ABSTRACT

Title of Dissertation: HEALTH POLICY, CARE COORDINATION, AND RACIAL AND ETHNIC DISPARITIES AMONG U.S. ADULTS AGED 18-64 WITH SERIOUS PSYCHOLOGICAL DISTRESS

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About one in five Americans have a mental health condition, and in any given year, 3-5% of the population experiences serious psychological distress (SPD). The goal of this dissertation is to examine the impact of health policy on racial and ethnic disparities among people experiencing SPD. The literature review in my dissertation details evidence on systemic racial and ethnic differences in access, quality, and care coordination. I develop a causal theory examining the reasons why the problem of SPD and racial and ethnic health disparities exist and specific evidence that illuminates how the problems come into existence. Using National Health Interview Survey data from 2011-2016, access to care among Non-Hispanic (NH) Whites, NH Blacks and Hispanics with SPD is examined. Findings suggest that in comparison to NH Whites, NH Blacks and Hispanics experienced greater gains in health care access following the Affordable Care Act (ACA). Next, using data from the 2015 and 2016 Medical Expenditure Panel Survey, differences in racial and ethnic minorities being served by usual sources of care with care coordination services is examined. Findings suggest that in comparison with NH Whites with SPD, Hispanics with SPD had lower odds of being seen at a Patient Centered Medical Home (OR 0.55, ($p <0.05$)). Hispanics had higher odds (1.29 ($p <0.03$)) of being seen at a practice that used case managers; and Non-Hispanic Blacks with SPD had higher odds (3.25 ($p< 0.001$)) of being seen at a practice that used care managers. Given that people with diabetes experiences mental health conditions occur at about twice the rate of the general population, this dissertation examined the quality of care provided to people with doctor-diagnosed diabetes and SPD using data from the Medical Expenditure Panel Survey. Findings suggest that between 2012 and 2016, racial and ethnic disparities in the receipt of glycated hemoglobin (HbA1c) testing improved but were not eliminated. Results suggest that increased health insurance coverage alone does not eliminate health disparities, and work remains to be done to ensure that all Americans benefit from high-quality, evidence-based care.

HEALTH POLICY, CARE COORDINATION, AND RACIAL AND ETHNIC DISPARITIES AMONG U.S. ADULTS AGED 18-64 WITH SERIOUS PSYCHOLOGICAL DISTRESS

by

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Dedication

For my grandparents, Morrison Bohling Williams and Vivian Thomas Williams, who inspired my love of learning and helped me be the first of my siblings to graduate from college.

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Chapter 1: Introduction and Literature Review

INTRODUCTION

The goal of this dissertation is to examine racial and ethnic disparities among people experiencing serious psychological distress (SPD) from a public health perspective. I explore SPD, access to care, care coordination, and differences in quality of care among sub-populations by race, ethnicity, and SPD status using data from 2012 to 2016 in the United States. This is a time period in which there were significant health policy changes, with the potential for impacts on access, care coordination, quality, and racial and ethnic health disparities among people with SPD. This topic is significant is because racial and ethnic health disparities are ethically unjust and cause a societal loss in terms of lost productivity and quality-adjusted life years lost. Most ethicists would agree that it is unfair to systematically deprive a group of some benefit that a social system can deliver. The literature review in my dissertation details evidence on systemic racial and ethnic differences in access, quality, care coordination, and SPD. I develop a causal theory examining the reasons why the problem of racial and ethnic health disparities exist and specific evidence that illuminates how the problem comes into existence. In the first study of this dissertation, I examine health care access among racial and ethnic groups with SPD. In the second study, I examine access to primary care practices with care coordination services by race, ethnicity, and SPD status. Finally, in the third study I examine provision of evidence-based care by race, ethnicity, and SPD status among people with diabetes. In the discussion and conclusion, I discuss the significance and policy implications of my studies and my future career trajectory.

Literature Review

In order to present a causal theory of SPD and why health disparities exist among people with SPD, I review in detail the literature related to SPD, health care access, care coordination, and quality of care among racial and ethnic minorities. Secondly, I examine the literature on causal theory and elaborate a causal theory of SPD and health disparities.

Serious Psychological Distress (SPD)

Serious psychological distress has been conceptualized as present if a survey respondent scores 13 or greater on the Kessler-6 screener(Alhussain, Meraya, & Sambamoorthi, 2017; Egede & Dismuke, 2012; P. K. Muhuri, 2013; Okoro, Dhingra, & Li, 2014; Pearson et al., 2009). The Kessler Psychological Distress Scale was developed by Ronald Kessler for population level surveillance of possible mental illness(Kessler et al., 2002; Kessler et al., 2003). The Kessler-6 scale has been validated in numerous studies(Min & Lee, 2015; Prochaska, Sung, Max, Shi, & Ong, 2012) and has high sensitivity and specificity (Prochaska et al., 2012). A 13 or greater score on the Kessler-6 screener has been validated in the literature as a score indicating distress serious enough to warrant intervention(A. L. Jones et al., 2015; Okoro et al., 2014; Weissman et al., 2017; Weissman, Russell, Jay, & Malaspina, 2018). This dissertation uses the Kessler-6 score of 13 or greater to identify those with SPD.

The Kessler-6 screener has six questions such as, “During the past 30 days, about how often did you feel so depressed that nothing could cheer you up? During the past 30 days, about how often did you feel worthless?” Respondents use a one to five scale to indicate how often they experienced the psychological state. The Kessler-6 also includes a question that asks, “Taking them altogether, did these feelings occur more often in the past 30 days than is usual for you, about the same as usual, or less often than usual?” Respondents scoring 13 or more on the instrument are considered to have SPD.

The existing literature suggests that people with SPD have more frequent emergency department visits; (Alhussain et al., 2017); poorer outcomes after surgery (D. S. Lee, Marsh, Garcia-Altieri, Chiu, & Awad, 2016; Ricciardi et al., 2017; Tully, Baker, Turnbull, & Winefield, 2008; Walker, Gebregziabher, Martin-Harris, & Egede, 2014a); and higher health care spending (Egede & Dismuke, 2012; Novak & Chen, 2017; Okumura & Ito, 2013; Pearson et al., 2009). My causal theory posits that SPD develops at the individual level as a result of antecedent, moderating, mediating, and causal factors. (See Figure 1.1)

Access to Health Care among Racial and Ethnic Minorities

Historically, Non-Hispanic White persons have had the lowest uninsurance rates. A 2005 literature review by Marsha Lillie-Blanton and Catherine Hoffman used the metric of having a usual source of care as a way of measuring access to care across races and ethnicities. They identified a total of eight peer reviewed articles that measured racial and ethnic differences in having a usual source of care. For comparisons using decomposition techniques, 19-60% of the gap in having a usual source of care was unexplained between non-Hispanic Whites and Hispanics (all races). For NH Blacks, decomposition techniques left 2-55% of the gap in access to care unexplained (Lillie-Blanton & Hoffman, 2005).

Since the enactment of the Affordable Care Act (ACA) in 2010 and its implementation in 2014, an estimated net of 17 to 20 million individuals between the ages of 18 to 64 have gained health insurance coverage in the United States. (Abdus, Mistry, & Selden, 2015) This increase in insurance coverage is due to various provisions of the ACA, such as the expansions in coverage through Medicaid, the health insurance exchanges, and the young adult mandate that allowed individuals between the ages of 19 to 26 to stay on their parent's employer-sponsored health insurance (Alcala, Chen, Langellier, Roby, & Ortega, 2017; Ali, Chen, Mutter, Novak, & Mortensen, 2016; J. Chen, Vargas-Bustamante, Mortensen, & Ortega, 2016; J. Chen, Vargas-Bustamante, & Novak, 2017; Novak, Williams-Parry, & Chen, 2017; Ortega et al., 2017). Studies have indicated that the insurance expansions of the ACA were associated with improvement in access to primary care, reduced out-of-pocket spending, and improved self-reported health (Gooptu, Moriya, Simon, & Sommers, 2016; Sommers, Buchmueller, Decker, Carey, & Kronick, 2013; Sommers, Gawande, & Baicker, 2017; Sommers, Gunja, Finegold, & Musco, 2015). In estimating the impact of increased health insurance coverage, a population of interest is those with SPD. Approximately 20% of the U.S. population has a mental or substance use disorder, if one aggregates all conditions ranging from chronic medication-managed depression up through active addiction and serious mental illness(Ali, Teich, & Mutter, 2015). People with SPD are at a higher risk of having adverse outcomes following physical health interventions (Desai et al., 2016; Donze, Lipsitz, Bates, & Schnipper, 2013; Freedland et al., 2016; McHugh, Carthon, & Kang, 2010; Meraya, Raval, & Sambamoorthi, 2015), as well as for reporting poor access to needed health care (Weissman et al., 2017; Weissman et al., 2018). Studies suggest that the ACA's Medicaid expansion provision might have led to greater number of encounters among people with mental health challenges (Cook, Zuvekas, Chen, Progovac, & Lincoln, 2016; Horgan et al., 2016; Le Cook, McGuire, Lock, & Zaslavsky, 2010; Tepper et al., 2017). However, limited research exists on the impact of expanded health insurance coverage for racial and ethnic minorities with SPD.

Care Coordination

Care coordination provided to individuals may vary significantly by race, ethnicity, and income levels (J. Chen, 2017; Eidus, Pace, & Staton, 2012; Fradgley, Paul, & Bryant, 2015; Gilchrist-Scott, Feinstein, & Agrawal, 2017; Gimpel et al., 2010; Levine, Linder, & Landon, 2018; Mays et al., 2006). Promoting care coordination is one of the six National Quality Strategy priorities. (Agency for Healthcare Research and Quality, 2015) The Agency for Healthcare Research and Quality's working definition of care coordination is—*marshalling and coordinating resources to carry out patient care* (McDonald et al., 2007). Care coordination includes activities such as the exchange of information between hospitals and doctor's offices; medication reconciliation at transitions of care (J. L. Lee et al., 2018; Pandolfe, Crotty, & Safran, 2016); and IT-enabled case management (Holland, Brandt, Targonski, & Bowles, 2017). It also involves novel approaches such as predictive analytics to identify high-needs, high-cost patients (Hawkins et al., 2015; White et al., 2017).

Improvements in care coordination strategies and innovative delivery models represent an important frontier for improving care efficiency, population health, ensuring access to care, and improving health equity (Alley, Asomugha, Conway, & Sanghavi, 2016; Casalino, Erb, Joshi, & Shortell, 2015; L. M. Issel, 2017; Sherry et al., 2016; Shortell, Washington, & Baxter, 2009). The available evidence suggests that specific care coordination practices have a role in quality improvement. Information exchange between hospitals and medical offices can help reduce the number of repetitive services, such as repeated diagnostic radiology services (Adler-Milstein et al., 2017; Adler-Milstein & Jha, 2017; J. E. Bailey, Pope, et al., 2013; J. E. Bailey, Wan, et al., 2013); medication reconciliation reduces medication errors by clarifying current medications (Jack et al., 2009; Pronovost et al., 2003); and case management helps ensure that the patient receives the services s/he needs to avoid readmission. (Baldwin, Zook, & Sanford, 2018). Furthermore, there has been a push to increase the use of patient centered medical home models. A patient-centered medical home uses a team-based approach, and, to be certified as a PCMH, the medical practice undergoes specific quality improvement activities aimed at increasing patient activation and engagement; ensuring that needed information is exchanged with other specialty practices that see the patient; using health IT to automate the delivery of evidence-based care; and ensuring that providers are able to assess the quality of the care that they themselves provide patients based on electronic clinical quality measures (Bates & Bitton, 2010; Beacham et al., 2017; Bowdoin, Rodriguez-Monguio, Puleo, Keller, & Roche, 2017; De Marchis, Doekhie, Willard-Grace, & Olayiwola, 2018; Dickinson & Miller, 2010; Hong, Huo, & Mainous, 2018).

Quality of Care among Racial and Ethnic Minorities

Because mental health problems are common among people with diabetes, I select people with diabetes and examine whether co-occurring SPD impacts the quality of care they receive. I stratify my analysis in this dissertation by race, ethnicity, and SPD. There is a preponderance of evidence that racial and ethnic minorities receive lower quality of care than NH Whites. For example, a recent study in Diabetes Research and Clinical Practice found that between 1999 and 2014, there was a steady uptake in the use of evidence-based statins among people with diabetes. However, after controlling for factors suggested by the Andersen model, a gap in statin use remained between NH Whites and NH Blacks (Gu, Kamat, & Argulian, 2018). A data brief from the Agency for Healthcare Research and Quality demonstrates that Hispanics with diabetes are the most likely to be dependent on injections to manage their condition (P. Muhuri & Machlin, 2018). Analysis by Egede and colleagues suggests that immigrants with diabetes are less likely to receive blood pressure checks or eye exams (Srivastava, Bishu, Walker, Williams, & Egede, 2018). Furthermore, there is also strong evidence to suggest that Hispanics, NH Blacks, Asians, and Native Americans have a higher prevalence of diabetes than NH Whites (Al Sayah, Majumdar, Egede, & Johnson, 2015; Al Sayah, Majumdar, & Johnson, 2015; Bauer et al., 2013; Bayliss, Blatchford, Newcomer, Steiner, & Fairclough, 2011; Bright R & B, 2016; Brunisholz, Joy, et al., 2017; Brunisholz, Kim, et al., 2017; Canedo, Miller, Schlundt, Fadden, & Sanderson, 2018; Cebul, Love, Jain, & Hebert, 2011; Chang, Moonesinghe, Athar, & Truman, 2016; P. C. Chen, Chan, Chen, Ko, & Li, 2013; Diabetes Prevention Program Research et al., 2009; Farrell et al., 2013; Gaskin et al., 2014; Geiss et al., 2014; Hu, Shi, Rane, Zhu, & Chen, 2014; Jiang et al., 2008; M. T. Kim et al., 2017; Kirk et al., 2006; Lemley & Spies, 2015; P. Muhuri & Machlin, 2018; Roubideaux et al., 2004; Rowley, Bezold, Arikan, Byrne, & Krohe, 2017).

Healthy People 2020 sets specific goals for diabetes management care, including increasing the proportion of adults with diabetes who have an annual dilated eye examination to 53.4% of adults aged >=18 years; increasing the proportion of adults with diabetes who have at least an annual foot examination to 68%; increasing the proportion of adults with diabetes who have a glycosylated hemoglobin measurement at least twice a year to 64.6%; and, improving lipid control among persons with diagnosed diabetes so that 53% of people with doctor-diagnosed diabetes have an LDL cholesterol value of <100 mg/dl or less.(Centers for Disease Control/National Center for Health Statistics, 2011; Healthy People 2020.) The outcome that I examine is the odds of having at least two glycosylated hemoglobin measurements in a year.

CAUSAL THEORY AND EMPIRICAL MODEL

A causal theory details the existing factors, moderating factors, key causal factors, mediating factors, health outcome, and impact of a problem. The combination of the existing, moderating, mediating, causal, and outcome factors are the basis to hypothesize about what leads to a health problem. Existing or antecedent factors are those elements that must be present for the health problem to come into existence. Causal factors are those elements that influence whether the health problem will manifest itself. Moderating factors are those elements that have the potential either to exacerbate or to lessen the presence of a health problem. Mediating factors come between causes and their outcomes (L Michelle Issel & Wells, 2018). The figures presented in this chapter suggest a causal theory for SPD and for health disparities related to access, quality, and care coordination.

In terms of development of SPD, I hypothesize that antecedent factors, such as age, race, ethnicity, sex, genetic predisposition, socioeconomic status (SES), the current state of physical health, housing, and education are antecedent to the health behaviors. The causal health behaviors include sleep, diet, exercise, smoking, and automatic thoughts (Beck). The moderating factors include knowledge of stress management and access to treatment to address serious psychological distress. The principal mediating factors are physiological and psychological processes. The health outcome is screening positive for SPD.

In a similar manner, I develop a causal diagram for the development of health disparities. I hypothesize that the antecedent factors, include age, race, ethnicity, sex, genetic predisposition, socioeconomic status (SES), the current state of physical health, housing, and education. The causal health behaviors include sleep, diet, and exercise. The moderating factors include organizational behavior (which may include structural racism), health care provider behavior (which may include personally mediated racism), and help seeking behaviors and self-efficacy (which may be affected by internalized racism). The principal mediating factors are physiological processes. The health outcomes are health disparities, which are manifest across multiple conditions, as previously stated, including length of life, quality of life, surgical outcomes, and diabetes care.

To guide empirical analysis in my studies, I use the Andersen model of health services use. (See Figure 1.3). In terms of explaining help seeking, the Andersen theoretical model of health behavior is an excellent fit to explain why someone with SPD seeks and receives help. Firstly, the domains of the Andersen model—the needs, enabling, and predisposing factors (Andersen, 1995)—explain to a great extent why any human seeks or receives medical care. One of the predisposing factors—age—is hugely influential in explaining the biologically possible health care needs at any given phase of human life (Carroll & Rhoades, 2001). Biological, social, and psychological science collaborate "age" as an important factor in determining need for public health and medical intervention.

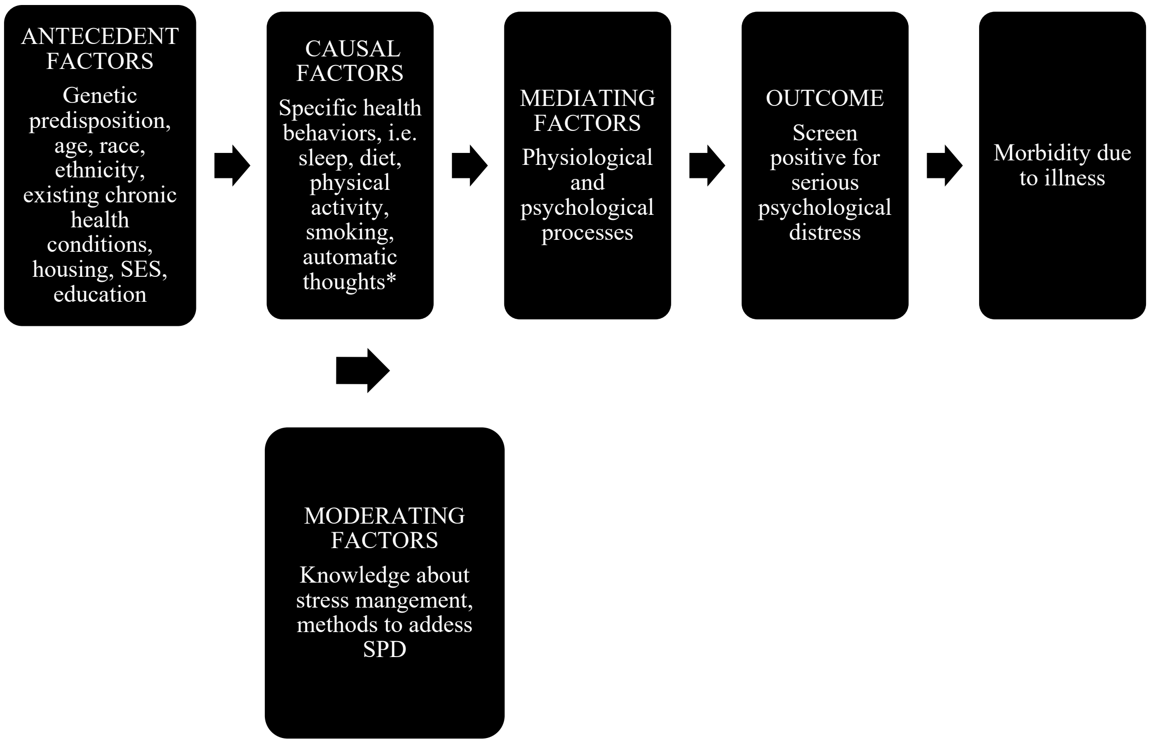
In the Andersen model, race and ethnicity are also conceptualized within the predisposing factors. Camila Jones' seminal work on racism and the production of health offers three mechanisms that attempt to explain why and how racism impacts health (A. L. Jones et al., 2015; C. P. Jones, 2000, 2001; C. P. Jones, LaVeist, & Lillie-Blanton, 1991; Shao, Richie, & Bailey, 2016). First, institutionalized racism impacts access to the means of production (Braveman & Gottlieb, 2014). Lack of access to social networks, schools, neighborhoods, jobs, and other social determinants of health produces material deprivation, resulting in poorer health (Z. D. Bailey et al., 2017; Krieger, 2016; Krieger et al., 2017; Phelan, Link, Diez-Roux, Kawachi, & Levin, 2004). Secondly, personally mediated racism, for example, experiences such as having people move away from you in public places, giving you poorer customer services, acting as if you are suspicious and a possible thief in stores, and police profiling, produce physical stress that elevates cortisol levels (Cozier et al., 2006;

Irby-Shasanmi & Leech, 2017; Mouzon & McLean, 2017; Wyatt et al., 2003). Finally, internalized racism refers to a subconscious self-concept in which one considers oneself as “less than” the Non-Hispanic White “other.” These subtle, internalized attitudes of inferiority manifest in poorer health, as has been shown in numerous studies (Graham, West, Martinez, & Roemer, 2016; James, 2017; La Veist, 1996; Molina & James, 2016; Mouzon & McLean, 2017; Paradies, Truong, & Priest, 2014).

The Andersen model of health services use, including race and ethnicity in predisposing factors, has been used to guide selection of covariates in studies that examine SPD and health disparities (Egede & Dismuke, 2012; Pearson et al., 2009; Straub & Cisternas, 2017; Weissman et al., 2017; Weissman et al., 2018).

FIGURES

Figure 1.1: Causal Theory of SPD



*For information on automatic thoughts (Causal Factors box) see *Cognitive Behavior Therapy* by Beck.

Figure 1.2: Causal Theory of Health Disparities Access, Quality, Care Coordination

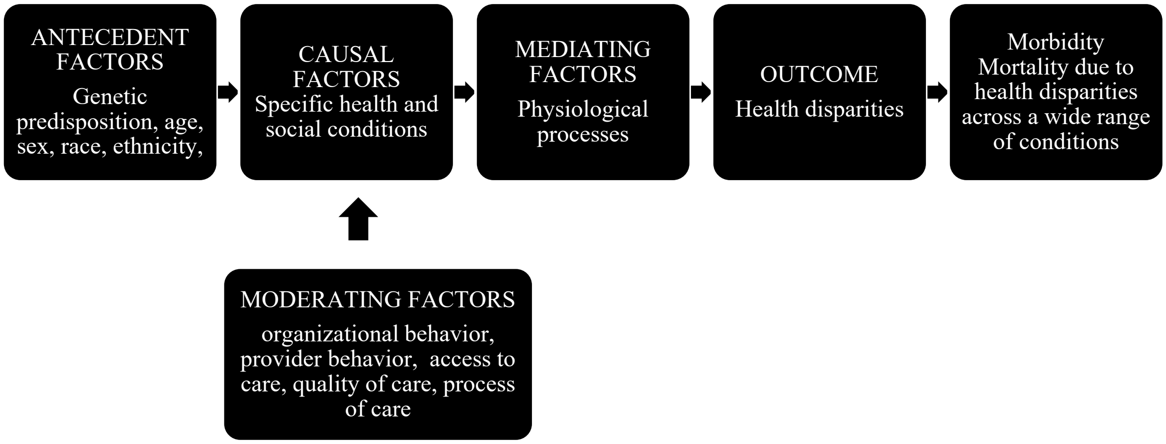
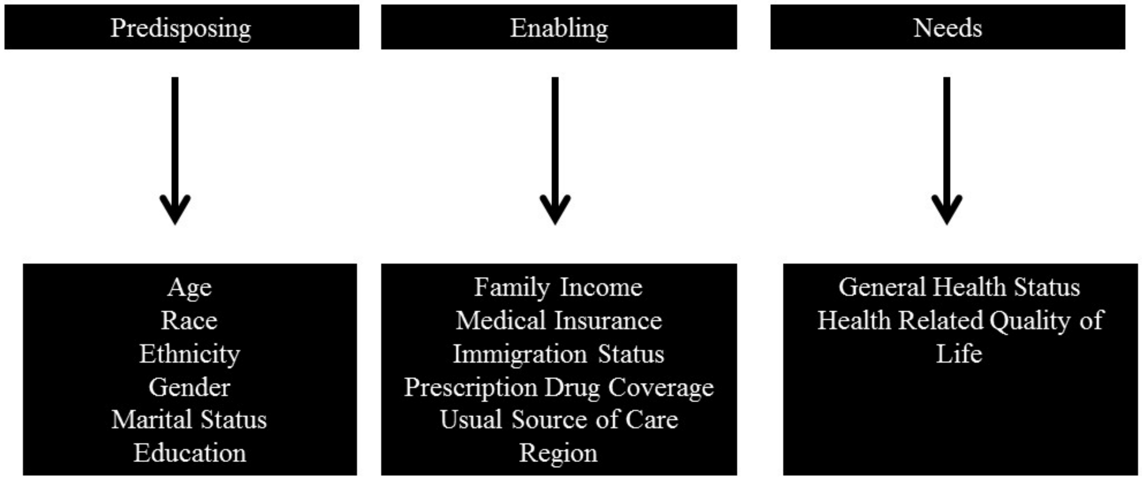


Figure 1.3: Andersen Model of Health Services Use



Note: Adapted by Author

DISSERTATION SUMMARY

Study 1 (Chapter 2) Changes in Health Insurance Coverage and Barriers to Health Care Access Among Individuals with Serious Psychological Distress Following the Affordable Care Act

In my first study (Chapter 2), I use National Health Interview Survey (NHIS) data from 2011-2016 to examine characteristics of adults with SPD by type of barrier to health care. Specifically, I examine the following barriers: being uninsured, delaying any necessary care, forgoing any care, or stating that they could not afford mental health care. Secondly, I examine the same barriers (i.e., uninsured, delaying care, forgoing care, and stating that they could not afford mental health care) among adults with SPD and low family income. Results of this study suggest that in 2014-2016 there was a significant reduction in the likelihood of being uninsured, delaying necessary care, foregoing necessary care, and not being able to afford mental health care. I also find that compared to Non-Hispanic Whites with SPD, after 2014, NH Blacks and Hispanics were less likely to report delaying care; and had decreases in saying that they could not afford mental health care.

Study 2 (Chapter 3): Care Coordination among People with Serious Psychological Distress

In my second study (Chapter 3) I use Medical Expenditure Panel Survey data from Households and Medical Offices to assess the likelihood of racial and ethnic minorities with SPD being served by a usual source of care with less robust care-coordination services. Specifically, I assessed whether patients were served at usual sources of care 1) that were certified patient-centered medical homes, 2) that used care/case managers, 3) that provide quality-of-care reports to physicians/providers, 4) that send patients reminders to come in for preventive care, and 5) that have the capability to exchange messages securely and electronically with patients. The results from this study found that controlling for individual level factors as suggested in the Andersen model of health services did not produce a well-fitted model for explaining differences in practice characteristics, as model fit was non-significant. Findings suggest that racial and ethnic minorities and those with SPD were equally likely to be served by practices with robust care-coordination services.

Study 3 (Chapter 4): Disparities in the Provision of Diabetes Management Services Among US Adults Aged 18-64 by Race, Ethnicity, and Serious Psychological Distress Status

In my third study (Chapter 4) I used data from the 2012–2016 Medical Expenditure Panel Survey to assess quality of care among people with doctor-diagnosed diabetes by race, ethnicity, and SPD status. Specifically, I examine the odds of receiving at least two HgA1C tests per year. The results of this study suggest that people with SPD had lower odds of receiving HbA1c testing. In the time period after the full expansion of health insurance coverage under the ACA, the odds of NH Blacks and Hispanics without SPD receiving recommended glycated hemoglobin tests increased.

CONCLUSION

My dissertation focuses on access, quality, and care coordination among people with SPD during a time period in which there were major policy initiatives to improve access to care and person-centered care. The findings suggest that NH

Blacks and Hispanics with SPD had significant gains in health insurance coverage after 2014. Furthermore, in 2015 and 2016, characteristics of the usual sources of care for racial and ethnic minorities with SPD did not substantially differ from usual sources of care for the Non-Hispanic White comparator group. However, my findings suggest that NH Blacks with diabetes remain at risk of non-receipt of evidence-based services. This is an important finding, given the reduced emphasis on addressing racial disparities in the U.S. since 2016. My dissertation suggests that barriers to quality, evidence-based care remain for NH Blacks and Hispanics. Ongoing action is warranted to ensure that all people in the U.S. have access to usual sources of care that provide evidence-based care, regardless of patient race or ethnicity.

Chapter 2: Changes in Health Insurance Coverage and Barriers to Health Care Access Among Individuals with Serious Psychological Distress Following the Affordable Care Act

INTRODUCTION

Changes in Insurance Coverage following the Enactment of the ACA

Since the enactment of the Affordable Care Act (ACA) in 2010 and its implementation in 2014, an estimated net of 17 to 20 million individuals between the ages of 18 and 64 have gained health insurance coverage in the United States (Carman et al, 2015; Avery et al., 2015). This increase in insurance coverage is due to various provisions of the ACA, such as the expansions in coverage through Medicaid, the health insurance exchanges, and the young adult mandate that allowed individuals between the ages of 19 and 26 to stay on their parent's employer-sponsored health insurance (Majerol et al., 2016). Recent studies have demonstrated that the implementation of the ACA is associated with significant improvement in access to primary care, medications, and health outcomes (Chen et al., 2016; Cutler, 2015; Sommers et al., 2015).

In estimating the impact of this increased health insurance coverage, a population of interest is those with a mental health condition. Approximately one out of five uninsured individuals in the U.S. has a mental health condition (Ali et al., 2016a), and these individuals are at a higher risk for poor health outcomes and having reduced access to care (Cohen and Zammitti, 2016). Recent research has shown that ACA's Medicaid expansion provision might have led to an increase in treatment utilization among those with a mental health condition (Creedon and Le Cook, 2016);

however, limited research exists that has estimated the impact of the implementation of the ACA (i.e., the impact of the Medicaid expansion, health insurance exchanges, and increased employer-sponsored coverage) on this population.

As a population, people with mental health conditions are at greater risk than those without mental health conditions for inadequate care for several reasons. First, the prevalence of mental health conditions is higher among low-income individuals. So being uninsured or poorly insured for this population may mean not being able to access the necessary treatment because of cost (Han et al., 2015). Second, the medical infrastructure to care for mental health conditions is more fragmented than for other medical conditions because of lower reimbursement rates (Mark, et al, 2017) and decades of falling state funding for mental health facilities (Croft and Parish, 2013). The siloed health care system may place the burden of care coordination activities on the shoulders of the patients least able to perform self-management tasks. Therefore, it is important to examine how the implementation of the ACA may affect health insurance coverage and barriers to health care access among adults with mental health conditions.

Study Objectives

The objective of this study is to examine the impact of the implementation of the ACA (Medicaid expansion, implementation of the health insurance exchanges, and employer mandated coverage in 2015 for employers with >=100 lives) on rate of health insurance coverage and reported barriers to health care access among individuals with serious psychological distress (SPD), an indicator of mental health problems severe enough to cause moderate-to-serious impairment in social, occupational, or school functioning, and to require treatment (Cohen and Zammitti, 2016). We also examine whether the ACA has had a more pronounced effect on minorities with SPD and low-income people with SPD. Although studies of Massachusetts health care reform and the Oregon Medicaid lottery experiment showed significant increases in health insurance coverage and services utilization with insurance expansion (Long et al., 2012; Baicker et al., 2011), to our knowledge, no studies have investigated the impact of the full implementation of ACA among individuals with SPD.

METHODS

Data

This study uses data from the 2011-2016 National Health Interview Survey (NHIS), which is a cross sectional nationally representative survey of the noninstitutionalized, civilian U.S. population collected by the National Center for Health Statistics (NCHS) of the Centers for Disease Control. Of the sample selected for participation, 80% of households successfully participate in the survey. This survey contains detailed information on participants' health care utilization and access during each year of participation, and respondents provide demographic, socioeconomic, and health-related characteristics, including Kessler 6 (K6) scores (Kessler 2002), which are standardized scores for psychological functioning (all Kessler 6 questions used are available at https://www.cdc.gov/nchs/nhis/). Race and ethnicity are collected for all respondents; the CDC/NCHS employs multiple imputation for income variables to increase usability of NHIS data. Details on the data imputation method are provided on their website (Centers for Disease Control/National Center for Health Statistics).

This study focuses on individuals' ages 18-64 years of age who had SPD. Individuals were considered to have severe psychological distress (SPD) if they had a K6 composite score of 13 or greater. There were a total of 6,052 individuals ages 18-64 who met the definition of severe psychological distress, as indicated by a K6 score >=13. The range of scores in the total survey population was from 0 to 24 (Prochaska et al., 2012). The Kessler 6 screener has been used extensively in the literature and has been demonstrated to be clinically valid, accurate and reliable (Prochaska et al., 2012). The Kessler-6 has 6 screening questions that use a Likert scale to query respondents on feelings such as hopelessness, depression, or anxiety in the previous 30 days, by asking questions such as "During the last 30 days, about how often did you feel so nervous that nothing could calm you down?". If a respondent reports rarely or never having felt the negative emotions ascertained in the survey, s/he would have a score of 0.

Dependent Variables

Our outcome variables include four measures that have been used in the literature to measure access to care (Carman, Eibner & Paddock, 2015; Wherry & Miller, 2016). These include being uninsured; having any delayed necessary medical care; having any forgone medical care; and whether the respondents stated they could not afford mental health care or counseling in the past twelve months.

Key Independent Variables

This study uses the Andersen behavioral model of health care utilization to guide the selection of covariates (Andersen & Newman, 1973; Andersen, 1995). The covariates we include can be categorized across predisposing, enabling, and need factors. The predisposing factors include race and ethnicity (i.e., non-Hispanic White (White), Non-Hispanic (NH Black), Hispanic, and "other"); immigration status (i.e., U.S. born citizens and naturalized U.S. citizens, and non-U.S. citizens). Citizenship is relevant because under current U.S. law, Lawful Permanent Residents cannot receive Medicaid coverage in their first 5 years of legal residency in the United States, whereas Lawful Permanent Residents who have permanently resided in the U.S. for five years and filed tax returns may qualify for Medicaid coverage; undocumented immigrants and non-permanent resident visa holders are not eligible for Medicaid. Additional predisposing factors in the Andersen model include sex and marital status (i.e., married or not). The Andersen Model enabling factors encompass family income (i.e., less than 100% of the Federal Poverty Level (FPL), 100%-200% FPL, and more than 200% FPL), education (i.e., less than high school degree, high school degree, college degree, and advanced degree), interview language (i.e., Spanish, English, and other), and U.S. Census region (i.e., Northeast, Midwest, South, and West). Within the Andersen model, race and ethnicity are considered "predisposing" factors because they are rough approximates for lived experiences, such as access to resources, discrimination, and cultural paradigms that influence the interpretation of physical symptoms. We limit our analysis to the mutually exclusive categories of White, African America, Hispanic, and "other" in order to ensure adequate sub-sets of the population for statistical inference. There were not adequate sample numbers to produce reliable estimates for the Asian-American, Native-American, and mixed-non-Hispanic respondents with SPD in individual sub-categories; for this reason, we have combined these respondents and include them in an “other” category. While NCHS oversamples NH Black, Hispanic, Asian-American, Native-American, and mixed race individuals, the prevalence of SPD in the general population was between 3-5% in any calendar year, resulting in small specific sub-categories for Asian-Americans, Native Americans, and mixed race individuals. Our research question focuses on the effects of the ACA on White, NH Black, Hispanic, and “other” populations with SPD; and so the omission of specific sub-populations is not a limitation in relation to our study aim.

Personal need factors within the Andersen Model are self-reported physical health (i.e., excellent, very good, good, fair, and poor), and any self-reported functional limitations. These Andersen Model domains and variables have been widely used to guide the examination of health care access and utilization (Cook, Zuvekas, Chen, et. al., 2016; Chen, Vargas-Bustamante, Tom, 2015; Vargas-Bustamante, Fang, Rizzo, et. al., 2009). Descriptive statistics on the study sample and the variables used in the analysis are provided in Table 1.

Analysis

We first summarize the trends of health care access and utilization among individuals with SPD from 2011-2016 (Figure 1). We summarize the trends of health care access and utilization among individuals with SPD and low-income from 2011-2016 (Figure 2). We then present population characteristics of individuals with or without reported health care barriers in 2011-2013 and compare them with characteristics in 2014-2016 in Table 1. Since we use the NHIS population survey weights, the results are nationally representative; however, we do not include state-level indicator variables due to data limitations. We next present multivariate logistic regression models used to estimate the trends of health care insurance and barriers to care under the ACA in Table 2. To explore whether the ACA differentially impacted racial and ethnic minorities among low-income individuals, we create a post-ACA indicator variable. This approach has been widely used to estimate the impact of the ACA, a natural experiment, on health care utilization and access (Akosa and colleagues,2015; Novak et al, 2016; and Scott et al,2015).

We report average marginal effects (ME) for each specified group of interest. The Medicaid insurance expansion was needs based, therefore it is reasonable to expect that at lower income levels, people would have been more likely to benefit from public insurance expansion; the extent to which certain races or ethnicities might have benefitted is a matter of ongoing discussion, and therefore we address this in our empirical analysis. Stata 14 was used to conduct all analysis.

RESULTS

Population Characteristics

Figure 1 presents the trends in health care coverage and indicators of health care access among individuals between the ages of 18 and 64 with SPD from 2011 to 2016. The uninsured rates for individuals with SPD have been reduced from 32% in 2011 to 15% after the implementation of the ACA (P <0.001). Figure 1 also shows a reduction in the rates of having any delayed or forgone care. Rates of delaying any necessary care declined from 44% in 2011 to 31% in 2016 (P <0.001). Similarly, the rate of forgoing any necessary care was 26% in 2016, down from 40% in 2011 (P <0.001). Reductions can also be seen in the rates of not being able to afford any mental health care, which decreased from 28% in 2011 to 20% in 2016 (P<0.001).

Figure 2 presents the trends in health insurance coverage, reporting delayed or forgone care, or reporting an inability to pay for needed mental health care among low-income individuals. Low-income individuals ages 18-64 were key targets of the Medicaid expansion and thus we sought to investigate if the implementation of the ACA had a differential impact on low-income people. Our findings suggest that people with SPD from low-income families were more likely to be uninsured, and to report delaying, forgoing or being unable to afford mental health care compared with their non-low-income peers who also had SPD. These rates of uninsurance were reduced for low-income individuals with SPD from 37% in 2011 to 17% in 2016; the rate of delaying care decreased from 49% in 2011 to 33% in 2016; forgone care decreased from 46% in 2011 to 26% in 2016; reports of not being able to afford mental healthcare decreased from 31% in 2011 to 21% in 2016.

Table 1 presents the population characteristics of adults reporting SPD regarding uninsured status, delaying necessary care, forgoing any care, and reporting that they were not able to afford mental health care or counseling. Among people with SPD, the highest reported negative outcome was delaying any care, followed by forgoing care, being uninsured, and not being able to afford mental health care or counseling. Thirteen percent of the uninsured population with SPD was non-US citizen in 2014-2016, compared with the 11% rate in 2011-2013 (P <0.001). Among the uninsured, the rates of individuals with less than high school increased from 25% in 2011-2013 to 27% to 2014-2016 (P <0.001). Between 2014-2016, geographic variation became significant, with 55% of the uninsured people with SPD living in the South, compared with 47% in the 2011-2013 period. Meanwhile, 9% of people who lived in the Northeast were uninsured in 2014-2016, compared to 11% in 2011-2013.

Table 2 shows the results of multivariable logistic regression models that control for an extensive array of predisposing, enabling, and need factors. After controlling for all the covariates, marginal effects of year indicators demonstrated that overall trends of health care access among SPD individuals have been significantly improved compared to 2011, especially after 2014. In particular, post-ACA implementation years 2015 and 2016 were associated with significant reduction in the likelihoods of being uninsured (average marginal effects (ME) = -0.12, p<0.001 in 2015; ME= -0.14, P < 0.001 in 2016), delaying any necessary care (MEs =-0.11, and -0.12, P < 0.001, 2015 and 2016 respectively), forgoing any necessary care (MEs = -0.08, -0.13, P < 0.001, 2015 and 2016 respectively), and not being able to afford needed mental health care (MEs =-0.09 to -0.08, P < 0.001, 2015 and 2016 respectively), compared with 2011.

Compared to Whites with SPD, NH Blacks and Hispanics were less likely to report delaying care. NH Blacks (ME=-0.06, P<0.001) and those in the "other" racial category (ME=-0.08, P <0.001) had decreases in saying that they could not afford mental health care. Individuals with family income above 200% FPL were also 5%-

9% less likely to face access barriers, compared to those with income below the 100% FPL.

We report average marginal effects (ME) for each specified group of interest in Table 3. Marginal effects of "post-ACA" indicator were also calculated for NH Blacks, Hispanics, "other" racial and ethnic groups, and people with low family income. MEs were all significant and the magnitudes of the MEs were similar across all groups. Results suggest that mental health care access among racial and ethnic minority populations and people with low income was significantly improved during 2014-2016; however, gaps in insurance coverage, delaying care, forgoing care, and not being able to afford mental health care remained.

DISCUSSION

This study utilized a nationally representative data set to examine the impact of the implementation of the ACA on health insurance coverage and barriers to health care access among individuals with SPD. As has been previously suggested, large nationally representative data sets may not necessarily be the ideal data sets to document the unique needs of smaller ethnic groups such as Native Americans and Asian-Americans (Assistant Secretary for Planning and Evaluation, 2013; Moffitt et al., 2015).

Notwithstanding, our results provide preliminary correlational evidence that previously uninsured individuals with SPD gained access to health insurance coverage and experienced reductions in the rates of delaying or forgoing necessary care and not being able to afford mental health care in 2014 to 2016.

This study finds that the implementation of the ACA is associated with an increase in rate of health insurance coverage among nonelderly adults with SPD and a reduction in delaying and forgoing necessary care. The ACA also reduced the odds of individuals with SPD not being able to afford mental health care. Mental health care access among racial and ethnic minority populations with SPD and people with low income and SPD has improved during the 2014-2016 time period, but gaps remain.

Our findings contribute to the emerging literature on the impact of the ACA (Gonzales et al., 2016; Saloner et al., 2017), whose findings suggest that access to health insurance and utilization of services have increased (Wherry and Miller, 2016), health-care-related financial burdens have decreased (Ali et al., 2016b), and barriers to paying for health services have been reduced (Chen et al., 2016). Our findings are consistent with this, in that we found that adults with SPD were more likely to have health insurance coverage and experience lower barriers in accessing treatments after 2014. This study also complements Creedon and Le Cook (2016), who showed an increase in treatment utilization among those with a mental health condition. Taken together, this implies that the ACA not only increased treatment utilization, but also reduced barriers to treatment, including delaying, forgoing, or not being able to afford mental health care among NH Blacks, Hispanics, and “other” races. The improvement in ability to pay for needed mental health care is especially salient in the light of recent work by Mark and colleagues examining psychiatrist reimbursement and psychiatrist participation in health insurance (Mark et al., 2017). This work suggests that psychiatrists may be less likely to participate in insurance networks than other medical specialties, allowing psychiatrists to charge out-of- network prices that cause the cost of mental healthcare to be higher, better aligning their remuneration with medical specialist rates.

Individuals with mental illness have historically had disproportionately lower rates of health insurance coverage and experienced significant barriers to accessing needed treatments (Han et al., 2015; Croft and Parish, 2013; Mechanic, 2012). These barriers are frequently not only related to the relatively high cost of mental health treatment in comparison with physical health, but also underscore the need for better integration of physical and mental health care as suggested by leading health agencies such as the Health Resources and Services Administration and the Substance Abuse Mental Health Services Administration (SAMHSA, 2017). The findings that more people were insured and fewer people reported delaying, forgoing, or being unable to afford health care after the implementation of the ACA is consistent with the literature examining the Oregon Health Insurance Experiment and Massachusetts health reform, which has shown evidence of reduced barriers to treatment among the newly insured (Long et al., 2012; Baicker et al., 2011). We have included three years of data after the expansion of Medicaid in 2014 in our analysis, and improvements in health care access appear across all years. If the ACA is not repealed, further reductions in barriers to treatment among individuals with a mental health condition may occur.

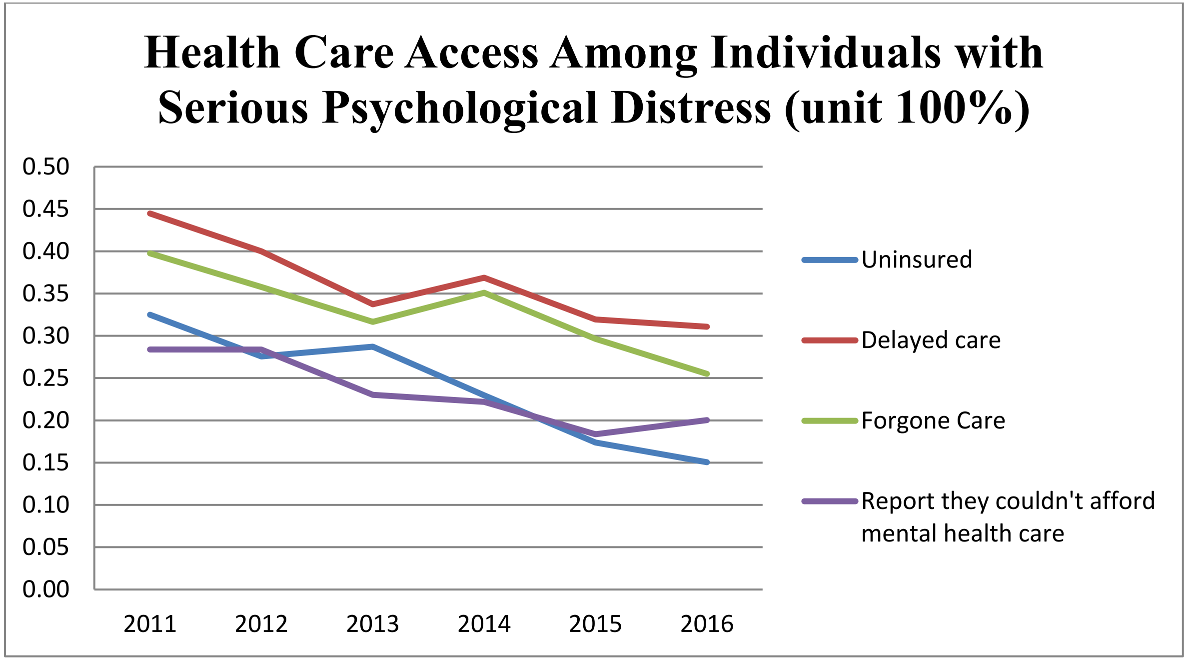
Limitations

Our study has several limitations that are worth noting. First, we were unable to conduct an analysis to estimate whether there was an increase in mental health service utilization among the population of interest. It is unclear whether reduced barriers to health care actually translate into mental or physical health services utilization. Indeed, “delaying any necessary care” and “forgoing any care” do not necessarily apply to mental health services exclusively. Examining whether there was an increase in utilization of mental health services as a result of the implementation of the ACA could be an important avenue for future research. Secondly, prior to the implementation of the ACA, various provisions of the legislation, such as the young adult mandate and early expansion of Medicaid in certain states, were already enacted. The existence of these various provisions in the pre-period of our analysis (i.e., prior to 2011) imparts a conservative bias to our findings. Third, the income thresholds we used in this study (e.g., 200% FPL) are not those used to determine eligibility in the ACA, as states have some liberty in deciding who may receive Medicaid (up to 400% of the FPL). Fourthly, we do not use state identifiers to control for the difference between states that did and didn’t expand Medicaid eligibility. These data limitations (e.g., our inability to identify whether the respondent was from a Medicaid expansion state or not) preclude us from disentangling whether the impacts we observed were due to Medicaid expansion, the health insurance marketplaces, increased employer sponsored insurance, or other provisions of the ACA.

This initial study provides some immediate insights into the impact of ACA among those with SPD. There were changes in both insurance coverage and barriers to care. Since health insurance by itself may be insufficient to guarantee that people with mental illness receive the treatment they need, ongoing outreach initiatives to help patients navigate the health care system might be warranted (Ali et al, 2015).

Efforts are needed to encourage the newly enrolled to seek appropriate treatment and to facilitate access to services. As additional years of data become available, future research will be able to better analyze the impact that ACA had on those with mental illness and gain a fuller understanding of the barriers they continue to face in getting care.

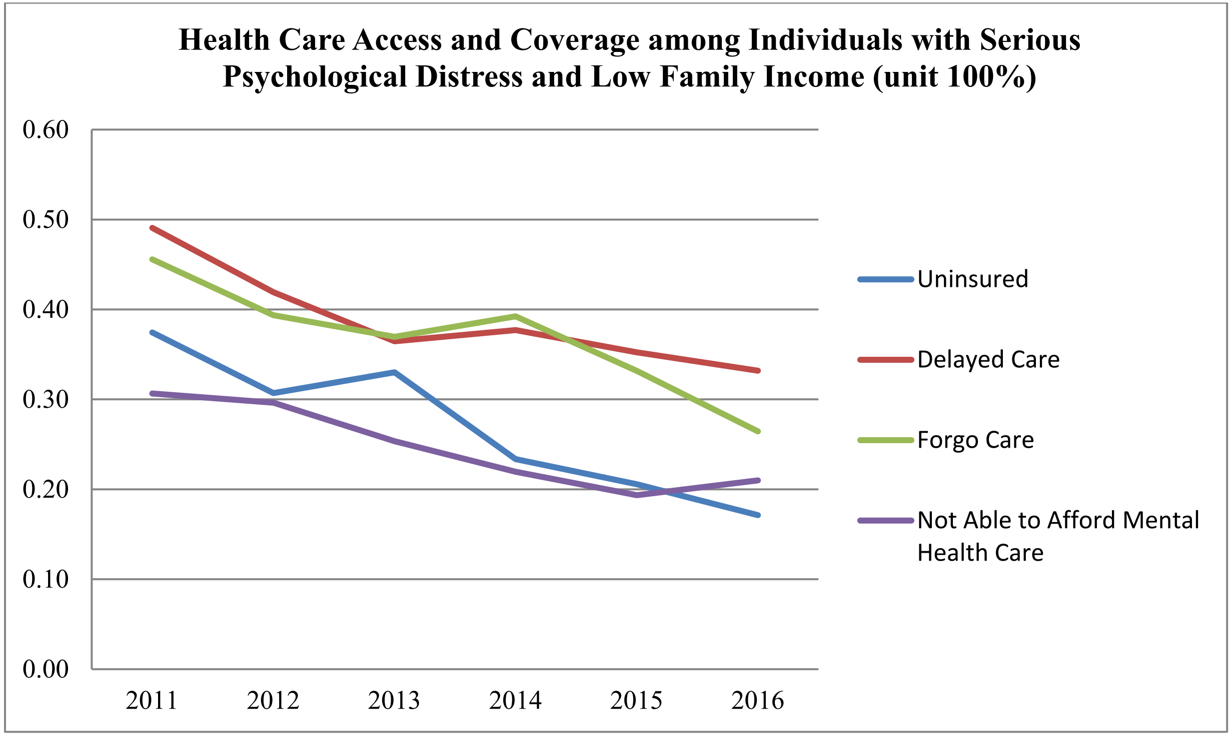
Figure 2.1: Health Care Access and Coverage among Adults (aged 18-64) with Serious Psychological Distress (2011-2016)



Note: ***p<0.001; **p<0.01; *p<0.05 (2011 is the reference year)

Being Uninsured				**Delaying Any Necessary Care**			**Forgoing Any Care**			**Could Not Afford Mental Health Care**		
		95% CI			95% CI			95% CI			95% CI	
2011	0.32	0.29	0.36	0.44	0.41	0.48	0.4	0.36	0.43	0.28	0.25	0.31
2012	0.28*	0.24	0.31	0.4	0.36	0.44	0.36	0.32	0.39	0.28	0.25	0.32
2013	0.29	0.26	0.32	0.34***	0.30	0.37	0.32**	0.28	0.35	0.23*	0.20	0.26
2014	0.23***	0.20	0.26	0.37**	0.33	0.41	0.35	0.32	0.39	0.22**	0.19	0.25
2015	0.17***	0.15	0.20	0.32***	0.29	0.35	0.30***	0.26	0.33	0.18***	0.16	0.21
2016	0.15***	0.13	0.18	0.31***	0.28	0.34	0.26***	0.22	0.29	0.20***	0.17	0.23

Figure 2.2: Health Care Access and Coverage among Individuals (Aged 18-64) with Serious Psychological Distress and Low Family Income (<200% Federal Poverty Line) (2011-2016)



	Being Uninsured			**Delaying Any Necessary Care**			**Forgoing Any Care**			**Could Not Afford Mental Health Care**		
	Mean	95%CI		Mean	95% CI		Mean	95% CI		Mean	95% CI	
2011	0.37	0.33	0.42	0.49	0.45	0.53	0.46	0.41	0.50	0.31	0.27	0.34
2012	0.31*	0.26	0.35	0.42*	0.37	0.46	0.39*	0.35	0.44	0.30	0.26	0.34
2013	0.33	0.29	0.37	0.36***	0.32	0.41	0.37**	0.33	0.41	0.25	0.21	0.29
2014	0.23***	0.20	0.27	0.38***	0.33	0.42	0.39*	0.35	0.43	0.22**	0.18	0.26
2015	0.21***	0.17	0.25	0.35***	0.31	0.40	0.33***	0.29	0.38	0.19***	0.16	0.23
2016	0.17***	0.14	0.20	0.33***	0.29	0.37	0.26***	0.23	0.30	0.21***	0.18	0.24

Note: ***p<0.001; **p<0.01; *p<0.05 (2011 is the reference year)

Table 2.1: Population Characteristics of Adults with Serious Psychological Distress by Barriers to Health Care Access

	Being Uninsured		**Delaying Any Necessary Care**		**Forgoing Any Care**		**Could Not Afford Mental Health Care**	
	2014-2016	2011-2013	2014-2016	2011-2013	2014-2016	2011-2013	2014-2016	2011-2013
	mean	mean	mean	mean	mean	mean	mean	Mean
Race and Ethnicity								
White	0.60	0.60	0.69	0.68	0.67	0.63	0.72	0.69
African-American	0.14	0.15	0.12	0.12	0.15	0.16	0.10	0.13
Hispanic	0.20	0.18	0.12	0.12	0.12	0.14	0.12	0.12
Other	0.06	0.07	0.07	0.07	0.06	0.07	0.06	0.05
Age								
18-24	0.08	0.09	0.09	0.06*	0.08	0.07	0.10	0.08
25-34	0.26	0.21	0.15	0.16	0.14	0.17	0.19	0.20
35-44	0.22	0.24	0.19	0.19	0.20	0.20	0.22	0.21
45-54	0.28	0.27	0.31	0.31	0.31	0.30	0.28	0.30
55-64	0.16	0.19	0.25	0.29	0.27	0.27	0.21	0.21
Gender: female	0.59	0.58	0.61	0.60	0.62	0.59	0.65	0.63
Marital Status: married	0.30	0.28	0.26	0.25	0.26	0.24	0.26	0.28
U.S. Citizenship								
U.S. citizen	0.87	0.89	0.95	0.94	0.95	0.94	0.96	0.96
Non-U.S. citizen	0.13	0.11	0.05	0.06	0.05	0.06	0.04	0.04
Family Income								
below 100% Federal Poverty Line (FPL)	0.43	0.49	0.40	0.43	0.42	0.48*	0.41	0.47
100-200% FPL	0.32	0.31	0.31	0.32	0.31	0.31	0.28	0.28
above 200% FPL	0.25	0.21	0.29	0.25	0.27	0.21*	0.31	0.24*

Table 2.1: Population Characteristics of Adults with Serious Psychological Distress by Barriers to Health Care Access (Continued)

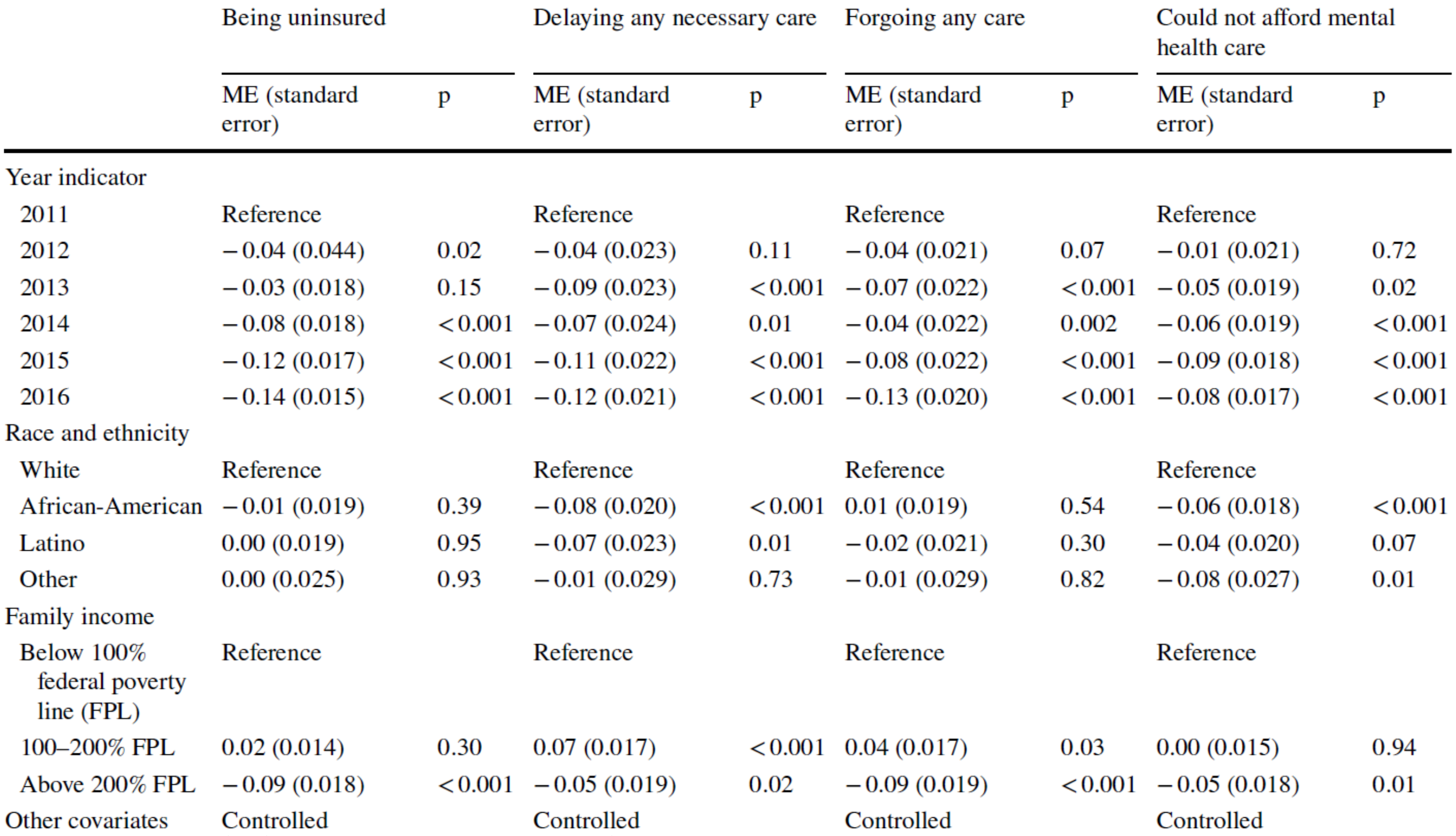
	Being Uninsured		**Delaying Any Necessary Care**		**Forgoing Any Care**		**Could Not Afford Mental Health Care**	
	2014-2016	2011-2013	2014-2016	2011-2013	2014-2016	2011-2013	2014-2016	2011-2013
	mean	mean	mean	mean	mean	mean	mean	mean
Education								
less than high school	0.27	0.25	0.21	0.22	0.22	0.24	0.20	0.21
high school	0.34	0.32	0.27	0.30	0.27	0.30	0.25	0.32*
some college education	0.19	0.22	0.25	0.24	0.26	0.24	0.26	0.25
college degree	0.17	0.18	0.23	0.21	0.21	0.19	0.24	0.18
college degree and higher	0.02	0.03	0.04	0.04	0.04	0.03	0.05	0.04
Interviewed Language: English	0.91	0.93	0.97	0.97	0.97	0.96	0.98	0.97
Self-reported Health Status								
Excellent	0.10	0.06*	0.04	0.04	0.04	0.04	0.06	0.04
Very good	0.16	0.15	0.13	0.12	0.11	0.11	0.15	0.13
Good	0.26	0.32	0.25	0.27	0.23	0.26	0.21	0.26
Fair	0.33	0.30	0.35	0.32	0.38	0.33	0.33	0.33
Poor	0.15	0.17	0.23	0.26	0.25	0.26	0.26	0.25

Table 2.1: Population Characteristics of Adults with Serious Psychological Distress by Barriers to Health Care Access (Continued)

	Being Uninsured		**Delaying Any Necessary Care**		**Forgoing Any Care**		**Could Not Afford Mental Health Care**	
	2014-2016	2011-2013	2014-2016	2011-2013	2014-2016	2011-2013	2014-2016	2011-2013
U.S. Census Region								
Northeast	0.09	0.11	0.11	0.12	0.10	0.12	0.10	0.11
Midwest	0.19	0.21	0.25	0.22	0.24	0.22	0.28	0.25
South	0.55	0.47*	0.43	0.44	0.45	0.45	0.34	0.43**
West	0.18	0.21	0.21	0.22	0.21	0.20	0.28	0.21**
n	553	923	992	1,182	903	1,082	591	767
Population size	242,789	395,156	455,377	541,569	408,738	489,292	268,886	353,020

Note: ***p<0.001; **p<0.01; *p<0.05 (2014-2016 vs. 2011-2013)

Table 2.2: Multivariable Logistic Regression for Adults with Serious Psychological Distress, Average Marginal Effects Reported



	Being uninsured		Delaying any necessary care		Forgoing any care		Could not afford mental health care	
	ME (standard error)	p	ME (standard error)	p	ME (standard error)	p	ME (standard error)	p
Year indicator								
2011	Reference		Reference		Reference		Reference	
2012	−0.04 (0.044)	0.02	−0.04 (0.023)	0.11	−0.04 (0.021)	0.07	−0.01 (0.021)	0.72
2013	−0.03 (0.018)	0.15	−0.09 (0.023)	<0.001	−0.07 (0.022)	<0.001	−0.05 (0.019)	0.02
2014	−0.08 (0.018)	<0.001	−0.07 (0.024)	0.01	−0.04 (0.022)	0.002	−0.06 (0.019)	<0.001
2015	−0.12 (0.017)	<0.001	−0.11 (0.022)	<0.001	−0.08 (0.022)	<0.001	−0.09 (0.018)	<0.001
2016	−0.14 (0.015)	<0.001	−0.12 (0.021)	<0.001	−0.13 (0.020)	<0.001	−0.08 (0.017)	<0.001
Race and ethnicity								
White	Reference		Reference		Reference		Reference	
African-American	−0.01 (0.019)	0.39	−0.08 (0.020)	<0.001	0.01 (0.019)	0.54	−0.06 (0.018)	<0.001
Latino	0.00 (0.019)	0.95	−0.07 (0.023)	0.01	−0.02 (0.021)	0.30	−0.04 (0.020)	0.07
Other	0.00 (0.025)	0.93	−0.01 (0.029)	0.73	−0.01 (0.029)	0.82	−0.08 (0.027)	0.01
Family income								
Below 100% federal poverty line (FPL)	Reference		Reference		Reference		Reference	
100–200% FPL	0.02 (0.014)	0.30	0.07 (0.017)	<0.001	0.04 (0.017)	0.03	0.00 (0.015)	0.94
Above 200% FPL	−0.09 (0.018)	<0.001	−0.05 (0.019)	0.02	−0.09 (0.019)	<0.001	−0.05 (0.018)	0.01
Other covariates	Controlled		Controlled		Controlled		Controlled	

Note: Average Marginal Effects (ME) were reported.

Other covariates included in the regressions were sex, marital status, education, citizenship status, interview language, census region, physical health, and limitations in activities of daily living.

Table 2.3: Estimated Average Differential Effect of ACA Implementation for Racial and Ethnic Minorities, and people with family income under 200% FPL, among populations with SPD

	Being Uninsured		**Delaying Any Necessary Care**		**Forgoing Any Care**		**Could Not Afford Mental Health Care**	
	Average Marginal Effects of post-ACA indicator		Average Marginal Effects of post-ACA indicator		Average Marginal Effects of post-ACA indicator		Average Marginal Effects of post-ACA indicator	
	ME (standard error)	**P**	**ME (standard error)**	**P**	**ME (standard error)**	**P**	**ME (standard error)**	**P**
All races/ethnicities	-0.11 (0.013)	<0.001	-0.06 (0.015)	<0.001	-0.05 (0.014)	<0.001	-0.06 (0.013)	<0.001
NH Black	-0.10 (0.014)	<0.001	-0.05 (0.014)	<0.001	-0.05 (0.014)	<0.001	-0.05 (0.012)	<0.001
Hispanic	-0.11 (0.014)	<0.001	-0.05 (0.014)	<0.001	-0.05 (0.014)	<0.001	-0.06 (0.012)	<0.001
Other race/ ethnicity	-0.11 (0.015)	<0.001	-0.06 (0.014)	<0.001	-0.05 (0.014)	<0.001	-0.05 (0.011)	<0.001
Low Income	-0.12 (0.014)	<0.001	-0.06 (0.015)	<0.001	-0.06 (0.015)	<0.001	-0.07 (0.014)	<0.001

Marginal effects produced by varying the characteristic of interest, i.e. 2014-2016 time frame. Other covariates included in the regressions were sex, marital status, education, citizenship status, interview language, census region, physical health, and limitations in activities of daily living.

Chapter 3: Care Coordination Among People with Serious Psychological Distress

INTRODUCTION

Salience of Care Coordination to Quality and Disparities

The National Quality Strategy identifies care coordination as one of six pillars foundational to improving healthcare (Agency for Healthcare Research and Quality, 2015). The working definition of care coordination provided by the Agency for Healthcare Research and Quality --marshalling and coordinating resources to carry out patient care (McDonald et al., 2007)—includes tasks such as medication reconciliation (making sure the medications the patient is taking are what they should be taking), exchanging information across settings of care and specialists, and IT-enabled care management. Such activities have been hypothesized to help address the needs of high-cost, high-needs patients (Sherry et al., 2016).

Patients experiencing serious psychological distress, as indicated by a Kessler-6 score of 13 or greater, may often fall into the "high-needs, high cost" category. The Kessler-6 screener for serious psychological distress has been validated for screening for psychological symptoms and referring people with a positive score to treatment and intervention (Egede & Dismuke, 2012; Kessler et al., 2002; Prochaska et al., 2012). Prior research has demonstrated that people with SPD are at higher risk for hospital readmission (Friedman, Jiang, & Elixhauser, 2008; Fuller, Atkinson, McCullough, & Hughes, 2013); use the emergency department at a higher rate than people without SPD (Alhussain et al., 2017); have worse outcomes following cardiac procedures (Vader et al., 2016); and are at higher risk for infection following surgery (D. S. Lee et al., 2016). Prior research suggests that those with SPD who are served by a patient-centered medical home (PCMH) are more likely to receive treatment for mental health conditions compared to people with SPD who are not served by a usual source of care that is a PCMH (A. L. Jones et al., 2015).

Medical-office level improvements in care coordination represent an important area for healthcare innovation (Shekelle et al., 2016). In terms of total volume, medical offices receive the most visits from patients annually, yet have historically been understudied in terms of how the safety, quality, and effectiveness of medical office services can be improved to bend the cost curve for patients and third-party payers. The purpose of this study is to examine whether medical-office-level provision of care-coordination services—as measured by being a patient-centered medical home model, using care coordinators, using EHR secure messaging, sending preventive care reminders, and providing reports to physicians on the quality of care they provide—varies by race and ethnicity, and, whether racial and ethnic minorities with SPD are more likely to be served by medical offices with less robust care-coordination services.

“Patient-centered medical home,” is an accreditation standard, and specifically means care that the services offered by a medical practice are comprehensive, patient centered, coordinated, accessible, and have high levels of safety and quality. In the context of people with SPD, this could mean that the PCMH that serves them has behavioral health treatment capabilities, or that their physician/provider that organizes their physical health care will be able to coordinate with their mental health care provider. The patient-centered medical home with integrated behavioral health services is especially salient to people with SPD. A PCMH involves all of the providers in a practice, and support staff such as nurses and medical assistants are educated on the principles of whole-person, coordinated care.

One of the staff positions that is required to be a certified PCMH is a care or case manager. While professional preparation for care/case managers may vary, these individuals most often have nursing backgrounds. The care/case manager uses the practices EHR to generate lists or dashboards of patients who may benefit from follow up. For example, there is significant activity around active care/case management of people with diabetes and chronic heart failure. The practice may also designate certain groups of individuals as high priority for follow-up, due to known high services utilization rates among that group. For example, some practices may target patients with schizophrenia due to the relatively poor ability of people with a schizophrenia to perform basic self-management functions. The role of the care/case manager is to proactively identify patients and populations with needs and connect them to services that will address these needs. To actively identify high-needs patients and populations requires real-time streams of data and information, which are only possible with an electronic health record (EHR).

In addition to supporting care/case management work, electronic health records are integral to the patient-centered medical home because they allow for population-level care coordination by case/care managers, allow for the electronic exchange of information between multiple physicians and settings of care,and allow for the generation of standing orders for preventive services, which can optimize uptake of preventive services and streamline patient flow through medical offices. Furthermore, electronic health records are necessary to enable secure electronic patient messaging and can be used to send preventive care reminders. Preventive care reminders can add value by encouraging well patients to receive evidence-based services. Some EHRs can send the preventive care reminder electronically, while other EHRs generate a list from which practices can send paper letters or postcards to their patients to come in for preventive care.

Conceptual Framework

The Andersen model of health services use is employed to guide selection of co-variates. The Andersen model has been widely used in the literature to examine health services use and contemplates demand-side factors as predisposing, enabling, and needs-based characteristics. The predisposing characteristics are the factors, such as gender and age, that could reasonably impact demand for services. The enabling characteristics include income and insurance, which allow people to gain health services when they are needed. Finally, the predisposing characteristics include chronic diseases, general health status, and mental health status as measured by serious psychological distress.

The key dependent variables included in this study to assess medical office adoption of care coordination practices include: being a certified patient-centered medical home (PCMH), using a care/case manager, using an electronic health record (EHR) to send patients secure electronic messages, sending preventive care reminders to patients, and showing providers reports on the quality of care that they provide.

According to the National Quality Care Alliance, patient-centered medical homes are comprehensive, coordinated, accessible, and committed to continuous quality improvement. In recognition of medical offices that have made significant commitments to improve patient-centeredness and quality of care, medical practices can apply to be certified as PCMHs. Once certified, PCMHs commit to providing care following best practices, and some PCMHs receive incentive payments from some private insurances. Ostensibly the practice transformation required to achieve PCMH certification improves the experience of care for both patients and providers through organization practices such as the use of health IT, care/case managers, setting aside time for same day appointments, establishing web portals for patients to be able to contact their provider for routine issues, and developing an organizational climate of continuous quality improvement.

In order to meet certification requirements, PCMHs must use EHRs. While the PCMH model has been scaled up significantly in the past 10 years, it is also helpful to understand that other policies drove non-PCMHs to increase their use of EHRs in the same time period. The Centers for Medicare and Medicaid Services (CMS) used its regulatory authority to incentivize the adoption and "meaningful use" of electronic health records following the American Recovering and Reinvestment Act (ARRA) of 2009 (Adler-Milstein et al., 2017; Singh, Bakken, Kindig, & Young, 2016). Under the meaningful use program, CMS established reporting requirements and meaningful-use incentives that provided bonus payments to hospitals and eligible providers to install and use electronic health records. The requirements were phased in over three waves—commonly referred to as meaningful use 1, meaningful use 2, and meaningful use 3 (Adler-Milstein & Jha, 2017). Each of the stages of meaningful use had an attestation requirement wherein eligible providers certified that their EHR could perform certain tasks—such as sending patients secure messages, or providing messages to providers in real time on evidence-based practices (also referred to as clinical decision support) (Eidus et al., 2012). The provision of incentive payments, combined with the threat of penalties beginning in 2019, induced most eligible providers to adopt EHRs and use them in place of paper records (Centers for & Medicaid Services, 2014).

Studies have been conducted to examine whether PCMH models improve use of needed services among people with serious psychological distress (A. L. Jones et al., 2015). Additionally, specific studies have addressed the feasibility of the aforementioned health IT components—clinical decision supports, secure messaging, and electronic exchange of health information (Abdus et al., 2015; J. E. Bailey, Pope, et al., 2013; Baldwin et al., 2018; Bauer et al., 2014; Machta, Maurer, Jones, Furukawa, & Rich, 2018). This is the first study I know of that empirically examines adoption of PCMH and electronic health functionality in medical offices between 2015-2016, in addition to whether care-coordination services reduce total or out-of-pocket expenditures among people by serious psychological distress status.

METHOD

Data

This study uses data from the 2015 and 2016 Medical Expenditure Panel Survey of households and medical offices. The MEPS is administered by the Agency for Healthcare Research and Quality, and is a nationally representative survey of noninstitutionalized household respondents that provides detailed data on household sociodemographic, employment, and health access and expenditures. The Agency for Healthcare Research and Quality (AHRQ) began administering the Medical Office Survey to medical offices named by household respondents as their usual source of care in 2015; I use both 2015 and 2016 Medical Office Survey data. To conduct the Medical Office Component of the survey, household members name the medical office where they are normally seen for the majority of their health needs, and AHRQ mails a survey to the practice. Respondents at both the household and medical office level are free to withdraw participation in the MEPS at any time. Household participation rate over the two years that each cohort completes varies between 70-80%.

Hypothesis

I hypothesize that racial and ethnic minorities are less likely than non-Hispanic Whites to be served by practices with care coordinators, that are certified patient-centered medical homes, that use EHR secure messaging, that send preventive care reminders, and that provide reports to physicians on the quality of care they provide.

Equation 3.1

$$CareCoor_i = f(\beta_0 + \beta_1 \times AfAm_i + \beta_2 AfAm_i \times SPDi + \beta_3 \times Hispanic_i + \beta_4 Hispanic_i \times SPDi + \beta_5 \times X_i)$$

I hypothesize that beta will have a negative sign for NH Blacks, Hispanics, and people with SPD. X_i is a vector for characteristics including sex, marital status, educational attainment, insurance status, income, and self-reported health. I categorize people by serious psychological distress status to evaluate whether care-coordination services impact those with SPD differentially and construct an interaction term between SPD and race/ethnicity to examine whether racial and ethnic sub-groups with SPD are less likely to be served by practices with the aforementioned care-coordination services.

Analysis

Descriptive statistics of the sample population and the subpopulation with SPD were developed. Population characteristics of adults aged 18-64 are presented in Table 3.1. In this sample, there was a total of 200 individuals with SPD observed in 2015, and 211 individuals with SPD in 2016, providing evidence of a population prevalence of SPD of 4.2% (95% confidence interval 3.6% to 4.7%), with a weighted estimate of 1,746,293 US adults aged 18-64 having SPD annually. Table 3.2 presents characteristics of the medical offices named as a usual source of care in 2015 and 2016. Stata 15 was used to conduct all analysis.

Dependent variables

My research question was whether people with SPD were served by practices with difference characteristics than people without SPD and whether there was any evidence of racial and ethnic disparities in the quality of practices used. There were five dependent variables that were examined to answer this question. The dependent variables of interest are whether:

- Patient used a practice that was recognized as a certified PCMH
- Patient used a practice that uses care/case managers
- Patient used a practice that provides clinicians with reports on the quality of care that they provide to patients
- Patient used a practice that sends patients preventive care reminders
- Patient used a practice that is able to send secure messages to patients electronically

Key independent variables

The key independent variable was serious psychological distress, which equaled 1 if the individual had a Kessler 6 summary score of 13 or greater and 0 otherwise.

Other Independent Variables

The Andersen model of health services use was selected to guide inclusion of independent variables. The independent variables included age (broken into bands of ages 18-25, 26-35, 36-45, 46-55, and 56-64); race/ethnicity (defined as non-Hispanic White, non-Hispanic Black, Hispanic-all races, and non-Hispanic other); marital status (defined as married or not), educational achievement (defined as less than high school, high school, some college, 4-year college degree, or more than 4 years of college); U.S. nativity status, defined as born in the U.S.A. or not; interview language (defined as English, Spanish, or other 3rd language), income category (defined as poor, near poor, low income, middle income, or high income), insurance coverage (private insurance, public insurance, and uninsured), region (Northeast, Midwest, South, or West) and the year (either 2015 or 2016).

Sample

Characteristics of the medical offices named as usual sources of care services are presented in Table 2. There were a total of 3,767 usual sources of care matched to a U.S. adult aged 18-64 in 2015 and 4,279 in 2016. Averaged across 2015 and 2016, among the medical offices named as regular sources of care for this population, 59% reported using care managers, 50% reported being a certified patient-centered medical home, 70% reported using practice reminders for clinicians in their EHRs (clinical decision supports), 81% sent secure messages to their patients through their EHR, 91% reported supplying reports to clinicians on the quality of the provider's care, and 91% sent messages to their patients to come in for preventive care.

Population Characteristics

The population was assessed by the proportion of SPD across sociodemographic factors. Among those who did not have SPD, 11% were aged 18-25, 17% were aged 26-35, 19% were aged 36-45, 26% were aged 46-55, and 27% were aged 56-64. Among those who did have SPD, 9% were aged 18-25, 15% were aged 26-35, 16% were aged 36-45, 29% were aged 46-55, and 29% were aged 56-64 (p for trend = 0.003), suggesting unequal distribution of SPD by age, with older people more likely to have SPD. Among those who did not have SPD, 41% were male, and 59% were female; among those that did have SPD, 37% were male, and 63% were female (chi-Square for unequal distribution = 0.053). Among those who did have SPD, 37% were married, and 63% were not married ($p < 0.000$). the burden of SPD distribution also differed by educational attainment. Among those without SPD, 12% had less than high school education, 15% had a high school education, 48% had some college, 17% were college graduates, and 7% had more than a four-year degree. Among those with SPD, 25% had less than high school education, 20% had a high school education, 47% had some college, 6% were college graduates, and 1% had more than a four-year degree ($p < 0.000$). The prevalence of SPD varied by race and ethnicity though these differences did not reach statistical significance. The distribution of SPD varied significantly by country of birth. Among those without SPD, 84% were born in the U.S.A., and 16% were not born in the U.S.A.. Among those with SPD, 90% were born in the USA while 10 percent were foreign born ($p < 0.005$).

There were statistically significant differences in the distribution of SPD by income level. Among those who were poor, 87% did not have SPD, while 13 percent had SPD. Those who were near-poor had 94% without SPD, and 6% with SPD. Those who were low-income had 93% without SPD and 7% with SPD. Those who were middle-income had 97% without SPD and 3% with SPD. Finally, those who were high-income had 98% without SPD and 2% with SPD ($p < 0.000$). Differences by insurance status were also observed. The privately insured had 98% of people without SPD and 2% with SPD. Those who were publicly insured had 86% without SPD and 14% with SPD. Among the uninsured, 95% reported no SPD while 5% had SPD ($p < 0.000$). Trends in the proportions of SPD by region of the U.S. and year were non-significant.

There were major differences in the distribution of SPD by self-reported physical health status. Among those who reported excellent physical health, 99% reported no SPD, while 1% had SPD. Those who categorized their health as “very good” saw 98.5% of respondents without SPD and 1.5% of respondents with SPD. Among those who reported “good” health status, 96% had no SPD, while 4% had SPD. Those reporting “fair” health-status, had 89% with no SPD while 11% had SPD. Finally, for those reporting “poor” physical health, 76% reported no SPD while 24% had SPD.

RESULTS

The outcomes of interest were the odds of being served by a medical home, and a practice that used care/case managers, sent preventive care reminders, gave reports to their physicians on the quality of care that they provide, and that used secure messaging to communicate with their patients.

I first present the characteristics of the sample of Medical Expenditure Survey Panel respondents with a usual source of care in Table 1. As has been discussed, I presented the characteristics in the practices that were named as a usual source of care in Table 2. In this results section, I present the odds ratios for being served at a practice that provides certain types of services. A total of five practice-level care provision features were examined as key independent variables: 1) Certified PCMH; 2) Care/case managers; 3) Sending preventive care reminders to patients; 4) Reports to physicians on the quality of care; and, 5) EHR secure messaging.

Model 1 –Logistic Regression Results PCMH

First, I fit a logistic regression model of the odds of having a usual source of care that is a patient-centered medical home (Model 1). Among practices named as a usual source of care, 49% were certified PCMHs in 2015 and 50% were certified PCMHs in 2016. SPD was not a predictor of being seen at a usual source of care that was a certified PCMH. Age, marital status, race/ethnicity, insurance status, family income level, US nativity, interview language, and self-report of physical health were not predictors of being seen at a practice that was a certified patient-centered medical home. Females were more likely to be seen at PCMH (OR 1.14 ($p < 0.03$). Compared to those without high school degrees, those with high school, some college, and college degrees were less likely to be seen at certified PCMHs. Those in the southern region of the U.S. were less likely to be seen at a certified PCMH (OR 0.49 (p <0.000).

Model 2 –Logistic Regression Results Care/Case Managers

In terms of practices using case managers, 56% and 61% used case managers in 2015 and 2016 respectively (p < 0.005). In the logistic regression Model 2 that controlled for the Andersen domains, SPD was not a predictor of being seen at a usual source of care that used care/case managers. Age, sex, marital status, insurance status, educational achievement, family income level, US nativity, interview language, and self-report of physical health were not predictors of being seen at a practice with a case manager. Hispanics were more likely to be seen by a usual source of care that had a care/case manager (OR 1.29 (p <0.03).

Model 3 –Logistic Regression Results Preventive Care Reminders

Odds ratios of being seen at a practice that sent preventive care reminders were calculated and examined using a logistic regression model (Model 3). Overall, 90% and 92% of practices reported that they sent preventive care reminders to patients in 2015 and 2016 respectively. Patients that had SPD were more likely to be seen at a usual source of care that sends preventive care reminders, compared to those without SPD (OR 1.64 (p < 0.05)). The odds of being served by a practice that sent preventive care reminders did not vary by age, sex, education, family income, insurance coverage, region, U.S.-born status, or self-report of physical health. However, those who were not married were less likely to receive preventive care reminders (OR 0.73 (p <0.05)). African-Americans (OR 1.79 (p <0.005)) and those who had their interview in Spanish (2.87 (p <0.000)) were more likely to receive preventive care reminders from their usual source of care, compared with non-Hispanic Whites and those who had their MEPS interview in English.

Model 4 –Logistic Regression Results Quality of Care Reports for Physicians/Providers

Next, I examined the odds of being seen at a usual source of care that provided reports to doctors/clinicians on the quality of care that they provide to patients (Model 4). The use of quality reports for providers was 90% in 2015 and 92% in 2016 (p for trend <0.000). Having SPD did not impact the odds of having a usual source of care that had quality reports. The use of quality reports did not vary at statistically significant levels across age, sex, marital status, education status, family income level, insurance coverage, region of the U.S., U.S. nativity, or self-report of physical health. Hispanics (OR 0.66 (p <0.02)) were less likely to be seen at a practice that used quality reports for providers; however, those who spoke Spanish in their MEPS interview were more likely (OR 2.00 (p <0.02)) than the English-speaking comparator group to have a usual source of care that provided doctors and clinicians with reports on the quality of care that they provided.

Model 5–Logistic Regression Results Secure Message Exchange

Finally, I calculated trends and odds of having a usual source of care that was able to exchange messages securely with their patients (Model 5). There were no statistically significant differences by SPD status, age, sex, marital status, educational attainment, race/ethnicity, insurance coverage, region, U.S. nativity, interview language, or self-report of health in the ability of patients to exchange messages securely with their usual source of care. Those that were college educated were more likely to be served by a practice that was able to send secure messages (OR 1.37 (p = 0.052)).

DISCUSSION

This study found limited evidence that NH Blacks, Hispanics, and NH Blacks or Hispanics with SPD had lower odds of being served by practices with low levels of care-coordination infrastructure. Specifically, I assessed whether patients were served at usual sources of care 1) that were certified patient-centered medical homes, 2) that used care/case managers, 3) that provide quality of care reports to physicians/providers, 4) that send patients reminders to come in for preventive care, and 5) that have the capability to exchange messages securely and electronically with patients. The results from this study found that the Andersen model of health services use was not a good fit for explaining differences in practice characteristics, and model fit was non-significant. It would be less likely to be seen at practices with robust care coordination features.

I found mixed evidence in this study, with Hispanics more likely to have a usual source of care with case/care managers. Non-Hispanic Blacks with SPD were also more likely to have a usual source of care with case managers. People in the South were less likely to have usual sources of care with case managers. Overall there was an increase use of case managers between 2015 and 2016.

Patient-centered medical home is a way of organizing care delivery around the needs of the patient. In my second study I found that females were more likely to be seen at a PCMH. Compared with those with less than high school, those with high school, some college, and college degrees were less likely to be seen at a PCMH. Hispanics with SPD less likely to have a usual source of care that was a PCMH. People in the South were less likely to be seen at a usual source of care that was a PCMH. I found no evidence that Non-Hispanic Blacks were less likely to be seen at a PCMH, and this did not vary by SPD status.

Quality of care reports can be an important mechanism for letting doctors and providers know if they are supplying evidence-based care. I found that Hispanics were less likely to be seen at a usual source of care that provided quality of care reports to doctors. However, people who had the interview in Spanish were more likely to be seen at practices that used quality of care reports. Overall, use of quality of care reports increased among usual sources of care for U.S. adults aged 18-64 between 2015 and2016.

Preventive care reminders can help people remember to come in for preventive care. People who were not married were less likely to be seen at usual sources of care that sent preventive care reminders Non-Hispanic Blacks were more likely to be seen at usual sources of care that sent preventive care reminders. People who had the interview in Spanish were more likely to have usual sources of care that sent preventive care reminders.

The ability to send secure, electronic messages has been hypothesized as a way to increase patient engagement. I find that middle-income people were more likely to be seen at usual sources of care that had the capacity to send secure electronic messages. Furthermore, usual sources of care for US adults aged 18-64 increased their capability to send secure electronic messages between 2015 and 2016. There was no evidence of racial/or ethnic disparities in being seen at a practice that uses secure messaging.

Limitations

This study used 2 years of data, and it is possible that additional data years might have provided additional insight on provision of care-coordination services. Unlike the first study that had a pre- and post-ACA period, this study uses only data for the period of time after the ACA expanded insurance coverage. It is possible that if earlier years of data were available that in the pre-ACA era, that lack of health insurance coverage would have resulted in NH Blacks, Hispanics and those with SPD being more likely to be served by practices with less robust care-coordination services.

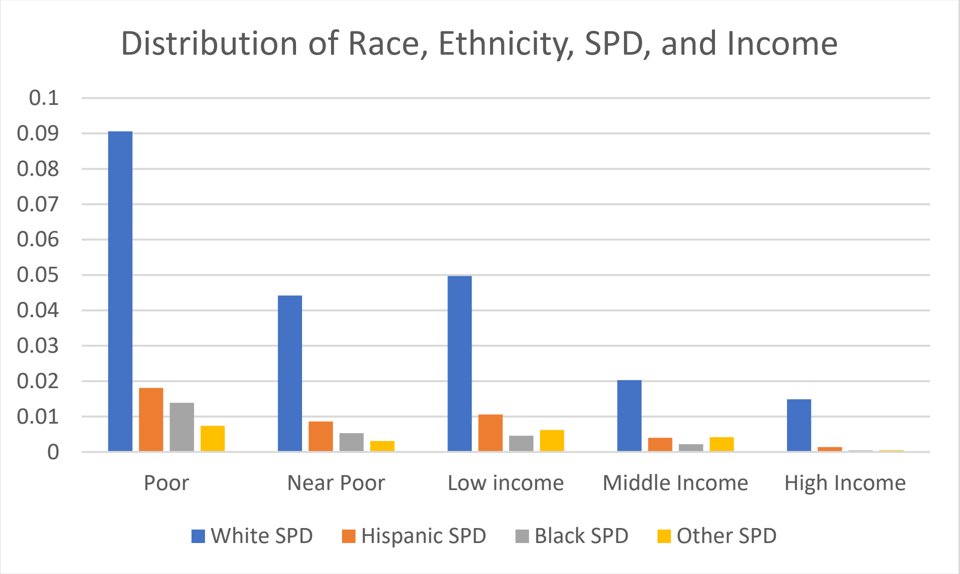
In 2017, the Centers for Medicare and Medicaid Services expanded clinician's ability to bill for care-coordination services, and it is possible that in subsequent years after 2016, care-coordination infrastructure continued to expand in response to the possibility of receiving payment for care-coordination services.

CONCLUSION

This study adds to the literature on care coordination at the medical office level among adults aged 18-64 by race, ethnicity, and serious psychological distress status, finding that NH Blacks, Hispanics, and people with serious psychological distress had similar odds of being served by practices with similar care-coordination practices in comparison with the NH White without SPD comparator group.

FIGURES

Figure 3.1: SPD by Race, Ethnicity, and Income (survey weights used)



Pearson: Uncorrected chi-squared (16) = 286.4886. Design-based F (11.13, 2180.50)= 18.7839 P = 0.0000

TABLES

Table 3.1: Prevalence of SPD by select sociodemographic factors (survey weights used)

	No SPD Proportion(Std Error)	**Yes, SPD Proportion (Std Error)**	**P Value**
Age (18-25)	0.1161 (.0058)	0.0994 (.0186)	
26-35	0.1748 (.0079)	0.1489 (.0262)	
36-45	0.1859 (.0066)	0.1759 (.0276)	
46-55	0.2574 (.0068)	0.2867 (.0291)	
56-64	0.2656 (.0085)	0.2889 (.0262)	Pr = 0.003
Sex			
Male	.4092 (.0077)	.3668 (.0305)	
Female	.5907 (.0077)	.6331 (.0305)	Pr = 0.053
Marital Status			
Married	.5689 (.0096)	.3814 (.0320)	
Not Married	.4310 (.0096)	.6185 (.0320)	Pr = 0.000
Education			
Less than high school	.1215 (.0050)	.2516 (.0286)	
High School	.1539 (.0065)	.1995 (.0263)	
Some College	.4827 (.0095)	.4704 (.0316)	
College	.1685 (.0066)	.0638 (.0158)	
More than 4 years of college	.0732 (.0044)	.0145 (.0068)	Pr = 0.000
Race/Ethnicity			
Non-Hispanic white	.6653 (.0120)	.7234 (.0290)	
Hispanic, all races	.1482 (.0097)	.1281 (.0164)	
Black, non-Hispanic	.1073 (.0073)	.0759 (.0113)	
Other, non-Hispanic, non-White	.0791 (.0064)	.0724 (.0173)	Pr = 0.125
U.S. Born Status			
U.S. Born	.8445 (.0082)	.9003 (.0147)	
Foreign Born	.1554 (.0082)	.0996 (.0147)	Pr = 0.002
Income Level			
Poor	.8700 (.0120)	.1300 (.0120)	
Near Poor	.9387 (.0144)	.0612 (.0144)	
Low Income	.9289 (.0102)	.0710 (.0102)	
Middle Income	.9693 (.0040)	.0306 (.0040)	
High Income	.9827 (.0031)	.0172 (.0031)	Pr = 0.000

Insurance status			
Private insurance	.9814 (.0019)	.0185 (.0019)	
Public insurance	.8681 (.0100)	.1318 (.0100)	
Uninsured	.9517 (.0127)	.0482 (.01279)	Pr = 0.000
Region			
Northeast	.9725 (.0041)	.0274 (.00416)	
Midwest	.9505 (.0068)	.0494 (.0068)	
South	.9566 (.0043)	.0433 (.0043)	
West	.9553 (.0066)	.0446 (.0066)	Pr = 0.225
Self-rating of physical health			
Excellent	.9907 (.0032)	.0092 (.0032)	
Very Good	.9850 (.0037)	.0149 (.0037)	
Good	.9608 (.0045)	.0391 (.0045)	
Fair	.8903 (.0097)	.1096 (.0097)	
Poor	.7628 (.0272)	.2371 (.0272)	Pr = 0.000
Year			
2015	.9575 (.0037)	.0424 (.0037)	
2016	.9582 (.0037)	.0417 (.0037)	Pr = 0.447

Table 3.2: Characteristics of Medical Offices named as Usual Sources of Care, Expressed as Percent, by Year

Year	**2015**	**2016**	**P Value**
Yes, ACO	64.95	68.79	
No ACO	35.05	31.21	Pr = 0.003
Case Manager			
Yes, Case Manager	56.21	61.8	
No Case Manager	43.79	38.2	Pr = 0.000
CDS Reminders			
CDS reminders, yes	89.22	87.51	
CDS reminders, no	10.78	12.49	Pr= 0.033
Practice is a certified Patient-Centered Medical Home			
Yes, PCMH	49.48	49.83	
No, not PCMH	49.80	50.52	P = 0.558
Practice provides reports to clinicians on the quality of care they provide			
Yes, provide quality reports to providers	90.05	92.74	
No, no quality reports	9.95	7.26	P= 0.000
Practice sends messages to patients to come in for preventive services			
Yes, send preventive care reminders to patients	90.12	92.01	
Do, don't send preventive care reminders to patients	9.88	7.99	P= 0.003
Providers have the capability to send secure messages to patients through the practice EHR			
Yes, use secure messaging between providers and patients	78.39	83.88	
No, does not use secure messaging between providers and patients	21.61	16.12	P= 0.000
Practice sets aside time for same day appointments			
Yes, set aside time for same day appointments	94.24	95.19	
No, do not set time aside for same day appointments	5.76	4.81	P = 0.056

Table 3.3: Logistic Regression Examining Use Patient Centered Medical Homes

Variables (Reference category)	Prob > F	=	0.0000	
Age (18 - 25)	Odds Ratio	P>t	95% Confidence Interval	
26-35	1.21	0.20	0.90	1.62
36-45	1.04	0.81	0.78	1.38
46-55	1.21	0.13	0.94	1.55
56-64	1.18	0.22	0.90	1.56
Sex (Male)				
Female	1.15	**0.02**	1.02	1.29
Marital Status (Married)				
Unmarried	0.93	0.42	0.79	1.11
Education (Less than high school)				
High School	0.76	**0.02**	0.60	0.96
Some College	0.77	**0.01**	0.63	0.94
College	0.74	**0.05**	0.55	1.00
More than 4 years college	1.06	0.77	0.73	1.54
Race/Ethnicity (NH White)				
Hispanic, all races	1.00	0.99	0.78	1.29
Black, non-Hispanic	1.17	0.20	0.92	1.48
Other, non-Hispanic, non-White	0.95	0.66	0.73	1.22
SPD Status (No SPD)				
Yes, SPD	1.19	0.40	0.80	1.76
Interaction of Race/Ethnicity with SPD (NH White with SPD)				
Hispanic with SPD	0.55	**0.05**	0.30	1.01
NH Black with SPD	0.86	0.72	0.37	2.00
Asian/Other with SPD	0.63	0.45	0.18	2.14
Income Category (Poor)				
Near Poor	1.18	0.37	0.82	1.69
Low Income	1.12	0.44	0.84	1.50
Middle Income	1.14	0.29	0.89	1.47
High Income	0.91	0.50	0.69	1.20
Insurance Coverage (Private)				
Public	1.08	0.46	0.88	1.33
Uninsured	1.28	0.09	0.97	1.69

	Odds Ratio	P>t	95% Confidence Interval	
Region (Northeast)				
Midwest	1.08	0.70	0.72	1.63
South	0.49	**0.00**	0.36	0.67
West	0.76	0.10	0.55	1.05
Interview Language (English)				
Spanish	0.93	0.70	0.64	1.35
Other	0.82	0.48	0.47	1.43
U.S. Nativity (U.S. Born)				
Not U.S. Born	0.92	0.46	0.74	1.15
Self-Reported Physical Health (Excellent)				
Very Good	1.19	0.11	0.96	1.47
Good	1.18	0.11	0.96	1.44
Fair	0.95	0.69	0.75	1.21
Poor	1.02	0.91	0.72	1.44
Year (2015)				
2016	0.94	0.48	0.78	1.12

Table 3.4: Logistic Regression Examining Use of Case Managers

Variables (Reference category)	Prob > F	=	0.0000	
	Odds Ratio	P>t	95% Confidence Interval	
Age (18-25)				
26-35	1.18	0.25	0.89	1.57
36-45	1.06	0.68	0.79	1.43
46-55	1.03	0.82	0.77	1.39
56-64	1.14	0.37	0.85	1.53
Sex (Male)				
Female	1.02	0.78	0.91	1.14
Marital Status (Married)				
Unmarried	0.99	0.93	0.84	1.18
Education (Less than high school)				
High School	0.92	0.48	0.72	1.17
Some College	1.05	0.68	0.84	1.30
College	0.87	0.31	0.66	1.14
More than 4 years college	0.87	0.42	0.63	1.22
Race/Ethnicity (NH White is the comparator group)				
Hispanic, all races	1.29	**0.03**	1.02	1.63
Black, non-Hispanic	1.14	0.26	0.91	1.43
Other, non-Hispanic, non-White	1.06	0.64	0.83	1.36
SPD Status (No SPD is the Comparator Group)				
Yes, SPD	0.85	0.38	0.60	1.22
Interaction of Race/Ethnicity with SPD				
Hispanic with SPD	1.18	0.62	0.61	2.27
NH Black with SPD	3.25	**0.01**	1.42	7.41
Asian/Other with SPD	1.28	0.66	0.42	3.87
Income Category (Poor)				
Near Poor	1.25	0.21	0.88	1.78
Low Income	1.01	0.93	0.77	1.34
Middle Income	0.96	0.76	0.76	1.22
High Income	0.95	0.70	0.72	1.24
Insurance Coverage (Private)				
Public	1.07	0.52	0.88	1.30
Uninsured	1.08	0.59	0.81	1.44

Region(Northeast)	Odds Ratio	P>t	95% Confidence Interval	
Midwest	1.07	0.69	0.76	1.51
South	0.63	**0.00**	0.49	0.83
West	0.89	0.38	0.68	1.16
Interview Language (English)				
Spanish	1.20	0.32	0.84	1.71
Other	0.84	0.57	0.46	1.53
U.S. Nativity (U.S. Born)				
Not U.S. Born	1.06	0.59	0.85	1.32
Self-Reported Physical Health (Excellent)				
Very Good	1.06	0.59	0.87	1.29
Good	1.00	0.98	0.82	1.23
Fair	0.93	0.56	0.74	1.18
Poor	0.83	0.25	0.60	1.14
Year (2015)				
2016	1.47	**0.00**	1.25	1.72

Table 3.5: Logistic Regression Examining Odds of Being Served by a Practice that Sends Preventive Care Reminders

		Prob > F	= 0.005	
Variables (Reference category)	Odds Ratio	P>t	95% Confidence Interval	
Age (18 - 25)				
26-35	1.19	0.41	0.78	1.82
36-45	1.00	1.00	0.67	1.50
46-55	1.00	1.00	0.63	1.58
56-64	1.24	0.33	0.81	1.89
Sex (Male)				
Female	1.05	0.68	0.84	1.31
Marital Status (Married)				
Unmarried	0.73	**0.03**	0.55	0.96
Education (Less than high school)				
High School	1.20	0.40	0.78	1.83
Some College	1.22	0.25	0.87	1.72
College	1.18	0.49	0.74	1.86
More than 4 years college	1.17	0.62	0.62	2.20
Race/Ethnicity (NH White is the comparator group)				
Hispanic, all races	0.93	0.75	0.60	1.45
NH Black	1.83	**0.00**	1.22	2.72
Asian/Other	1.09	0.72	0.68	1.74
SPD Status (No SPD is the Comparator Group)				
Yes, SPD	1.62	0.12	0.89	2.97
Interaction of Race/Ethnicity with SPD				
Hispanic with SPD	1.08	0.89	0.34	3.45
NH Black with SPD	0.54	0.28	0.17	1.68
Asian/Other with SPD	2.80	0.37	0.30	26.30
Income Category (Poor)				
Near Poor	1.14	0.67	0.62	2.09
Low Income	1.03	0.87	0.72	1.47
Middle Income	1.06	0.73	0.74	1.52
High Income	1.02	0.91	0.68	1.54
Insurance Coverage (Private)				
Public	1.31	0.12	0.93	1.84
Uninsured	0.87	0.52	0.57	1.33

	Odds Ratio	P>t	95% Confidence Interval	
Region (Northeast)				
Midwest	0.99	0.98	0.59	1.69
South	0.68	0.07	0.45	1.04
West	1.27	0.27	0.83	1.95
Interview Language (English)				
Spanish	2.86	**0.00**	1.61	5.08
Other	1.06	0.89	0.45	2.49
U.S. Nativity (U.S. Born)				
Not U.S. Born	1.07	0.71	0.76	1.49
Self-Reported Physical Health (Excellent)				
Very Good	1.03	0.83	0.77	1.39
Good	1.12	0.42	0.84	1.49
Fair	1.01	0.95	0.73	1.40
Poor	1.37	0.29	0.76	2.46
Year (2015)				
2016	1.48	**0.02**	1.07	2.06

Table 3.6: Logistic Regression Examining Use of Clinician Level Quality Reports

	Prob > F	=	0.1056	
Variables (Reference category)	Odds Ratio	P>t	95% Confidence Interval	
Age (18 - 25)				
26-35	0.86	0.46	0.56	1.30
36-45	1.01	0.95	0.63	1.64
46-55	0.78	0.26	0.50	1.21
56-64	0.90	0.61	0.62	1.33
Sex (Male)				
Female	1.13	0.20	0.94	1.36
Marital Status (Married)				
Unmarried	0.86	0.21	0.68	1.09
Education (Less than high school)				
High School	0.95	0.84	0.61	1.49
Some College	1.00	0.99	0.69	1.47
College	0.95	0.85	0.59	1.55
More than 4 years college	1.09	0.79	0.56	2.12
Race/Ethnicity (NH White)				
Hispanic, all races	0.67	**0.02**	0.47	0.94
Black, non-Hispanic	1.16	0.43	0.80	1.66
Asian/Other	0.68	0.15	0.40	1.15
SPD Status (No SPD)				
Yes, SPD	1.46	0.31	0.71	3.03
Interaction of Race/Ethnicity with SPD				
Hispanic with SPD	0.79	0.68	0.25	2.49
NH Black with SPD	1.31	0.75	0.25	6.93
Asian/Other with SPD	5.23	0.14	0.57	47.71
Income Category (Poor)				
Near Poor	1.64	0.19	0.78	3.44
Low Income	1.34	0.41	0.67	2.71
Middle Income	1.24	0.56	0.59	2.61
High Income	1.27	0.58	0.54	2.97
Insurance Coverage (Private)				
Public	1.33	0.22	0.85	2.09
Uninsured	0.73	0.26	0.42	1.27

Model 3.6: Logistic Regression Examining Use of Quality Reports, Continued

	Odds Ratio	P>t	95% Confidence Interval	
Region (Northeast)				
Midwest	1.27	0.36	0.76	2.10
South	0.99	0.95	0.66	1.47
West	1.21	0.37	0.79	1.86
Interview Language (English)				
Spanish	2.00	**0.02**	1.13	3.54
Other	1.90	0.30	0.56	6.49
U.S. Nativity (U.S. Born)				
Not U.S. Born	1.18	0.39	0.81	1.72
Self-Reported Physical Health (Excellent)				
Very Good	0.96	0.78	0.70	1.31
Good	1.03	0.83	0.78	1.37
Fair	1.06	0.74	0.76	1.48
Poor	1.18	0.60	0.64	2.19
Year (2015)				
2016	1.52	**0.01**	1.13	2.03

Table 3.7: Logistic Regression Examining Use of Secure Messaging

Variables (Reference category)	Odds Ratio	P>t	95% Confidence Interval	
Prob > F = 0.0000				
Age (18 - 25)				
26-35	1.10	0.61	0.75	1.62
36-45	1.07	0.72	0.75	1.52
46-55	1.00	0.99	0.75	1.34
56-64	1.22	0.25	0.87	1.70
Sex (Male)				
Female	1.08	0.30	0.93	1.25
Marital Status (Married)				
Unmarried	0.92	0.42	0.76	1.12
Education (Less than high school)				
High School	1.05	0.77	0.74	1.50
Some College	1.14	0.33	0.87	1.49
College	1.22	0.26	0.86	1.74
More than 4 years college	1.24	0.41	0.74	2.08
Race/Ethnicity (NH White is the comparator group)				
Hispanic, all races	0.98	0.89	0.71	1.35
NH Black	0.86	0.30	0.66	1.14
Asian/Other	0.72	0.08	0.51	1.04
SPD Status (No SPD is the Comparator Group)				
Yes, SPD	0.93	0.75	0.58	1.48
Interaction of Race/Ethnicity with SPD				
Hispanic with SPD	1.45	0.33	0.68	3.08
NH Black with SPD	0.97	0.94	0.46	2.04
Asian/Other with SPD	2.60	0.14	0.74	9.17
Income Category (Poor)				
Near Poor	1.09	0.66	0.74	1.62
Low Income	0.96	0.81	0.70	1.33
Middle Income	1.37	**0.05**	0.99	1.88
High Income	1.19	0.41	0.79	1.77
Insurance Coverage (Private)				
Public	0.97	0.80	0.74	1.26
Uninsured	0.77	0.12	0.55	1.07

	Odds	P>t	95% Confidence

	Ratio			Interval
Region (Northeast)				
Midwest	1.13	0.55	0.75	1.71
South	0.74	0.07	0.53	1.02
West	0.80	0.24	0.54	1.17
Interview Language (English)				
Spanish	0.83	0.43	0.53	1.31
Other	0.62	0.21	0.29	1.32
U.S. Nativity (U.S. Born)				
Not U.S. Born	0.91	0.47	0.70	1.18
Self-Reported Physical Health (Excellent)				
Very Good	1.31	0.09	0.96	1.79
Good	1.37	0.07	0.98	1.94
Fair	1.08	0.67	0.76	1.54
Poor	1.31	0.25	0.83	2.07
Year (2015)				
2016	1.40	**0.00**	1.13	1.73

Chapter 4: Disparities in Provision of Diabetes Management Services among U.S. Adults Aged 18-64 by Race, Ethnicity, and Serious Psychological Distress Status

INTRODUCTION

Approximately 26 million Americans had doctor-diagnosed diabetes in 2015, and the number is expected to increase to at least 41 million Americans by 2030 (Geiss et al., 2014; Rowley et al., 2017). Evidence on best practices in diabetes treatment and management is readily available; the American Diabetes Association (ADA) recommends at least 2 glycosylated hemoglobin (HbA1c) tests per year among people with doctor-diagnosed diabetes. As part of the standards of care, the ADA also recommends annual diabetic foot exams and eye exams, and that all individuals with diagnosed diabetes receive annual influenza vaccination (Fox et al., 2015). Research suggests that even when such clear evidence on clinical treatment for diabetes management are available, it is often not used by clinicians (Y. Chen, Sloan, & Yashkin, 2015; Hashmi & Khan, 2016). Furthermore, studies suggest that clinicians often undertreat racial/ethnic minorities, even when evidence-based treatment options are well known (Schulman et al., 1999).

Racial and ethnic minority groups have historically had less health insurance coverage than Non-Hispanic Whites. The Affordable Care Act aimed to increase health insurance coverage for all, and was to some extent, successful in achieving that aim (Ali et al., 2015; Sommers, Mc, Blendon, Benson, & Sayde, 2017). However, the research documents that even when insured, compared to Non-Hispanic Whites (NH Whites), Non-Hispanic Blacks (NH Blacks) and Hispanics are less likely to have a usual source of care (Hargraves & Hadley, 2003), less likely to receive preventive care(Abdus et al., 2015), and more likely to receive generic medications (J. Chen & Rizzo, 2008). Taken together, the evidence suggests the possibility that health insurance alone does not increase the use of evidence-based services such as recommended HbA1c tests, among populations with diabetes that need them.

Another group that may frequently be undertreated by health care professionals, is people with Serious Psychological Distress (SPD). SPD is not a clinical diagnosis; rather it has been defined in the literature as distress serious enough to warrant additional evaluation, and is defined as present if an individual scores 13 or more on a Kessler-6 screener (P. K. Muhuri, 2013). The Kessler-6 was developed by Ron Kessler for population screening for mental illness. It asks a variety of questions on depressed, anxious, hopeless, and restless feelings, and weights them according to respondent report of normalcy and persistence over the past 30 days (Kessler et al., 2003). The population prevalence of SPD in the US normally ranges from 3-5% among adults aged 18-64 (Alhussain et al., 2017; Novak P & Chen J, 2017; Okoro et al., 2014; Pratt, Dey, & Cohen, 2007). However, in people with diabetes, the prevalence of SPD tends to be much higher (Egede & Dismuke, 2012). There are a number of reasons why this is so. First, there is a well-established bi-directional relationship between diabetes and depression (Golden et al., 2008). Second, people with diabetes are at risk for "diabetes distress," a phrase that describes anxiety and hopelessness associated with a diabetes diagnosis, as the prognosis for diabetes is generally one of "having it for the rest of your life" (Belvederi Murri et al., 2017; Perrin, Davies, Robertson, Snoek, & Khunti, 2017; Pibernik-Okanovic et al., 2015; Saydah, Imperatore, & Beckles, 2013; Snoek, Bremmer, & Hermanns, 2015). There have been a number of studies documenting that people with diabetes and SPD have higher expenditures(Okumura & Ito, 2013; Pearson et al., 2009), poorer outcomes (Walker, Gebregziabher, Martin-Harris, & Egede, 2014b), and are less likely to receive preventive services (Okoro et al., 2014) such as the recommended number of glycated hemoglobin tests per year. People who screen positive for SPD may be under-activated to self-manage their diabetes (Blixen et al., 2016; Chiauzzi, Rodarte, & DasMahapatra, 2015; Hermanns et al., 2015; Hernandez et al., 2016; Maneze, Everett, Astorga, Yogendran, & Salamonson, 2016). Thus, ensuring that health care providers prioritize care management (Y. Chen et al., 2015) among these high-needs patients is warranted to help prevent further deterioration.

This study investigates the provision of at least two HbA1c tests per year among Non-Hispanic Whites (NH White), Non-Hispanic Blacks (NH Blacks) and Hispanics, following the expansion of health insurance coverage through the Affordable Care Act (ACA). The ACA came into full effect on January 1, 2014. There are several key provisions that are salient to the provision of glycated hemoglobin tests among people with diabetes. Firstly, the ACA required that all Americans purchase health insurance or pay a penalty. The penalty was waved for very low-income individuals. Furthermore, low-income individuals could receive health insurance through state-sponsored Medicaid programs or through health insurance exchanges that were run in every state. Additionally, the ACA required that certain "preventive" services be covered at no cost to covered individuals. Glycated hemoglobin was selected as the focus of this study, given that it is mandated for coverage at no cost-sharing by the United States Preventive Services Task Force, and the close relationship between glycemic control and the prevention of renal disease and amputations (Y. Chen et al., 2015; Diabetes et al., 1993; Tricco et al., 2012). Glycated hemoglobin reflects long-term glycemic control and provides a better clinical picture of glycemic management than spot checks (Kirk et al., 2006; Suckow et al., 2016).

Our hypothesis is that NH Blacks and Hispanics will be less likely to receive the evidence-supported two or more HbA1c tests per year, and that people with SPD will be less likely to receive the tests compared to people without SPD. After the ACA, we hypothesize that

NH Blacks and Hispanics will see greater improvements in the provision of HbA1c tests than the NH White comparator group. We test whether these improvements varied by SPD status by analyzing six categories: NH White without SPD, NH White with SPD, NH Black without SPD, NH Black with SPD, Hispanics without SPD, and Hispanics with SPD. While other scholars have examined racial and ethnic disparities in the provision of HbA1c tests using 2010 or 2013 data alone (Canedo et al., 2018)·(Hu et al., 2014), this is the first study that we know of to examine the important question on how provision of HbA1c tests may have improved following health insurance expansion after the implementation of the ACA in 2014.

Research Design and Methods

Data Source

This study uses data from the 2012-2016 Medical Expenditure Panel Survey (MEPS). The MEPS is administered by the Agency for Healthcare Research and Quality, and is a nationally representative survey of noninstitutionalized household respondents. The MEPS provides detailed data on household sociodemographic, employment, and health access and expenditures. Household participation rate varies between 70-80%. Detailed description of the methodology for collecting the MEPS and the development of MEPS survey weights are available from meps.ahrq.gov.

Sample

In the general Medical Expenditure Panel Survey, there is a question that asks if the respondent has diabetes. Respondents that state that they have diabetes are sent an additional Diabetes Care Survey. The first question on the Diabetes Care Survey is “Do you have doctor-diagnosed diabetes?” Respondents who answered “yes” to this question are the subjects of this study; the sample was limited to adults between ages 18-64. This study does not distinguish between people who had type 1 or type 2 diabetes mellitus.

Variables

The outcome of interest is having at least two glycated hemoglobin (HbA1c) tests per year. Independent variables controlled for in our logistic regression include age, sex, marital status, race/ethnicity, the interaction of race/ethnicity with the post-2014 time period, SPD status, an interaction term between race/ethnicity and SPD, education, income category, insurance coverage status, whether the subject reported being born in the U.S.A., the language of the MEPS interview, geographic region in the U.S., having a usual source of care, and self-report of physical health. The utility and validity of including interaction terms in non-linear models has been described elsewhere(Karaca-Mandic, Norton, & Dowd, 2012). Because the sample did not contain sufficient numbers of Asian American, Native American, or mixed race Non-Hispanic individuals with SPD, we limit the sample to three mutually exclusive racial and ethnic groups: NH White, NH Black, and Hispanic, which are subsequently characterized as either screening positive for SPD or not.

We use the measure of SPD as an indicator of distress serious enough to warrant referral to further professional assessment. SPD has been defined as present if an individual has a score of 13 or greater on a Kessler-6 screener (Kessler et al., 2003). The Kessler-6 screener has been used widely and is validated through numerous psychometric evaluations. SPD has been used in a wide number of studies, including those that evaluate use of healthcare resources (Alhussain et al., 2017; Okoro et al., 2014; Okumura & Ito, 2013; Pearson et al., 2009) and risks for high diabetes related expenditures (Egede & Dismuke, 2012).

Data Analysis

Descriptive statistics were developed to quantify sociodemographic characteristics by race, ethnicity, and SPD across the years 2012 to 2016. Rates of being uninsured were calculated by race, ethnicity, and SPD status. Rates of receiving the two recommended HbA1c tests were calculated from NH Whites, NH Blacks, and Hispanics, comparing rates of receipt with the rate of the same racial/ethnic group with no SPD. A logistic model with interaction terms was fit to examine the impact of ACA adoption on HbA1c receipt before and after the ACA, by race, ethnicity, and SPD status. Our basic model was:

$$E|(Y_i) = f(\beta_0 + \beta_1 ACA + \beta_2 NHBlack_i + \beta_2 Hispanic_i + \beta_4 SPD_i + \beta_5 * X_i + \varepsilon)$$

where $A1C_i$ is the receipt of HbA1c testing by person i, *f* is the functional form. We fit a second model

$$E|(Y_i) = f\big(\beta_0 + \beta_1 ACA + \beta_2 NHBlack_i + \beta_2\ ACA * NHBlack_i + \beta_3 Hispanic_i + \beta_3\ ACA * Hispanic_i + \beta_4 SPD_i + \beta_4\ ACA * SPD_i + \beta_5 * X_i + \varepsilon\big)$$

to test the interaction of the ACA with race, ethnicity, and SPD. Thirdly, we fit a model with a three-way interaction term of the ACA, SPD, and race/ethnicity. Stata 15 was used for analysis; diabetes person survey weights were used to make the results nationally representative of the American population living with type 1 or 2 diabetes. Statistical significance was defined *a priori* at $p < 0.05$. Institutional Review Board approval was obtained from our institution prior to undertaking the study.

Results

Description of Sample

Table 1 presents the demographic characteristics of people with diabetes, and sub-divides the population into three groups: NH Blacks, Hispanics, and people with psychological distress.

Age was classified into five mutually exclusive categories; 18-26, 27-35, 36-45, 46-54, and 55-64. Age distribution was similar across the first two categories, however, there was a higher proportion of NH Blacks and Hispanics in the 36-45 year old category, compared with the general population. Furthermore, there was a lower proportion of Hispanics and NH Blacks in the 55-64 year old category, compared with the NH White category.

In the general population, there was roughly 50% male and 50% female distribution of sex. However, women were over represented in the population with SPD (.63, $p<0.02$) and in the proportion of NH Black respondents (.55, $p < 0.02$). There were significant differences in marital status across the categories. For the entire population of adults aged 18-64 with diabetes, 59% were married, and 41% were not. However, there was a higher proportion of unmarried individuals in the sub-group with SPD (.57, $p <0.03$) and those that were NH Black (0.57, $p <0.02$).

There were notable differences in the distribution of educational attainment across groups, with 20% having less than high school in the whole population with diabetes, and this rose to 47% ($p < 0.000$) for the Hispanic sub-group, fell to 17% ($p<0.05$) among NH Blacks, and was almost 28% among people with SPD ($p <0.000$). Among those with diabetes, 33% had completed high school, while for Hispanics 25% ($p<0.000$) had completed high school. NH Blacks had high school attainment of 37% ($p<0.05$), while those with SPD overall had attainment of 32%. In terms of college education, 30% of the general population, 20% ($p<0.000$) of the Hispanic sub-group, 32% of the NH Black sub-group and 34% of the sub-group with SPD had completed some college. Those that had completed a four-year degree made up 11% of the general population of adults aged 18-64 with diabetes, while 5% ($p<0.000$) of Hispanics had a four-year degree; 9% of NH Blacks, and only 4% of people with SPD ($p<0.000$). Among those with more than a four-year degree, 5.7% of the general group had advanced degrees, 1.7% of Hispanics ($p<0.000$), 4.3% of NH Blacks, and 1.3% ($p<0.000$) of those with SPD had more than a four-year degree.

There were statistically significant differences in rates of observing SPD by race and ethnicity. The sample of adults with diabetes aged 18-64 was 60.8% NH White, 20.7% Hispanic, and 18.5% NH Blacks. However, NH Whites were overrepresented in the group with SPD, comprising 67% ($p<0.05$) of the people with SPD, while Hispanics comprised 19%, and the NH Black sub-group comprised 13.7% ($p<0.05$) of the population with SPD.

Differences in family income were observed. Among the whole population, 16.7% were poor; this was 23.6% ($p < 0.000$) for the Hispanic subgroup, 23% ($p < 0.000$) for NH Blacks, and 37.9% ($p < 0.000$) for those with SPD. For the category of near poor, 5% were near poor in the whole population, while 8% ($p < 0.000$) of the Hispanic subgroup, 6.8% ($p<0.001$) of NH Blacks and 9% ($p<0.000$) of those with SPD were near poor. For the low-income category, 15% of the adults aged 18-64 with diabetes fell into this category, while 20% ($p<0.000$) were Hispanic, 16.5% were NH Black, and those with SPD 20.5% ($p<0.000$). For the whole population of adults aged 18-64 with diabetes, 29.3% were middle income, while 31.3% were Hispanic, 29.8% were NH Black, and this was 21.3% ($p<0.001$) among those with SPD. The general population of adults had 33.7% in the high-income category, while just 11.3% ($p <0.000$) of those with SPD, 16.8% ($p < 0.000$) of Hispanics, and 24.7% ($p<0.000$) of NH Blacks were categorized as high income.

Self-reported health was categorized as excellent, very good, good, fair, and poor. For all categories of race and ethnicity, those with SPD reported that they were in poorer health. Among those adults aged 18-64 with diabetes, 4.1% reported they were in excellent health, while 2.6%

of those with diabetes and SPD ($p < 0.000$) categorized their health as excellent. Again, for the "very good" category, 19.8% of the population with diabetes stated they were in very good health, while 2.6% ($p < 0.000$) of those with diabetes and SPD identified themselves in this category. For the category of "good" 39.4% of the sample stated they were in good health, while 22.3% ($p < 0.000$) of those with SPD and 34.4% ($p <0.001$) of Hispanics identified as such. For the category of "fair" health, 26.8% of the sample claimed to be in fair health, while 43.1% ($p < 0.000$) of those with SPD, and 35.4% ($p < 0.000$) of Hispanics, stated they were in fair health. Finally, for the category of "poor health" 9.9% of the sample stated they were in poor health, while 30.6% ($p < 0.000$) of those with SPD reported they were in poor health.

Insurance Coverage

There were significant differences in the rate and type of insurance coverage, with 63.4% of 18-64 year old adults with diabetes having private health insurance, 44.9% of Hispanics having private health insurance, 58.6% of NH Blacks, and 33.5% of those with SPD having private health insurance. Among this population, 25.1% had public insurance (Medicaid); 30.9% of Hispanics, 31.3% of NH Blacks, and 53.4% of the population with SPD had public insurance. The general rate of un-insurance was 11.5% for all races and ethnicities of 18-64 year old adults with diabetes, 13.1% for people with SPD, 24.2% ($P <0.000$) for Hispanics, and 10% for NH Blacks. To better explore differences in insurance coverage over time, Table 2 presents detailed characteristics of un-insurance among people with diabetes by minority and SPD status for the years between 2012-2016.

Trends in uninsured rates were calculated for non-Hispanic Whites, NH Blacks, Hispanics, and people with serious psychological distress were calculated (Figure 1). A mean of 8.9% of Non-Hispanic Whites were uninsured in 2012, and this increased to 11% in 2013, decreased to 7.7% in 2014, 5.2% in 2015 and 6.2% in 2016. In contrast, Hispanics, had an uninsured rate of 30% in 2012, falling to 29.8% in 2013, to 21.8% in 2014, 20.7% in 2015, and 19.1% in 2016. Among NH Blacks, the uninsured rate was 13.8% in 2012, falling to 10% in 2013, to 10.5% in 2014, 7.9% in 2015, and 8.6% in 2016. For those with SPD, the rates of un-insurance were 15% in 2012, 20% in 2013, 15.3% in 2014, falling to 9.5% in 2015 and 5% in 2016.

Receipt of HbA1c Testing

Rates of receiving at least two HbA1c were calculated and are shown in Figure 2 by race, ethnicity, and SPD status. The mean rate of receiving the two HbA1c tests were the highest in both pre- and post- ACA for the Non-Hispanic White sub-group without SPD. Prior to 2014, 66.4% of Non-Hispanic Whites reported receiving at least two HbA1c tests in a year, and this decreased to 65% post-ACA. For NH Whites with SPD, the rate was 55% pre-ACA and 51% post-ACA. For NH Blacks, the rate was 50% pre-ACA and 56% post ACA. NH Blacks with SPD had the lowest rates, with 46% pre-ACA and 47% post-ACA. Hispanics had rates of 47% pre-ACA and 52% post-ACA. Hispanics with SPD had rates of 47% pre-ACA and this increased to 57% post-ACA. For NH Blacks, the difference in pre- post- ACA testing rates was significance at p = 0.0299. The NH Black with SPD pre- post- ACA trend in HbA1c testing was non-significant. For Hispanics without SPD, the pre- post- ACA trend was significant at (p = 0.0523). For Hispanics with SPD, the pre- post- ACA was not statistically significant.

To control for factors other than race, ethnicity, and SPD, a logistic regression model was utilized to estimate the odds of reporting receipt of at least two HbA1c tests in a year. The model controlled for age, sex, marital status, educational attainment, SPD status, race, ethnicity, family income, region, U.S. nativity, and self-report of physical health. Covariates were selected based upon the Andersen model (Babitsch, Gohl, & von Lengerke, 2012). Having a usual source of care and insurance coverage status was not included in the model as other investigators have demonstrated endogeneity between the ACA and insurance status.

Results suggest that NH Blacks (OR 0.76, ($p <0.005$)) and Hispanics (OR 0.776, ($p <0.05$)) had lower odds of receiving at least two HbA1c tests compared with NH Whites. SPD decreased the odds of receiving the recommended HbA1c tests (OR 0.765, $p< 0\ 0.05$)). In this model, higher education was a statistically significant predictor of increasing odds of reporting receipt of at least two HbA1c tests in a year. Compared to those without at least a high school diploma or GED, people who had some college (OR 1.63, ($p <0.000$)), a four-year college degree (OR 2.17, ($p<0.000$), and more than four years of college (OR 2.08, ($p <0.001$)) had better odds of receiving the two recommended HbA1c tests.

We created interaction terms to test the relationship between the ACA, race/ethnicity, and SPD (Table 3). The results suggest, as in the first model, that NH Blacks and Hispanics were less likely to report the receipt of at least two HbA1c tests per year. However, following the implementation of the ACA, the odds ratios for Hispanics (OR 1.59, ($p <0.02$)) and NH Blacks (OR 1.54, ($p <0.03$)) improved. As in the first logistic regression model, those with SPD were less likely (OR 0.648, ($p <0.02$)) to report receiving at least two HbA1c tests in a given year. The interaction term indicates that compared with NH Whites with SPD, Hispanics were more likely (OR 1.792, ($p <0.02$)) to receive the two HbA1c tests. However, the results for NH Blacks with SPD were not statistically significant.

We created a three-way interaction terms between the ACA; race/ethnicity; and, SPD (Table 4). As in the first two models, Hispanics and NH Blacks were less likely to report receipt of at least two HbA1c tests per year. The interaction term of the ACA and race/ethnicity was still significantly associated with improved odds for Hispanics (OR 1.61, ($p < 0.02$)) and NH Blacks (OR 1.58, ($p < 0.03$)) reporting that they received at least two HbA1c tests in a year. However, the interaction terms of the ACA with SPD and the ACA with race/ethnicity and SPD were non-significant, suggesting that care for people of all races and ethnicities with diabetes and SPD remained relatively stable across the pre- and post- ACA periods.

We conducted a decomposition analysis to examine differences in the receipt of HbA1c testing between NH Blacks and NH Whites (Table 4.5). Prior to the ACA the predicted probability of HbA1c receipt was 0.63 among NH Whites and 0.47 among NH Blacks. In the pre-ACA period college education accounted for 27% ($p < 0.000$) of the explained difference and private insurance accounted for 44% of the explained difference. Following the ACA, the predicted probability of HbA1c receipt was 0.64 among NH Whites and 0.53 among NH Blacks. In the post-ACA period college education accounted for 37% ($p < 0.000$) of the explained difference and health insurance status was no longer a significant factor to explain the gap.

We conducted decomposition analysis to examine differences in the receipt of HbA1c testing between Hispanics and NH Whites (Table 4.6). Prior to the ACA the predicted probability of HbA1c receipt was 0.63 among NH Whites and 0.46 among Hispanics. In the pre-ACA period college education accounted for 19% ($p < 0.000$) of the explained difference and private insurance accounted for 35% ($p < 0.000$) of the explained difference. In the pre-ACA period low family income, fair self-reported health status, and Spanish language interview were non-significant. Following the ACA, the predicted probability of HbA1c receipt was 0.64 among NH Whites and 0.51 among Hispanics. In the post-ACA period private insurance status became non-significant, while Spanish language interview came to explain 39% ($p < 0.000$) of the observed differences. Any college education explained 32% (p <0.000) of the observed difference.

Conclusion

Our study adds to the literature on the use of evidence-based services among people with diabetes by race, ethnicity, and serious psychological distress status, finding that NH Blacks, Hispanics, and people with serious psychological distress were less likely to receive the evidence-based HbA1c tests that are recommended by the American Diabetes Association and supported by Healthy People 2020 goals. However, following the ACA in 2014, NH Blacks and Hispanics experienced gains in the likelihood of receiving the recommended tests, and this was statistically significant for both Hispanics and NH Blacks. This is significant, given that better glycemic control has the potential to prevent blindness, amputation, and avoidable hospitalizations. We speculate that ongoing efforts to ensure that evidence-based care is provided are warranted, given that in the post-ACA period the group reporting the highest service provision (NH Whites without SPD) that received at least two HbA1c tests, was only 65% HbA1c.

There are some limitations to note. First, the MEPS data are cross sectional in nature, therefore causation between the ACA and the improved receipt of at least two HbA1c tests among NH Blacks and Hispanics cannot be established. Our study aimed to describe trends pre- and post- ACA to account for this limitation. Secondly, answers about getting HbA1c tests are based on respondent recall and may be subject to recall bias. Another limitation that is worth noting is that this study does not contemplate provision of HbA1c tests among Native Americans or Asian Americans. The challenges of using survey data to study these sub-groups has been noted elsewhere. However, these important sub-groups were not specified as a part of our research objective, therefore this limitation is not salient to our ability to answer our research question.

This study finds significant differences in the provision of evidence-based HbA1c tests to NH Blacks and Hispanics before the Affordable Care Act, and that this gap in service receipt narrowed following the ACA. Post ACA, rates of testing were still less than those proposed by the Healthy People 2020 goals. This is an important finding, given the disproportionate burden of diabetes among NH Blacks and Hispanics and the relationship between glycemic control and prevention of diabetes-related complications. Further efforts are warranted to ensure that racial/ethnic groups receive HbA1c testing to guide diabetes management.

Table 4.1: Descriptive Characteristics of Adults Aged 18-64 with Diabetes (weighted proportion, standard error). Source: Medical Expenditure Panel Survey, 2012-2016

	Adults 18-64 with diabetes, all races/ethnicities (N=5,318) (Weighted N = 10,740,747)	Adults 18-64 with diabetes and SPD (N = 686) (Weighted N = 1,291,468)	Hispanic Adults 18-64 with diabetes (N=2,138) (Weighted N=2,498,539)	Non-Hispanic Black Adults 18-64 with diabetes (N=1,753) (Weighted N = 2,228,798)
Age				
18-25	0.014 (0.002)	0.018 (0.006)	0.017 (0.004)	0.019 (0.004)
26-35	0.066 (0.006)	0.059 (0.012)	0.072 (0.008)	0.061 (0.009)
36-45	0.141 (0.006)	0.126 (0.014)	0.184 (0.012) ***	0.177 (0.011) ***
46-55	0.337 (0.010)	0.351 (0.029)	0.364 (0.015)	0.334 (0.016)
56-64	0.439 (0.009)	0.445 (0.031)	0.363 (0.016) ***	0.408 (0.019)**
Sex				
Male	0.500 (.009)	0.372 (0.023)***	0.497 (0.015)	0.448 (0.016)**
Female	0.499 (.009)	0.627 (0.023)***	0.503 (0.016)	0.555 (0.016)**
Marital Status				
Married	0.590 (0.012)	0.424 (0.026)***	0.593 (0.016)	0.431 (0.019)***
Not Married	0.410 (0.012)	0.576 (0.026)***	0.407 (0.016)	0.569 (0.019)***
Education				
Less than HS	0.202 (0.009)	0.279 (0.023)***	0.472 (0.018)***	0.170 (0.014)*
HS	0.328 (0.012)	0.326 (0.023)	0.254 (0.016)***	0.368 (0.021)*
Some college	0.301 (0.012)	0.343 (0.027)	0.202 (0.014)***	0.325 (0.017)
4 Yr. Degree	0.111 (0.008)	0.039 (0.009)***	0.054 (0.006)***	0.095 (0.012)
More than 4 Yr. Degree	0.057 (0.006)	0.013 (0.006)***	0.017 (0.005)***	0.043 (0.007)
Race/Ethnicity				
NH White	0.608 (0.014)	0.672 (0.027)**	—	—
Hispanic	0.207 (0.014)	0.191 (0.024)	1.000	—
NH Black	0.185 (0.012)	0.137 (0.014)**	—	1.000
Family Income				
Poor	0.167 (0.008)	0.379 (0.026)***	0.236 (0.017)***	.230 (.012)***
Near Poor	0.050 (0.003)	0.090 (0.018)*	0.080 (0.007)***	.068 (.007)**
Low Income	0.153 (0.006)	0.205 (0.022)***	0.204 (0.012)***	0.165 (0.013)
Middle Income	0.293 (0.010)	0.213 (0.020)**	0.313 (0.017)	0.298 (0.016)
High Income	0.337 (0.012)	0.113 (0.021)***	0.168 (0.015)***	0.247 (0.015)***
Region				

Northeast	0.146 (0.009)	0.164 (0.026)	0.135 (0.018)	0.141 (0.016)
Midwest	0.221 (0.012)	0.216 (0.024)	0.097 (0.020)***	0.149 (0.015)***
South	0.442 (0.014)	0.434 (0.033)	0.367 (0.039)*	0.626 (0.027)***
West	0.191 (0.011)	0.186 (0.027)	0.401 (0.033)***	0.083 (0.015)***
Language of Interview				
English	0.904 (0.008)	0.907 (0.014)	0.536 (0.020)***	1.00***
Spanish	0.090 (0.007)	0.086 (0.013)	0.433 (0.019)***	---
Other, non-English	0.006 (0.001)	0.007 (0.003)	0.031 (0.005)***	---
Born in U.S.A.				
Yes	0.842 (0.010)	0.851 (0.020)	0.416 (0.022)***	0.930 (0.012)***
No	0.158 (0.010)	0.149 (0.020)	0.584 (0.022)***	0.070 (0.012)***
Self-Reported Health				
Excellent	0.041 (0.004)	0.013 (0.006)***	0.044 (0.006)	0.047 (0.008)
Very Good	0.198 (0.008)	0.026 (0.007)***	0.151 (0.011)	0.183 (0.015)
Good	0.394 (0.009)	0.223 (0.023)***	0.344 (0.014)**	0.409 (0.015)
Fair	0.268 (0.009)	0.431 (0.026)***	0.354 (0.016)***	0.279 (0.015)
Poor	0.099 (0.006)	0.306 (0.026)***	0.106 (0.009)	0.083 (0.007)*
Insurance				
Private	0.634 (0.011)	0.335 (0.031)***	0.449 (0.018)***	0.586 (0.020)*
Public	0.251 (0.009)	0.534 (0.032)***	0.309 (0.016)***	0.313 (0.017)**
Uninsured	0.115 (0.007)	0.131 (0.021)	0.242 (0.015)***	0.100 (0.010)

The reference group for people with SPD is the people with diabetes but no SPD. Reference group for Hispanics is all Non-Hispanics. Reference group for NH Blacks is NH White and Hispanics.

Data was weighted to adjust for complex survey design and is nationally representative.

† May not sum to 100 due to rounding

* Significant at P < 0.05 confidence level

** Significant at P < 0.005 confidence level

*** Significant at P < 0.001 confidence level

Data points with '---' indicate there were no members of our sample in this subpopulation

Table 4.2: Logistic regression showing odds of receiving at least 2 Hemoglobin HBA1C tests per year, pre- and post- ACA. Medical Expenditure Panel Survey, Survey Weights Used.

	Odds Ratio	P>t	(95% Conf. Interval)	
ACA Period (Pre-Implementation is the comparator)				
ACA Post 2014	0.98	0.76	0.83	1.14
Race/Ethnicity (NH White is the comparator)				
Hispanic	0.78	**0.04**	0.61	0.99
NH Black	0.76	**0.00**	0.64	0.91
No Serious Psychological Distress				
Yes, Has SPD	0.77	**0.04**	0.60	0.98
Age (18-25 is the reference group)				
26-35	0.54	**0.05**	0.29	1.01
36-45	0.73	0.26	0.43	1.26
46-55	0.81	0.44	0.48	1.38
56-64	0.83	0.50	0.48	1.43
Sex (male is the comparison group)				
Female	1.05	0.58	0.89	1.24
Marital Status (Married is the reference group)				
Not Married	0.83	**0.03**	0.70	0.98
Education (Less than HS or GED is the reference group)				
HS or GED	1.17	0.13	0.95	1.43
Some College	1.63	**0.00**	1.25	2.13
4-Year Degree	2.17	**0.00**	1.55	3.04
More than 4 years of college	2.09	**0.00**	1.36	3.19
Family Income Category (Poor is the Reference Group)				
Near Poor	0.89	0.45	0.64	1.22
Low Income	0.93	0.50	0.74	1.16
Middle Income	0.95	0.66	0.76	1.19
High Income	1.24	0.12	0.95	1.64
Region (Northeast is the comparator group)				
Midwest	1.19	0.28	0.86	1.64
South	0.93	0.59	0.72	1.21
West	0.94	0.70	0.68	1.29
Self-Report of Physical Health (Excellent is the comparator group)				
Very Good	1.46	0.10	0.93	2.29
Good	1.43	0.15	0.88	2.32
Fair	1.48	0.11	0.91	2.38
Poor	1.59	0.07	0.96	2.62

Table 4.3: Logistic regression showing odds of receiving at least 2 HbA1c tests per year; interaction terms for ACA, SPD, and race/ethnicity.

	Odds Ratio	P>t	(95% Conf. Interval)	
ACA Period (Pre-ACA is the comparator)				
Post ACA	0.80	0.08	0.62	1.03
Race/Ethnicity (NH White is the comparator)				
Hispanic	0.56	**0.00**	0.39	0.80
NH Black	0.54	**0.00**	0.39	0.74
Interaction Term of ACA and Race/Ethnicity (NH White post ACA is the comparator)				
Hispanic/ACA	1.59	**0.02**	1.09	2.33
NH Black/ACA	1.54	**0.03**	1.06	2.25
No Serious Psychological Distress				
Yes, Has SPD	0.65	**0.01**	0.46	0.91
Interaction Term of SPD and Race/Ethnicity				
Hispanic w/ SPD	1.79	**0.01**	1.13	2.83
NH Black w/SPD	1.45	0.17	0.86	2.47
Age (18-25 is the reference group)				
26-35	0.58	0.08	0.31	1.07
36-45	0.78	0.33	0.46	1.30
46-55	0.85	0.54	0.51	1.42
56-64	0.87	0.60	0.51	1.48
Sex (male is the comparison group)				
Female	1.04	0.64	0.88	1.22
Marital Status (Married is the reference group)				
Not married	0.83	**0.04**	0.70	0.99
Education (Less than HS or GED is the reference group)				
HS or GED	1.13	0.24	0.92	1.39
Some College	1.57	**0.00**	1.19	2.06
4-Year Degree	2.13	**0.00**	1.51	2.99
More than 4 years of college	2.06	**0.00**	1.34	3.17
Family Income Category (Poor is the Reference Group)				
Near Poor	0.92	0.57	0.68	1.24
Low Income	0.92	0.49	0.73	1.16
Middle Income	0.96	0.72	0.76	1.21
High Income	1.25	0.12	0.94	1.64

Table 3 Continued

Region (Northeast is the comparator group)				
Midwest	1.20	0.27	0.87	1.66
South	0.94	0.63	0.73	1.21
West	0.97	0.85	0.70	1.35
Self-Report of Physical Health (Excellent is the comparator group)				
Very Good	1.45	0.12	0.91	2.30
Good	1.43	0.17	0.86	2.37
Fair	1.50	0.11	0.91	2.46
Poor	1.60	0.08	0.95	2.71

Source: Medical Expenditure Panel Survey. Survey weights were used to adjust for complex survey design and is nationally representative.

Table 4.4: Logistic Regression calculating odds of receiving at least 2 HbA1c Tests Annually. Interaction terms of ACA with Race, Ethnicity, and SPD Status Among Adults Aged 18-64 with Healthcare Provider Diagnosed Diabetes, Survey Weights Used.

	Odds Ratio	P>t	95% Conf Interval	
Post ACA Period (Pre-Implementation is the comparator)				
Post ACA	0.81	0.11	0.62	1.05
Race/Ethnicity (NH White is the comparator)				
Hispanic	0.56	**0.00**	0.38	0.82
NH Black	0.53	**0.00**	0.38	0.73
Interaction Term of ACA and Race/Ethnicity (NH White post ACA is the comparator)				
Hispanic/ACA	1.62	**0.02**	1.09	2.41
NH Black/ACA	1.59	**0.02**	1.07	2.37
No Serious Psychological Distress				
Yes, Has SPD	0.65	0.15	0.37	1.16
Interaction Term of ACA and SPD (Post ACA without SPD is the comparator)				
Post ACA with SPD	0.99	0.97	0.51	1.91
Interaction Term of Race/Ethnicity and SPD (NH White with SPD)				
Hispanic with SPD	1.69	0.17	0.80	3.56
NH Black with SPD	1.78	0.19	0.75	4.23
Three Way Interaction Term(Post ACA with SPD/NH White)				
Post ACA/Hispanic/with SPD	1.15	0.77	0.46	2.85
Post ACA/ NH Black/ with SPD	0.70	0.55	0.21	2.34

Source: Medical Expenditure Panel Survey. Survey weights were used to adjust for complex survey design and is nationally representative.

Table 4.5: Blinder Oaxaca Decomposition Analysis of Post ACA Provision of HbA1c Testing Between NH White and NH Black Adults aged 18-64 with Doctor Diagnosed Diabetes

	Adults 18-64 with Diabetes Pre-ACA		Adults 18-64 with Diabetes Post-ACA	
	NH White	NH Black	NH White	NH Black
Predicted Probability of having A1c tests	0.63	0.47	0.64	0.53
Difference	-0.15***		-0.10***	
Total	Explained differences: 24%		Explained differences: 35%	
Significant individual factors				
Education: college	27% of explained difference		39% of explained difference	
Private insurance	44% of explained difference		Non-significant	
Public insurance	-34%		Non-significant	
<100% of Federal Poverty Level	35% of explained difference		Non-significant	

Table 4.6: Blinder Oaxaca Decomposition Analysis of Pre- Post-ACA Provision of HbA1c Testing between NH Whites and Hispanics

	Adults 18-64 with Diabetes Pre-ACA		Adults 18-64 with Diabetes Post-ACA	
	NH White	Hispanic	NH White	Hispanic
Predicted Probability of having A1c tests	0.63	0.46	0.64	0.51
Difference	-0.17***		-0.12***	
Total	Explained differences: 49%		Explained differences: 85%	
Significant individual factors				
Private Insurance	35% of explained difference		Non-significant	
Spanish language	Non-significant		39% of explained difference	
Any college	19% of explained difference		32% of explained difference	
Low family income	Non-significant		8% of explained difference	
Fair health	Non-significant		5% of explained difference	

Chapter 5: Discussion and Conclusion

DISCUSSION

In my first study, I hypothesized that gains in health insurance coverage were more likely to benefit low-income people with SPD and that minorities with SPD would benefit more than Non-Hispanic Whites from gains in health insurance coverage. In the first study, I found that post 2014, there was an increase in health insurance coverage among adults aged 18-64, along with decreases in delaying any necessary care, forgoing any care, and stating that one could not afford mental health care.

In my second study, I hypothesized that minorities and people with SPD would be less likely to be seen at practices with robust care-coordination features. I found mixed evidence in this regard, with Hispanics more likely to have a usual source of care with case/care managers. NH Blacks with SPD were also more likely to have a usual source of care with case managers. People in the South were less likely to have usual sources of care with case managers. Overall there was an increased use of case managers between 2015 and 2016.

Patient-centered medical home is a way of organizing care delivery around the needs of the patient. In my second study I found that females were more likely to be seen at a PCMH. Compared with those with less than high school, those with high school, some college, and college degrees were less likely to be seen at PCMH. Hispanics with SPD were less likely to have a usual source of care that was a PCMH. People in the South were less likely to be seen at usual source of care that was a

PCMH. I found no evidence that NH Blacks were less likely to be seen at PCMH, and this did not vary by SPD status.

Quality-of-care reports can be an important mechanism for letting doctors and providers know if they are supplying evidence-based care. I found that Hispanics were less likely to be seen at a usual source of care that provided quality-of-care reports to doctors. However, people who had the interview in Spanish were more likely to be seen at practices that used quality-of-care reports. Overall, use of quality-of-care reports increased among usual sources of care for U.S. adults aged 18-64 between 2015-2016.

Preventive care reminders can help people remember to come in for preventive care. People who were not married were less likely to be seen at usual sources of care that sent preventive care reminders Non-Hispanic Blacks were more likely to be seen at usual sources of care that sent preventive care reminders. People who had the interview in Spanish were more likely to have usual sources of care that sent preventive care reminders.

The ability to send secure, electronic messages has been hypothesized as a way to increase patient engagement. I find that middle-income people were more likely to be seen at usual sources of care that had the capacity to send secure electronic messages. Furthermore, usual sources of care for U.S. adults aged 18-64 increased their capability to send secure electronic messages between 2015 and 2016. There was no evidence of racial/or ethnic disparities in being seen at a practice that uses secure messaging.

In my third study, I hypothesized that racial and ethnic minorities with SPD would be less likely to receive evidence-based diabetes management services. Specifically, I hypothesized that Non-Hispanic Blacks would be less likely to receive the recommended two annual glycated hemoglobin (HgA1c) tests. I found that Non-Hispanic Blacks and Hispanics were less likely than Non-Hispanic Whites to have their A1c checked bi-annually, even when controlling for insurance status and pre-post- ACA period. Furthermore, people with SPD were less likely than people without SPD to have their A1c checked bi-annually. The interaction term for race/ethnicity and SPD revealed that Hispanics with SPD had higher odds of receiving bi-annual HbA1c tests. I conclude that there is some evidence that Non-Hispanic Blacks are less likely to receive evidence-based diabetes management services and that Asians and mixed-race individuals may also not receive all of the recommended diabetes management services that are recommended by the American Diabetes Association.

Abundant research demonstrates that the social determinants of health are unequally distributed across the US population. Increasingly, public discourse on the social determinants of health is politicized. However, whether one focuses on medical care or the social determinants of health, data that demonstrate patterns of deprivation emerge across for NH Blacks and Hispanics, who are just some of the groups who face special challenges in meeting basic human needs and in receiving patient-centered, evidence-based health care (J. Chen, Mullins, Novak, & Thomas, 2016).

Gains in insurance coverage have been made among many racial and ethnic minority groups since 2010, yet research from the Agency for Healthcare Research and Quality suggests that “most (health care) access measures did not demonstrate significant improvement (from 2000-2014), but that uninsurance rates decreased from 2010 to 2016.” (Agency for Healthcare Research and Quality, 2017). Health insurance, while essential to care access, is not enough to improve racial and ethnic population health. Social conditions have been suggested as a fundamental cause of health and health inequities (Phelan et al., 2004). My studies add to the consistently observed patterns of association between income, education, occupation, and mortality. Initially, sociologists and epidemiologists struggled to identify causal mechanisms for how social conditions could affect mortality and morbidity. With the rise of more advanced statistical designs including instrumental variable models, social network analysis, regression discontinuity, and difference-in-difference approaches, researchers have begun to disentangle the effects of social conditions from race and ethnicity.

It is important to note that race and ethnicity are socially developed constructs, and not evidence of underlying biological differences (C. P. Jones, 2001). This is not to say that there are not important biological differences from person to person that may be applicable to a larger group. However, rather than being a marker of biology, categories of race and ethnicity have been defined over time by the dominant social group in the United States, and used as categories to maintain a social system where certain privileges are targeted to specific groups and denied to other groups (Braveman & Gottlieb, 2014; C. P. Jones et al., 1991; LaVeist, 1994).

As a group, you can effectively argue that NH Blacks have been most specifically excluded from opportunities available to the NH White majority (C. P.

Jones, 2000). NH Blacks currently have the poorest health and lose the most quality-adjusted life years due to social injustice (G. Kim et al., 2017; Lynn, 1999). NH Blacks have documented poorer outcomes for diagnosis ranging from cardiac disease to diabetes, cancer to infant mortality. The preponderance of evidence suggests that NH Blacks have access to fewer resources outside the health system and receive less care from the health system.

In terms of insurance coverage, my studies find that coverage for NH Blacks increased after the full implementation of the ACA. However, evidence suggests that NH Whites benefitted more from private insurance expansion for young adults, likely because whites were more likely to have private coverage that allowed them to keep children under the age of 26 on private employer-sponsored plans (Novak et al., 2017). There are many examples of how NH Blacks receive less beneficial social conditions and less positive intervention from the health care system, when compared with NH White counterparts. Residential segregation, which was formally outlawed by the Civil Rights Act of 1964, remains high. Williams and Collins argued in their 2001 paper (Williams & Collins, 2001), *Racial Residential Segregation: A Fundamental Cause of Racial Disparities in Health*, that racial segregation continues to be a fundamental cause of health disparities, largely due to the impact of residence on access to employment, education, socioeconomic status, housing quality, access to public transportation, the experience of personal and property crime, lack of amenities such as attractive parks for children, limited social connection or "neighborliness" among residents, and noise and physical pollution.

In addition to residential segregation which falls within the domain of the "fundamental causes" theory of health disparities, the accumulated insult, or allostatic load theory of health disparities exists. The allostatic load theory suggests that due to numerous instances across the life course, NH Blacks, Hispanics, and other racial and ethnic minorities in the United States accumulate stress, with important implications for cortisol levels, which when permanently elevated lead to greater cardiac disease. (Z. D. Bailey et al., 2017; Butler, 2015; Dinwiddie, Gaskin, Chan, Norrington, & McCleary, 2013; Gaskin et al., 2014; Gibbons & Yang, 2014; Inagami et al., 2006; Krieger et al., 2017; Subramanian, Midha, & Chellapilla, 2017; Williams & Collins, 2001)

My studies found that low-income NH Whites had higher proportions of SPD than NH Blacks, Hispanics, or other race/ethnicities. Still mental illness is common among the aging and the aging population is becoming more diverse. As a result, part of my future career path is to explore racial disparities in Alzheimer's disease and how housing assistance from the Department of Housing and Urban Development (HUD) may mediate progression of Alzheimer's and related dementias. A recent paper by Gibbons and Yang (Gibbons & Yang, 2014) provided empirical evidence that suggests that the simple fact of living in a more integrated neighborhood does not produce immediate gains in self-reported health among NH Blacks. More research is needed to understand the complex interplay between residential segregation and place of residence, and long-term health outcomes.

I also find that Hispanics face unique challenges within the US health care system. For some Hispanics, the ACA helped them attain insurance coverage.

However, many Hispanic families have mixed legal status (Landale, Oropesa, & Noah, 2017; Young & Pebley, 2017). It is common for a family abiding under one roof to be made up of citizens, permanent residents, and undocumented family members. Even though the ACA expanded coverage for Hispanic citizens and permanent residents, families still live with the agony of deciding whether to pay for expensive treatments for undocumented family members who are essentially uninsurable in the US system (Smith-Miller, Berry, & Miller, 2017). Further limiting access to care, Hispanics, both documented and undocumented, have higher rates of participation in the informal labor force, which is less likely to offer benefits such as health insurance (Fleming, Villa-Torres, Taboada, Richards, & Barrington, 2017; Negi, 2013).

One interesting facet of Hispanic health is the so-called “Hispanic Health Paradox” (Camacho-Rivera, Kawachi, Bennett, & Subramanian, 2015; Franzini, Ribble, & Keddie, 2001). The Hispanic Health Paradox, also referred to as the Hispanic Epidemiological Paradox, refers to the fact that Hispanics, as a group, have lower socioeconomic status than Non-Hispanic Whites, but are seemingly healthier than higher-SES Non-Hispanic Whites. Some possible theories to explain the Hispanic Health Paradox include the healthy immigrant hypothesis and the salmon bias hypothesis. Another possible explanation is that residential segregation, which is present in Hispanic communities, actually serves as a protective factor for Hispanics by reinforcing the social networks, social supports, and social capital of new and established immigrants (Inagami et al., 2006). Finally, a hypothesis tested empirically by Hamilton and Kawachi suggests that immigrants to the US may have an improvement in the macro-level exposure they face in terms of income inequality (Hamilton & Kawachi, 2013). Based on the empirical findings, the Hispanic Health Paradox of better health despite lower SES seems to be well established and yet poorly explained. As suggested by Franzini and colleagues, the reasons for the Hispanic Health Paradox may be social in nature and require additional empirical evaluation (Franzini et al., 2001).

Policy implications

There have been both system-level and patient-level approaches proposed, implemented, and evaluated to improve health disparities in the US. However, I speculate that without a cohesive, nationally applied policy to improve the social determinants of health, such interventions to decrease health disparities may be effective at the local level but will do little to improve health disparities in the nation.

Some of the key strategies suggested for decreasing health disparities include delivery system redesign, which moves practices and hospitals away from encounter-based billing toward bundled payments that incentivize health systems to proactively coordinate care for their patients. Coupled with changes in how payments are made, hospitals, health systems, and practices adopt team-based care and a care coordination focus. Additionally, it has been suggested that self-management support may be an intervention that effectively decreases disparities. Decision support and decision support systems bring evidence-based care guidelines to clinicians and patients at the time that information is needed. An example of clinical decision support is the pop-up reminders that are now ubiquitous in Electronic Health Records. These reminders can ensure that services such as cholesterol management, diabetic foot screenings, dilated eye exams, flu shots, and bi-annual hemoglobin A1c checks are administered as recommended by the American Diabetes Association. These types of clinical decision supports reply on clinical information systems, a term that encompasses Electronic Health Records, health information exchanges, clinical registries, and sophisticated predictive analytics capable of triggering an EHR to deliver reminders to clinicians.

While many cling to the allure of technology to improve the health system, community supports and programs are an essential component in decreasing health disparities. The Robert Wood Johnson Foundation has developed and funded its "Culture of Health" initiative to promote health equity by developing action areas, metrics, and drivers of community level health (Denham, 2017). Such drivers coalesce around the social determinants of health (Foundation., 2014). Culture of Health grantees have wide-spanning coalitions that include creating more walkable communities, developing local sustainable food sources, improving health information exchanges, and access to housing, employment, and social supports as underlying determinants of wellness.

Another critical component to improve health disparities is addressing racism. In 2011, Thomas, Quinn, Butler, and Fryer described three generations of health disparities research and outlined public health critical race praxis needed to enable a fourth generation of health disparities research (Thomas, Quinn, Butler, Fryer, & Garza, 2011). Such a framework is more urgent now than ever. During the presidency of Barack Obama, some commentators suggested that the U.S. had moved to a post-racial society (Lum L, 2009). Race riots in Charlottesville, Virginia and the ongoing existence of police brutality and murder of NH Blacks (Taibbi, 2017) suggest that race as a determinant of health is continues to be of vital importance in 2019.

The principles of public health critical race praxis include race consciousness, the primacy of racism, race as a social construct, the ordinariness of racism, structural racism, social construction of knowledge, critical approaches, and intersectionality (experiencing race, class, gender, and other social constructs simultaneously). Practically applied, public health critical race praxis allows us to recognize that unconscious bias continues to exist and address such bias at the inter-personal level. In order to be transformational, public health critical race praxis must be practiced across the profession of public health, not only by health disparities researchers, but to all disciplines and sub-disciplines until true diversity and inclusion is achieved.

Some may be curious to know what I have learned through the process of writing this dissertation. A fundamental tenant of health economics is that better educated individuals are better producers of health at every income level. Yet we also see through public health program planning and evaluation that individuals and their education do not exist in isolation, but rather are nested in families, social networks, organizations, municipalities, states, and societies at large. The policies that govern these social interactions have serious implications for human health and for reaching maximum health potential. Education plays an important role in transmitting social knowledge and norms. Across all studies, I observed that better-educated individuals were more likely to have better access to care and to receive evidence-based care independently of income. Differences in education were significant in decomposing the gap in HbA1c testing between NH Whites and NH Blacks. These findings suggest that one path to addressing health disparities lies in better education across all stages of the life course and all levels of public health program delivery.

Limitations

My study has several limitations. First, it is well documented in the literature that Non-Hispanic Blacks are less likely to report depressive or anxious feelings, compared with Non-Hispanic Whites. This would result in them being underrepresented in the population with Serious Psychological Distress across all three studies. Secondly, prior to 2014, some states had already begun efforts to expand health insurance coverage. My studies do not account for geographic differences apart from the four regional areas described as Northeast, Midwest, West, and South. In studies 2 and 3, geographic variation in the characteristics of practices serving people with SPD and the provision of diabetes management services varied in the South. It would be interesting to conduct further analysis controlling for state-level effects of various health policies. Thirdly, the data used were cross-sectional in nature, therefore causality between the timing of the implementation of the ACA and the increase in health insurance coverage cannot be established. However, given the preponderance of evidence, it is likely that policy changes associated with the ACA led to increases in health insurance coverage. As noted in study 1, health insurance coverage by itself may not lead to increases in health care access, but it is a first step in ensuring that people are able to receive care should they need it.

Future study

Part of my future career path is to explore racial disparities in Alzheimer's disease and how housing assistance from the Department of Housing and Urban

Development (HUD) may mediate progression of Alzheimer's and related dementias. A recent paper by Gibbons and Yang (Gibbons & Yang, 2014) provided empirical evidence that suggests that the simple fact of living in a more integrated neighborhood does not produce immediate gains in self-reported health among NH Blacks. More research is needed to understand the complex interplay between residential segregation and place of residence, and long-term health outcomes.

CONCLUSION

My results support previous findings that health insurance coverage increased and barriers to receiving care decreased among people with SPD following 2014. Furthermore, my results suggest that racial and ethnic minorities with SPD were not systematically less likely to be served with practices with care-coordination services, such as the use of a case manager, preventive care reminders, secure messaging, or being a PCMH. Finally, my results suggest that the odds of receiving evidence-based quality care is lower among Non-Hispanic Blacks with diabetes compared to Non-Hispanic Whites, but that SPD alone did not increase the odds of non-receipt of care among Non-Hispanic Blacks. This finding of non-receipt of evidence-based care among certain racial and ethnic sub-groups suggests that ongoing policy activities are warranted to ensure that all Americans with diabetes receive essential preventive services such as A1C tests to prevent costly complications such as blindness and amputations.

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