0.216)	-0.005 (0.048)	-0.006 (0.004)	-0.021 (0.049)	-0.009 (0.007)
<b>Nativity status</b>						
Born in the US	Ref	Ref	ref	ref	ref	ref
Not born in the US	-0.013 (0.026)	-0.005 (0.165)	-0.005 (0.048)	-0.012*** (0.004)	-0.08 (0.05)	-0.02*** (0.005)
<b>SF-12 Physical Health Component</b>	-0.004*** (0.001)	-0.014** (0.006)	-0.009*** (0.002)	-0.003*** (0.0002)	-0.008 *** (0.001)	-0.004*** (0.0003)
<b>Insurance status</b>						
Private/exchange	ref	Ref	ref	ref	ref	ref
Medicaid/Other public	0.021 (0.023)	0.161 (0.164)	0.059 (0.042)	0.019*** (0.004)	0.114** (0.046)	0.032*** (0.006)
Medicare	0.057** (0.029)	0.134 (0.154)	0.112** (0.048)	0.025*** (0.008)	0.154*** (0.053)	0.043*** (0.012)

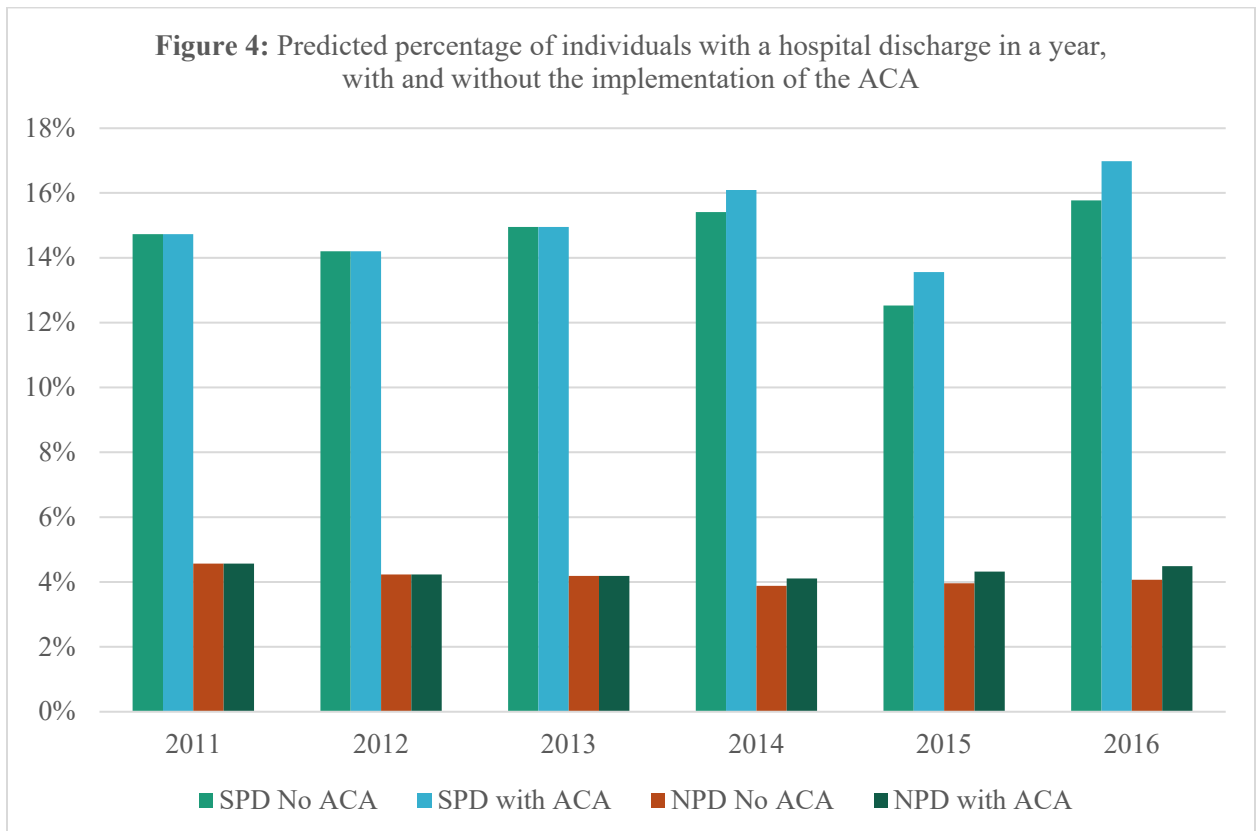
Uninsured	-0.063*** (0.021)	0.102 (0.168)	-0.083** (0.038)	-0.031*** (0.003)	0.063 (0.043)	-0.035*** (0.004)
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Statistical significance from reference category: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



\*Predicted number of visits conditional on any use is based on the expected utilization in Table 4.



#### 4. Outpatient and office-based visits

##### 4.1 Results and discussion

In Table 5, people with SPD do not demonstrate significant increases in the likelihood of outpatient/office-based visits from 2011-2016. Despite this, there is a significant increase in the number of outpatient/office-based visits conditional upon having at least one during the same period. These increases are statistically significant in 2014 and 2015 relative to 2011 (2014: 2.6 visits,  $p<0.1$ ; 2015: 2.5 visits,  $p<0.1$ ), but drop off in 2016 (1.9 visits, NS). The results from the SPD group in 2014 and 2015 may be reflective of the realization of some pent-up demand among individuals who use health services, however the decline observed in 2016 is not statistically different from 2014 or 2015 and more years of data may help assess if this is a persistent trend. Those with NPD also see an increase in the likelihood of using outpatient/office-based services, which is significantly different in 2014 relative to 2011 (1.5 percentage points,  $p<0.1$ ). Additionally, there is a significant increase in the number of visits, conditional on there being any visit, between 2013 and 2015 compared to 2011 (2013: 0.7 visits,  $p<0.05$ ; 2014: 0.8 visits,  $p<0.05$ ; 2015: 0.8,  $p<0.01$ ). This results in statistically significant expected utilization for the same years relative to 2011 (2013: 0.5 visits,  $p<0.05$ ; 2014: 0.6 visits,  $p<0.01$ ; 2015: 0.5,  $p<0.01$ ).

The results from the individuals with NPD do not align with the idea of pent-up demand as clearly as the results from individuals with SPD because the increase in the use of health services begins in 2013, rather than in 2014.

Figure 5 depicts changes in expected utilization of outpatient/office-based visits when insurance status is varied in the presence of the ACA compared to held constant at 2013 levels. The trends displayed in Figure 5 for both psychological distress groups are similar to hospital discharges and ER visits in terms of number of visits with and without ACA implementation.

Both groups increase the number of visits with the ACA, but the increase among individuals with SPD is more drastic than those with NPD.

In both psychological distress groups, people with lower levels of education are significantly less likely to have an outpatient/office-based visit than people with a bachelor's degree or higher. People with SPD who have an outpatient/office-based visit and less than a high school level of education have 10 fewer visits than those with a bachelor's degree or higher, and those with NPD and less than a high school education have about 3 fewer visits than those with a bachelor's degree or higher. Insurance status also is a significant predictor of office-based/outpatient visits, as those with Medicare or Medicaid in both groups are more likely to have a visit and have significantly more visits for those with private insurance. This may be due in part to the fact that Medicare and Medicaid are designed to provide health insurance to the disabled in this age group and therefore these individuals may have greater needs. The uninsured are significantly less likely to have an outpatient/office-based visit and have fewer visits relative to those with private insurance in both groups.

Literature assessing the association of the ACA with the change in outpatient/office-based visits among the general population and individuals with SPD is not available, therefore the results presented in this analysis are novel. The data from this analysis suggests that there may have been pent-up demand for outpatient and office-based services among individuals with SPD who were already disposed to using health services, meaning those who used outpatient/office-based resources used more for a few years after the ACA was fully implemented. It is unclear whether this is also the case for individuals with NPD because the number of visits begins to increase in 2013 and the decrease in 2016 is not be statistically different from 2015. However, all three models are statistically significant in 2014 indicating that in 2014 people with NPD may have realized some pent-up demand, and align with the effects of health insurance expansions on health services use from previous insurance expansions [19, 21].

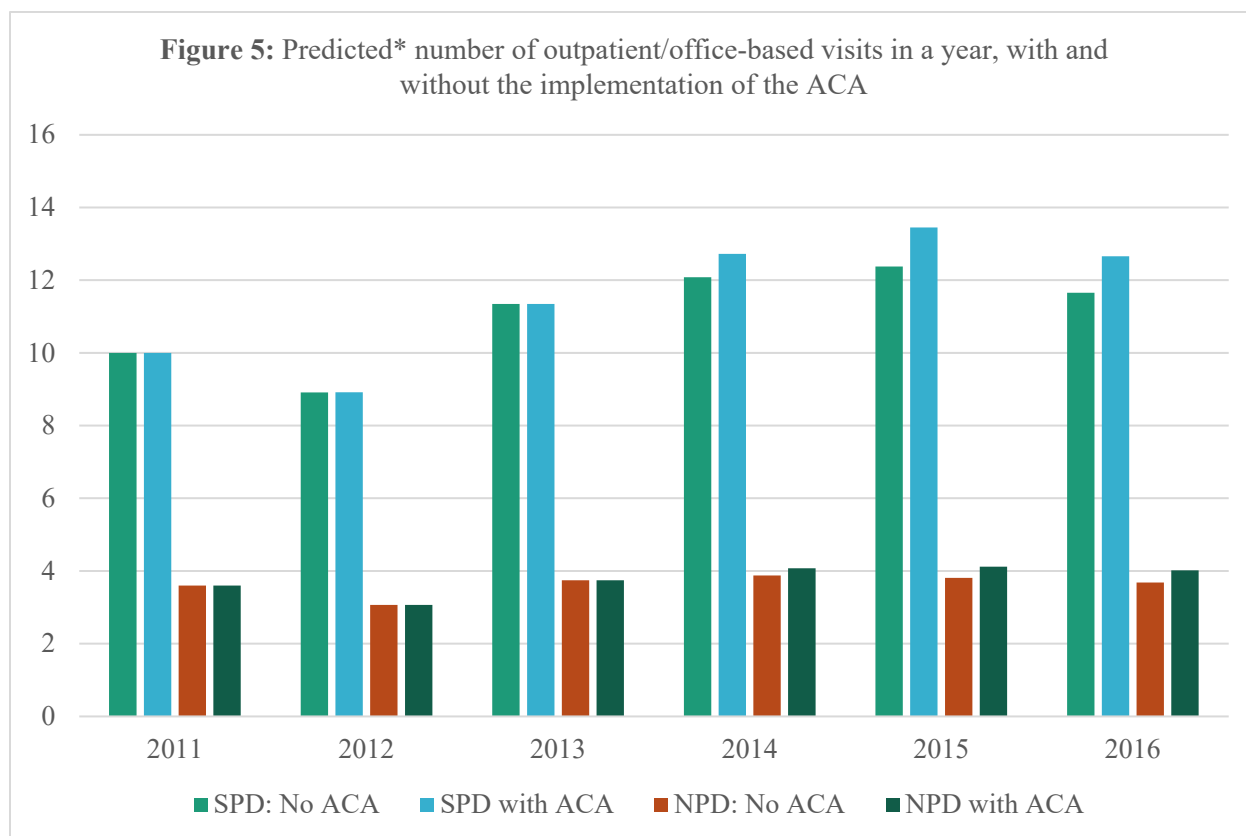
**Table 5: Outpatient and office-based visits**

<b>Variable ME (SE) reported</b>	<b>SPD</b>			<b>NPD</b>		
	<b>Logit model N=3,902</b>	<b>Truncated NB model N=3,310</b>	<b>Expected Utilization N=3,902</b>	<b>Logit model N=51,706</b>	<b>Truncated NB model N=32,633</b>	<b>Expected Utilization N=51,706</b>
<b>Year</b>						
2011	ref	ref	Ref	ref	ref	ref
2012	-0.012 (0.017)	-1.278 (1.144)	-1.212 (0.992)	-0.026*** (0.007)	-0.618** (0.254)	-0.547*** 0.171
2013	0.016 (0.020)	1.184 (1.265)	1.194 (1.107)	0.01 (0.008)	0.697** (0.301)	0.529** (0.212)
2014	0.010 (0.021)	2.575* (1.341)	2.333** (1.185)	0.015* (0.008)	0.776** (0.34)	0.614*** (0.237)
2015	0.033 (0.021)	2.531* (1.454)	2.571* 1.318	-0.002 (0.009)	0.822*** (0.291)	0.549*** (0.201)
2016	0.019 (0.024)	1.908 (1.437)	1.854 (1.291)	-0.002 (0.01)	0.479 (0.36)	0.314 (0.247)
<b>Region</b>						
Northeast	ref (0.02)	ref -9.628***	Ref -8.09***	ref 0.007	ref -1.051***	ref -0.678**
Midwest	(0.026)	(2.266)	(2.028)	(0.011)	(0.397)	(0.301)
South	0.012 (0.025)	-10.982*** (2.338)	-9.34*** (2.086)	-0.026*** (0.01)	-2.276*** (0.344)	-1.69*** (0.259)
West	-0.0106598 (0.025)	-8.115 (2.503)	-7.099*** (2.242)	-0.019** (0.01)	-0.958** (0.394)	-0.767 (0.291)
<b>Poverty level</b>						
Middle income (200-399% FPL)	ref	ref	Ref	ref	ref	ref
Low income (139-199% FPL)	- 0.0004 (0.021)	-0.015 (1.457)	-0.0176 (1.259)	-0.012* (0.007)	0.351 (0.242)	0.174 (0.171)
Near poor (100- 138% FPL)	-0.002 (0.021)	1.627 (1.427)	1.387 (1.234)	-0.018** (0.008)	0.179 (0.31)	0.021 (0.217)
Poor (less than 100% FPL)	-0.007 (0.016)	0.042 (1.302)	-0.039 (1.146)	-0.018** (0.008)	0.745*** (0.284)	0.398** (0.20)
<b>Gender</b>						
Male	ref	ref	Ref	ref	ref	ref
Female	0.084*** (0.013)	2.328*** (0.843)	2.918*** (0.731)	0.157*** (0.005)	2.014*** (0.18)	2.245*** (0.124)
<b>Age category</b>						
27-34	ref	ref	Ref	ref	ref	ref
35-44	0.004 (0.024)	1.396 (1.615)	1.223 (1.358)	0.017** (0.007)	0.273 (0.231)	0.264* (0.157)
45-54	0.055*** (0.02)	2.014 (1.369)	2.319 ** (1.170)	0.065*** (0.007)	1.163*** (0.256)	1.133*** (0.175)

55-64	0.058** (0.023)	2.361 (1.546)	2.658* (1.366)	0.117*** (0.008)	2.722*** (0.367)	2.564*** (0.277)
<b>Race</b>						
White, non-Hispanic	ref	ref	Ref	ref	ref	ref
Black, non-Hispanic	-0.048** (0.019)	-2.391** .9697095	-2.54*** (0.876)	-0.069*** (0.008)	-1.593*** (0.232)	-1.441*** (0.167)
Hispanic	-0.017 (0.016)	0.867 (1.479)	0.554 (1.32)	-0.04*** (0.009)	-0.533* (0.283)	-0.594*** (0.207)
Other race/ethnicity	-0.038 (0.031)	-0.654 (1.857)	-0.975 (1.605)	-0.065*** (0.012)	-1.164*** (0.309)	-1.139*** (0.218)
<b>Marital status</b>						
Married	ref	ref	Ref	ref	ref	ref
Widowed	0.074*** (0.023)	2.579 (2.364)	3.067 (2.157)	0.011 (0.019)	-0.363 (0.446)	-0.188 (0.329)
Divorced	0.028* (0.016)	0.302 (0.898)	0.542 (0.793)	0.013 (0.008)	0.147 (0.265)	0.172 (0.189)
Separated	0.003 (0.029)	-0.953 (1.477)	-0.797 (1.278)	-0.016 (0.014)	-0.131 (0.434)	-0.178 (0.305)
Never Married	-0.019 (0.018)	3.348** (1.337)	2.645** (1.159)	-0.014** (0.007)	0.955*** (0.299)	0.56*** (0.207)
<b>Education</b>						
Bachelor's degree or higher	ref	ref	Ref	ref	ref	ref
Some college, no bachelor's degree	-0.052*** (0.019)	-4.600** (2.13)	-4.779** (1.956)	-0.014*** (0.007)	-1.481*** (0.356)	-1.332*** (0.258)
High school or GED	-0.064*** (0.018)	-7.346*** (1.99)	-7.288*** (1.82)	-0.089*** (0.008)	-2.244*** (0.303)	-2.069*** (0.22)
Less than high school	-0.079*** (0.018)	-10.361*** (1.958)	-10.00*** (1.785)	-0.115*** (0.011)	-2.73*** (0.367)	-2.515*** (0.263)
<b>Nativity status</b>						
Born in the US	ref	ref	Ref	ref	ref	ref
Not born in the US	-0.011 (0.02)	-1.164 (1.305)	-1.117 (1.155)	-0.032*** (0.009)	-1.639*** (0.235)	-1.27*** (0.172)
<b>SF-12 Physical Health Component</b>	-0.002*** (0.0004)	-0.222*** (0.028)	-0.215*** (0.025)	-0.008*** (0.0003)	-0.165*** (0.012)	-0.154*** (0.009)
<b>Insurance status</b>						
Private/exchange	ref	ref	Ref	ref	ref	ref
Medicaid/Other public	0.021 (0.017)	2.211** (1.192)	2.227** (1.059)	0.02** (0.008)	1.653*** (0.361)	1.313*** (0.268)
Medicare	0.05** (0.021)	6.56*** (1.721)	6.648*** (1.603)	0.138*** (0.015)	5.252*** (0.689)	5.026*** (0.573)

Uninsured	-0.153 *** (0.022)	-4.16*** (1.068)	-4.925*** (0.898)	-0.218*** (0.008)	-1.776*** (0.207)	-2.252*** (0.141)
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Statistical significance from reference category: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



\*Predicted number of visits conditional on any use is based on the expected utilization in Table 5.

## 5. Prescriptions

### 5.1 Results

In Table 6, among individuals with SPD, the likelihood of getting a prescription fill is significantly higher in 2015 relative to 2011 (4 percentage points,  $p < 0.05$ ). The number of prescription fills, conditional on having received any, increases in 2014-2015 and drops back down in 2016, but these effects are not statistically different from 2011. The pattern of prescription use among those with SPD seems to indicate that there may have been some pent-up demand for prescription drugs that was realized from 2014 to 2015 significantly decreased in 2016 (vs. 2015).

Individuals with NPD are significantly less likely to get a prescription fill in all years relative to 2011, except in 2013 (percentage point; 2012: -3,  $p < 0.01$ ; 2014: -1.6,  $p < 0.1$ ; 2015: -3,  $p < 0.01$ ; 2016: -3,  $p < 0.01$ ). Among those who do receive a prescription fill, they receive fewer overall in each year relative to 2011 although these effects are not statistically significant, apart from 2012 (-1.4 prescriptions,  $p < 0.01$ ). The expected utilization for this group demonstrates a similar trend and is statistically significant in 2012, 2014, and 2016 relative to 2011 (2012: -1.2 prescriptions,  $p < 0.01$ ; 2014: -0.8,  $p < 0.01$ ; 2016: -0.8,  $p < 0.01$ ).

In Figure 6, the number of prescriptions for people with SPD is higher with the ACA insurance expansion than without it from 2014-2016. The number of prescriptions in those years for people with NPD is also slightly higher but is in line with the insignificant results observed in Table 6. The percentage of people likely to have any prescriptions are also predicted in each group with and without the ACA insurance expansions (data not shown). While there is not a higher percentage of people with SPD receiving a prescription in the scenario with the insurance expansions compared to the scenario without the insurance expansions, there is a larger gap between the two scenarios for individuals with NPD.

In both psychological distress groups, education and insurance status play significant roles in prescription use. Those with lower levels of education have a significantly lower likelihood of receiving a prescription and receive fewer prescriptions than those with a college degree. Additionally, the uninsured have a lower likelihood of receiving a prescription relative to those with private insurance.

## *5.2 Discussion*

This analysis demonstrates that individuals with NPD are getting fewer prescription fills during the timeframe of ACA implementation. It is possible that the ACA may have had a greater impact on health services use in specific populations or for services that had restricted access, and therefore pent-up demand, prior to ACA implementation. For example, pharmaceutical contraceptives were widely available prior to the implementation of the ACA and many of them were inexpensive generics, therefore access through health insurance was relatively well-established for most women of reproductive age prior to the ACA, yet many hypothesized that the zero-dollar copay provision for contraceptives would increase the use of contraceptives. However, early evidence from the ACA does not support an increase in the use of pharmaceutical contraceptives [35]. In contrast, treatment for opioid abuse disorder is significantly less accessible than contraceptives. Treatment can only be prescribed by physicians who have a federal waiver and those doctors are limited in the number of people they can treat. In addition, the treatment is very expensive and often not covered by insurance. The ACA provisions that were aimed at improving coverage of treatment for opioid abuse disorder (the Medicaid expansions and the requirement that the treatment, buprenorphine with naloxone, be covered by Medicaid) were associated with an increase in use of the drug, especially in Medicaid expansion states [36]. Assuming that the ACA allowed for better access to health care for groups of individuals and/or to services with restricted access prior to ACA implementation, then it makes sense that the present analysis demonstrates possible realization of pent-up demand for

pharmaceuticals among individuals with SPD, because individuals with SPD were more likely to be uninsured prior to ACA implementation than those with NPD [5].

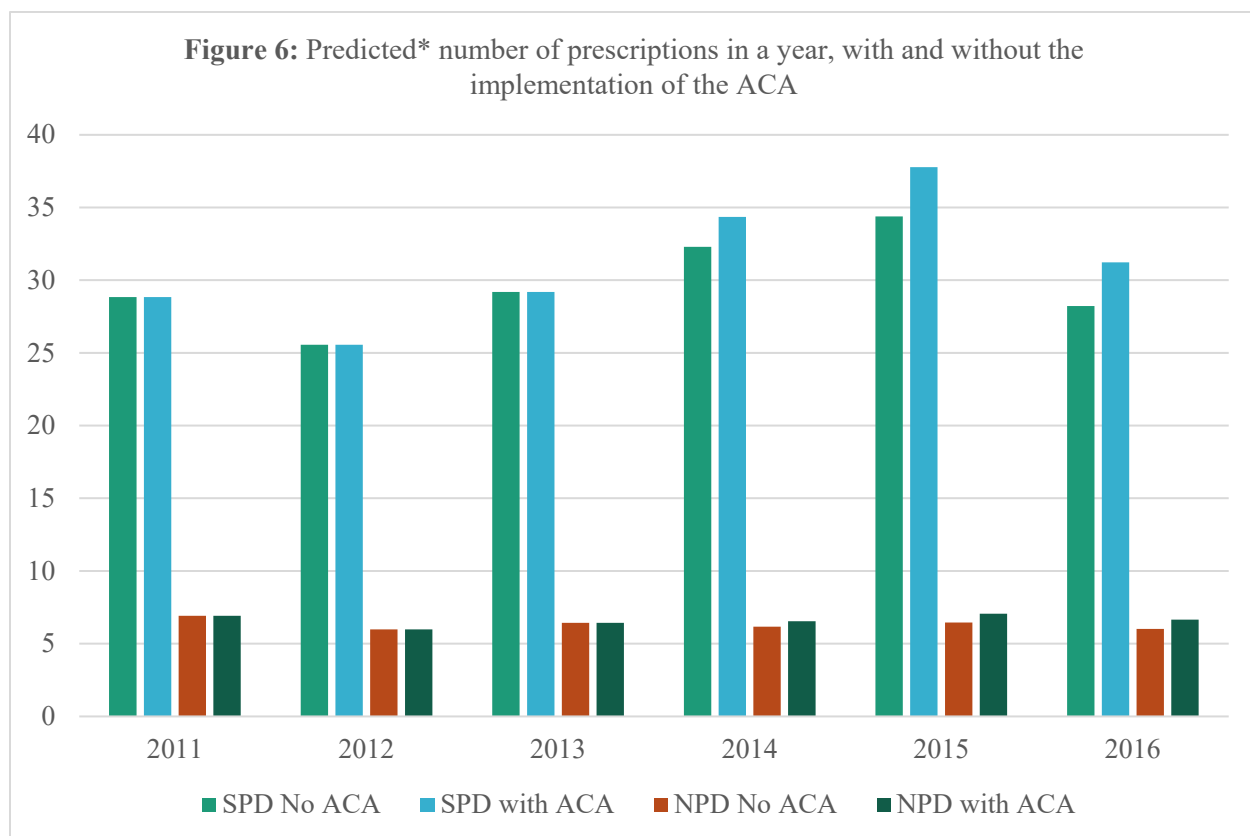
Table 6: Number of prescription fills

Variable ME (SE) reported	SPD			NPD		
	Logit model N=3,902	Truncated NB model N=3,356	Expected utilization N=3,902	Logit model N=51,706	Truncated NB model N=29,287	Expected utilization N=51,706
<b>Year</b>						
2011	Ref -0.014 (0.017)	ref -3.916* (2.21)	ref -3.742* (1.928)	ref -0.03*** (0.009)	ref -1.425*** (0.505)	ref -1.227*** (0.325)
2012	-0.021 (0.021)	-0.652 (2.653)	-1.098 (2.282)	-0.013 (0.009)	-0.348 (0.679)	-0.378 (0.424)
2013	0.024 (0.019)	2.19 (2.987)	2.554 (2.695)	-0.016* (0.009)	-0.99 (0.614)	-0.799** (0.394)
2014	0.04** (0.019)	3.806 (2.88)	4.409* (2.599)	-0.03*** (0.01)	-0.097 (0.617)	-0.429 (0.401)
2015	-0.018 (0.024)	-0.173 (3.01)	-0.603 (2.757)	-0.031*** (0.009)	-0.744 (0.707)	-0.829** (0.431)
2016						
<b>Region</b>						
Northeast	Ref 0.017 (0.028)	Ref 0.071 (3.084)	Ref 0.503 (2.92)	ref 0.035*** (0.012)	ref -0.016 (0.807)	ref 0.438 (0.553)
Midwest	0.025 (0.026)	0.406 (2.587)	1.001 (2.467)	0.027** (0.01)	-0.576 (0.667)	-0.004 (0.451)
South	0.008 (0.027)	-4.543 (2.791)	-3.732 (2.568)	-0.011 (0.012)	-2.631*** (0.713)	-1.679*** (0.481)
West						
<b>Poverty level</b>						
Middle income (200-399% FPL)	Ref	Ref	Ref	ref	ref	ref
Low income (139-199% FPL)	0.032* (0.018)	4.31 (2.882)	4.574* (2.581)	-0.007 (0.007)	0.261 (0.496)	0.069 (0.325)
Near poor (100- 138% FPL)	0.024 (0.017)	2.711 (2.556)	2.964 (2.163)	-0.003 (0.009)	1.226** (0.576)	0.702* (0.385)
Poor (less than 100% FPL)	0.011 (0.017)	2.211 (2.415)	2.202 (2.062)	-0.003 (0.008)	0.838 (0.581)	0.471 (0.376)
<b>Gender</b>						
Male	Ref 0.065*** (0.015)	Ref 4.187** (1.961)	ref 5.293*** (1.784)	ref 0.146*** (0.005)	ref 0.838*** (0.581)	ref 2.936*** (0.258)
Female						
<b>Age category</b>						
27-34	Ref 0.02 (0.023)	Ref 8.493*** (2.429)	Ref 7.696*** (2.161)	ref 0.032*** (0.008)	ref 3.963*** (0.376)	ref 2.544*** (0.232)
35-44	0.037* (0.019)	20.755*** (1.958)	18.816*** (1.78)	0.087*** (0.009)	9.92*** (0.517)	6.806*** (0.338)
45-54						

55-64	0.070*** (0.02)	23.843*** (2.458)	22.633*** (2.207)	0.163*** (0.01)	14.863*** (0.52)	11.26*** (0.377)
<b>Race</b>						
White, non-Hispanic	Ref	Ref	Ref	ref	ref	ref
Black, non-Hispanic	-0.047*** (0.018)	-8.146*** (1.907)	-8.175*** (1.679)	-0.066*** (0.008)	-2.61*** (0.466)	-2.351*** (0.294)
Hispanic	-0.003 (0.017)	2.849 (3.591)	2.415 (3.263)	-0.041*** (0.009)	-2.192*** (0.678)	-1.816*** (0.447)
Other race/ethnicity	-0.028 (0.031)	-8.307** (3.973)	-7.904** (3.327)	-0.063*** (0.015)	-1.367 (0.836)	-1.597*** (0.551)
<b>Marital status</b>						
Married	Ref	Ref	Ref	ref	ref	ref
Widowed	0.08*** (0.02)	3.817 (4.464)	5.527 (4.098)	0.044** (0.017)	1.247 (0.896)	1.29** (0.581)
Divorced	0.041** (0.017)	-1.674 (2.325)	-0.387 (2.052)	.0268*** (0.008)	0.872 (0.594)	0.852** (0.382)
Separated	0.055** (0.022)	-5.661* (3.046)	-3.616 (2.712)	0.01 (0.013)	1.636 (1.185)	1.116 (0.737)
Never Married	0.017 (0.018)	-4.611* (2.554)	-3.564 (2.252)	-0.007 (0.007)	1.65*** (0.567)	0.905** (0.359)
<b>Education</b>						
Bachelor's degree or higher	Ref	Ref	ref	ref	ref	ref
Some college, no bachelor's degree	-0.017 (0.021)	-3.983 (3.551)	-3.962 (3.241)	-0.01 (0.009)	0.936 (0.591)	0.452 (0.373)
High school or GED	-0.026 (0.018)	-6.501* (3.352)	-6.396** (3.068)	-0.034*** (0.008)	0.629 (0.497)	-0.024 (0.322)
Less than high school	-0.052** (0.022)	-8.704** (3.424)	-8.94*** (3.109)	-0.036*** (0.009)	1.447** (0.639)	0.438 (0.412)
<b>Nativity status</b>						
Born in the US	Ref	Ref	Ref	ref	ref	ref
Not born in the US	-0.052** (0.021)	-11.8*** (2.933)	-11.41*** (2.576)	- .07*** (0.009)	-4.85*** (0.534)	-3.659*** (0.335)
<b>SF-12 Physical Health Component</b>						
	-0.003*** (0.0004)	-0.715*** (0.067)	-0.702*** (0.06)	-0.01*** (0.0004)	-0.401*** (0.024)	-0.367*** (0.017)
<b>Insurance status</b>						
Private/exchange	Ref	Ref	ref	ref	ref	ref
Medicaid/Other public	0.056*** (0.018)	14.623*** (2.357)	14.782*** (2.14)	0.032*** (0.008)	7.341*** (0.606)	5.183*** (0.433)
Medicare	0.069*** (0.019)	26.014*** (2.561)	25.764*** (2.47)	0.192*** (0.019)	15.383*** (0.887)	13.849*** (0.798)

Uninsured	-0.125*** (0.022)	-7.107*** (1.884)	-8.733*** (1.509)	-0.198*** (0.008)	-2.841*** (0.399)	-3.78*** (0.23)
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Statistical significance from reference category: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



\*Predicted number of visits conditional on any use is based on the expected utilization in Table 6.

### Limitations

Many of the effects observed in this study were not statistically significant despite suggesting trends that are possibly associated with ACA implementation, therefore some of the results that seem like trends may be spurious. However, the size of the marginal effects is substantial in most tables, so it is possible that the lack of statistical significance in the SPD group could be due to insufficient sample size in each year.

Additionally, all health care utilization data from MEPS used in this analysis is household-reported. This means that there may be inaccuracies in reporting of each type of

service use. Further, measuring the impact of the ACA on number of hospital discharges and number of prescription fills has limitations. These measures do not provide any insight into the impact of the ACA on the quality and duration of care received at a hospital, or on the cost or type of prescription drugs that are filled in this population.

The endogeneity of health insurance status is an obstacle that is difficult to overcome. In an ideal scenario it would have been possible to identify an appropriate control group to assess the impacts of the ACA on individuals with SPD but given limitations of the data (i.e. small sample sizes and lack of state-level geographic identifiers) I was unable to do so. Therefore, the model is estimated in two situations, one where health insurance status is allowed to vary over time, and one where it is held constant at the mean level observed in 2013. Sample size and restricted availability of geographic indicators (such as states) are also limitations of this analysis. The lack of a control group also limits the ability to draw inferences from the results.

Furthermore, this study only extends to 2016. Although this is a strength of the study relative to other research that has been conducted on health services use as it relates to the ACA, additional years of data may assist in providing clarity to the idea that increased use in the early years of the ACA was due to pent-up demand. Additionally, although the results of this study suggest that there may have been some pent-up demand that was observed after ACA implementation, this study was not designed to explicitly assess pent-up demand and therefore these results must be interpreted cautiously.

Finally, this study does not control for other policies that may have influenced both the enrollment in insurance and health services use which were unrelated to the ACA in the time period after the ACA was implemented (for example, the expansion of employer-sponsored insurance coverage to same-sex couples on the federal level in 2015).

## Conclusions

During ACA implementation, expected health services use differs between individuals with SPD and NPD in terms of hospital discharges, ER visits, and prescription fills. Individuals with SPD have significantly higher expected utilization of hospital discharges and prescription fills after the ACA insurance expansion relative to 2011, whereas individuals with NPD have significantly higher expected utilization of ER visits and significantly lower expected utilization of prescription fills. Both groups have significantly higher expected utilization of outpatient/office-based visits. Increases in health services use are apparent in the first year (2014) or two (2015) after ACA implementation but trail off by the third year (2016) after implementation. Increased health services use after ACA implementation may be explained in part by the realization of pent-up demand.

Several studies have looked at realized pent-up demand resulting from public insurance expansions on the state and national level and as previously stated, each found that after an initial period of increased utilization, use of services dropped off [19, 21]. This aligns with the data produced as a result of this study, where increases in the number of outpatient/office-based visits for all individuals started in 2013 and trailed off by 2016, although the decline is not always statistically significant. Additionally, patients with SPD had an increased likelihood of using the ER starting in 2013, peaking in 2015, and trailing off in 2016. Prescription drug use among this cohort followed a similar pattern, with the likelihood of filling a prescription and the conditional use of prescriptions increasing over time, peaking in 2015, and dropping in 2016. Patients with NPD did not have an increased likelihood of using the ER, but conditional use of the ER increased in 2013 and 2014 then trailed off in 2015. Unlike ER use, prescription use in this cohort showed no differences in the likelihood of filling a prescription or the conditional use of prescription fills over the timeframe of ACA implementation.

The findings of this study regarding hospital discharges are less clear. For individuals with NPD there is no change in the likelihood of having a hospitalization, but if an individual had one, they went more frequently. Reasons for this may be because they were more likely to have that hospitalization covered by insurance or had lower levels of cost-sharing under the ACA. Additionally, patients with SPD did not have a higher likelihood of being hospitalized, and the conditional use of hospital discharges does not show a consistent pattern over time. Regardless, there is no evidence that hospital discharges went down for either psychological distress group over the time frame of ACA implementation.

One of the interesting findings of this study is that health services use seems to begin to increase in 2013 for both SPD and NPD groups, specifically for outpatient/office-based visits and ER visits. This indicates that there are other factors at play outside of the insurance expansions that were affecting the use of the ER and outpatient/office-based visits. It is possible that provisions of the ACA that took effect before 2014 or a combination of other unspecified policy changes, may have allowed individuals to use health services before the ACA insurance expansion. For example, some states began expanding Medicaid prior to 2014, and some insurance plans knew that they would be required to change the structure of their benefits so that they were comparable to the marketplace plans and therefore chose to do so earlier so that they would not lose business to the marketplaces when they opened in 2014. Furthermore, insurance companies were required to remove restrictions that prevented coverage of preexisting conditions prior to 2014.

The results of the present study may be explained by pent-up demand for certain services among people with SPD. People with NPD also demonstrate similar use of certain services, however not to the same degree and not always in the same way. Given that the intent of this study was to observe changes in health services use during ACA implementation and not to test

for evidence of pent-up demand, I am unable to determine with certainty that there was pent-up demand for certain services among individuals with SPD and not for those with NPD.

In addition, education level and insurance status are consistently significant predictors in each of the models for each psychological distress group. The effect of education demonstrates similar trends in both groups, where low levels of education tend to have lower levels of utilization than the reference category except emergency room use, where people with lower levels of education are more likely to go than people with a higher level of education. While no statistical comparisons are made between the SPD and NPD groups, the marginal effects for these predictors in those in the SPD group tend to be larger than for those in the NPD group.

One of the contributions to the literature of the present study is that the timeframe extends several years beyond ACA implementation than what has been studied previously, and that it looks at individuals with SPD and those with NPD. Although statistical power in the SPD group is a limitation of this dissertation, one of the key findings of the first chapter of this dissertation is that individuals with SPD seemed to move from being uninsured into Medicaid after the ACA insurance expansions in 2015. This may be why the conditional use of each type of health service in the SPD group peaks in 2015 but tends to peak earlier for those with NPD. Interestingly, even though the conditional use of most services goes up around the time of ACA implementation in both groups, there is no increased likelihood of using health services after ACA implementation relative to 2011 for both groups, apart from ER services for people with SPD.

In sum, individuals with SPD and NPD were not more likely to use health services overall during ACA implementation, but among those who did use services they used more services after 2014. The types of services used by individuals with SPD did not exactly align with the types of services used by individuals with NPD. Finally, conditional use of health services use among individuals peaks in 2014 for individuals with NPD, but the peak for individuals with SPD

comes later in 2015, indicating that individuals with SPD may have faced barriers or delays in access that are not experienced by individuals with NPD.

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**Appendix 1: Description of variables by conceptual framework**

<b>All variables originated in the MEPS Household Component</b>			
<b>Variable type</b>	<b>Variable name</b>	<b>Variable Description</b>	<b>Scale</b>
Dependent	ERTOTVIS	Emergency room total visits in a year.	Positive continuous variable (count data)
Dependent	HPTOTVIS	Total number of hospital discharges in a year	Positive continuous variable (count data)
Dependent	OPOBTOTVIS	Combination of IPUMS MEPS Variables OPTOTVIS and OBTOTVIS. The ability of individuals to differentiate between these two variables is limited, therefore they are being combined into one category to reflect all outpatient and office-based visits.	Positive continuous variable (count data)
Dependent	RXPRMEDSNO	Total number of prescriptions that were reported by the respondent and purchased at a pharmacy in a survey year. Self-filers of insurance claims were asked to provide charge and payment information regarding their prescriptions in the household component of the survey. Charge and payment information were collected for non-self-filers through the pharmacy component of MEPS where pharmacies were contacted directly to verify the purchase of prescriptions	Positive continuous variable (count data)
<b>Predisposing characteristics</b>			
Independent	AGECAT	Categorical age variable constructed from the linear variable AGE from IPUMS MEPS	5 27-36 (ref) 6 37-46 7 47-56 8 57-64
Independent	RACE/ETHNICITY	Reconstructed the RACEA and HISPYN variables from IPUMS MEPS to consolidate the race categories and combine them with the ethnicity categories.	1 "White, non-Hispanic" (ref) 2 "Black, non-Hispanic" 3 "Hispanic" 4 "Other Race/Ethnicity"
Independent	SEX	Gender, male or female	

Independent	REGION	IPUMS MEPS variable is REGIONMEPS. I recoded the variable to address the missing values.	1 Northeast (ref) 2 Midwest 3 South 4 West
<b>Enabling characteristics</b>			
Independent	EDUCATION	There are several education variables in IPUMS MEPS, however they were inconsistently administered throughout the time frame that I am studying. One variable, educational attainment or EDUC, was administered in all years, hence I selected this one. This variable was reconstructed and condensed to create 4 broader categories of educational attainment, rather than the 30 categories in the original variable	5 Bachelor's degree or more (ref) 6 Some college, no bachelor's 7 High school or GED 8 Less than high school
Independent	YEARIND	A single categorical year indicator variable constructed from the IPUMS MEPS variable YEAR to identify which year an individual reported their data in.	7 2011 (ref) 8 2012 9 2013 10 2014 11 2015 12 2016
Independent	MARRIED	IPUMS MEPS variable is MARSTAT, or marital status. I recoded the variable to address the missing values.	1 Married (ref) 2 Widowed 3 Divorced 4 Separated 5 Never married
Independent	NATSTAT	Nativity status or USBORN in IPUMS MEPS. This variable was reconstructed to simplify the number of categories so that they simply describe whether an individual was born as a US citizen or not (regardless of if they were born in the US, US territories, overseas military base, etc.)	2 Born in the US (ref) 3 Not born in the US

Independent	POVCAT	The IPUMS MEPS variable for poverty category. This variable takes the linear variable for family income and creates a categorical variable, classifying respondents according to their family income as a percentage of the Federal Poverty Level (FPL)	<p>5 Negative or poor (LT 100% poverty line)</p> <p>6 Near poor (100-124% poverty line)</p> <p>7 Low income (125-199% poverty line)</p> <p>8 Middle income (200-399% poverty line)</p> <p>9 High income (GE 400% poverty line)</p>
Independent	INSSTAT3	Insurance status. This variable was constructed using several variables from IPUMS MEPS. IPUMS MEPS reports insurance variables monthly. This means an individual can have 12 insurance statuses reported in a year. Therefore, the choice was made to select the insurance status that the individual reported at the same time they reported their Kessler 6 score to reflect a person's insurance status at the time they may have reported being in psychological distress. I coded each category of insurance as being selected in the same month as the SAQ was taken (using IPUMS MEPS variable ADCMPM) or not and created 5 new variables based on the following categories: Private Insurance, Exchange, Medicaid, Other public, and Uninsured. I then created another variable, INSSTAT, to establish a categorical variable that represents the insurance status of an individual in the month that they took the SAQ. After looking at the frequencies for this variable I realized that the sample size for the Exchange category was too small. Additionally, I ran IIA tests to assess the best combination of insurance categories that provided the best model fit. Based on this information created the variable INSSTAT3	<p>5 Private Insurance</p> <p>6 Medicaid</p> <p>7 Medicare</p> <p>8 Uninsured</p>
<b>Need</b>			

Independent	PCS	Physical Health Component from the SF-12.	Continuous variable
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## CHAPTER 3

### AVAILABILITY AND ACCESSIBILITY OF CARE FOR INDIVIDUALS WITH SERIOUS PSYCHOLOGICAL DISTRESS DURING THE IMPLEMENTATION OF THE AFFORDABLE CARE ACT

#### Abstract

**Background:** Individuals with serious psychological distress (SPD) experience great difficulty accessing many types of health care. Compared to individuals with no psychological distress (NPD), they are more likely to forgo mental health care due to cost (18% vs. 1.5%) [2], have a higher likelihood of experiencing delays in receiving care (AOR 2.7,  $p < 0.001$ ), and are more likely to change their usual place of care due to insurance reasons (AOR 1.5,  $p < 0.001$ ) [3]. The Affordable Care Act (ACA) sought to improve access to health care primarily through expanding health insurance coverage, which individuals with mental illness often lack. Available literature demonstrates that the ACA is associated with increases in insurance coverage among individuals with mental illness and thus improved affordability of health care. This study aims to assess how other dimensions of access health care (availability and accessibility) changed around the ACA implementation time period among individuals with severe, mild to moderate, and no psychological distress.

**Methods:** The probability of accessing health care in each year during ACA implementation (2012-2016) is compared to the reference year (2011) within each psychological distress group. Logistic regression models are utilized, and marginal effects are reported. Pooled cross-sectional data from the Integrated Public Use Microdata Series (IPUMS) Medical Expenditure Panel Survey (MEPS) is used for analysis. Access to health care outcomes include the need for health care, the unmet need for health care, and having a usual place of care. Furthermore, each outcome is predicted in the event that the ACA insurance expansions did not occur (i.e. insurance status is

held constant at 2013 levels in the logistic regression models). Psychological distress as defined by the Kessler 6 (K6) questionnaire. A score of  $\geq 13$  is SPD, 12 to 8 is mild to moderate (MMPD), and  $\leq 7$  is NPD. Individuals included in the sample had a score on the K6, an income  $\leq 399\%$  of the federal poverty level and are between the ages of 27 and 64.

**Results:** Each year during the time frame of ACA implementation (2012-2016) is associated with a lower probability of needing health care relative to 2011 within each psychological distress (PD) group, although this association is only statistically significant in 2013 for those with SPD (-6.6 percentage points,  $p < 0.05$ ), and in 2015 for those with MMPD (-5.8 percentage points  $p < 0.05$ ). Among individuals with NPD the need for health care was lower compared to 2011 in each year from 2013 through 2016, ranging from 3 to 5.3 percentage points lower than 2011 ( $p < 0.01$ ). The unmet needs for health care seems to have increased during ACA implementation for those with SPD or MMPD, but not for those with NPD. Again, the statistical significance of these results is not strong for most groups in most years. Individuals with SPD observe significant increased unmet need in 2013 (5.8 percentage points,  $p < 0.05$ ) and 2015 (5.1 percentage points,  $p < 0.1$ ), and individuals with MMPD observe significant increases in 2013 (2.6 percentage points,  $p < 0.1$ ) and 2014 (3.3 percentage points,  $p < 0.05$ ). Not having a usual place of care is generally higher in each year relative to 2011 for each PD group. For individuals with SPD, there are only statistically significant increases in 2012 (4.2 percentage points,  $p < 0.1$ ) and 2013 (8.1 percentage points,  $p < 0.01$ ). For the MMPD and NPD groups, there are statistically significant increases compared to 2011, but the marginal effects fluctuate from year to year and there are no clear changes after the ACA insurance expansions are implemented in 2014. For example, individuals with MMPD observe significant effects in 2012 (3.4 percentage points,  $p < 0.1$ ), 2013 (4.4 percentage points,  $p < 0.05$ ), 2015 (3.7 percentage points,  $p < 0.1$ ), and 2016 (5.1 percentage points,  $p < 0.05$ ). Individuals with NPD observe similar fluctuations in the marginal effects related to not having a usual place of care.

**Conclusions:** It is possible that the lack of a strong association of these outcomes with the implementation of the ACA in the SPD population is a result of the fact the ACA made limited attempts to improve these dimensions of access to health care, and that changes observed in these dimensions of access to health care would have been in response to the provisions of the ACA that address affordability, rather than specific ACA provisions to address availability and accessibility.

## Introduction

Americans face a complex health care system with many barriers to access. Some of these barriers are related to a lack of health insurance, however, both insured and uninsured individuals face a health care system that lacks capacity to meet their needs. These challenges are exacerbated for some individuals by predisposing factors such as age, race, ethnicity, geographic location, and health status[1]. Included in this group are individuals with mental illness, who experience greater difficulties accessing health care than those without mental illness [2, 3]. Serious psychological distress (SPD) as assessed by the Kessler 6 (K6) questionnaire is often used as a proxy for serious mental illness. SPD is defined as “a mental health problem severe enough to cause moderate-to-serious impairment in social, occupational, or school functioning and requires treatment” [4], and is typically defined by a K6 score of 13 or greater. Compared to individuals with no psychological distress (NPD), they are more likely to forgo mental health care due to cost (18% vs. 1.5%) [2], have a higher likelihood of experiencing delays in receiving care (AOR 2.7,  $p < 0.001$ ), and are more likely to change their usual place of care due to insurance reasons (AOR 1.5,  $p < 0.001$ ) [3]. The Affordable Care Act (ACA), enacted in 2010, is designed to improve the affordability and accessibility of health care. Research regarding the effects of the ACA on individuals with SPD focuses on improvements in the affordability of health care and is limited regarding other dimensions of access to health care. Furthermore, changes in access to health care resulting from the implementation of the ACA for individuals with mild to moderate psychological distress (MMPD) have not been adequately researched. Although SPD is defined by a certain cutoff on the K6 scale, mental illness is not necessarily a dichotomous condition where an individual has it or does not. Mental illness exists on a spectrum of severity and may also be transient, with individuals experiencing mental illnesses periodically throughout their lives or transitioning between SPD, MMPD, or no psychological distress (NPD). This paper aims to close these gaps in the literature by examining access to health care for individuals with SPD,

NPD, and those who may be transitioning in and out of SPD and present with lower K6 scores (i.e. individuals with MMPD) during the implementation of the Affordable Care Act.

The concept of access to health care previously defined by Penchansky and Thomas as having five dimensions – availability, accessibility, accommodation, affordability, and acceptability[5] is operationalized to conduct this work. Availability of health care refers to availability of appropriate supply and mix of providers, as well as other health services to meet the level of demand and type of health care needs required by the local patient population. Accessibility of health care refers to the proximity of a patient to providers as well as how easy it is to reach those providers, and accommodation of health care refers to whether the supply of health care services provided is flexible enough to meet a patient's need for care. Affordability of health care refers to the patient's ability and willingness to pay for care given their out of pocket costs, and acceptability of health care is determined by the patient's perception of the quality and relevance of care available through local providers[5]. The intent of this paper is to assess within each group, changes in access to health care along the dimensions of availability and accessibility for individuals with SPD, MMPD, and no psychological distress (NPD) over the time frame of ACA implementation (2011-2016). Barriers to these dimensions of access to health care may be particularly difficult for individuals with mental illness to overcome.

## **Background**

The ACA seeks to improve access to health care through multiple provisions that improve access to health insurance. The first set of provisions aim to expand health insurance coverage by expanding Medicaid eligibility requirements, creating insurance marketplaces, and expanding coverage of dependents. Newly insured individuals gain financial protections through insurance, leading to lower cost sharing and improved access (affordability) of health care[6]. The expansion of health insurance is coupled with measures designed to improve the quality of

health insurance, primarily through the essential benefits package. The essential benefits package requires that many insurance plans cover ten health benefits that previously were not always included in health insurance plans. These benefits include, but are not limited to, treatment for mental health conditions and substance abuse disorders, preventative care and wellness care, and prescription drugs [7].

Improvements in the affordability and quality of health insurance increase demand, thus challenging the health care system to meet that demand with additional supply of providers (availability) and ensuring that the supply of providers matches the geographic location and health care needs of the individuals who are demanding more services (accessibility). Prior to ACA implementation there was concern that the availability of care would not be able to keep up with demand brought on by improvements in the affordability of health care. In situations where availability of health care meets demand, there is concern that the accessibility of health care would not be appropriately distributed in terms of specialization of services. This was expected to worsen accessibility of care for subgroups of individuals, including those with mental illness [8]. Mental health services have historically been under-resourced, with an estimated 77% of US counties having a shortage of psychiatrists or other mental health specialists in 2009 [9]. As a result, treatment for SPD and mental illness is generally provided in a primary care setting. These providers are often overloaded with patients and unable to spend the time required to properly identify and address mental health issues. Furthermore, primary care providers tend to lack the knowledge required to diagnose mental health issues [10-13], and do not screen for mental health problems, with only 39-48.6% of patients reporting mental health screening during their primary care visits [14, 15]. Men, the elderly, and the uninsured in particular are less likely to be screened compared to women, younger individuals and those with private insurance, respectively [14]. Prior to the ACA's enactment, the American College of Physicians had voiced concern that the nation's primary care system was on the verge of collapse due to the lack of availability of

primary care providers for the general population [16]. Due to these shortages there was concern that the increased demand for health care resulting from expanded access to health insurance through the ACA would stress the primary care system beyond its limits, resulting in longer waiting times for appointments, lower quality of care, and overloaded physician practices[17]. Nationally, it was estimated that the number of primary care providers might need to increase by 2.5% to meet the increased demand resulting from the ACA [18], and while this may seem reasonable, there are pockets of the country where the supply of primary care providers needs to increase by 5-10% of the pre-ACA level to meet demand. Seven million people live in areas where supply might need to increase by 10% and an additional 44 million people live in areas where supply might need to increase by 5% [18]. Therefore, it is possible that the location of the increased supply of providers will not match the location of the increased need. Under such circumstances, geographic disparities in access to care may worsen, especially in terms of availability and accessibility.

Thus, improvements in the availability and accessibility of primary and specialized health care for individuals with SPD specifically, and mental illness more broadly, are greatly needed. Given that the health care system available to provide health care for individuals with SPD and mental illness was strained prior to the ACA, there is concern that the increased demand for health care by individuals with SPD and mental illness resulting from the ACA has further strained the system due an insufficient improvement in the availability and accessibility of providers who can adequately care for this population [8].

Despite these concerns, the supply, or availability, of primary care providers seems to have kept up with demand during ACA implementation [18, 19]. To successfully meet this increased demand, health care systems hired more providers, including mid-level providers such as physician assistants and advance practice nurses, opened more clinics, and extended hours to outside of the traditional working hours[19]. To assist the implementation of these structural

changes, the Institute of Medicine called for the removal of scope of practice restrictions on mid-level providers to increase the supply of providers and alleviate the burden to the primary care system[21]. Research has consistently demonstrated the quality of care provided by mid-level providers is comparable to that of physicians[21, 22], making them an effective tool for meeting increased demand for health care resulting from the ACA and contributing to their increased use over the time of ACA implementation. [23]. There is little evidence that similar changes in the supply of mid-level providers specializing in the treatment of mental health has increased to meet demand, or that there have been efforts by policy makers to do so. Although the availability and accessibility of primary care has improved, the availability and accessibility of specialized health care services for specific sub-groups of patients may not have kept pace [19].

Research assessing improvements in access to health care for individuals with SPD or mental illness during ACA implementation is limited but growing. The focus of this literature tends to be on the affordability of care in this population. For example, young adults (aged 19-25 years) who benefited from the dependent coverage provision and had moderate-to-serious mental illness, report a significant decrease in cost as a barrier to health care relative to slightly older adults who did not benefit from the dependent coverage provision of the ACA [25]. Prior research on the Medicaid expansions under the Section 1115 waiver of the Social Security Act has demonstrated that expansions are associated with a 2.2 percentage points ( $p<0.05$ ) decrease in the perception of unmet need for mental health services among individuals with SPD, and increased the probability of receiving mental health treatment by 1.5 percentage points ( $p<0.01$ ) [24]. The ACA seems to have decreased cost as a barrier to mental health services for young adults, and prior Medicaid expansions demonstrate that expansion can be associated with improved access to mental health services for individuals with SPD. However, the effects of the ACA on the availability (i.e. supply and mix of providers) and accessibility (i.e. proximity and ease of access to providers) of health care for individuals with SPD is unknown. Further, there is very little literature assessing

changes in these dimensions of access among individuals with milder forms of psychological distress.

To contribute to this gap in the literature, the present study identifies three outcomes from the MEPS that may serve as indicators of changes in the availability and accessibility of health care for people with SPD, MMPD, and NPD. First, changes in the underlying need for health care in each of these groups over the timeframe of ACA implementation are assessed in order to understand if this need remains stable or varies in association with the timeframe of ACA implementation. This will provide context to the other outcomes because it provides information regarding whether the populations of interest expect to interact with the health care system. Second, self-reported unmet need for health care is used as an indicator of changes in the availability of health care over the time frame of ACA implementation. Finally, “having a usual place of care” is used as an indicator in changes in the accessibility of health care.

### **Conceptual frameworks**

The Andersen Behavioral Model of Health Services Use has informed the selection of independent variables for the models for this paper [27]. Description of the model can be found in Paper 2. The three components of the Andersen model (predisposing characteristics, enabling resources, and need) not only influence the use of health services, but also the ability to access health services. Individuals may have predisposing characteristics, (such as race or gender), enabling resources (such as health insurance), and a need for health care that will influence their likelihood of accessing care. The model provides a framework by which one can structure and select factors that may influence an individual’s propensity to use health care services. It also provides a framework to select factors that may cause disparities in the ability to access health care, as many predisposing characteristics, enabling resources, and need for health care are related to known disparities in access and quality of health care. Predisposing characteristics,

such as age category, gender, race/ethnicity, and region were selected because an individuals' predisposition to using health care varies based on these qualities. Year indicator, marital status, education, nativity status, insurance status, and poverty level are enabling factors that may prevent or support the use of health care services. Self-reported health status indicates the level of need that an individual may have for care regardless of their ability to access it. Prior to the ACA, individuals with SPD faced difficulties accessing health care due to limitations with the supply of providers[9]. The increased demand for health care resulting from the ACA has the potential to place further pressure on the supply for these individuals and limit access to health care.

## **Data and Methods**

### *Study Design:*

Pooled cross-sections of survey data from years 2011 through 2016 are used for the analysis.

### *Data source:*

Data from the Integrated Public Use Microdata Series (IPUMS) Medical Expenditure Panel Series (MEPS) was extracted and analyzed. MEPS is a nationally representative survey of the US civilian noninstitutionalized population. It collects information on each family member regarding demographics, health condition and status, use of medical services, charges and sources of payment, access to care, satisfaction with care, health insurance coverage, income, and employment. A new panel of households is selected each year and is interviewed five times over the course of two years. Data may be analyzed either longitudinally across 2 years, or cross-sectionally in each year. Outcome variables from this analysis was pulled from the Self-Administered Questionnaire (SAQ) or Access to Care sections of the MEPS survey. Both IPUMs and MEPS have been described in detail in the first paper of this dissertation.

### *Mental health status:*

The Kessler 6 (K6) questionnaire was used to assess mental health status. The K6 has been used in MEPS since 2004 [2] and is administered as part of the SAQ. The K6 has been described in detail in the first paper of this dissertation. For the purposes of this study, individuals will be classified as having SPD if they have a K6 score  $\geq 13$ , mild- to- moderate psychological distress (MMPD) with scores of 12-8 (inclusive), and no psychological distress NPD with a score of 7 or less.

*Sample:*

The population of interest in this study are low-income individuals (income  $\leq 399\%$  of the federal poverty level) between the ages of 27 and 64. Individuals are included in the analytic sample if they are eligible to take the SAQ (SAQELIG) with a positive SAQWEIGHT, are between ages 27 and 64, have a family income between 0-399% of the federal poverty level (FPL), and have a valid response on the K6 variable. This population was selected because the intent of the Medicaid expansions and private insurance exchanges as part of the ACA targeted these individuals, they did not benefit from the dependent care provision, and were too young to be eligible for Medicare without being disabled. As a result of the Medicaid expansion not occurring in every state there will be individuals in the sample who did not benefit from the Medicaid expansions even though they were a target of the original policy. Further details on how the variables for the inclusion criteria are defined can be found in the first paper of this dissertation.

*Outcomes and hypotheses*

There are three primary outcomes in this study – the need for healthcare, the unmet need for healthcare, and having a usual place of care. Changes in the reported need for health care are important to establish that needing healthcare is a necessary precondition for accessing care. Understanding the level of need for healthcare among the population of interest provides context

for the trends in availability and accessibility of health care observed during ACA implementation. For instance, an increase in need for healthcare may increase the demand for health care possibly putting additional pressure on the supply of providers. The unmet need for healthcare is selected as an outcome to understand the within group changes in the availability of healthcare during ACA implementation. Having a usual place of care is selected as an indicator of within group changes in accessibility during the same time frame. Data is available for all outcomes in all years considered for analysis, 2011-2016 inclusive. Each outcome is assessed in each PD group (SPD, MMPD, and NPD) and a sensitivity check is conducted in the full sample to assess the interaction of PD status with year of ACA implementation.

Need for health care: The likelihood of needing health care is assessed in each group of individuals with SPD, MMPD and NPD in each year from 2011 through 2016, while controlling for the covariates listed previously. The question from MEPS selected to assess this asks whether in the last 12 months the respondent had an illness, injury, or condition that needed care right away in a clinic, emergency room, or doctor's office, with Yes/No response options.

*Hypothesis:* I expect that there will be minimal change in reporting the need for healthcare in all groups during the timeframe of ACA implementation because illness should be independent of legislation, except in cases where availability of preventative care may have avoided illness altogether if an individual had been able to access it. It is possible that in some circumstances having insurance allows an individual to seek preventative care, which may reduce a future need for health care. The essential health benefits require preventative care to be covered by insurance, therefore any decreases in the need for health that may be observed in the present study and others could be associated with the addition of the essential health benefits, and other quality-oriented provisions of the ACA.

Unmet need for health care: The likelihood of being unable to access health care when needed is assessed in each group of individuals with SPD, MMPD and NPD in each year from

2011 through 2016, while controlling for the covariates listed. To capture the availability of care and thus the unmet need, the question, “In the past 12 months, were you unable obtain medical care, tests, or treatments you or a doctor believed necessary?” with Yes/No response options is utilized. This question serves as an indicator of the availability of care because it addresses whether the appropriate medical care is available when needed.

*Hypothesis:* If there is an improvement in the availability of healthcare, one would expect that the ability to access health care when needed would increase over the time of ACA implementation. I hypothesize that the availability of care will improve after ACA implementation for all psychological distress groups. I further hypothesize that the magnitude of this improvement will be strong for individuals with NPD but limited for those with MMPD and SPD.

Usual place of care: The likelihood of an individual having a usual place of care is assessed in each year from 2011 through 2016 within each PD group. In MEPS, individuals are asked if they have a usual place of care, defined as a doctor’s office, clinic, health center, or other place a person usually goes if they are sick or need advice about their health with Yes/No response options. This may include the emergency department as a usual place of care. This outcome captures accessibility of care because it indicates that the patient is in proximity to a provider they can see regularly.

*Hypothesis:* Increases in reporting a usual place of care should be observed over the timeframe of ACA implementation if there is an improvement in the accessibility of health care. I expect that there will be improvements in the accessibility of care in each group, but that change magnitude of the change will not be as dramatic in the groups with MMPD or SPD as it is for NPD[28].

*Covariates*

As previously mentioned, the Andersen model informed the selection of covariates for this analysis. Data is available for all covariates in all years considered for analysis. Covariates of primary focus include year indicator, census region, and insurance status. Additional covariates include race/ethnicity, age category, gender, marital status, nativity status, poverty level, and self-reported physical health as reported by the SF-12. Please see Appendix 1 for a detailed description of these covariates.

Year indicator: The year indicator variable is selected as the primary covariate of interest to assess trends over time for each outcome, stratified by psychological distress status, during ACA implementation period, which is defined as 2011-2016, inclusive. A categorical variable indicating the year an individual completed the SAQ was generated to assess this.

Census region: Census region is included in the analysis to account for regional variations in the implementation of the ACA. The four Census regions are (1) the Northeast (used as a reference category in the regression analysis since it is the region with the most states that implemented the ACA to the fullest extent, including expanding Medicaid and creating state based insurance marketplaces), (2) the Midwest, (3) the South (the region that consists of the most states with weak implementation of the ACA, including minimal or no Medicaid expansions and use of federal insurance marketplaces), and (4) the West.

Insurance status: Insurance status is also of interest because insurance type impacts the amount and kind of health care services utilized based on the generosity of benefits and amount of cost sharing. Additionally, a higher proportion of individuals with SPD are covered by Medicaid or uninsured relative to people with NPD[29], therefore their access to health care is mediated differently by insurance status relative to people with NPD. Insurance status includes four categories: private/exchange insurance, Medicare, Medicaid, and uninsured. Insurance status in the MEPS is based on interviewee self-report. Note that the sample may include certain disabled non-elderly adults who can be eligible for Medicare. Insurance status is reported for each

month of the year therefore an individual's insurance status was selected by the insurance status reported in the same month that the SAQ was taken.

Further, the lack of insurance can influence whether a person uses health care services and how frequently they may use those services. Due to these factors, it is important to control for differences in insurance status. However, there are two important concerns that imply that caution should be exercised when including and interpreting health insurance status covariates. First, insurance status does not account for the generosity and quality of benefits, which were significantly altered in many plans as a result of the essential health benefits package. The generosity and quality of benefits vary by plan and can be drastically different within the same broad category of insurance. As a result, this analysis captures the variation in the generosity and quality of benefits that accompanied the insurance expansions associated with the ACA. Second, controlling for changes in insurance status washes away the effects that the ACA insurance expansion has on insurance type and uninsured status. A description of how this is handled is provided in the analysis and model specification section.

#### *Analyses and model specification*

Logistic regression models are used for all outcomes in each PD group (SPD, MMPD, and NPD) and marginal effects are reported. All models are weighted to account for oversampling and non-response using the SAQWEIGHT and adjusted to control for the impact of the sample design (i.e. clustering and stratification) on the estimates of variance and standard errors using the annual primary sampling unit (PSUANN) and the annual stratum for variance estimation (STRATANN). The models were specified using the following equation:

$$\text{Log}(\text{prob ATC}_{ij} / (1 - \text{prob ATC}_{ij})) = \beta_0 + \beta_1 \text{Year indicator}_{ij} + \beta_2 \text{Region}_{ij} + \beta_3 \text{Poverty level}_{ij} + \beta_4 \text{Gender}_{ij} + \beta_5 \text{Age category}_{ij} + \beta_6 \text{Race/ethnicity}_{ij} + \beta_7 \text{Marital Status}_{ij} + \beta_8 \text{Education}_{ij} + \beta_9 \text{Nativity status}_{ij} + \beta_{10} \text{SF-12 Physical health}_{ij} + \beta_{11} \text{Insurance status}_{ij} + e_{ij}$$

\*ATC: Access to care

While this approach captures changes in access to health insurance associated with the provisions of the ACA that improve the quality of insurance benefits, it cannot effectively capture the effects of gains in health insurance or changes in types of health insurance. Therefore, the ability to assess the association between changes in health insurance resulting from the insurance expansion with access to health care is limited for all outcomes due to the endogenous nature of health insurance status. However, removing insurance status as a covariate would confound the results because insurance status does impact how, or if, an individual is able to access health care. Taking all of this into account, a descriptive assessment of the association of the overall effects of the ACA, including the health insurance expansion, is predicted in two scenarios. In the first scenario, the average marginal effects are calculated where the mean values for insurance status in years 2014-2016 vary according to what is observed in the data. This scenario reflects the changes associated with the ACA in 2014, 2015, and 2016 as they occurred (i.e. with the insurance expansion). In the second scenario, the average marginal effects are calculated where the mean values for insurance status in years 2014-2016 are held at the mean values of insurance status in 2013, (i.e. without the insurance expansion). In both scenarios, the original model is run, and the average marginal effects are calculated to provide the predicted proportion of individuals reporting the outcome in each year. This provides a glimpse into the differences in access to care in the presence and absence of the ACA insurance expansions and provides insight into whether the effects of the expansion trend in the same direction as the effects of the improvements in the quality of insurance.

### *Sensitivity checks*

#### *1. The need for health care and self-reported physical health*

The “need for health care” outcome described in the outcomes section is selected as a primary outcome to assess the underlying need for care of the population. This outcome is selected instead of the often used SF-12 Physical Component Score (PCS) [27, 29, 30], because the objective of

the outcome is to assess health status as it relates to the patient's perception of their need for health care. Poor self-reported health status may not necessitate medical intervention, or individuals with poor health may not feel the need to seek out health care. As such, the SF-12 may not be the best measure of individuals need to access health care. However, the SF-12 PCS is included in the primary model as a covariate because it is a good marker of underlying differences in physical health. Since there may be some overlap between the "need for health care" outcome and self-reported health status as reported by the SF-12, two sensitivity checks are conducted to understand if the changes in self-reported health status over time align with the "need for health care" outcome. In the first sensitivity check, self-reported health status is assessed using the PCS as the dependent variable in a linear regression analysis and was therefore removed as a covariate. All other covariates remained the same. The second sensitivity check uses the original "need for health care" outcome and the same covariates as the original model, except that the PCS score is removed from the model entirely. The purpose of this sensitivity check is to determine if controlling for PCS scores impacts the "need for health care" outcome over time.

## *2. Full sample with interaction term*

Stratifying the models by psychological distress group in the main analyses allows for covariates to differ by PD status. Examining within group differences allows for more precise estimation of the marginal effects for each PD group. However, stratifying the model prevents assessment of the differing effects of the time trend on each psychological distress group. Therefore, a model with the full cohort including an interaction term between the time trend variable and PD status for each outcome is run. This model shows the outcomes for the full sample and for each PD group in each year, which provides a view of how the groups may differ when all covariates are held at the means of the full sample. Both logit models and linear probability models without interaction terms are estimated on the full sample first, and the

marginal effects of the logit models are compared to the coefficients of the linear probability models to ascertain if the two methods produce results that are robust across the distinct modelling approaches. Since no major differences between the marginal effects of the logit models and the coefficients of the linear probability models are found, the models with interactions are run as linear probability models and the coefficients are reported for ease of interpretation of the interaction term, following the example of several other analyses of the ACA regarding access to health care [29, 31, 32].

### *3. Reference year*

The reference year was changed to 2013 and reported for some analyses to assess the differences immediately before the ACA insurance expansions to the following years, especially for the outcomes and PD groups that seemed to be observing a distinct trend when comparing each year to 2011.

## **Results and Discussion**

### *Need for health care*

#### *Results*

Demand for health care services is expected to increase with ACA implementation due to improved access to insurance. Increases in demand may be compounded by increases in the overall need for health care during the same time period. Under these circumstances, the availability and accessibility of health care may be restricted by an increased need for health care, in addition to increased demand driven by the ACA. However, this analysis demonstrates the need for health care trends lower in every year relative to 2011 for all PD groups (Table 1). When 2013 is used as a reference year the picture is more mixed. In this situation, individuals with SPD have a higher need for health care in all years relative to 2013 (2011 and 2012 are statistically significant), individuals with MMPD show little change relative to 2013, and individuals with

NPD demonstrate statistically higher probabilities of needing care in 2011 and 2012 relative to 2013, and statistically lower probabilities of needing care in 2014-2016.

The changes relative to 2011 are not statistically significant in the SPD and MMPD groups - apart from 2013 for those with SPD (-6.6 percentage points,  $p < 0.05$ ), and in 2015 for those with MMPD (-5.8 percentage points  $p < 0.05$ ). Among individuals with NPD, the need for health care was lower compared to 2011 in each year from 2013 through 2016, ranging from 3 to 5.3 percentage points lower than 2011 ( $p < 0.01$ ). These results are in line with findings from other studies that assess the need for care among individuals with SPD during the timeframe of ACA implementation. For example, Cohen and Zammitti found that the percentage of adults with SPD reporting that they needed care in the past 12 months decreased from 28.4% in 2012 to 16.7% in the first 9 months of 2015 [29]. While the results of the present study do not demonstrate statistically significant decreases in the need for health care among individuals with SPD, the results trend in the same direction as Cohen and Zammitti, providing support for their findings.

Figure 1 predicts the proportion of people who report needing health care in the presence and absence of the ACA insurance expansions. If the insurance expansions play a significant role in how individuals perceive their need for health care for any reason, a divergence in the need for health care between the scenario where insurance status is maintained at the pre-ACA levels and the scenario where insurance status was allowed to be influenced by the ACA would be observed. After 2013, there is almost no difference between the predictions with and without the ACA insurance expansions, indicating that the proportion of people reporting the need for health care is following a trend that is independent of the ACA. This provides evidence for the assumption that the need for health care should mostly be driven by health status rather than health insurance status.

*Sensitivity check 1: PCS score*

The first sensitivity check seeks to assess if self-reported physical health trends in the same direction as the need for health care are aligned with the results above. In the first sensitivity check, the PCS score is utilized as the dependent variable instead of the need for health care variable and dropped as a covariate from the model. In the SPD group there is a clear trend of improving PCS scores over time (i.e. improving self-reported physical health), which becomes statistically significant in 2016 (relative to 2011). For the MMPD group, PCS scores reach statistical significance and peak in 2014. They remain high in 2015 and 2016 but are not statistically significant. For those with NPD the PCS, scores are significantly higher in 2014 and 2016 relative to 2011 (data not shown, but available upon request). The original model demonstrates that there is a mostly insignificant trend of a decreasing need for health care over time for all PD groups. Similarly, the results of this sensitivity check demonstrate an insignificant trend of improving self-reported physical health.

In a second sensitivity check, the original model is re-run but PCS scores are removed as a covariate from the model to allow the scores to vary in each year. This is conducted to understand if variation in self-reported physical health influences the need for health care. For the MMPD and NPD groups, removing the PCS score from the model and allowing the score to vary does not substantially change the results of the model. Excluding the PCS score from the SPD model does increase the size of the marginal effects in the model, and the marginal effects become statistically significant in 2015 and 2016 (data not shown). This implies that while people with MMPD and NPD are reporting improved physical health, the variation in physical health in these populations does not affect their need for care over time. However, variation in physical health for people with SPD does seem to affect their need for care over time.

### *Discussion*

The present study does not find strong statistical associations between ACA implementation and reduced need for health care in the SPD and MMPD groups. However, the

marginal effects of both groups trend in the same direction as individuals with NPD, where significant decreases in the need for health care in each year relative to 2011 are observed. In 2015, for example, the magnitude of the difference in marginal effects among those with SPD are greater than those with NPD but are not statistically significant, perhaps due to a smaller sample size. This indicates that although there are not statistically significant differences in this group, the marginal effects observed may be economically meaningful.

For those with NPD, there is a notable difference in the size of the marginal effects from 2013 (-3 percentage points,  $p < 0.01$ ) to 2014 (-5.3 percentage points,  $p < 0.01$ ) relative to 2011. This may be an indication that gaining insurance influences those with any level of psychological distress differently from those with NPD. The sensitivity checks further support this idea because they demonstrate that it is possible that for individuals with SPD, the ACA is associated with improved physical health and lower need for health care (when physical health is not controlled for), whereas this association does not exist for the rest of the population. However, in Figure 1 the need for care under the insurance expansions of the ACA does not seem to be differentiated from the need for care without the expansions. Therefore, this work contributes new information to the literature regarding the impacts of the ACA by demonstrating that the ACA insurance expansions are likely not associated with changes in the underlying need for health care, although this may vary by PD group.

While the literature is lacking in research differentiated by PD group regarding the association of health insurance expansions and the need for health care, it does consist of many studies demonstrating improvements in self-reported health status associated with previous Medicaid expansions [33-37] in the general population. However, research specific to the Medicaid expansions associated with the ACA do not find an association with improvements in self-reported health status [29, 30]. While the main outcome of the present study is not self-reported health status, the findings of the sensitivity analysis find that self-reported physical

health *mostly* demonstrates insignificant improvements in each PD group during the time of ACA implementation, which is in alignment with the existing literature regarding the ACA.

There are several other notable results produced by the models in Table 1, regarding the effects of region, insurance status, poverty level, age, and educational status. The likelihood that individuals report that they need care in the past 12 months is not significantly different in any region relative to the Northeast, and this is consistent across PD groups. This presents evidence that regional differences in ACA implementation did not affect the need for healthcare within each PD group when insurance status is held constant. Insurance status is also a significant covariate in the model. Those with MMPD are less likely to report needing care in all insurance status categories relative to private insurance. This finding seems out of place given that individuals in this sample on Medicare are disabled and those with SPD and NPD are more likely to report needing care if they are on Medicaid or Medicare relative to private insurance. Only the marginal effects for those on Medicaid in the NPD group are statistically significant. Those with NPD are also less likely to report needing care if they are uninsured relative to those with private insurance. The reason may be that since the uninsured do not have insurance, they know they will have difficulty accessing care, and therefore do not perceive a need. In addition, poverty level does have a significant association with the need for care in the SPD and MMPD groups, which demonstrates that those with lower incomes are more likely to report needing care in the past 12 months relative to the middle-income group. The only significant difference in the NPD group is a slightly lower likelihood of needing care in the low-income group relative to the middle-income group. Additionally, older age is associated with a lower need for care in all PD groups relative to those between the ages of 27 and 35. This result is counterintuitive given that older age is usually associated with worsening health, however older individuals tend to have lower levels of health literacy relative to younger individuals and therefore may not correctly perceive or understand that they are in need of health care [39]. The results for educational status in each PD group are

not statistically significant, but groups with less than a bachelor's degree report a lower likelihood of needing care than those with a bachelor's degree or more. Kutner, et al. also found that individuals with a lower level of education have lower levels of health literacy, so an effect similar to that observed in the age category may be observed in education as well[39].

In summary, the results of this analysis demonstrate a decline in the perceived need for health care over the study period, which is significantly associated with year in the NPD group, but generally not significant in the SPD and MMPD groups. This decline does not appear to be associated with the ACA insurance expansion for any group. There are strong associations between the need for health care and age, gender, and nativity status, but not with region or educational status. Lower income is strongly associated with a higher need for health care in the SPD and MMPD groups, but it is not for those with NPD. Race demonstrates similar effects.

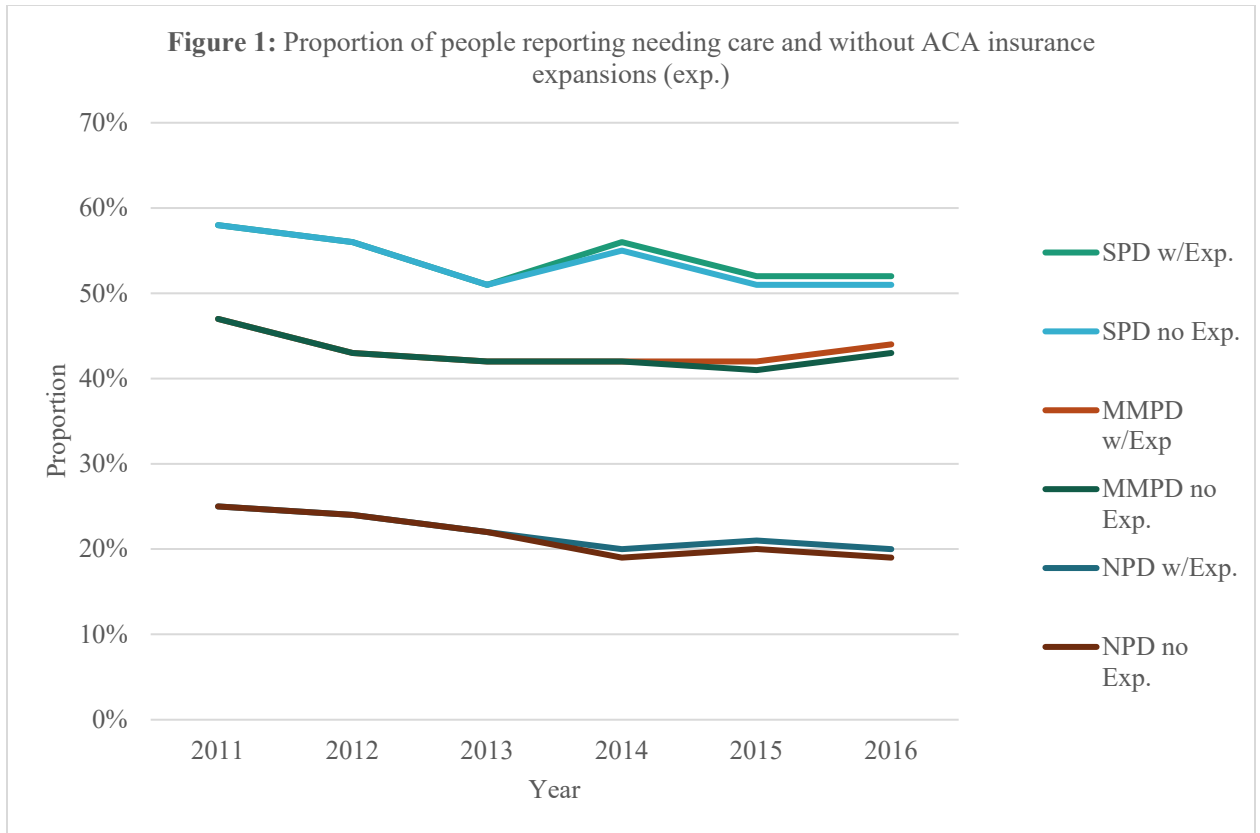
**Table 1: Report needing care in the past 12 months**

Variable, ME (SE)		SPD N = 3,746	MMPD N = 5,458	NPD N = 44,737
<b>Year</b>				
	2011	ref	ref	Ref
	2012	-0.010 (0.032)	-0.025 (0.024)	-0.014 (0.010)
	2013	-0.066** (0.031)	-0.034 (0.028)	-0.030*** (0.009)
	2014	-0.028 (0.034)	-0.035 (0.030)	-0.053*** (0.010)
	2015	-0.058 (0.035)	-0.058** (0.028)	-0.048*** (0.009)
	2016	-0.043 (0.038)	-0.032 (0.030)	-0.049*** (0.010)
<b>Region</b>				
	Northeast	ref	ref	Ref
	Midwest	0.025 (0.038)	0.012 (0.027)	0.007 (0.010)
	South	0.012 (0.034)	0.005 (0.024)	-0.003 (0.010)
	West	-0.029 (0.036)	-0.016 (0.025)	-0.001 (0.009)
<b>Poverty level</b>				
	Middle income (200-399% FPL)	Ref	ref	ref
	Low income (139-199% FPL)	0.060* (0.031)	0.061** (0.026)	-0.014* (0.008)
	Near poor (100-138% FPL)	0.064** (0.031)	0.008 (0.030)	0.006 (0.009)
	Poor (less than 100% FPL)	0.026 (0.027)	0.054** (0.023)	0.005 (0.008)
<b>Gender</b>				
	Male	ref	Ref	ref
	Female	0.064*** (0.022)	0.059*** (0.017)	0.045*** (0.006)
<b>Age</b>				
	27-34	ref	ref	ref
	35-44	-0.038 (0.030)	-0.037 (0.024)	-0.020*** (0.007)
	45-54	-0.024 (0.032)	-0.057** (0.025)	-0.036*** (0.008)
	55-64	-0.102*** (0.034)	-0.083*** (0.029)	-0.045*** (0.008)

<b>Race/Ethnicity</b>				
	White, non-Hispanic	ref	ref	Ref
	Black, non-Hispanic	0.057** (0.027)	0.021 (0.024)	0.006 (0.008)
	Hispanic	0.033 (0.025)	0.075*** (0.028)	-0.001 (0.008)
	Other race/ethnicity	0.053 (0.052)	-0.009 (0.044)	-0.022** (0.011)
<b>Marital status</b>				
	Married	ref	ref	Ref
	Widowed	-0.037 (0.054)	0.057 (0.049)	0.014 (0.019)
	Divorced	0.042 (0.028)	0.064*** (0.023)	0.018** (0.007)
	Separated	0.061 (0.050)	0.047 (0.032)	0.024 (0.016)
	Never married	-0.031 (0.027)	-0.034* (0.020)	-0.009 (0.008)
<b>Education</b>				
	Bachelor's degree or more	ref	Ref	Ref
	Some college, no bachelor's	-0.006 (0.036)	0.017 (0.027)	0.023*** (0.008)
	High school	-0.039 (0.033)	-0.013 (0.027)	-0.003 (0.008)
	Less than high school	-0.041 (0.037)	-0.014 (0.026)	-0.010 (0.009)
<b>Nativity status</b>				
	Born in US	ref	ref	ref
	Not Born US	-0.078** (0.032)	-0.120*** (0.026)	-0.042*** (0.008)
<b>SF-12 physical health, mean (SD)</b>		-0.008*** (0.001)	-0.008*** (0.001)	-0.009*** (0.000)
<b>Insurance status</b>				
	Private/Exchange	ref	ref	ref
	Medicaid/other public	0.022 (0.031)	-0.045* (0.025)	0.021** (0.009)
	Medicare	0.064 (0.040)	-0.056* (0.032)	0.017 (0.016)
	Uninsured	-0.021 (0.030)	-0.097*** (0.023)	-0.063*** (0.007)

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\*\*\* p<0.01, \*\* p<0.05, \* p<0.1



### *Inability to get health care when needed*

#### *Results*

The likelihood of being unable to get health care when needed for individuals with SPD and MMPD increases in all years relative to 2011, and seems to spike in certain years around the time the ACA is fully implemented (Table 2). The marginal effects for people with SPD are statistically significant in 2013 (5.8 percentage points,  $p < 0.05$ ) and 2015 (5.1 percentage points,  $p < 0.1$ ) relative to 2011. When 2013 is used as the reference year, there are no statistically significant differences in any year except 2011. Individuals with MMPD also report statistically significant marginal effects in 2013 (2.6 percentage points,  $p < 0.1$ ) and 2014, but when 2013 is used as the reference year there are no statistically significant differences from 2014-2016. (3.3 percentage points,  $p < 0.05$ ). Those with NPD report almost no difference in the ability to get health care when needed over the years except in 2016, where they are 0.7 percentage points less likely to be unable to get health care when needed compared to 2011. When 2013 is used as the reference there are no statistically significant differences.

Figure 2 displays the proportion of people unable to get health care when needed, with and without the ACA insurance expansions. The SPD group experiences a spike in 2013, a decline in 2014, an increase in 2015, and finally a decline in 2016. This pattern occurs in both scenarios, and although statistical significance between the two scenarios was not tested, a lower proportion of individuals report being unable to get health care in the presence of the insurance expansions than in the absence of the expansions. The trends for those with MMPD are similar, but the separation between the two scenarios seems to happen sooner than it does in the SPD group. Similar to the logistic regression model in Table 2, Figure 2 shows that there is almost no difference in the ability to access care over time for the NPD group.

The inability to get care when needed did not vary by region for any PD group.

Individuals with SPD and who were categorized as “low-income” or “poor” have a significantly increased likelihood of being unable to get care when needed, as do the “near-poor” and “poor” individuals with MMPD. The “near-poor” individuals among those with NPD are the only poverty level in this group that reports a significantly higher probability of being unable to get care.

Insurance status also has a significant effect on the inability of each PD group to get care when needed. All uninsured individuals are significantly more likely to report being unable to get care when needed compared to privately insured individuals. However, those uninsured with NPD report a 6-percentage point higher probability of being unable to get care when needed relative to those with private insurance, whereas those uninsured with SPD report a 22-percentage point higher probability of being unable to get needed care relative to those with private insurance - an effect nearly four times larger than those with NPD. Individuals with SPD who are on Medicaid also report that they are significantly more likely to be unable to get care when needed compared to those with private insurance.

### *Discussion*

The significant change in the inability to get health care when needed for the SPD and MMPD groups is not necessarily expected. Both groups observe a significant increase in the inability to get health care when needed in 2013 relative to 2011. Given that most of the major provisions of the ACA came into effect in 2014, a spike in the inability to access health care when needed in 2013 is surprising. A possible explanation for this spike is that some of the effects of the earlier provisions of the ACA are observed in 2013. The provisions of the ACA that came into effect in 2013 include increased Medicaid payments to primary care doctors, and required coverage of preventative services by Medicaid programs [40]. These provisions may have led to a burst of increased demand in 2013 among individuals with SPD and MMPD

because a significant proportion of these individuals are covered by Medicaid. The increased demand may have temporarily decreased availability of providers in health care systems because this increase was unexpected, thereby increasing unmet need. Health care systems planned to increase their capacity in 2014 when the insurance expansions took effect, rather than in 2013. Increased capacity should have led to reductions in the inability to get care when needed for all PD groups, despite increased demand resulting from the insurance expansions. However, in 2015 the SPD group observes an increased probability of being unable to get care when needed. It is possible that this significant increase is observed for people with SPD because Medicaid enrollment for those with SPD significantly increased in 2015 (results of paper 1), and utilization of certain types of care (ED and outpatient/office-based visits) increased in 2015 in this group as well (results of paper 2). As a result, the availability of care was limited in 2015 due to increased demand and insufficient supply of services required by people with SPD. However, in a sensitivity check using 2013 as the reference year there are almost no differences in the marginal effects between 2013 and 2015. However, in 2014 and 2016 there is a lower, statistically insignificant, probability of being unable to get care when needed compared to 2013. These data seem indicate that there are similarities between 2013 and 2015, perhaps due to restrictions in the availability of health care, albeit for different reasons.

Individuals in the present study who are covered by Medicaid have significantly greater difficulties accessing care when needed relative to those with private insurance. This aligns with prior research that demonstrates that the Medicaid expansions are associated with delays in access to health care [19, 29, 30, 32]. This is likely a result of the limited supply of Medicaid providers, but also of the low levels of reimbursement to these providers. Further, individuals with SPD covered by Medicaid may have greater difficulty accessing care when needed due to unobserved differences in overall health status between those individuals with private insurance and

Medicaid. Additionally, although health status is controlled for using the SF-12 PCS in the model, there may be health related factors that the PCS does not capture in play.

The main results of this analysis indicate that the implementation of the ACA may have temporarily worsened the availability and accessibility of care for individuals with SPD and MMPD. However, Figure 2 implies that it is possible that availability and accessibility of health care for these individuals was worsening prior to the ACA, and that the ACA may have lessened the impact of an ongoing trend. This warrants further investigation. In the event that the ACA did temporarily worsen the availability and accessibility of care, it is possible that this could be related to demand-side issues where consumer expectations about the availability of care changed due to the ACA, or supply-side issues where providers are unable to meet the initial increase in demand for services as the full provisions began to take effect until, they had sufficient time to scale up capacity. This is especially true for mental health and primary care services which were under-resourced to begin with, and which may be contributing to the significant marginal effects in the SPD group. This point is important because it indicates that the ACA impacted individuals with SPD differently than those with NPD. Literature specifically addressing the association of the ACA with access to health care when needed for individuals with SPD is not available, so this finding is novel. The existing literature assessing the impacts of the ACA on the inability to get health care when needed for the general population aligns with the findings for the present analysis for individuals with NPD, which finds that the ACA is not associated with any changes in being unable to get care when needed[19].

Literature assessing changes in access to care after ACA implementation reveals that several similar indicators of access to health care worsened in Medicaid populations, which tend to have high proportions of individuals with SPD. Increased enrollment in Medicaid after the ACA resulted in delays in accessing care [19]. Miller et al. compare differences in barriers to access between states that expand Medicaid and those that do not. They find that in states that

expand Medicaid, the first year of expansion is associated with a significant increase in delaying medical care. This is because in expansion states relative to non-expansion states, a patient was unable to see a doctor soon enough or had to wait too long to see a doctor in the office, before and after the expansion. This difference persisted in the second year after implementation [30]. Selden et al. find that all low-income individuals report delays in getting an appointment and long wait times to see a doctor after ACA implementation. These delays are worse for individuals living in Medicaid expansion states relative to non-expansion states [32]. Additionally, both studies find that there are significant increases in reporting that appointment wait time is too long [29, 32]. The SPD population relies more heavily on Medicaid than those without SPD, and although the literature assessing the Medicaid expansions does not specifically address access barriers for individuals with SPD, it is aligned with the findings of this study for individuals with SPD. The results presented in Table 1 and Figure 2, in conjunction with the results of the available literature, provide evidence that supports the idea that the availability of health care was strained during ACA implementation, at least for the first few years. This occurs despite the declining trend in the need for health care across all PD groups.

The results of the need for health care analysis bare some resemblance to the present one. Neither analysis finds an association between region and the outcome. Income seems to be associated with both outcomes and the effects are more consistent across income levels in the SPD and MMPD groups than the NPD group. Gender shows strong associations with both outcomes in all PD groups, except in individuals with MMPD and the inability to get care when needed. Additionally, there is a higher proportion of individuals with SPD or MMPD reporting they need health care or are unable to get health care than individuals with NPD. There are several differences as well. Age is strongly associated with the need for health care but does not seem to be associated with the inability to get health care when needed. Overall, educational status does not seem to be associated with the need for health care in any group, but it does have

strong associations with the inability to get health care for those with MMPD. Finally, minorities report having a lower probability of being unable to get care when needed in the SPD and NPD groups, and report a higher need for health care, but the strength of this association is not strong in every race/ethnic group.

**Table 2: Unable to access care when needed**

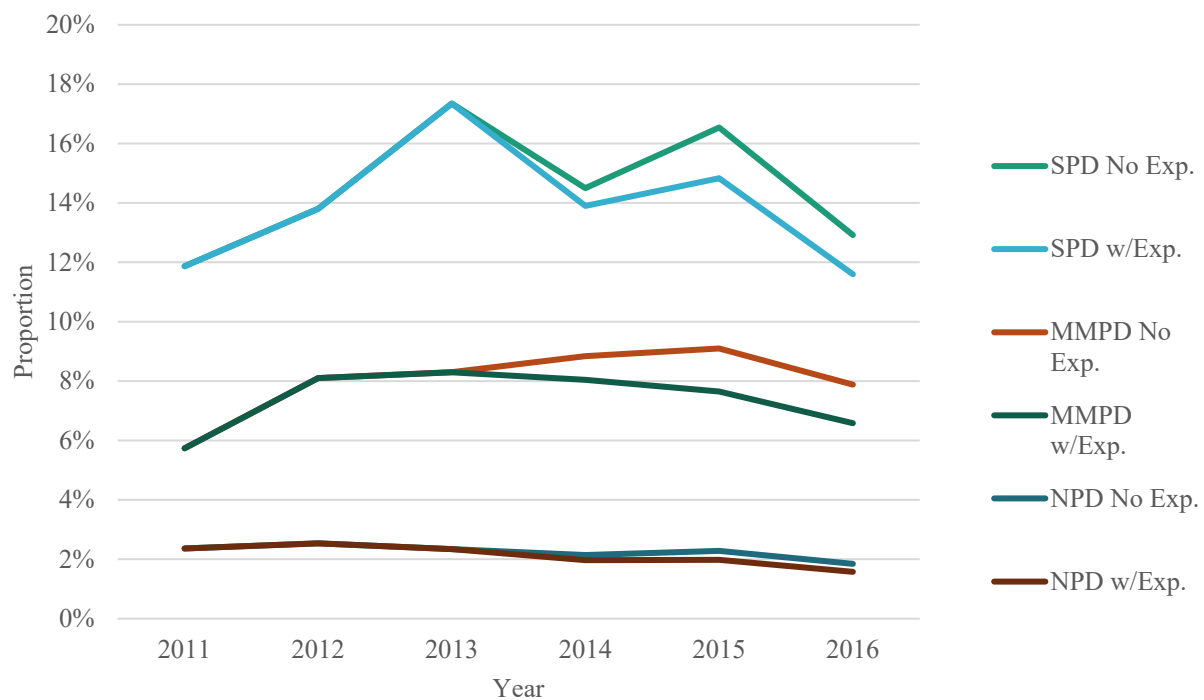
Variable, ME (SE)		SPD N = 3,892	MMPD N = 5,666	NPD N = 45,937
<b>Year</b>				
	2011	ref	ref	Ref
	2012	0.020 (0.018)	0.024 (0.015)	0.002 (0.004)
	2013	0.058** (0.026)	0.026* (0.014)	-0.001 (0.004)
	2014	0.027 (0.024)	0.033** (0.016)	-0.003 (0.004)
	2015	0.051* (0.028)	0.029 (0.018)	-0.001 (0.004)
	2016	0.024 (0.028)	0.017 (0.015)	-0.007* (0.004)
<b>Region</b>				
	Northeast	ref	ref	ref
	Midwest	-0.026 (0.023)	0.008 (0.022)	-0.007 (0.005)
	South	-0.001 (0.026)	0.004 (0.020)	-0.003 (0.005)
	West	0.009 (0.027)	0.008 (0.020)	0.001 (0.006)
<b>Poverty level</b>				
	Middle income (200-399% FPL)	ref	ref	ref
	Low income (139-199% FPL)	0.045* (0.027)	0.011 (0.013)	0.004 (0.003)
	Near poor (100-138% FPL)	0.008 (0.023)	0.036** (0.017)	0.011*** (0.004)
	Poor (less than 100% FPL)	0.033* (0.020)	0.032*** (0.012)	0.004 (0.004)
<b>Gender</b>				
	Male	ref	ref	Ref
	Female	0.024* (0.014)	-0.001 (0.009)	0.007*** (0.002)
<b>Age</b>				
	27-34	ref	Ref	ref
	35-44	-0.011 (0.025)	0.003 (0.016)	0.006* (0.004)
	45-54	0.012 (0.026)	0.028** (0.013)	0.007** (0.003)
	55-64	-0.016 (0.026)	0.011 (0.018)	0.002 (0.004)

<b>Race/Ethnicity</b>			
White, non-Hispanic	ref	ref	Ref
Black, non-Hispanic	-0.067*** (0.018)	-0.015 (0.011)	-0.010*** (0.003)
Hispanic	-0.086*** (0.019)	-0.017 (0.015)	-0.014*** (0.003)
Other race/ethnicity	-0.033 (0.031)	-0.003 (0.017)	-0.001 (0.005)
<b>Marital status</b>			
Married	ref	ref	ref
Widowed	0.034 (0.034)	0.047** (0.024)	0.014* (0.007)
Divorced	0.074*** (0.018)	0.049*** (0.014)	0.017*** (0.004)
Separated	-0.008 (0.025)	0.020 (0.019)	0.009* (0.005)
Never married	0.042** (0.021)	0.024* (0.012)	0.003 (0.003)
<b>Education</b>			
Bachelor's degree or more	ref	ref	ref
Some college, no bachelor's	0.017 (0.028)	-0.035* (0.019)	-0.002 (0.004)
High school	-0.012 (0.026)	-0.049*** (0.017)	-0.005 (0.004)
Less than high school	-0.008 (0.027)	-0.063*** (0.022)	-0.007* (0.004)
<b>Nativity status</b>			
Born in US	ref	ref	ref
Not Born US	-0.012 (0.026)	0.004 (0.017)	-0.011*** (0.004)
<b>SF-12 physical health, mean (SD)</b>	-0.003*** (0.001)	-0.002*** (0.000)	-0.001*** (0.000)
<b>Insurance status</b>			
Private/Exchange	ref	ref	ref
Medicaid/other public	0.045** (0.020)	0.017 (0.011)	0.010*** (0.003)
Medicare	0.012 (0.024)	-0.012 (0.013)	0.011** (0.005)
Uninsured	0.227*** (0.026)	0.140*** (0.018)	0.060*** (0.004)

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\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Figure 2:** Proportion of people reporting being unable to access care when needed with and without ACA insurance expansions (exp.)



### *No usual place of care*

#### *Results*

Among individuals with SPD there is a statistically significant higher probability of not having a usual place of care in 2012 (4.2 percentage points,  $p < 0.1$ ) and 2013 (8.1 percentage points,  $p < 0.01$ ) relative to 2011, but the trend reverses in 2014 (3 percentage points, NS) and is not statistically different thereafter (Table 3). The magnitude of the marginal effects for those with SPD in 2015 is not statistically significant but is greater than the magnitude of the effects for those with MMPD, which demonstrate statistically significant effects, indicating that these effects may be practically significant for individuals with SPD. For those with MMPD, there is a significantly higher likelihood of not having a usual place of care in all years except 2014 (1.3 percentage points, NS), relative to 2011. For those with NPD, there is a significantly higher probability of not having a usual place of care in 2012 and 2015 relative to 2011. When 2013 is used as a reference year in sensitivity checks, in the MMPD (2.3 percentage points,  $p < 0.01$ ) and SPD groups, all years demonstrate a lower likelihood of not having a usual place of care relative to 2013. The NPD group demonstrates almost no differences from 2013 in each year except for 2015 (2.6 percentage points,  $p < 0.05$ ), relative to 2011. Overall, reporting having a usual place of care fluctuates over time within each PD or across PD groups. The exception being the SPD group, where it seems that individuals with SPD were increasingly more likely to not to have a usual place of care up until 2014 when the trend is no longer statistically significant.

Figure 3 shows the proportion of people reporting that they do not have a usual place of care in the presence and absence of the ACA insurance expansions. It seems that the insurance expansions may be associated with a slowing upward trend of not having a usual place of care among the MMPD and NPD groups. For those with SPD, Figure 3 indicates that regardless of ACA implementation, a lower proportion of individuals are reporting not having a usual place of care, and that the ACA magnifies those improvements. Therefore, it is possible that the reversal

of the trend described in Table 3 after ACA implementation may be independent of the ACA. However, the statistical precision of Figure 3 is limited and must be viewed cautiously.

There is not strong evidence demonstrating a regional effect on the likelihood of not having a usual place of care among those with SPD, however for those with MMPD and NPD the South and the West are significantly more likely to report not having a usual place of care relative to the Northeast. This indicates that where an individual with SPD lives may not influence their probability of having a usual place of care and may be connected to the fact that the need for care in this group does not demonstrate regional variations as well (Table 1). This may imply that those with SPD may be less sensitive to the regional differences in implementation of the ACA or in the provision of health care services generally, whereas those with MMPD and NPD may be more sensitive. It is also possible that the Southern and Western regions may have struggled to accommodate the newly uninsured, although Table 2 does not indicate that individuals experience greater difficulties accessing care when needed in those regions relative to the Northeast.

Income level does not seem to have a significant effect on the likelihood of having a usual place of care for those with SPD and MMPD, but it does have a significant effect for those with NPD. Middle income individuals with NPD are less likely to lack the usual source of care compared to “low-income”, “poor”, or “near-poor” individuals. Insurance status does have an association with not having a usual place of care for all PD groups. In each PD group, individuals with Medicare report that they have a lower probability of not having a usual place of care relative to those with private insurance, and the uninsured have a higher probability of not having a usual place of care. It is possible that individuals on Medicare have a lower probability of not having a usual place of care because Medicare is widely accepted by providers. Furthermore, individuals on Medicare in this sample are almost certainly disabled given the inclusion criteria. Therefore, it is likely the SF-12 has not adequately controlled for differences in health status and some of these differences are being observed in the insurance variable. Those on Medicaid report

no difference in having a usual place of care relative to those with private insurance. Notably, among the uninsured, the marginal effects for the probability of not having a usual place of care are similar in all PD groups.

Table 4 displays the top five reasons for not having a usual place of care. These reasons are consistent across PD groups, however the percentage of people reporting each reason varies by PD group. For example, the top reason for not having a usual place of care for the MMPD and NPD groups is that they have not needed care, but only 37.5% of those with MMPD report this, whereas 59% of those with NPD give the same reason. Not needing care was the number two reason for not having a usual place of care among individuals with SPD (25.3%), and the top reason in this group was not having health insurance (28%). Cost of care was the number three reason in all groups for not having a usual place of care, but the percentage of people responding with this reason in the SPD and MMPD groups is more than twice that of the NPD group.

### *Discussion*

Assessment of a usual place of care is a common measure of access to health care, especially in the literature regarding the ACA. The literature regarding the ACA's impact on having a usual place of care tends to assess all low-income individuals and compares changes in Medicaid expansion states relative to non-expansion states, including individuals who may have fallen into the "coverage gap" in non-Medicaid expansion states. The "coverage-gap" consists of individuals that live in non-Medicaid expansion states and are between 100 and 138% of the federal poverty level. These individuals have incomes that are too high for Medicaid in the non-expansion states but do not qualify for subsidies in the marketplaces, and therefore do not have affordable options for health insurance coverage[41]. The present study contributes new information to the literature because the question of having a usual place of care is stratified by

PD group, and projects trends in not having a usual place of care with and without the ACA insurance expansions. It is difficult to compare the existing literature to the results of this study because the objectives and study populations are significantly different. However, the existing literature shows that low income populations tend to report small improvements in having a usual place of care after the ACA relative to before the ACA, and that Medicaid expansion states see greater improvements than non-expansion states [19, 32]. Selden et al. used the National Health Interview Survey to assess changes in reporting a usual place of care in the general population of working age adults between 19 and 64 years old with incomes from 100-138% FPL between 2008 and 2015. In non-expansion states, this is the income and age group that fell into the “coverage gap”. They found that there were large increases in having a usual place of care between the baseline period (2008-2013) and post-ACA implementation (2015). Although these increases were larger in Medicaid expansion states, they were not significantly different from non-expansion states[32]. While Selden, et al. studies individuals in the “coverage gap”, the present study assesses a broader income distribution. Selden demonstrates that the ACA improves access to a usual place of care in the income distribution that the Medicaid expansions are targeted, but Table 3 indicates that in a broader distribution of incomes there is not a strong association with not having a usual place of care, regardless of PD status. Despite this, Figure 3 demonstrates that the aggregate effect of the ACA may have improved access to a usual place of care for all PD groups relative to the scenario where the ACA insurance expansions are not enacted, supporting Selden’s results.

The fact that cost is still being reported as a top barrier to accessing a usual place of care in Table 4, despite the implementation of the ACA, aligns with the findings of Novak, et al. Novak assessed changes in access to health care for individuals with SPD during the time of ACA implementation. Overall, there was improved access to health care among people with SPD but a significant proportion (20%) still report cost of care as a primary barrier to access [28].

Factors that are associated with access to care for each PD group vary by dimension of access. Income is associated with the inability to get care when needed (availability) in all PD groups, but it is only associated with having a usual place of care (accessibility) for individuals with NPD. Region is not associated with the availability of care but is associated with the accessibility of care for all PD groups except those with SPD. Gender is strongly associated with availability of care for those with SPD and NPD but is strongly associated with accessibility of care in all PD groups. Age and race/ethnicity demonstrate few associations with availability of health care but are strongly associated with accessibility of health care for most PD groups. Finally, education is associated with availability of care for those with MMPD and is strongly associated with accessibility of care for those with SPD.

*Sensitivity check 2: Interaction terms with full sample (Appendix 2)*

Models for all three outcomes were run on the full sample to test for the interaction between SPD status and year indicator. The intention of these models is to determine if there are significant differences in outcomes between PD groups in each year after ACA implementation relative to 2011.

The full sample is significantly less likely to need care in the past 12 months in 2013-2016 relative to 2011 (2013: -3 percentage points,  $p<0.01$ ; 2014: -5.3 percentage points,  $p<0.01$ ; 2015: -4.8 percentage points,  $p<0.01$ ; 2016: -4.8 percentage points,  $p<0.01$ ). These effects are like those observed in the stratified analysis of the NPD group. Once PD status has interacted with the time trend variable, there is no statistically significant difference between the SPD and MMPD groups relative to the NPD group in the need for care over the years relative to 2011 (maximum percentage point difference is in 2013 where individuals with SPD are 4.2 percentage points less likely to need care relative to those with NPD). In the stratified analysis there is no significant change in reporting the need for care over time in the SPD and MMPD groups, but there is in the NPD group. It is possible that the effects in the full cohort and with the interaction

term are a result of greater precision resulting from larger sample size. When the analysis is stratified by PD group (Table 1) the effects in the SPD and MMPD group trend in the same direction as the NPD group but are not consistently statistically significant. With the larger sample size in the full cohort it is possible to see that there is no statistically significant difference between the PD groups over time.

There are no statistically significant changes in the ability to access care when needed over the 2011-2016 timeframe in the full cohort. In the stratified analysis (Table 2), the SPD and MMPD groups are more likely to report being unable to get care when needed in all years relative to 2011, although this is not always statistically significant. When PD status is interacted with the year indicator variable, people with SPD and MMPD are significantly more likely to report being unable to get care when needed compared to those with NPD in 2013 (SPD: 6.1 percentage points,  $p<0.01$ ; MMPD: 2.7 percentage points,  $p<0.01$ ) relative to 2011. This carries through to 2014 for those with MMPD (2.8 percentage points,  $p<0.1$ ). Otherwise there is no statistically significant change in the ability to get care when needed over the years, and no difference between psychological distress groups. This is similar to the effects of the time trend observed when each PD group is observed separately in Table 2. Despite the inconsistency of the statistical significance of the results, the data does trend in the direction that implies that it is more difficult for those with any level of psychological distress to receive needed health care compared to those with NPD in each year relative to 2011. In fact, the coefficients in the interaction term for the MMPD and SPD groups in all years are significantly larger than the coefficients for the year indicator variable in the full sample, and it is possible they are not significant due to smaller sample size of the SPD and MMPD groups.

The full sample is significantly more likely to not have a usual place of care in 2012 (2.4 percentage points,  $p<0.01$ ), 2014 (2 percentage points,  $p<0.1$ ), and 2015 (2.6 percentage points,  $p<0.05$ ) relative to 2011. When the year indicator is interacted with PD status, the SPD group is

7.6 percentage points more likely to not have a usual place of care in 2013 compared to 2011 relative to the NPD group, a statistically significant difference ( $p < 0.01$ ). Relative to 2011, the coefficients of the interaction term start to go down in 2014 (1.9 percentage points, NS) and become negative in 2015 (-2.4 percentage points, NS) before coming back up in 2016 (2.5 percentage points, NS), but none of these coefficients are statistically significant. This indicates that overall, people with SPD had more difficulty accessing, or less need for, a usual place of care relative to those with NPD prior to the ACA. Once the ACA was fully implemented, they seemed to have improved access to usual place of care relative to those with NPD for a few years. The MMPD group follows a similar trend but the coefficients are not as large as the SPD group and none are statistically significant.

These results confirm what is suggested in the stratified analyses, that despite the lack of statistical significance, the direction of the coefficients suggest that individuals with psychological distress seem to have more difficulty accessing health care than individuals with NPD.

**Table 3: No usual place of care**

Variable, ME (SE)		SPD N = 3,871	MMPD N = 5,628	NPD N = 45,450
<b>Year</b>				
	2011	ref	ref	Ref
	2012	0.042* (0.024)	0.034* (0.020)	0.023*** (0.009)
	2013	0.081*** (0.025)	0.044** (0.020)	0.010 (0.010)
	2014	0.031 (0.025)	0.013 (0.021)	0.018* (0.010)
	2015	-0.003 (0.024)	0.037* (0.021)	0.026** (0.011)
	2016	0.042 (0.027)	0.051** (0.022)	0.016 (0.011)
<b>Region</b>				
	Northeast	ref	ref	ref
	Midwest	0.027 (0.031)	-0.005 (0.018)	0.006 (0.016)
	South	0.024 (0.030)	0.064*** (0.017)	0.090*** (0.013)
	West	0.038 (0.032)	0.061*** (0.023)	0.047*** (0.013)
<b>Poverty level</b>				
	Middle income (200-399% FPL)	ref	Ref	Ref
	Low income (139-199% FPL)	-0.028 (0.023)	0.016 (0.020)	0.024*** (0.008)
	Near poor (100-138% FPL)	-0.004 (0.022)	0.040 (0.025)	0.032*** (0.010)
	Poor (less than 100% FPL)	0.006 (0.021)	0.030 (0.019)	0.032*** (0.009)
<b>Gender</b>				
	Male	ref	ref	ref
	Female	-0.036** (0.017)	-0.087*** (0.013)	-0.113*** (0.005)
<b>Age</b>				
	27-34	ref	Ref	ref
	35-44	-0.026 (0.029)	-0.043** (0.021)	-0.076*** (0.008)
	45-54	-0.125*** (0.028)	-0.095*** (0.023)	-0.128*** (0.009)
	55-64	-0.162*** (0.026)	-0.120*** (0.021)	-0.184*** (0.009)

**Race/Ethnicity**

White, non-Hispanic	ref	ref	ref
Black, non-Hispanic	0.011 (0.020)	0.005 (0.018)	0.001 (0.010)
Hispanic	0.004 (0.023)	0.032* (0.018)	0.018* (0.011)
Other race/ethnicity	0.038 (0.044)	-0.011 (0.023)	0.020 (0.019)

**Marital status**

Married	ref	ref	ref
Widowed	-0.046 (0.037)	0.048 (0.041)	0.037 (0.023)
Divorced	-0.003 (0.022)	0.023 (0.018)	0.040*** (0.009)
Separated	0.025 (0.032)	0.069** (0.028)	0.056*** (0.015)
Never married	0.058*** (0.021)	0.066*** (0.017)	0.071*** (0.008)

**Education**

Bachelor's degree or more	ref	ref	ref
Some college, no bachelor's	0.016 (0.026)	-0.048** (0.020)	-0.005 (0.008)
High school	0.044* (0.024)	0.004 (0.022)	0.020*** (0.008)
Less than high school	0.044* (0.027)	0.001 (0.023)	0.015 (0.011)

**Nativity status**

Born in US	ref	ref	ref
Not Born US	0.025 (0.024)	0.051** (0.020)	0.046*** (0.012)

**SF-12 physical health, mean (SD)**

0.001* (0.001)	0.003*** (0.001)	0.005*** (0.000)
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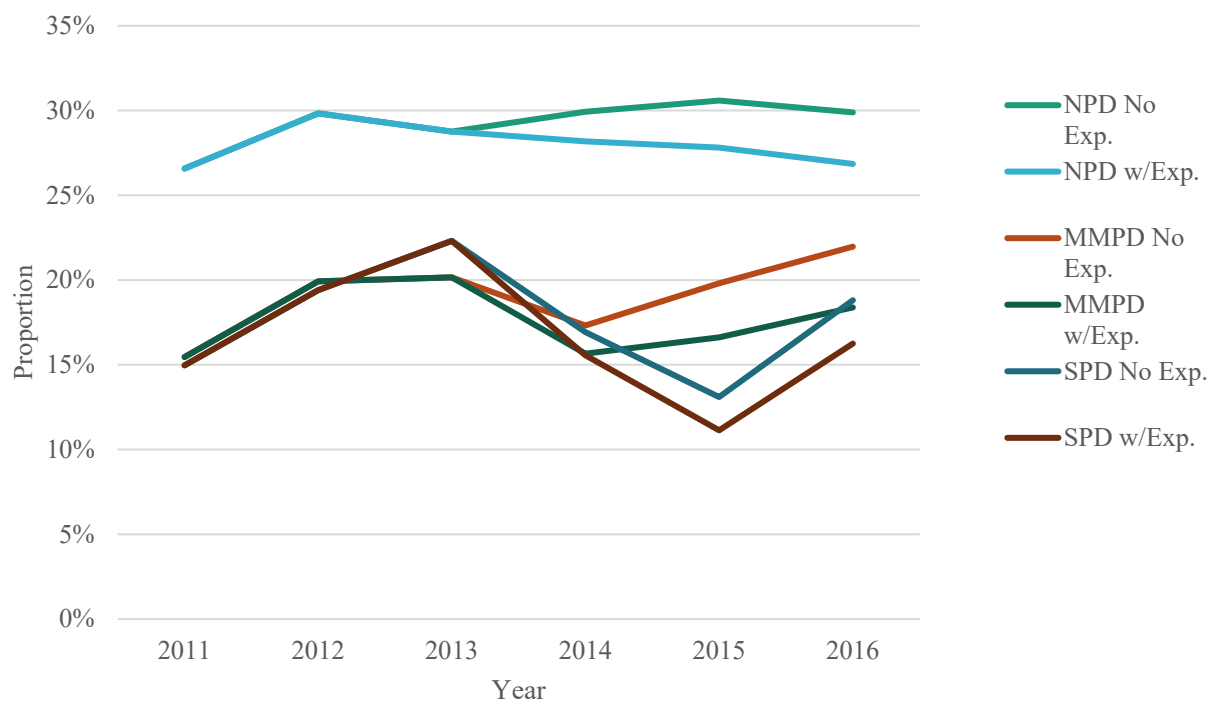
**Insurance status**

Private/Exchange	ref	Ref	ref
Medicaid/other public	0.003 (0.024)	-0.013 (0.016)	-0.005 (0.010)
Medicare	-0.064*** (0.023)	-0.050** (0.022)	-0.088*** (0.017)
Uninsured	0.256*** (0.029)	0.224*** (0.022)	0.250*** (0.011)

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\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Figure 3:** Proportion of people reporting not having a usual place of care with and without ACA insurance expansions (exp.)



**Table 4: Top 5 reasons for not having a usual place of care by SPD status (cumulative, 2011 to 2016)**

<b>SPD</b> <b>N= 829</b>	<b>%</b>	<b>MMPD</b> <b>N=1,364</b>	<b>%</b>	<b>NPD</b> <b>N=15,604</b>	<b>%</b>
No health insurance	27.99%	Hasn't needed care	37.5%	Hasn't needed care	59%
Hasn't needed care	25.3%	No health insurance	22.7%	No health insurance	17.3%
Cost of care	13.59%	Cost of care	13.6%	Cost of care	6.3%
Goes different places for different needs	6.06%	Goes different places for different needs	5.5%	Recently moved to the area	3.7%
Don't know where to go	5.15%	Recently moved to the area	4.8%	Don't use doctors/I treat myself	2.8%

*Limitations*

There are several limitations to this study. First, smaller sample size in the SPD and MMPD groups may have limited the precision of the estimates in some of the stratified analyses, producing results lacking statistical significance. Second, the endogeneity of health insurance status is an obstacle that is difficult to overcome. To pull apart the endogeneity of health insurance the model is estimated in two situations, one where health insurance status is allowed to vary over time, and one where it is held constant at the mean level observed in 2013. In an ideal scenario, it would have been possible to identify an appropriate control group to assess the impacts of the ACA on individuals with SPD, but given limitations of the data (i.e. small sample sizes and lack of state-level geographic identifiers) I was unable to do so. Sample size and restricted availability of geographic indicators (such as states) are also limitations of this analysis. The lack of geographic indicators prevented an assessment of barriers to access in Medicaid expansion states compared to non-expansion states. The results presented in this study are the aggregate effects of the ACA as it was implemented in a politicized environment and may dilute the impact that Medicaid expansions may have had on access to health care if the ACA had been fully implemented on a national level. Additionally, for the access to care supplement question

(usual place of care), one respondent answers for the whole household and may not be able to accurately report certain types of information for all members of the household. Further, this study was not able to demonstrate improvements in access to care for specialized mental health services, as the indicators of access to health care in the MEPS data are generic in nature.

### **Conclusions**

One of the unique aspects of this study is that availability and accessibility of health care outcomes are stratified by psychological distress group. During the timeframe of ACA implementation (2011-2016) individuals with NPD experience a decline in the need for health care, very little change in being able to access health care when needed, and a slight jump in not having a usual source of care. During this timeframe, individuals with SPD experience a similar decline in the need for health care, but the ability to get care when needed and having a usual place of care fluctuates from year to year.

The results of this study demonstrate differing trends in the availability and accessibility of health care during the timeframe of ACA implementation between individuals with any level of psychological distress and individuals with NPD. In terms of availability for those with SPD or MMPD, there seems to be an increase in the inability to get care when needed up to 2014, at which point the ACA is enacted and this increasing trend seems to reverse, whereas those with NPD observe no difference in being unable to get care when needed until 2016, when they observe a significant improvement. However, when the year indicator is interacted with SPD status, we do not see a significant difference between groups.

Similarly, there are no consistent trends in the accessibility of health care within or between each PD group. The most significant findings of this study are the projections that demonstrate that after ACA implementation, the proportion of people in each PD group that report being unable to access care when needed and not having a usual place of care was lower in

2014 and beyond than it would have been had the insurance coverage levels and mix of insurers remained unchanged from 2013. However, the strength of this association with the implementation of the ACA is unclear and should be considered an area for further research.

Additionally, region seems to have very little effect on each outcome in the stratified analyses, only affecting not having a usual place of care in the full cohort. Income and insurance status seem to consistently play a role in access to care for all PD groups, highlighting the importance of targeting low-income individuals and those without private insurance or Medicare with health care reforms that improve access to care.

Where prior research looking at other barriers to care (such as cost, delaying or foregoing care) in the SPD population shows strong associations between the ACA implementation and improvements in those outcomes [24, 25, 27], the results of this study are less clear. Since the outcomes of this study focus on the dimensions of access to health care that are specific to availability and accessibility, it is possible that the lack of a strong association of these outcomes with the implementation of the ACA in the SPD population is a result of the fact the ACA made limited attempts to improve these dimensions of access to health care. It is possible that changes observed in these dimensions of access to health care are in response to the provisions of the ACA that address affordability, rather than specific ACA policies to address availability and accessibility.

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**Appendix 1: Variable descriptions**

<b>Variable type</b>	<b>Variable name</b>	<b>Variable Description</b>	<b>Scale</b>
Dependent	NEEDCARE	The question from MEPS selected to assess this asks if in the last 12 months the respondent had an illness, injury, or condition that needed care right away in a clinic, emergency room, or doctor's office. Reconstructed the IPUMS MEPS variable ADILCR to address missing values.	0 -Did not need care in the past 12 months (ref) 1 - Needed care in the past 12 months
Dependent	NOCARE	To capture the availability of care and thus the unmet need, the question, "In the past 12 months, were you unable obtain medical care, tests, or treatments you or a doctor believed necessary?" Reconstructed the IPUMS MEPS variable UNMTNDMC to address missing values.	0 - Able to get care when needed in the past 12 months, (ref) 1 - Unable to get care when needed in the past 12 months
Dependent	USUPLACE	Individuals are asked if they have a usual place of care, defined as a doctor's office, clinic, health center, or other place a person usually goes if they are sick or need advice about their health. Reconstructed the IPUMS MEPS variable USUALPL to address missing values.	0 - Has a usual place of care, (ref) 1 - Does not have a usual place of care
<b>Predisposing characteristics</b>			
Independent	AGECAT	Categorical age variable constructed from the linear variable AGE from IPUMS MEPS	1. 27-36 (ref) 2. 37-46 3. 47-56 4. 57-64
Independent	RACE/ETHNICITY	Reconstructed the RACEA and HISPYN variables from IPUMS MEPS to consolidate the race categories and combine them with the ethnicity categories.	1 "White, non-Hispanic" (ref) 2 "Black, non-Hispanic" 3 "Hispanic" 4 "Other Race/Ethnicity"
Independent	SEX	Gender, male or female	

Independent	REGION	IPUMS MEPS variable is REGIONMEPS. I recoded the variable to address the missing values.	<ol style="list-style-type: none"> <li>1. Northeast (ref)</li> <li>2. Midwest</li> <li>3. South</li> <li>4. West</li> </ol>
<b>Enabling characteristics</b>			
Independent	EDUCATION	There are several education variables in IPUMS MEPS, however they were inconsistently administered throughout the time frame that I am studying. One variable, educational attainment or EDUC, was administered in all years, hence I selected this one. This variable was reconstructed and condensed to create 4 broader categories of educational attainment, rather than the 30 categories in the original variable	<ol style="list-style-type: none"> <li>1. Bachelor's degree or more (ref)</li> <li>2. Some college, no bachelor's</li> <li>3. High school or GED</li> <li>4. Less than high school</li> </ol>
Independent	YEARIND	A single categorical year indicator variable constructed from the IPUMS MEPS variable YEAR to identify which year an individual reported their data in.	<ol style="list-style-type: none"> <li>1. 2011 (ref)</li> <li>2. 2012</li> <li>3. 2013</li> <li>4. 2014</li> <li>5. 2015</li> <li>6. 2016</li> </ol>
Independent	MARRIED	IPUMS MEPS variable is MARSTAT, or marital status. I recoded the variable to address the missing values.	<ol style="list-style-type: none"> <li>1. Married (ref)</li> <li>2. Widowed</li> <li>3. Divorced</li> <li>4. Separated</li> <li>5. Never married</li> </ol>
Independent	NATSTAT	Nativity status or USBORN in IPUMS MEPS. This variable was reconstructed to simplify the number of categories so that they simply describe whether an individual was born as a US citizen or not (regardless of if they were born in the US, US territories, overseas military base, etc.)	<ol style="list-style-type: none"> <li>1. Born in the US (ref)</li> <li>1. Not born in the US</li> </ol>

Independent	POVCAT	The IPUMS MEPS variable for poverty category. This variable takes the linear variable for family income and creates a categorical variable, classifying respondents according to their family income as a percentage of the Federal Poverty Level (FPL)	<ol style="list-style-type: none"> <li>1. Negative or poor (LT 100% poverty line)</li> <li>2. Near poor (100-124% poverty line)</li> <li>3. Low income (125-199% poverty line)</li> <li>4. Middle income (200-399% poverty line)</li> <li>5. High income (GE 400% poverty line)</li> </ol>
Independent	INSSTAT3	Insurance status. This variable was constructed using several variables from IPUMS MEPS. IPUMS MEPS reports insurance variables on a monthly basis. This means an individual can have 12 insurance statuses reported in a year. Therefore, the choice was made to select the insurance status that the individual reported at the same time they reported their Kessler 6 score to reflect a person's insurance status at the time they may have reported being in psychological distress. I coded each category of insurance as being selected in the same month as the SAQ was taken (using IPUMS MEPS variable ADCMPM) or not and created 5 new variables based on the following categories: Private Insurance, Exchange, Medicaid, Other public, and Uninsured. I then created another variable, INSSTAT, to establish a categorical variable that represents the insurance status of an individual in the month that they took the SAQ. After looking at the frequencies for this variable I realized that the sample size for the Exchange category was too small. Additionally, I ran IIA tests to assess the best combination of insurance categories that provided the best model fit. Based on this information created the variable INSSTAT3	<ol style="list-style-type: none"> <li>1. Private Insurance</li> <li>2. Medicaid</li> <li>3. Medicare</li> <li>4. Uninsured</li> </ol>
Need			

Independent	PCS	Physical Health Component from the SF-12.	Continuous variable
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## Appendix 2: Sensitivity check 2 - Interaction terms with full sample

Variable		Report needing care N = 53,941	Unable to access care when needed N = 55,531	No usual place of care N = 54,949
<b>Year</b>				
	2011	ref	ref	ref
	2012	-0.014 (0.010)	0.001 (0.004)	0.024*** (0.009)
	2013	-0.030*** (0.009)	-0.000 (0.005)	0.011 (0.010)
	2014	-0.053*** (0.010)	-0.002 (0.004)	0.020* (0.010)
	2015	-0.048*** (0.009)	0.000 (0.004)	0.026** (0.011)
	2016	-0.048*** (0.010)	-0.003 (0.004)	0.016 (0.011)
<b>Region</b>				
	Northeast	ref	ref	ref
	Midwest	0.009 (0.010)	-0.005 (0.005)	0.008 (0.014)
	South	-0.001 (0.010)	-0.000 (0.006)	0.083*** (0.012)
	West	-0.004 (0.009)	0.004 (0.005)	0.048*** (0.012)
<b>Poverty level</b>				
	Middle income (200-399% FPL)	Ref	ref	ref
	Low income (139-199% FPL)	-0.002 (0.008)	0.007* (0.004)	0.019** (0.007)
	Near poor (100-138% FPL)	0.011 (0.009)	0.015*** (0.004)	0.030*** (0.009)
	Poor (less than 100% FPL)	0.014* (0.008)	0.016*** (0.004)	0.029*** (0.008)
<b>Gender</b>				
	Male	ref	ref	ref
	Female	0.049*** (0.005)	0.007*** (0.002)	-0.107*** (0.005)
<b>Age</b>				
	27-34	ref	ref	ref
	35-44	-0.021*** (0.007)	0.005 (0.003)	-0.075*** (0.008)
	45-54	-0.033***	0.011***	-0.132***

	55-64	(0.008) -0.048*** (0.008)	(0.003) 0.003 (0.004)	(0.008) -0.178*** (0.008)
<b>Race/Ethnicity</b>				
	White, non-Hispanic	ref	ref	ref
	Black, non-Hispanic	0.010 (0.007)	-0.016*** (0.004)	-0.000 (0.009)
	Hispanic	0.009 (0.008)	-0.023*** (0.004)	0.023** (0.010)
	Other race/ethnicity	-0.014 (0.011)	-0.004 (0.005)	0.015 (0.018)
<b>Marital status</b>				
	Married	ref	ref	ref
	Widowed	0.011 (0.018)	0.020** (0.008)	0.041*** (0.014)
	Divorced	0.027*** (0.007)	0.030*** (0.005)	0.037*** (0.007)
	Separated	0.033** (0.016)	0.007 (0.006)	0.056*** (0.014)
	Never married	-0.012* (0.007)	0.006** (0.003)	0.076*** (0.008)
<b>Education</b>				
	Bachelor's degree or more	ref	ref	ref
	Some college, no bachelor's	0.023*** (0.007)	-0.003 (0.004)	-0.007 (0.007)
	High school	-0.004 (0.007)	-0.010*** (0.003)	0.023*** (0.007)
	Less than high school	-0.008 (0.008)	-0.016*** (0.004)	0.018* (0.009)
<b>Nativity status</b>				
	Born in US	ref	ref	ref
	Not Born US	-0.052*** (0.008)	-0.011*** (0.004)	0.050*** (0.011)
<b>SF-12 physical health, mean (SD)</b>		-0.009*** (0.000)	-0.002*** (0.000)	0.004*** (0.000)
<b>Insurance status</b>				
	Private/Exchange	ref	ref	ref
	Medicaid/other public	0.018** (0.008)	0.007** (0.003)	-0.010 (0.009)
	Medicare	0.030**	-0.011	-0.046***

	Uninsured	(0.014) -0.061*** (0.006)	(0.009) 0.072*** (0.004)	(0.010) 0.260*** (0.010)
<b>SPD Status</b>				
	NPD	ref	ref	ref
	MMPD	0.123*** (0.02)	0.021** (0.01)	-0.054*** (0.015)
	SPD	0.173*** (0.026)	0.073*** (0.014)	-0.045** (0.017)
<b>Year indicator*SPD status</b>				
<b>2011</b>				
	NPD	Ref	Ref	ref
	MMPD	Ref	Ref	Ref
	SPD	Ref	Ref	Ref
<b>2012</b>				
	NPD	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
	MMPD	-0.020 (0.025)	0.022 (0.017)	0.007 (0.023)
	SPD	-0.003 (0.034)	0.022 (0.020)	0.023 (0.026)
<b>2013</b>				
	NPD	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
	MMPD	-0.010 (0.029)	0.027* (0.015)	0.029 (0.023)
	SPD	-0.042 (0.034)	0.061** (0.025)	0.076*** (0.027)
<b>2014</b>				
	NPD	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
	MMPD	0.008 (0.031)	0.028* (0.015)	-0.010 (0.026)
	SPD	0.021 (0.036)	0.027 (0.026)	0.019 (0.029)
<b>2015</b>				
	NPD	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
	MMPD	-0.022 (0.030)	0.022 (0.017)	0.007 (0.022)
	SPD	-0.020 (0.035)	0.035 (0.027)	-0.024 (0.028)
<b>2016</b>				
	NPD	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
	MMPD	0.008	0.015	0.037

	(0.031)	(0.015)	(0.024)
SPD	-0.002	0.012	0.025
	(0.039)	(0.027)	(0.030)

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\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## CONCLUSION

Individuals with serious psychological distress in the United States face many barriers that impact their ability to access the health care system promptly and efficiently. They have higher levels of comorbid conditions [1, 2], they have difficulties judging when to go to the doctor [3], and physicians often have difficulties identifying and treating their mental illness [4]. They are more likely to be uninsured than people without psychological distress [5-7], more likely to use the emergency room [8] and more likely to have difficulties affording health care [6]. Provisions of the ACA had the potential to break down some of these barriers in meaningful ways.

Individuals with serious psychological distress are more likely to be uninsured than individuals without psychological distress [5-7]. This analysis demonstrates that most individuals benefited from a lower likelihood of being uninsured after ACA implementation, however the magnitude of the observed benefit was greatest for individuals with SPD. Individuals with SPD also experience an increased probability of Medicaid enrollment during ACA implementation and did not experience significant increases in enrollment in private insurance. This implies that individuals with SPD who did gain health insurance were covered by Medicaid. As a result, it is possible that states that have not expanded Medicaid under the ACA have further exacerbated disparities in health care access for individuals with SPD. The regional effects on insurance status in the SPD group compared to the full sample suggest that this is an important area of further research. There are few Medicaid expansion states in the South, and all individuals there are less likely to be enrolled in Medicaid and more likely to be uninsured than their counterparts in the Northeast. However, the magnitude of the difference for those with SPD is substantially greater than the full sample, highlighting the fact that the lack of Medicaid expansions may have disproportionately impacted people with SPD.

Mental health services are underutilized by individuals with SPD [6, 9], but these individuals are high utilizers of health care overall [2] and are more likely to use the emergency room than individuals without SPD [8]. After the ACA insurance expansion, individuals with SPD have significantly higher expected utilization of hospital discharges, outpatient/office-based visits, and prescription fills relative to 2011, but not do not have higher emergency department use. However, they do have a higher likelihood of having emergency department use around the time of ACA implementation, suggesting that perhaps psychosocial barriers to care may have impacted their care seeking behavior around that time. For example, perhaps individuals with SPD gained insurance in 2014 and therefore could afford to go to the doctor, but they did not have a usual place of care and did not know where to go, so they end up in the emergency department for routine care. For outpatient/office-based visits and prescription fills, the expected utilization increased immediately after ACA implementation and dropped off in subsequent years, implying that individuals with SPD may have had some pent-up demand for these services but not for services that they were already high utilizers of. What is also clear is that individuals with SPD use more health services with the insurance expansions than they would have if the insurance expansions had not taken place, and this is not the case for people with NPD. As a result, insurance expansions enable use of health services for people with SPD in a manner that they do not for people with NPD.

Where prior research looking at other barriers to care (such as cost, delaying or foregoing care) in the SPD population shows strong associations between the ACA implementation and improvements in those outcomes[10-12], the results of this study are less clear. Since the outcomes of this study focus on the dimensions of access to health care that are specific to availability and accessibility, it is possible that the lack of a strong association of these outcomes with the implementation of the ACA in the SPD population is a result of the fact the ACA made limited attempts to improve these dimensions of access to health care. It is possible that changes

observed in these dimensions of access to health care are in response to the provisions of the ACA that address affordability, rather than specific ACA policies to address availability and accessibility.

The ACA seems to have fulfilled significant unmet need among individuals with SPD, especially in terms of health insurance and use of health care services that promote preventative care and wellness. However, the effect of the ACA on other barriers to health care access for individuals with SPD are less clear, and the uneven implementation of the ACA across the country likely disproportionately disadvantaged for these individuals. Although this study was mostly hypothesis generating in nature, what it clearly demonstrates the ACA had limitations in terms of the impact it was able to have outside of improving access to insurance. It is clear from this study that covering more individuals with Medicaid and improving the quality of the insurance does not translate into more efficient use of health care services, and it does not bring down barriers in access to care in the dimensions outside of affordability. The ACA was a good first step in improving health care in the United States, particularly for those with SPD, but policy makers should revisit the question of health care reform and identify strategies to improve health care outside of insurance coverage, because doing so will disproportionately lift up the weakest individuals in our society, including individuals with SPD.

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