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Disparities in Mental Health Service Utilization between Native American and White Adults

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Abstract

Disparities in Mental Health Service Utilization between Native American and White Adults

By Lacey P. Gleason

Despite the high risk of behavioral health conditions and poor outcomes among non-Hispanic American Indians and Alaska Natives (AI/ANs), little is known about current patterns of mental health (MH) service utilization in this population. This study aimed to examine rates of MH service utilization in a nationally representative sample of AI/ANs and identify if there is a disparity between AI/ANs and non-Hispanic whites. Data from the 2014-2016 National Survey on Drug Use and Health were used to examine differences in any MH service use, any outpatient MH service use, and any prescription medication use for MH in the past year between non-elderly adults (18-64 years old) who identified as AI/AN or non-Hispanic white. Differences in probability of MH service utilization were assessed using logistic regression models that were sequentially adjusted for relevant predisposing, enabling, and need-based factors. The unadjusted, weighted proportions of any MH service use in the past year were 14.4% among AI/ANs and 19.3% among non-Hispanic whites ($p<0.01$). On average, AI/ANs were less likely to have used any MH services than non-Hispanic whites. The results differed by treatment type as a significant AI/AN-white disparity was observed for any MH service use (AI/ANs had a 4.6 percentage point lower likelihood of service use, $p<0.001$) and prescription medication use for MH (AI/ANs had a 4.2 percentage point lower likelihood of service use, $p<0.001$) but not for outpatient MH service use. Population density had a significant moderating effect on the relationship between AI/AN race/ethnicity and MH service utilization. Significant AI/AN-white disparities in any MH service use and prescription medication use for MH were found among those living in moderately populated areas (AI/ANs had a 7.6 percentage point and 7.2 percentage point lower likelihood of utilizing these services, respectively, $p<0.001$ for both) but not among those living in densely populated areas or outside of core-based statistical areas. The majority of AI/ANs (55%) lived in moderately populated areas where these clinically and statistically significant disparities were observed. Future interventions aimed at improving MH among AI/ANs should consider how access to and uptake of MH services varies by treatment type and population density.

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Chapter I. Introduction

There are approximately 5 million American Indians and Alaska Natives (AI/ANs)[1] living in the United States (Norris, Vines, & Hoeffel, 2012). American Indians and Alaska Natives live 4.4 years shorter than the average American and have disproportionately high rates of many health conditions, including both infectious diseases like tuberculosis and non-communicable diseases like diabetes (Indian Health Service, 2017a). While federal healthcare services for AI/ANs have historically focused on prevention and treatment of communicable diseases, there has been increasing recognition of disparities in morbidity and mortality from behavioral health issues. AI/ANs face disproportionately high rates of serious psychological distress, sadness, hopelessness, worthlessness, and suicide (Office of Minority Health, 2017b). Unrecognized or untreated mental health conditions are of particular concern as they can lead to reduced quality of life, poor physical health outcomes, and reduced productivity (Banerjee, Chatterji, & Lahiri, 2015; National Alliance on Mental Illness, 2018). Targeting improvements in mental health among AI/ANs has been a recent policy priority, and the reauthorization of the Indian Health Care Improvement Act, which was made permanent by the Patient Protection and Affordable Care Act (ACA), emphasized the expansion and integration of programs for mental and behavioral health (National Indian Health Board, 2010; Ross, Garfield, Brown, & Raghavan, 2015).

[1] While many Native Americans would prefer to be referred to by the name of their nations, the term American Indian and Alaska Native is used exclusively in this text for the sake of clarity. American Indians and Alaska Natives in this study were self-identified using the race category labeled American Indian or Alaska Native as outlined in the 1997 Office of Management and Budget standards on race and ethnicity. Data on tribal affiliation were not available.

In order to address these highly prevalent behavioral health conditions, AI/ANs must have access to treatment. Previous investigations of mental health service utilization among AI/ANs have often been limited to rural populations living on reservations or restricted to a single tribe or geographic area (Cromer, Gray, Vasquez, & Freyd, 2017). Due to significant heterogeneity across the 573 federally recognized tribes and the wide geographic range of the service areas funded by the Indian Health Service (IHS) (Indian Health Service, 2018b; Office of the Surgeon General, 2001), it is difficult to use these smaller studies to make judgements about resource allocation for behavioral health services and outreach programs at the federal level. The few studies that have used nationally representative data on AI/ANs were carried out using data from over a decade ago and may not be representative of the current utilization patterns among AI/ANs (Brave Heart et al., 2016; Harris, Edlund, & Larson, 2005).

Using recent, nationally representative data, this study will examine rates of mental health service utilization among non-Hispanic AI/AN adults, investigate if there is a disparity in utilization between non-Hispanic AI/AN and non-Hispanic white adults, and observe if any racial/ethnic differences persist after controlling for predisposing demographic, need-based, and enabling factors. In recognition of the unique geographic distribution of AI/ANs in the United States and the ongoing shift towards residence in urban areas (Jacobs-Wingo et al., 2016), this study will also explore if population density moderates the relationship between non-Hispanic AI/AN race/ethnicity and mental health service utilization. It is particularly important to detect and describe the magnitude of any disparity in mental health service utilization between non-Hispanic AI/ANs and non-Hispanic whites as IHS funds remains discretionary and funding cuts are currently

proposed for several programs aimed to improve the acceptability of health services provided to AI/ANs.

Chapter II. Background and Review of the Literature

A. Mental Health of American Indians and Alaska Natives

The U.S. Government started mental health programs for AI/ANs in 1966, and early research identified alcohol dependence and feelings of depression as major problems among AI/ANs (Shore & Manson, 1983). Today, AI/ANs continue to face greater economic adversity and poorer social conditions than nearly any other demographic group in the United States, putting them at greater risk for behavioral health conditions (Bagalman & Heisler, 2016; Office of the Surgeon General, 2001). Among these risk factors is greater exposure to trauma and violence than other racial/ethnic groups (Bassett, Buchwald, & Manson, 2014; Perry, 2004; Sapra, Jubinski, Tanaka, & Gershon, 2014; Smith et al., 2017). While correct diagnosis can be challenging, AI/ANs suffer from elevated mental health symptoms (i.e., serious psychological distress, feelings of sadness, hopelessness, worthlessness, nervousness, and restlessness) as well as higher rates of posttraumatic stress and substance use disorders (Indian Health Service, 2011; Payne, Steele, Bingham, & Sloan, 2018).

This high level of behavioral health need among AI/ANs is associated with poor outcomes. For example, AI/ANs have the highest and fastest growing suicide rate of any racial/ethnic group in the United States (Curtin, Warner, & Hedegaard, 2016; Leavitt et al., 2018). In fact, age-adjusted suicide rates increased 89% for AI/AN women and 38% for AI/AN men between 1999 and 2014 (Curtin et al., 2016). This is especially

concerning for young adult AI/ANs (ages 18-34) for whom suicide is the second leading cause of death (Agency for Healthcare Research and Quality, 2017). In addition to suicide, AI/ANs die at disproportionately high rates from unintentional injury, which often results from poisonings and motor vehicle crashes related to substance use (Chartier, Vaeth, & Caetano, 2013; Jacobs-Wingo et al., 2016). Alcohol use is also thought to contribute to the disproportionately high mortality from chronic liver disease and cirrhosis among AI/ANs (Chartier et al., 2013; Indian Health Service, 2017a).

Behavioral health conditions are also associated with housing instability, job instability, and incarceration. AI/ANs are overrepresented among individuals experiencing homelessness, making up an estimated 3.0% of all homeless people and 4.2% of all unsheltered people compared with less than 1% of the total population (U.S. Department of Housing and Urban Development, 2017). AI/ANs also have the highest unemployment rate (12.6% vs. 5.8% for the total population) of any single racial or ethnic group in the United States (U.S. Census Bureau, 2016). People living with a mental illness are frequently criminalized (Gary, 2005), and incarcerated individuals often suffer from mental health conditions (Gottfried & Christopher, 2017). The incarceration rate for AI/ANs was higher than the overall national incarceration rate in 2014 and has grown rapidly (Bureau of Justice Statistics, 2017). Despite similar rates of population growth, the number of AI/ANs incarcerated in jails and prisons increased 72% from 1999 to 2014 compared to 15% among all other racial/ethnic groups combined (Bureau of Justice Statistics, 2017). Substance use plays a significant role in criminal justice involvement among AI/ANs as AI/AN jail inmates are more than twice as likely as all other inmates to be held for driving while intoxicated or driving under the influence

(Bureau of Justice Statistics, 2017). Although causality has not been individually demonstrated for each of these relationships, it is clear that AI/ANs have significant behavioral health needs and disproportionately suffer poor outcomes.

B. Access to Mental Health Services among American Indians and Alaska Natives

Given elevated need and poor outcomes in a variety of domains, timely access to mental health services is crucial for the AI/AN population. The Behavioral Model of Health Services Use identifies characteristics that make an individual more or less likely to utilize health services based on innate or socially constructed predisposing characteristics, presence of the resources and infrastructure necessary to access care (i.e., enabling characteristics), and actual or perceived need for health services (Andersen, 1995). AI/ANs likely have a distinct distribution of predisposing, enabling, and need-based characteristics relative to non-Hispanic whites, and these differences may lead to deficits—or in some cases, relative advantages—in access to mental health services.

AI/ANs may have predisposing characteristics that inhibit mental health services related to their cultural health beliefs and preferences. Many AI/ANs demonstrate a preference for complementary and alternative medicine (CAM) (Moorehead, Gone, & December, 2015). Depending on specific health beliefs and the degree to which CAM is integrated into Western medical services, use of CAM by AI/ANs may serve to complement or substitute for Western mental health services (Tom Xu & Farrell, 2007). A long history of broken treaties, discriminatory policies, and misconduct by medical professionals and researchers has caused many AI/ANs to distrust Western health services and, in particular, care provided by the U.S. Government (Grandbois, 2005;

Johansson, Muller, Samos, & Goldberg, 2013; Johnson & Cameron, 2001). Although the overall evidence is mixed, some studies have shown that racial/ethnic concordance between patients and providers and measures of cultural competency in the provision of healthcare services affect care-seeking behavior and patient satisfaction with services (Griner & Smith, 2006; LaVeist & Nuru-Jeter, 2002; Meghani et al., 2009; Office of the Surgeon General, 2001; Saha, Komaromy, Koepsell, & Bindman, 1999). Overall, these factors are likely to serve as barriers to mental health service utilization among AI/ANs.

AI/ANs are less likely to have key enabling characteristics that facilitate utilization of mental health services including financial resources, health insurance, and close proximity to healthcare providers. In 2016, the median household income for non-Hispanic AI/ANs was $38,473 compared with $57,617 for the overall US population, and 22.2% of all non-Hispanic AI/AN families were living in poverty compared with 10.0% of the overall U.S. population (U.S. Census Bureau, 2016). As mentioned above, non-Hispanic AI/ANs also had the highest unemployment rate of any single racial/ethnic group (U.S. Census Bureau, 2016). Of those over 25 years old, 17.1% of non-Hispanic AI/ANs had less than a high school diploma (vs. 12.5% of total population), and non-Hispanic AI/ANs had the lowest proportion of college graduates (14.7%) of any single racial/ethnic group (U.S. Census Bureau, 2016). Among all single racial/ethnic groups, non-Hispanic AI/ANs were the least likely to be covered by private health insurance (44.1% vs. 67.8% of total population) and were the most likely to be uninsured (19.4% vs. 8.6% of total population) (U.S. Census Bureau, 2016). AI/ANs are also likely to live in areas with fewer healthcare services. Unlike the pattern for most racial/ethnic minorities in the United States, lower shares of the population are AI/AN as one moves to

core-based statistical areas (CBSAs) with larger population cores (Wilson, Plane, Mackun, Fischetti, & Goworowska, 2012). In 2010, AI/ANs made up 2.62% of the population in non-CBSAs, 0.98% of the population in metropolitan statistical areas (MSAs) with fewer than one million people, 0.68% of the population in MSAs with at least one million and fewer than five million people, and 0.49% of the population in MSAs with at least five million people (Wilson et al., 2012).

Nevertheless, it is important to recognize that many AI/ANs have enabling resources that facilitate mental health service use. More specifically, they may have access to other types of contextual enabling resources that are generally not available to other racial/ethnic groups. Due to the trust responsibility between the United States government and federally recognized tribes, many AI/ANs qualify for access to healthcare services through the Indian Health Service (Indian Health Service, 2015). The federal trust responsibility is a "legal obligation under which the U.S. has charged itself with moral obligations of the highest responsibility and trust toward Indian tribes" arising from interpretations of the U.S. Constitution, hundreds of treaties between the U.S. Government and AI/AN tribes, various statutes, and federal judicial decisions (Bureau of Indian Affairs, 2018). While it is generally recognized that the U.S. Government has a duty to protect the tribes and provide certain services, the U.S. Congress retains plenary power over Indian affairs and funds these services at its discretion. In addition to the appropriations IHS receives from Congress, it collects payments from Medicare, Medicaid, the Veterans Administration, and other third-party insurers for services provided to their beneficiaries at IHS and tribally-operated facilities. Despite a long

history and continued state of inadequate funding (Lindrooth, 2017), federal funding for the IHS increased by 53% between 2008 and 2016 (HHS Office of Budget, 2016).

IHS provides direct healthcare services through a network of hospitals and outpatient facilities, funds tribes who administer their own healthcare services under tribal self-determination provisions, and supports Urban Indian Organizations. Currently, more than half of all tribes administer and deliver their own mental health programs (Indian Health Service, 2018a). IHS primarily provides primary care services but may also contract out care to providers of specialty services. For example, inpatient mental health services are usually purchased from outside hospitals or are provided by state or county hospitals (Indian Health Service, 2018a). In addition to access to healthcare through IHS, AI/ANs who are members of federally recognized tribes qualify for special considerations under the ACA. For example, members of federally recognized tribes may enroll in health exchange plans outside of the open-enrollment period without a qualifying event and are responsible for reduced cost-sharing compared to individuals at the same income level who are not AI/ANs (Ross et al., 2015).

Thus, especially when living in proximity to IHS-funded healthcare facilities, AI/ANs may have better access to healthcare services than would be expected based on their socioeconomic disadvantage and relatively low levels of health insurance coverage. Over the last few decades, however, a demographic shift has resulted in an increasing number of AI/ANs living in urban areas, often in search of better housing, education, and employment opportunities (Jacobs-Wingo et al., 2016). Since less than 1% of IHS funding is allocated for its Urban Indian Health Programs and current funding meets less

than a quarter of the need, this shift towards urban areas may increase barriers to accessing IHS services (Bhaskar & O'Hara, 2017; Indian Health Service, 2018a, n.d.-b).

On the one hand, AI/ANs may be more likely to face barriers to mental health service utilization due to health beliefs and socioeconomic disadvantage. On the other hand, AI/ANs may have more resources available to them than individuals of other racial/ethnic groups who have similar socioeconomic status, which may facilitate mental health service utilization.

C. Previous Literature

Previous research on mental health service utilization has shown lower service utilization among racial/ethnic minorities compared to non-Hispanic whites, however, AI/ANs are often excluded from these analyses due to small sample size (Lê Cook et al., 2018). A couple of studies have used nationally representative samples to investigate mental health service use among adults who identify as AI/AN compared with non-Hispanic whites and other racial/ethnic groups (Brave Heart et al., 2016; Harris et al., 2005). Harris and colleagues used data from the 2001, 2002, and 2003 administrations of the National Survey on Drug Use and Health (NSDUH) to measure past year prevalence of mental health problems, use of mental health care, and unmet need for mental health services (Harris et al., 2005). This was the first study to allow for direct comparison of these outcomes across Asians, AI/ANs, and four Hispanic/Latino subgroups in addition to non-Hispanic whites and African Americans. Covariates included in their model were past year dependence on drugs or alcohol, years since first use of alcohol, marijuana, and illicit drugs other than marijuana, self-reported physical health, nativity, age, gender, health insurance status, marital status, low income, educational status (i.e., college

graduate or not), residence in a rural area, and survey year. Harris and colleagues found the highest rate of mental health problems among AI/ANs and multiracial respondents (compared to non-Hispanic whites), but these differences did not persist once the authors adjusted for covariates. AI/ANs were found to use mental health care at rates statistically similar to non-Hispanic whites in both the unadjusted and adjusted models. Conversely, African Americans, Asians, Mexican Americans, and Central and South Americans used mental health care at rates lower than non-Hispanic whites. Among respondents with one or more mental health symptom or past year serious mental illness, AI/ANs reported significantly higher unmet need for mental health than non-Hispanic whites.

Similarly, Brave Heart and colleagues investigated the prevalence of DSM-IV disorders and mental health treatment-seeking patterns among a nationally representative sample of non-Hispanic AI/AN and non-Hispanic white adults using data from the 2000-2001 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) (Brave Heart et al., 2016). Non-Hispanic AI/ANs in the study population included both single race AI/ANs and multiracial AI/ANs who also identified as Asian, Native Hawaiian/Pacific Islander, or white. Covariates included nativity, age, education level, individual and family income, marital status, rural residence, Census region, and insurance coverage. After adjusting for sociodemographic factors, non-Hispanic AI/AN men had higher odds of having any psychiatric disorder, substance use disorder, or mood disorder in the past 12 months compared to non-Hispanic white men. Non-Hispanic AI/AN women had significantly higher odds of having any psychiatric disorder, substance use disorder, Axis I disorder, or drug use disorder in the past 12 months compared to non-Hispanic white women. The results for treatment seeking were stratified

by gender and limited to individuals who had diagnosable conditions based on diagnostic interviews. In adjusted analyses, no differences were detected between non-Hispanic AI/AN men and non-Hispanic white men in past 12-month mental health treatment-seeking. The only difference found between non-Hispanic AI/AN women and non-Hispanic white women was among those with an anxiety disorder in the past year, and AI/AN women had twice the odds of seeking treatment. The authors propose that this difference may be explained by higher rates of violent trauma exposure among non-Hispanic AI/AN women, which could prompt them to seek treatment for anxiety. Socioeconomic differences accounted for a substantial proportion of the disparities found in unadjusted analyses.

While these studies contributed to our understanding of mental health service utilization in nationally representative groups of AI/ANs, they suffer from several limitations. First, both of these studies utilized data from the early 2000s, and it is unclear if current utilization patterns would be similar following a considerable period of growth and urbanization in the AI/AN population as well as substantial changes in health policy. Another limitation of these studies is that they used a single combined measure of mental health service use, which may have masked differences between racial/ethnic groups in utilization of particular types of mental health services (i.e., inpatient services, outpatient services, use of prescription medications). Third, while these studies included rural residence as a covariate, they did not comment on the direction or magnitude of the effect of geography on mental health service use. Furthermore, it is not clear how rural residence was operationalized, and the researchers were not able to measure if the AI/ANs in their sample lived in American Indian Areas. Thus, gaps remain in our

understanding of current mental health service utilization among AI/ANs, whether there are differences between AI/ANs and non-Hispanic whites in the utilization of various types of mental health services, and how geography impacts the relationship between AI/AN race/ethnicity and mental health service utilization.

Chapter III. Methodology

D. Conceptual Framework

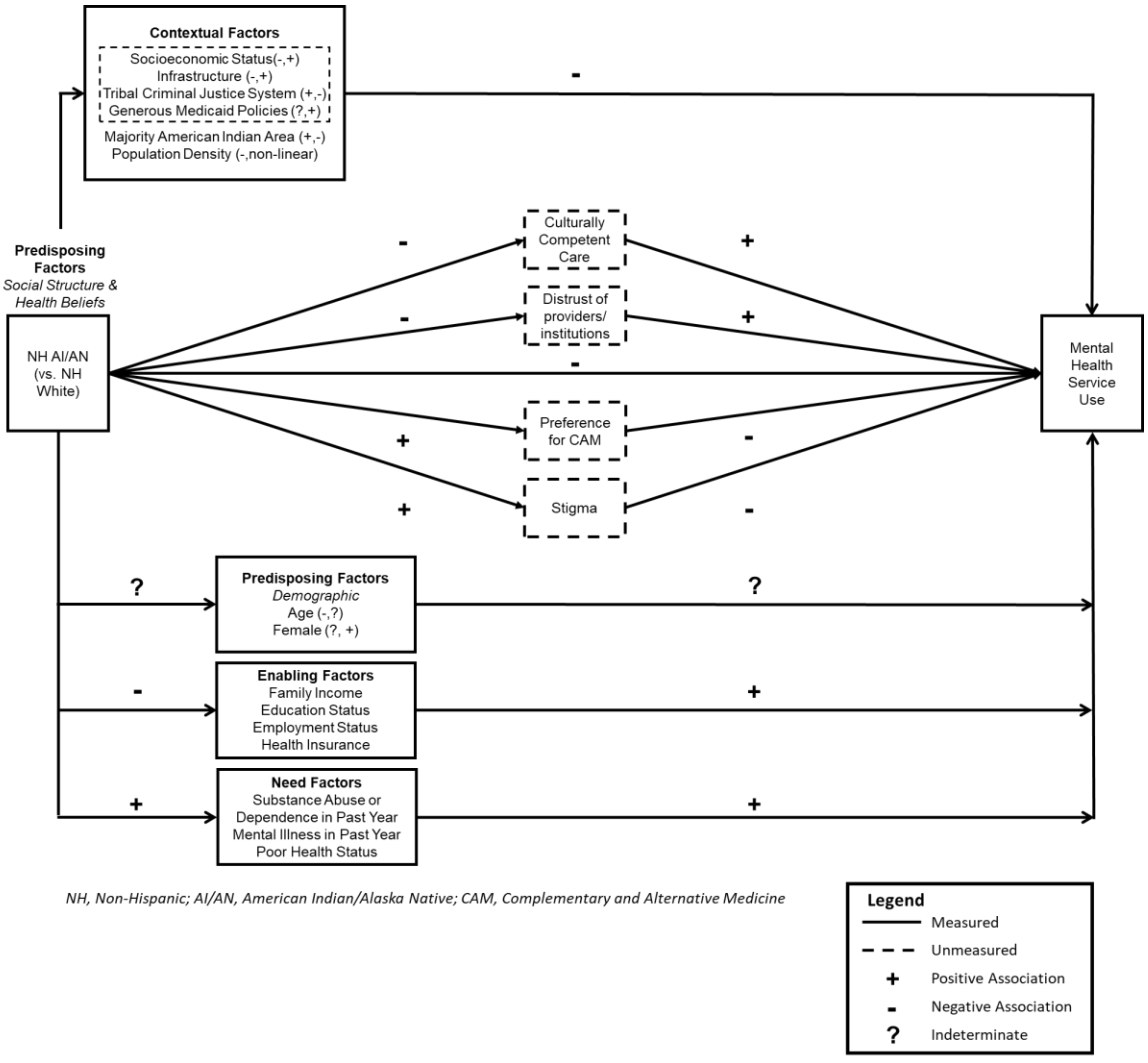


Figure 1. Conceptual Framework

Figure 1 shows the conceptual framework used to illustrate the relationship between non-Hispanic AI/AN race/ethnicity and mental health service use. This conceptual framework is based on Andersen's Behavioral Model of Health Services Use (Andersen, 1995). Andersen's model has previously been used to explore help-seeking attitudes toward mental health services among older AI/ANs in the Midwest (Roh et al., 2015; Roh et al., 2014), but our study is the first to use this framework to understand actualized access to mental health services among adult AI/ANs. Andersen's model outlines the contextual and individual level factors that act as determinants of health service utilization, including predisposing factors, enabling factors, and need-based factors. Predisposing factors "describe the propensity of individuals to use services" and typically include characteristics that precede the onset of illness like age, sex, race, and religion (Aday & Andersen, 1974). Enabling factors "describe the means individuals have available to them for use of services" and include attributes of the individual and community that can serve as facilitators or barriers to accessing health services (Aday & Andersen, 1974). Need-based factors describe an individual's perceived and evaluated health status, which are often proximate drivers of health service utilization (Aday & Andersen, 1974).

Andersen proposed that the environment in which people live and work impacts their utilization of healthcare services depending on how well a community facilitates healthcare access (Andersen, 2008). Health policy is considered the starting point for considering access as it frames financing, education, manpower, and reorganization programs related to healthcare (Aday & Andersen, 1974). Contextual enabling factors also include community attributes (e.g., urbanicity, region) as well as the resources (i.e.,

labor and capital) and organization (i.e., entry and structure) of the surrounding healthcare delivery systems (Aday & Andersen, 1974). In Figure 1, dashed lines enclose constructs that are unmeasured in this analysis.

Focal Relationship

The focal relationship of interest in this model is that between race/ethnicity and mental health service utilization. Specifically, we seek to determine if there are differences in past year mental health service utilization between non-Hispanic AI/ANs and non-Hispanic whites. Four pathways are proposed through which patients' race/ethnicity may influence mental health service utilization. The first pathway involves the likelihood of receipt of culturally competent care. Culturally competent care involves services that "are respectful of and responsive to the health beliefs, practices, and needs of diverse patients" (Office of Minority Health, 2017a). Views of mental health held by AI/ANs affect presentation of symptoms and communication with providers about mental health conditions. In particular, the conceptualization of mental health as an individual attribute diverges from a community-focused perspective emphasized by many groups of AI/ANs (Goodkind, Gorman, Hess, Parker, & Hough, 2014). Strong patient identification with American Indian ethnicity and ethnic discordance between patient and provider have both been linked to worse evaluations of providers' respectfulness (Garroutte, Sarkisian, & Karamnov, 2012). Along with reducing patient satisfaction, culturally incongruent services have been associated with reduced engagement with mental health treatment (Joseph P. Gone, 2004; Johnson & Cameron, 2001). It is hypothesized that difficulty

obtaining culturally competent care contributes to a negative association between non-Hispanic AI/AN race/ethnicity and mental health service utilization.

The second pathway proposed to explain the hypothesized negative relationship between AI/AN race/ethnicity and mental health utilization is distrust of medical providers. Due to a history of broken treaties, discriminatory policies, harm inflicted under the guise of treatment (e.g., care at the Hiawatha Asylum for Insane Indians), and research misconduct, many AI/AN groups are distrustful of healthcare providers and institutional sources of care (Abdullah & Brown, 2011). Focus groups with Midwestern AI/ANs revealed that they were more likely than African Americans to associate Western healthcare with abuses perpetrated by the U.S. Government (Burgess, Ding, Hargreaves, van Ryn, & Phelan, 2008). This is a particularly challenging barrier to overcome considering that many AI/ANs access mental health services through Medicaid coverage and the Indian Health Service (Artiga, Ubri, & Foutz, 2017; Indian Health Service, 2011). Distrust is reinforced by perceived discrimination, which is commonly felt among AI/ANs in interactions with their healthcare providers and is associated with underutilization of medical care (Burgess et al., 2008; Walls, Gonzalez, Gladney, & Onello, 2015).

The third pathway proposed to explain the relationship between non-Hispanic AI/AN race/ethnicity and mental health service utilization is preference for complementary and alternative medicine. Complementary and alternative medicine are "health care approaches developed outside of mainstream Western or conventional medicine" (National Center for Complementary and Integrative Health, 2016). Complementary practices are used alongside conventional medicine while alternative

practices are substituted for conventional medicine (National Center for Complementary and Integrative Health, 2016). The complementarity and substitution of CAM and mainstream medicine has been shown to vary across racial and ethnic groups (Tom Xu & Farrell Tommie, 2006). AI/ANs often demonstrate a preference for traditional AI/AN healing practices over biomedical interventions. Previous studies among some groups of AI/ANs have shown that stronger identification with Caucasian culture was associated with more help-seeking of biomedical services while greater loss of indigenous traits (i.e., deculturation) and incorporation of the ways of the majority culture (i.e., reculturation) were associated with acceptance of Western diagnostic and treatment processes (Freitas-Murrell B. & Swift J. K., 2015; Grandbois, 2005). It is hypothesized that preference for CAM contributes to a negative relationship between non-Hispanic AI/AN race/ethnicity and mental health service utilization and that the relationship may be weaker in areas where there is less identification with AI/AN culture (i.e., large cities which are both far from reservations and have the lowest concentration of AI/ANs).

Fourth, non-Hispanic AI/AN race/ethnicity may also act through its association with stigma to reduce utilization of mental health services. Stigma includes "a collection of negative attitudes, beliefs, thoughts, and behaviors that influences the individual, or the general public, to fear, reject, avoid, be prejudiced, and discriminate against people with mental disorders" (Gary, 2005). Stigma is a barrier to mental health service use because individuals who need services may be reluctant to seek help due to the potential for discrimination or rejection by others (Gary, 2005). Although there is substantial variation in the level of stigma attached to mental health conditions across tribes, there is often stigma associated with the choice of treatment source and type for mental health

conditions (Grandbois, 2005). For example, among some AI/ANs there is stigma against accessing behavioral health services due to historic attempts to transform AI/AN culture through similar service offerings. Based on these four pathways, non-Hispanic AI/AN race/ethnicity is hypothesized to be negatively associated with mental health service utilization.

Confounders

Predisposing Characteristics

Demographic predisposing characteristics include sex and age. Previous research suggests that among AI/ANs, female sex is associated with greater mental health service utilization (Brave Heart et al., 2016; Harris et al., 2005). The AI/AN population is generally younger than the overall U.S. population due to lower life expectancy (Johnson & Cameron, 2001).

Enabling Characteristics

Enabling characteristics include measures of socioeconomic status and insurance status. Measures of socioeconomic status include employment status, family income, poverty status, and education status. AI/ANs are less likely to work in management or professional occupations, have lower median household income, are more than twice as likely to live in poverty, and have lower educational attainment than non-Hispanic whites (Office of Minority Health, 2018). AI/ANs are also less likely than non-Hispanic whites to have private health insurance and much more likely to have Medicaid coverage or to be uninsured (Office of Minority Health, 2018). Higher socioeconomic status is associated with increased likelihood of obtaining private health insurance and affects an individual's ability to pay for both health insurance coverage and the out-of-pocket costs

associated with utilization of healthcare services. Lower socioeconomic status is associated with higher rates of psychiatric disorders (Holzer, Shea, Swanson, & Leaf, 1986). Conditional on need, higher education status is associated with increased health service utilization. Education affects health by enabling care for oneself and dependents as well as indirectly facilitating access to jobs that provide health insurance (Probst, Moore, Glover, & Samuels, 2004).

Need-Based Characteristics

Need-based characteristics include mental illness in the past year, overall health status, and substance abuse or dependence in the past year. Presence of mental illness, poor overall health status, and substance abuse or dependence are typically associated with greater use of mental health services. AI/ANs have many risk factors for mental health conditions and substance use disorders, including suffering from historical trauma and economic deprivation (Akins, Lanfear, Cline, & Mosher, 2013). As discussed in the Background, several mental health conditions are, in fact, more prevalent among AI/ANs compared with non-Hispanic whites. AI/ANs also suffer a greater burden of chronic illness, which is associated with poor mental health. These conditions and their attendant poor outcomes disproportionately reduce the health status of AI/ANs and increase need for mental health services.

Contextual Characteristics

Contextual enabling factors that are hypothesized to affect mental health service utilization include population density, residence in an American Indian Area, policies and procedures associated with the local criminal justice system, and the organization and financing of healthcare services. AI/ANs are more likely than non-Hispanic whites to live

in rural areas that are less densely populated, to live in the western part of the United States, and to live in American Indian Areas (Office of Minority Health, 2018). AI/ANs are disproportionately likely to live in health professional shortage areas, which would typically be associated with lower mental health service utilization (Payne et al., 2018). In fact, 92% of counties with an AI/AN majority were health professional shortage areas, and there is evidence that rural racial/ethnic minority communities may not be able to economically support needed healthcare providers (Probst et al., 2004). However, the presence of IHS- and tribally-run facilities in rural areas is expected to substantially facilitate access to care for AI/ANs residing in these areas. Residence in American Indian Areas may also have protective effects on mental health for AI/ANs stemming from connection to tribal land and increased social support (Goodkind et al., 2014).

Individuals with mental health conditions and substance use disorders often become involved with the criminal justice system, which can serve as a pathway to services (Center for Behavioral Health Statistics and Quality, 2012; Gary, 2005; Gottfried & Christopher, 2017). Local policies and practices related to law enforcement may also have indirect impacts on mental health service utilization. For example, the prohibition of alcohol and the lack of involuntary commitment laws for individuals exhibiting suicidal ideation in areas under tribal jurisdiction may lead to handling of behavioral health issues by law enforcement personnel rather than by medical professionals, which can exacerbate stigma and serve as a barrier to treatment seeking. Additionally, the patchwork jurisdiction for crimes committed on reservations has further eroded trust between AI/ANs and the federal government, which may contribute to the distrust of institutional sources of care mentioned above (Washburn, 2005). The organization and financing of

healthcare services includes the availability of mental health facilities and providers as well as state Medicaid policies relating to generosity of coverage for behavioral health conditions. Support systems that help counteract risk factors for poor behavioral health, such as poverty, also differ at the state level (Probst et al., 2004). Since geographic identifiers are not available in the public-use NSDUH files, this analysis is unable to control for measures of state-level or tribal-level policy, the local healthcare infrastructure, and the mental healthcare infrastructure that may confound the focal relationship of interest.

E. Hypotheses

H1: In an unadjusted model, non-Hispanic AI/AN race/ethnicity (relative to non-Hispanic white race/ethnicity) is negatively associated with mental health service utilization in the past year.

H2: After adjusting for predisposing and need-based factors, the negative association between non-Hispanic AI/AN race/ethnicity and mental health service use in the past year is exacerbated.

H3: After adjusting for enabling factors, the negative association between non-Hispanic AI/AN race/ethnicity and mental health service use in the past year is attenuated.

H4: The negative association between non-Hispanic AI/AN race/ethnicity and mental health service utilization is attenuated among those living outside of a CBSA and exacerbated among those living in or adjacent to moderately populated areas compared to those living in or adjacent to densely populated areas.

F. Data Source

Data used in this analysis are from the 2014, 2015, and 2016 administrations of the NSDUH. Public-use data files are available from the Substance Use and Mental Health Services Administration's Substance Abuse and Mental Health Data Archive (Center for Behavioral Health Statistics and Quality, n.d.). NSDUH is an annual, nationally representative, cross-sectional survey of the U.S. civilian, non-institutionalized population 12 years and older (Center for Behavioral Health Statistics and Quality, 2015c, 2016c, 2017d). From 2014 to 2016, the annual numbers of completed interviews were 67,901, 68,073, and 67,942, respectively (Center for Behavioral Health Statistics and Quality, 2017b). The weighted screening response rates ranged from 77.88% in 2016 to 82.57% in 2014 while the weighted interviewing response rates ranged from 68.44% in 2016 to 71.2% in 2014 (Center for Behavioral Health Statistics and Quality, 2017b). NSDUH includes questions about respondent demographics, physical and mental health status, substance use, drug treatment, and mental health service use. Due to the sensitive nature of the topics covered, the survey is administered in a private area of the respondent's home, respondents are assured about the confidentiality of their responses, and audio computer-assisted self-interviewing is utilized to improve the accuracy of self report (Center for Behavioral Health Statistics and Quality, 2015c, 2016c, 2017d). Data from NSDUH surveys prior to 2014 are not included in this analysis because geographic variables of interest were based on the 2000 Census rather than the 2010 Census in earlier survey administrations (Center for Behavioral Health Statistics and Quality, 2015a).

The Emory University Institutional Review Board (IRB) provided a determination of exemption from IRB Review for this study as it does not constitute human subjects research.

G. Analytic Sample

Figure 2 shows the steps used to derive the analytic sample, which includes non-elderly adults (18 to 64 years old) who self-identified as non-Hispanic white alone or non-Hispanic American Indian or Alaska Native alone. Adolescents and the elderly were excluded from the analytic sample because their need for mental health services, attitudes towards care-seeking, and mechanisms of accessing care would likely be different and require a different conceptual framework (Garrett, Baldridge, Benson, Crowder, & Aldrich, 2015; Roh et al., 2015; Schure & Goins, 2015). In the NSDUH public-use files, race and ethnicity are recoded into a single variable that assigns individuals who report Hispanic ethnicity to the "Hispanic" category and assigns those who report multiple races to the "more than one race" category. Thus, AI/AN is coded in a way that excludes people who identify as Hispanic or with more than one race. While this excludes many Americans who identify as AI/ANs, including only non-Hispanic, single-race AI/ANs is a common way of isolating the group that is most likely to have strong AI/AN cultural identification and be eligible for IHS services (Asdigian, Bear, Beals, Manson, & Kaufman, 2018; Bhaskar & O'Hara, 2017; Huyser, Sakamoto, & Takei, 2010; Pew Research Center, 2015). The NSDUH uses the predictive mean neighborhood procedure to impute missing values in core demographic variables, employment status, insurance status, and income (Center for Behavioral Health Statistics and Quality, 2015c, 2016c, 2017d). Individuals with missing values for any of the other model variables (0.6%) were

excluded from the analysis. 69,101 non-Hispanic white adults and 1,855 non-Hispanic AI/AN adults were included in the final analytic sample.

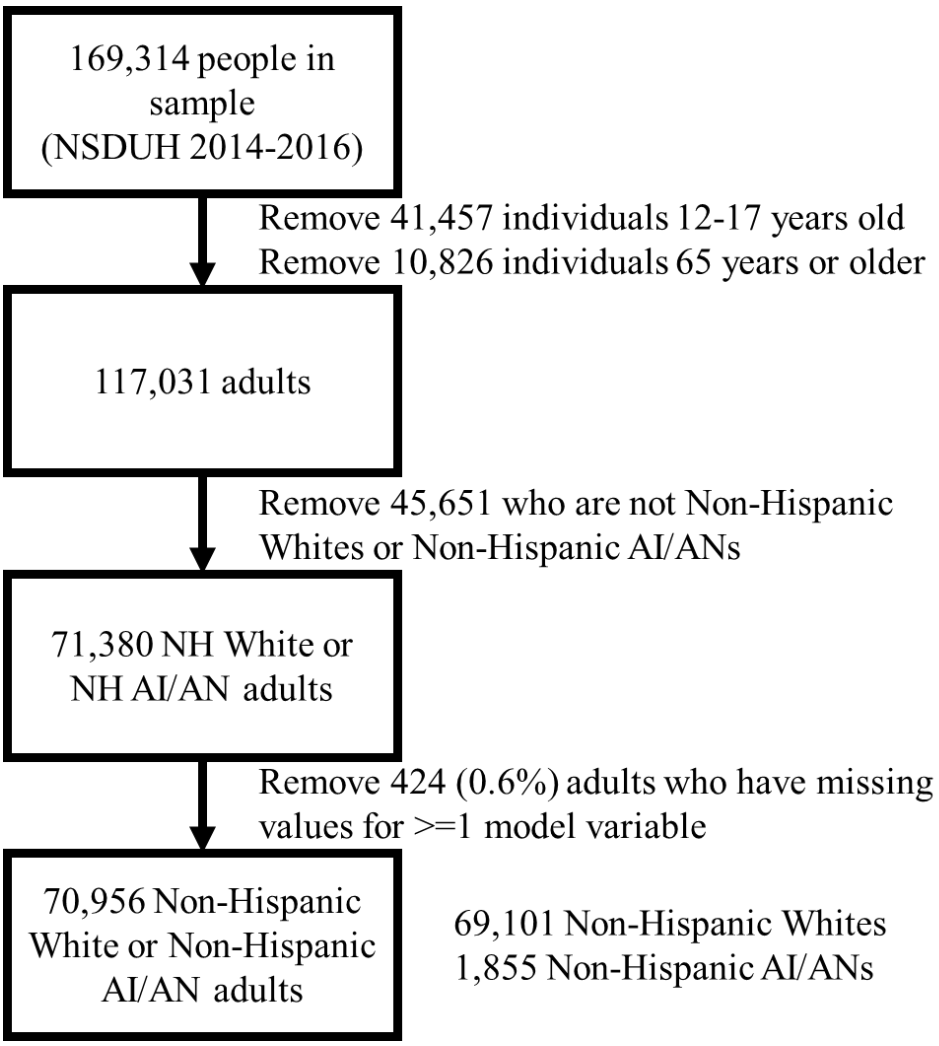


Figure 2. Analytic Sample

H. Constructs and Measures

Mental Health Service Utilization

The main outcome of interest is mental health service utilization. NSDUH respondents were asked separately about inpatient service use, outpatient service use, and prescription medication use for mental health treatment in the 12 months preceding the

survey. To determine inpatient mental health service use, respondents were asked if they had "stayed overnight or longer in a hospital or other facility to receive treatment or counseling for any problem [they were having] with their emotions, nerves, or mental health" (Center for Behavioral Health Statistics and Quality, 2013, 2014, 2015d). To determine outpatient mental health service use, respondents were asked if they had "received any outpatient treatment or counseling for any problem [they were having] with their emotions, nerves, or mental health" at any of the facility types listed. Respondents were provided with a list of outpatient facility types including "a mental health clinic or center, an office of a private therapist, psychologist, psychiatrist, social worker, or counselor, a doctor's office that was not part of a clinic, an outpatient medical clinic, a partial day hospital, or a day treatment center." Respondents were also able to select "some other place" as an option for location of outpatient mental health treatment. Finally, respondents were asked if they had "taken any prescription medication [that was prescribed for the respondent] to treat a mental or emotional condition in the past year." For all mental health service use questions, respondents were instructed not to include treatment for alcohol or drug use. In this study, past year mental health service use is specified in three ways that each serve as an outcome in a separate model. The first outcome is any mental health service use in the past year, which is coded as 1 for those who answered any one of the above three questions (i.e., inpatient service use, outpatient service use, or prescription medication use) affirmatively and coded as 0 for those who reported no inpatient, outpatient, or prescription medication use for mental health in the past year. The second outcome is any outpatient mental health service use in the past year, which is coded as 1 for those respondents who answered the outpatient service use

question affirmatively and coded as 0 for those who reported no outpatient service use. The third outcome is prescription medication use for mental health in the past year, which is coded as 1 for those who answered the prescription medication use question affirmatively and coded as 0 for those who reported no prescription medication use for mental health in the past year. Inpatient mental health service use in the past year is not included as a separate outcome because of the small proportion of individuals who answered this question affirmatively (0.9%).

Race and Ethnicity

NSDUH operationalizes race and ethnicity according to the standards for the classification of federal data (Office of Management and Budget, 1997). The sequence of questions about race/ethnicity follows the best practices of allowing self-identification, asking about Hispanic ethnicity independently from race, and allowing selection of multiple races. On the NSDUH questionnaire, the AI/AN race category includes North American, Central American, and South American Indians (Center for Behavioral Health Statistics and Quality, 2013, 2014, 2015d). Respondents who reported they were of Hispanic, Latino, or Spanish origin or descent were classified as Hispanic. Those who reported they were AI/AN and another race were classified as more than one race. Non-Hispanic American Indian or Alaska Native alone and non-Hispanic white alone are the two race/ethnicity categories included in this analysis.

Predisposing Characteristics – Demographic

Age at survey administration was calculated from date of birth and confirmed by the respondent. For those included in the analytic sample, NSDUH categorizes age into

four categories: 18-25 Years Old, 26-34 Years Old, 35-49 Years Old, and 50-64 Years Old. Sex is categorized as male or female.

Enabling Characteristics

NSDUH contains questions that ascertain both health insurance status (i.e., covered vs. uninsured) and type of health insurance. Respondents indicate if they are covered by Medicare, Medicaid, TRICARE/CHAMPUS/CHAMPVA/VA/Military, private, or other health insurance. Other health insurance includes "any policy or program that provides or pays for medical care" other than the ones listed above (Center for Behavioral Health Statistics and Quality, 2013, 2014, 2015d). NSDUH codes respondents who report "Indian Health Insurance" as having other health insurance, but these individuals may be more appropriately categorized as uninsured since the Indian Health Service is not a health insurance program (Indian Health Service, n.d.-a). Indicators for any private insurance, any Medicaid, any Medicare, any military insurance, and other insurance are included in the models with uninsured serving as the omitted reference category.

Respondents were asked a series of employment questions. A threshold of 35 or more hours is used to determine full-time employment status. Respondents who did not have jobs or businesses are categorized as unemployed only if they made specific efforts to find work in the 30 days prior to survey administration. The recoded employment categories include employed full-time, employed part-time, unemployed, and other (including not in the labor force). These four categories of employment are included in this analysis with indicators for employed part-time, unemployed, and other while full-time employment serves as the omitted reference category. In 2015, employment

questions moved from being interviewer-administered to being self-administered (Center for Behavioral Health Statistics and Quality, 2015e).

Survey respondents selected the range of values that best represented their total combined family income before taxes and other deductions in the year of survey administration. These responses were then coded into four categories available in the public-use datasets including Less than $20,000, $20,000-$49,999, $50,000-$74,999, and $75,000 or more (Center for Behavioral Health Statistics and Quality, 2013, 2014, 2015d). Less than $20,000 was used as the omitted reference category in this analysis.

Respondents were also asked to identify the highest level of education they had completed in one year increments from never attended school to 5+ years of college or university. These responses were then recoded into categories including less than high school diploma, high school diploma/General Equivalency Diploma (GED), some college, or college graduate. These four categories of education status are included in this analysis with indicators for high school diploma/GED, some college, and college graduate while less than high school diploma serves as the omitted reference category.

A respondent was coded as living in an American Indian Area if mapping the survey respondent's Census block revealed that the block was in a federally-recognized American Indian Reservation, a state-recognized American Indian Reservation, an Oklahoma tribal statistical area, a tribal-designated statistical area, or a state-designated tribal statistical area based on the 2010 Census (Center for Behavioral Health Statistics and Quality, 2015a, 2016a, 2017a). While another measure of residence in an American Indian Area was available based on the respondent's NSDUH segment, the Census block measure was chosen because the Census Bureau's algorithm for creating Census blocks

holds all of the tribal areas as guaranteed block boundaries (U.S. Census Bureau, n.d.). As a result, Census blocks do not cross American Indian Areas.

NSDUH's population density variable indicates if a respondent resided in a NSDUH segment in a CBSA with at least one million people, in a CBSA with fewer than one million people, or not in a CBSA based on the 2010 Census data and December 2009 CBSA classifications (Center for Behavioral Health Statistics and Quality, 2015a, 2016a, 2017a). NSDUH segments are a component of NSDUH's sampling design and originate from collapsing adjacent Census blocks within a sampled Census block group until a minimum number of dwelling units is included (Center for Behavioral Health Statistics and Quality, 2015b, 2016b, 2017c). This minimum number of dwelling units ranges from 100 to 250 depending on the state being sampled and whether the area is urban or rural (Center for Behavioral Health Statistics and Quality, 2015b, 2016b, 2017c). According to the 2009 CBSA classifications, "a CBSA is a geographic entity associated with at least one core of 10,000 or more population plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties" (Office of Management and Budget, 2010). A CBSA with at least one million people would be considered a metropolitan area. However, a CBSA with fewer than one million people could be a metropolitan area (contains urbanized area with ≥50,000 people) or a micropolitan area (contains urban cluster with 10,000-49,999 people). Overall, this population density variable indicates if a survey respondent lived in or adjacent to a densely or moderately populated area. Individuals in NSDUH segments not in CBSAs reside outside of densely or moderately populated areas. These three levels of population density are included in the analysis with indicators for living in a CBSA with fewer than

one million people and living outside of a CBSA while living in a CBSA with at least one million people serves as the omitted reference category.

Need-based Characteristics

Past year mental illness is determined in the NSDUH using a weighted logistic regression model that predicts the likelihood of a respondent having had a diagnosable mental illness in the past year. This model was developed between 2008 and 2012 when a subsample of adult NSDUH respondents completed a clinical follow-up interview that included thorough mental health assessments to determine if they had diagnosable mental, behavioral, or emotional disorders based on DSM-IV diagnostic criteria. Following testing and validation of the model, it is now deployed to predict likelihood of mental illness in the past year for each NSDUH respondent. The model inputs include psychological distress based on the Kessler 6 scale (Kessler et al., 2002), functional impairment based on the World Health Organization Disability Assessment Schedule (World Health Organization, 2010), past year Major Depressive Episode, past year serious suicidal thoughts, and respondent age (Center for Behavioral Health Statistics and Quality, 2015c, 2016c, 2017d). Cutoffs for mild, moderate, or severe mental illness in the past year indicate an increasing degree of functional impairment. Four categories of past year mental illness are included in this analysis with indicators for mild mental illness, moderate mental illness, and severe mental illness while no mental illness serves as the omitted reference category.

Overall health status has five categories corresponding to respondents' rating of their general health as excellent, very good, good, fair, or poor. Indicators for these

categories of overall health status are included in the analysis with excellent serving as the omitted reference category.

Need related to substance use is operationalized as an indicator of any abuse of or dependence on alcohol, marijuana, cocaine, or heroin in the past year. Alcohol, marijuana, cocaine, and heroin are the only substances included in this metric because there were changes to the NSDUH questionnaire concerning use of other illicit drugs between 2014 and 2015; thus, these measures are not comparable across 2014-2016 (Center for Behavioral Health Statistics and Quality, 2015e). Substance dependence or abuse in the past year are based on DSM-IV criteria (American Psychiatric Association, 1994). A respondent was considered dependent on a substance if he or she met at least three of the following criteria: (1) needed more to get same effect/same amount caused less effect, (2) reported withdrawal symptoms, (3) set limits but not able to keep them, (4) wanted to cut out or stop using but not able to, (5) had a month or more when he/she spent a lot of time getting, using, or getting over effects of substance, (6) spent less time doing hobbies/activities due to use of substance, or (7) continued using substance despite it having caused emotional or physical problems (Center for Behavioral Health Statistics and Quality, 2015a, 2016a, 2017a). The withdrawal criterion is not used to determine marijuana dependence. If a respondent was not dependent on a substance, abuse was indicated when he or she met at least one of the following criteria: (1) had serious problems at home, work, or school due to substance, (2) regularly used substance and did something to put self in danger, (3) use caused respondent to do things that repeatedly caused trouble with the law, or (4) continued use despite problems with family or friends (Center for Behavioral Health Statistics and Quality, 2015a, 2016a, 2017a).

Unmeasured Constructs

In addition to race/ethnicity, predisposing characteristics related to social structure and health beliefs include distrust of healthcare providers or institutional sources of care, preference for complementary and alternative medicine, and stigma associated with the receipt of mental health services. These constructs are unmeasured in this study except insofar as they are associated with race/ethnicity or other factors. Availability and receipt of culturally competent care are enabling characteristics that are likely associated with the predisposing characteristics mentioned above since an individual's health beliefs and preferences shape what constitutes cultural competence in the provision of his/her healthcare services. Availability and receipt of culturally competent care are also unmeasured in this study.

Table 1 presents the measures used to capture the constructs represented in this study's conceptual framework.

Table 1. Constructs and Measures

Construct	**Measures Available**	**Hypothesized Relationship with Dependent Variable**
Inpatient mental health service use	During the past 12 months, have you stayed overnight or longer in a hospital or other facility to receive treatment or counseling for any problem you were having with your emotions, nerves, or mental health? • Yes (1) • No (0) [Referent]	Not applicable
Outpatient mental health service use	During the past 12 months, did you receive any outpatient treatment or counseling for any problem you were having with your emotions, nerves, or mental health at any of the places listed below? • An outpatient mental health clinic or center	Not applicable

	• The office of a private therapist, psychologist, psychiatrist, social worker, or counselor that was not part of a clinic
	• A doctor's office that was not part of a clinic
	• An outpatient medical clinic
	• A partial day hospital or day treatment program
	• Some other place
	  ○ Yes (1)
	  ○ No (0) [Referent]	

Prescription medication use for mental health	During the past 12 months, did you take any prescription medication that was prescribed for you to treat a mental or emotional condition? • Yes (1) • No (0) [Referent]	Not applicable
Any mental health service use	Any mental health service use in past year • Yes (Inpatient MH Service Use=1 OR Outpatient MH Service Use=1 OR Rx Medication Use for MH =1) • No (Inpatient MH Service Use = 0 AND Outpatient MH Service Use = 0 AND Rx Medication Use for MH = 0)	Not applicable
Race/ ethnicity	Respondent AI/AN Status • Non-Hispanic White (0) [Referent] • Non-Hispanic American Indian or Alaska Native (1)	NH AI/AN (-)
Age	Age category • 18-25 Years Old [Referent] • 26-34 Years Old • 35-49 Years Old • 50-64 Years Old	Unknown
Sex	• Male (0) [Referent] • Female (1)	Female (+)
Mental health status	Mental illness in past year • None [Referent] • Mild • Moderate • Serious	More severe mental illness (+)
Overall health status	This question is about your overall health. Would you say your health in general is excellent, very good, good, fair, or poor? • Excellent [Referent] • Very Good	Worse health status (+)

	• Good • Fair • Poor	
Substance use	Any abuse of or dependence on alcohol, marijuana, cocaine, or heroin in the past year? • Yes (1) • No (0) [Referent]	Substance abuse or dependence (+)
Insurance status	Insurance status • Any Medicaid • Any Medicare • Any TRICARE, CHAMPUS, CHAMPVA /VA/Military health care • Any private • Any other insurance • Uninsured [Referent]	Have insurance (+)
Employment status	Employment status • Employed full-time [Referent] • Employed part-time • Unemployed • Other (including not in labor force)	Unemployed (+)
Family income	Total family income • Less than $20,000 (including loss) [Referent] • $20,000-$49,999 • $50,000-$74,999 • $75,000 or more	Higher income (+)
Education level	Highest grade or year of school completed • Less than high school [Referent] • High school graduate • Some college • College graduate	Lower education (-)
Geographic characteristics	Census block in an American Indian Area • Yes (1) • No (0) Population density • NSDUH segment in a CBSA of at least one million [Referent] • NSDUH segment in a CBSA with fewer than one million people • NSDUH segment not in a CBSA	American Indian Area (-) Lower population density (-)

I. Data Analysis

Multiple logistic regression models were run to compare the probability of mental health service utilization in the past year between non-Hispanic AI/ANs and non-Hispanic whites. A separate model was created for each of the three outcome variables of interest (i.e., any mental health service utilization in the past year, any outpatient mental health service utilization in the past year, and any prescription medication use for mental health in the past year). Predisposing, need-based, and enabling characteristics were sequentially added to the models to see if they attenuated or strengthened any relationship between non-Hispanic AI/AN race/ethnicity and mental health service utilization in the past year. Finally, interaction terms were added to determine if the effect of non-Hispanic AI/AN race/ethnicity on past year mental health service utilization was the same for respondents living across categories of population density.

Equation for Logit Analysis of Probability of Past Year Mental Health Service Use

$$y_{irt} = \lambda(\beta_0 + \beta_1 AIAN_i + \beta_2 MODDEN_r + \beta_3 LOWDEN_r + \beta_4(AIAN_i * MODDEN_r) + \beta_5(AIAN_i * LOWDEN_r) + \beta_6 X_{irt} + \beta_7 YEAR_t) + \varepsilon_{irt}$$

In the above model, y_{irt} represents the mental health service utilization outcomes of interest, and λ represents the logistic cumulative distribution function. The variable $AIAN_i$ represents non-Hispanic AI/AN race/ethnicity (vs. non-Hispanic white), and β_1 is the parameter of interest. X_{irt} represents the vector of control variables for individual *i* in a region *r* in a given year *t*, which include the predisposing, need-based, and enabling characteristics explained above. $YEAR_t$ represents the year fixed effects. ε_{irt} represents the

regression error term. The terms ($AIAN_i * MODDEN_r$) and ($AIAN_i * LOWDEN_r$) represent the interaction between non-Hispanic AI/AN race/ethnicity and living in a CBSA with fewer than one million people and the interaction between non-Hispanic AI/AN race/ethnicity and living in a non-CBSA, respectively. The coefficients β_4 and β_5 are additional parameters of interest for the third iteration of each model where iteration one is the model adjusted only for survey year, iteration two is the model adjusted for control variables, and iteration 3 is the model adjusted for control variables with the addition of the interaction terms. The inclusion of the interaction terms allowed for determination of the change in the predicted probability that mental health service utilization in the past year=1 for a change in both non-Hispanic AI/AN race/ethnicity and population density.

All analyses were conducted in Stata Version 15.1 (College Station, TX: StataCorp LLC). Sampling weights were used to correct for the NSDUH complex survey design, and standard errors were estimated allowing for sampling of covariates (StataCorp).

Chapter IV. Results

A. Descriptive Statistics

Table 2 shows characteristics of non-Hispanic whites and non-Hispanic AI/ANs included in the analytic sample. The total sample size was 70,956 respondents, which included 69,101 non-Hispanic whites and 1,855 non-Hispanic AI/ANs.

Table 2. Predisposing Characteristics, Need-based Characteristics, Enabling Characteristics, and Past Year Mental Health Service Use of Study Sample, by Race/Ethnicity

Characteristic	Non-Hispanic White (Weighted Proportion)	Non-Hispanic AI/AN (Weighted Proportion)	*p*-value*
Age			
18-25 years old	15.8%	20.1%	0.0035
26-34 years old	18.1%	19.0%	
35-49 years old	29.9%	32.4%	
50-64 years old	36.3%	28.5%	
Sex			
Female	50.6%	51.6%	0.6054
Mental Illness in Past Year			
None	78.0%	77.1%	0.3185
Mild	10.4%	12.3%	
Moderate	5.9%	4.7%	
Severe	5.7%	5.8%	
Overall Health Status			
Excellent	23.5%	14.6%	<0.0001
Very good	39.8%	27.5%	
Good	26.2%	35.9%	
Fair	8.1%	18.5%	
Poor	2.4%	3.5%	
Substance Use			
Alcohol, marijuana, cocaine, or heroin dependence or abuse in past year	9.2%	15.5%	<0.0001
Insurance Status[ŧ]			
Any private	74.2%	38.7%	<0.0001
Any Medicaid	10.8%	30.2%	<0.0001
Any Medicare	4.6%	5.1%	0.6297
Any military	3.9%	4.9%	0.2284
Only other	2.2%	17.5%	<0.0001
Uninsured	9.7%	9.9%	0.8122

**p*-values calculated from Pearson chi-square tests; AI/AN = American Indian/Alaska Native

ŧThe first four categories of insurance status are not mutually exclusive

Table 2. Continued

Characteristic	Non-Hispanic White (Weighted Proportion)	Non-Hispanic AI/AN (Weighted Proportion)	*p*-value*
Employment Status			
Employed full-time	61.0%	51.1%	
Employed part-time	14.8%	10.8%	<0.0001
Unemployed	4.0%	10.4%	
Other (including not in labor force)	20.2%	27.7%	
Family Income			
Less than $20,000	13.3%	33.3%	
$20,000-$49,999	25.1%	37.1%	<0.0001
$50,000-$74,999	17.0%	13.1%	
$75,000 and more	44.6%	16.5%	
Education Level			
Less than high school	7.8%	21.9%	
High school graduate	25.2%	33.2%	<0.0001
Some college	32.0%	33.8%	
College graduate	35.1%	11.1%	
Census Block in American Indian Area	1.2%	39.8%	<0.0001
Population Density			
Segment in a CBSA³1 million	48.0%	22.4%	<0.0001
Segment in a CBSA<1 million	45.1%	54.5%	
Segment not in CBSA	6.9%	23.1%	
Mental Health Service Use in Past Year			
Any	19.3%	14.4%	0.0029
Inpatient	0.9%	1.4%	0.1198
Outpatient	9.3%	7.3%	0.0765
Prescription medication	16.6%	12.6%	0.0052
Sample Size			
2014	23,027	634	
2015	23,065	622	–
2016	23,009	599	
Total	69,101	1,855	

**p*-values calculated from Pearson chi-square tests; AI/AN = American Indian/Alaska Native; CBSA = Core-Based Statistical Area

There were significant differences between non-Hispanic whites and non-Hispanic AI/ANs across most characteristics of interest. For predisposing characteristics, non-Hispanic AI/ANs had a younger age distribution than non-Hispanic whites (p=0.0035). There was not a significant difference in sex distribution between the groups (p=0.6054).

For enabling characteristics, non-Hispanic AI/ANs had lower socioeconomic status and were less likely to be privately insured, more likely to have Medicaid, and

more likely to have other insurance (including Indian Health Service payment for services) than non-Hispanic whites ($p<0.0001$ for all). When examining specific indicators of socioeconomic status, non-Hispanic AI/ANs were more likely to be unemployed, had lower family income, and had lower educational attainment than non-Hispanic whites ($p<0.0001$ for all). Non-Hispanic AI/ANs were much more likely than non-Hispanic whites to reside in a Census block in an American Indian Area ($p<0.0001$) and were less likely to live in or adjacent to a densely populated area ($p<0.0001$).

For need-based characteristics, non-Hispanic AI/ANs had worse overall health status ($p<0.0001$) and were more likely to have suffered from abuse of or dependence on alcohol, marijuana, cocaine, or heroin in the past year than non-Hispanic whites ($p<0.0001$). Non-Hispanic AI/ANs and non-Hispanic whites had a similar distribution of mental illness in the past year ($p=0.3185$).

With regard to overall mental health service use in the past year, non-Hispanic AI/ANs and non-Hispanic whites used similar amounts of inpatient and outpatient mental health services ($p=0.1198$ and $p=0.0765$, respectively), but non-Hispanic whites were more likely than non-Hispanic AI/ANs to have used prescription medication for mental health in the past year ($p=0.0052$).

B. Results of Logistic Regression Model Predicting Any Mental Health Service Use in Past Year

Table 3. Logit Analysis of Probability of Any Mental Health Service Use in Past Year among Non-Hispanic AI/AN and Non-Hispanic White Adults

Characteristic	Model 1[α]		Model 2[β]		Model 3[γ]		Model 4[δ]		Model 5[ε]		Model 6[ζ]	
	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)
Race/Ethnicity												
NH White	[Ref]	–	–	–	–	–	–	–	–	–	–	–
NH American Indian or Alaska Native	-0.049 ***	(0.014)	-0.049 ***	(0.014)	-0.058 ***	(0.011)	-0.049 ***	(0.012)	-0.046 ***	(0.013)	-0.034 *	(0.013)
Census block in an American Indian Area												
Yes									-0.002	(0.020)	-0.001	(0.020)
Population Density 2010												
Segment in a CBSA with ≥ 1 Million People									[Ref]	–	–	–
Segment in CBSA with < 1 Million People									-0.006	(0.004)	-0.006	(0.004)
Segment not in a CBSA									-0.022 **	(0.007)	-0.022 **	(0.007)
Interaction Effects												
AIAN#CBSA with <1 Million People											-0.080 *	(0.034)
AIAN#Not in a CBSA											-0.026	(0.028)

*p <0.05, **p <0.01, ***p <0.001; AME = Average Marginal Effects; SE = Standard Error; NH = Non-Hispanic; CBSA = Core-Based Statistical Area; AIAN = American Indian/Alaska Native

[α]Controlled for survey year

[β]Controlled for survey year, age, and sex

[δ]Controlled for survey year, age, sex, mental illness in past year, overall health status, and substance dependence or abuse in past year

[ε]Model 4 plus the variables for American Indian Area and population density

[ζ]Model 5 plus interaction terms for race/ethnicity X population density. Interaction effects are only presented for Model 6 because it is the only model that includes the interaction terms.

The overall proportion of individuals in the study sample who reported any mental health service use in the past year was 19.2%. Table 3 shows the results of a multiple logistic regression model predicting the probability of any mental health service use in the past year. In the model adjusted only for survey year, non-Hispanic AI/ANs had a 4.9 percentage point lower probability of any mental health service use in the past year compared to non-Hispanic whites (H1, $p<0.001$). This effect remains the same after adjusting for predisposing demographic characteristics. With the addition of need-based characteristics to the model, the disparity between non-Hispanic AI/ANs and non-Hispanic whites is slightly exacerbated, to a 5.8 percentage-point lower probability of service use among non-Hispanic AI/ANs relative to non-Hispanic whites (H2, $p<0.001$). When enabling characteristics including socioeconomic status, insurance status, residence in an American Indian Area, and population density are added to the model, the average marginal effect returns to a 4.6 percentage point lower probability of service use among non-Hispanic AI/ANs relative to non-Hispanic whites (H3, $p<0.001$).

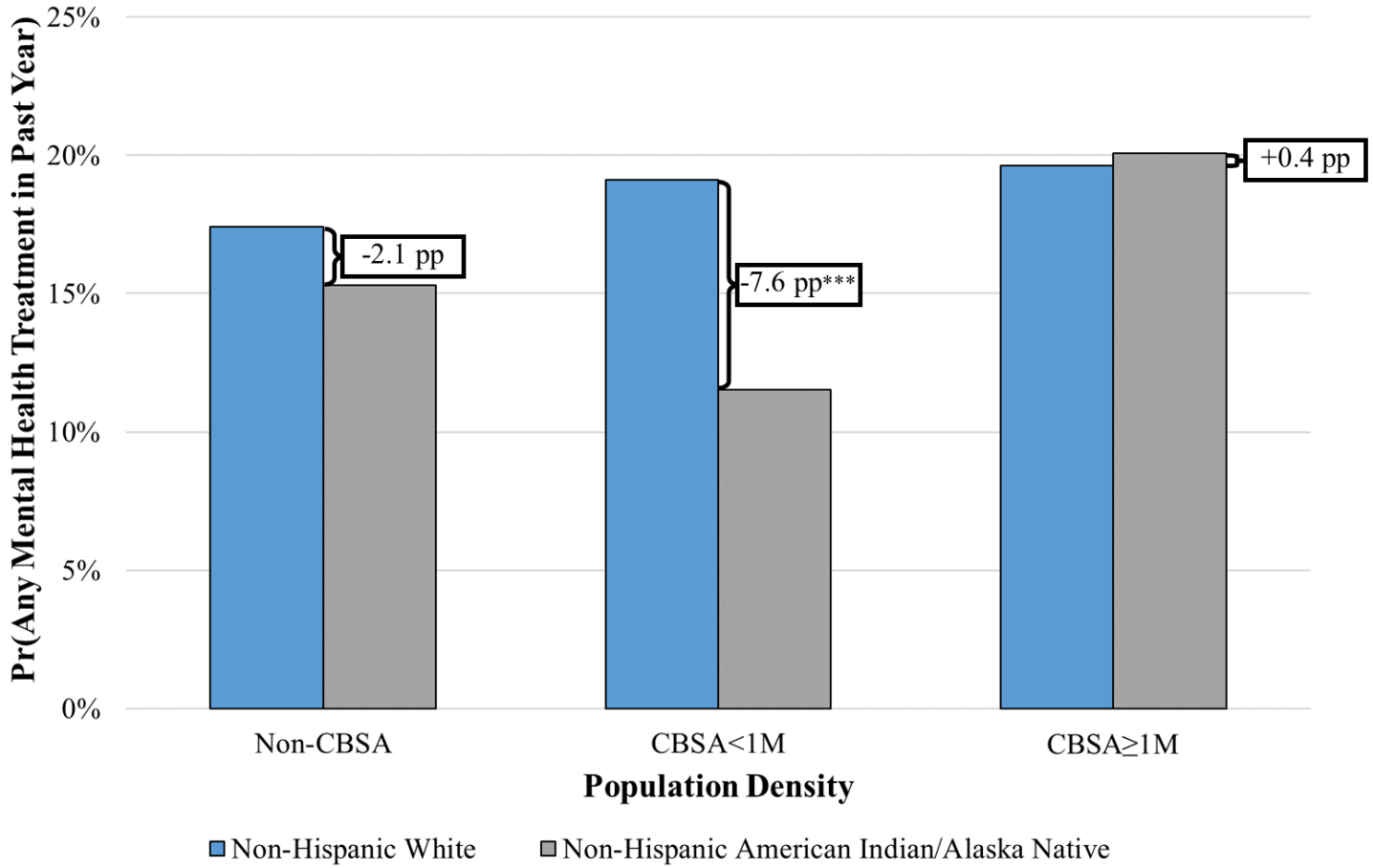
The negative association between non-Hispanic AI/AN race/ethnicity and any mental health service utilization persists after adding the interaction terms for non-Hispanic AI/AN race/ethnicity and population density, but it is weakened. The average change in the predicted conditional probability of any past year mental health service use for non-Hispanic AI/ANs vs. non-Hispanic whites differs by 8.0 percentage points between individuals living in a CBSA with fewer than one million people and individuals living in a CBSA with at least one million people (H4, $p=0.020$), with individuals living in CBSAs with fewer than one million people having greater (i.e., more negative) marginal effects of non-Hispanic AI/AN race/ethnicity on average. The interaction term

between AI/AN race/ethnicity and residing in a non-CBSA area was not statistically significant (H4, p=0.308).

Several control variables were also significantly associated with the likelihood of having any mental health service utilization in the past year. Older age, female sex, more severe mental illness in the past year, having abused or been dependent on alcohol, marijuana, cocaine, or heroin in the past year, health insurance (vs. uninsured), and higher education were all positively associated with any mental health service utilization in the past year. Better overall health status, full-time employment (vs. part-time employment, unemployment, or other employment status), and living outside of a CBSA (versus living in or adjacent to a densely populated area) were negatively associated with any mental health service utilization in the past year. Living in or adjacent to a moderately populated area (vs. a densely populated area) was not associated with any mental health treatment in the past year. Full regression results are available in Appendix A.

In order to understand how differences between non-Hispanic AI/ANs and non-Hispanic whites vary across categories of population density, Figure 3 shows adjusted predictions of the probability of any mental health service utilization in the past year for a non-Hispanic white adult and non-Hispanic AI/AN adult who live in or adjacent to a densely populated area, in or adjacent to a moderately populated area, or outside of a CBSA. The average marginal effect of non-Hispanic AI/AN race/ethnicity on the outcome for each level of population density is presented in brackets. These average marginal effects show how the adjusted predictions for non-Hispanic AI/ANs differ from the adjusted predictions for non-Hispanic whites at each value of population density.

Among those living in a CBSA with fewer than one million people, the predicted probability of any past year mental health service utilization is significantly lower for non-Hispanic AI/ANs than for non-Hispanic whites ($p<0.001$). There was not a significant difference in predicted probability of any mental health service utilization between non-Hispanic AI/ANs and non-Hispanic whites living in CBSAs with at least one million people or in non-CBSAs. The disparity between non-Hispanic AI/ANs and non-Hispanic whites was significantly greater in CBSAs with fewer than one million people than in CBSAs with at least one million people ($p=0.0195$). No other significant differences were detected between pairs of population density types. The results presented in Figure 3 were generated as predicted probabilities using the model's coefficient estimates, not the marginal effects estimates presented in Table 3. Thus, the significant average marginal effect of non-Hispanic AI/AN race/ethnicity presented in Table 3 represents the average across respondents living in all types of population density areas. As shown in Figure 3, the magnitude and significance of the non-Hispanic AI/AN vs. non-Hispanic white disparity in any past year mental health service utilization varies across categories of population density.



*p <0.05, **p<0.01, ***p<0.001; pp = Percentage Point CBSA = Core-Based Statistical Area; 1M = 1 Million People
Results in this figure were generated as predicted probabilities using the models' coefficient estimates, not the average marginal effect estimates as presented in Table 3; hence the figures are not simply representations of the marginal effects from Table 3.

Figure 3: Adjusted Predicted Probabilities of Any Mental Health Treatment in Past Year by Race/Ethnicity and Population Density

C. Results of Logistic Regression Model Predicting Any Outpatient Mental Health Service Use in Past Year

Table 4. Logit Analysis of Probability of Any Past Year Outpatient Mental Health Service Use among Non-Hispanic AI/AN and Non-Hispanic White Adults

Characteristic	Model 1[α]		Model 2[β]		Model 3[γ]		Model 4[δ]		Model 5[ε]		Model 6[ζ]	
	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)
Race/Ethnicity												
NH White	[Ref]	–	–	–	–	–	–	–	–	–	–	–
NH American Indian or Alaska Native	-0.020 *	(0.010)	-0.021 *	(0.010)	-0.022 *	(0.008)	-0.013	(0.010)	-0.008	(0.011)	-1.0E-5	(0.012)
Census block in an American Indian Area												
Yes									-0.006	(0.012)	-0.005	(0.013)
Population Density 2010												
Segment in a CBSA with ≥ 1 Million People									[Ref]	–	–	–
Segment in CBSA with < 1 Million People									-0.009 **	(0.003)	-0.009 **	(0.003)
Segment not in a CBSA									-0.023 ***	(0.004)	-0.023 ***	(0.004)
Interaction Effects												
AIAN#CBSA with <1 Million People											-0.032	(0.025)
AIAN#Not in a CBSA											-0.036	(0.026)

*p <0.05, **p <0.01, ***p <0.001; AME = Average Marginal Effects; SE = Standard Error; NH = Non-Hispanic; CBSA = Core-Based Statistical Area; AIAN = American Indian/Alaska Native

[α]Controlled for survey year

[β]Controlled for survey year, age, and sex

[δ]Controlled for survey year, age, sex, mental illness in past year, overall health status, and substance dependence or abuse in past year

[ε]Model 4 plus the variables for American Indian Area and population density

[ζ]Model 5 plus interaction terms for race/ethnicity X population density. Interaction effects are only presented for Model 6 because it is the only model that includes the interaction terms.

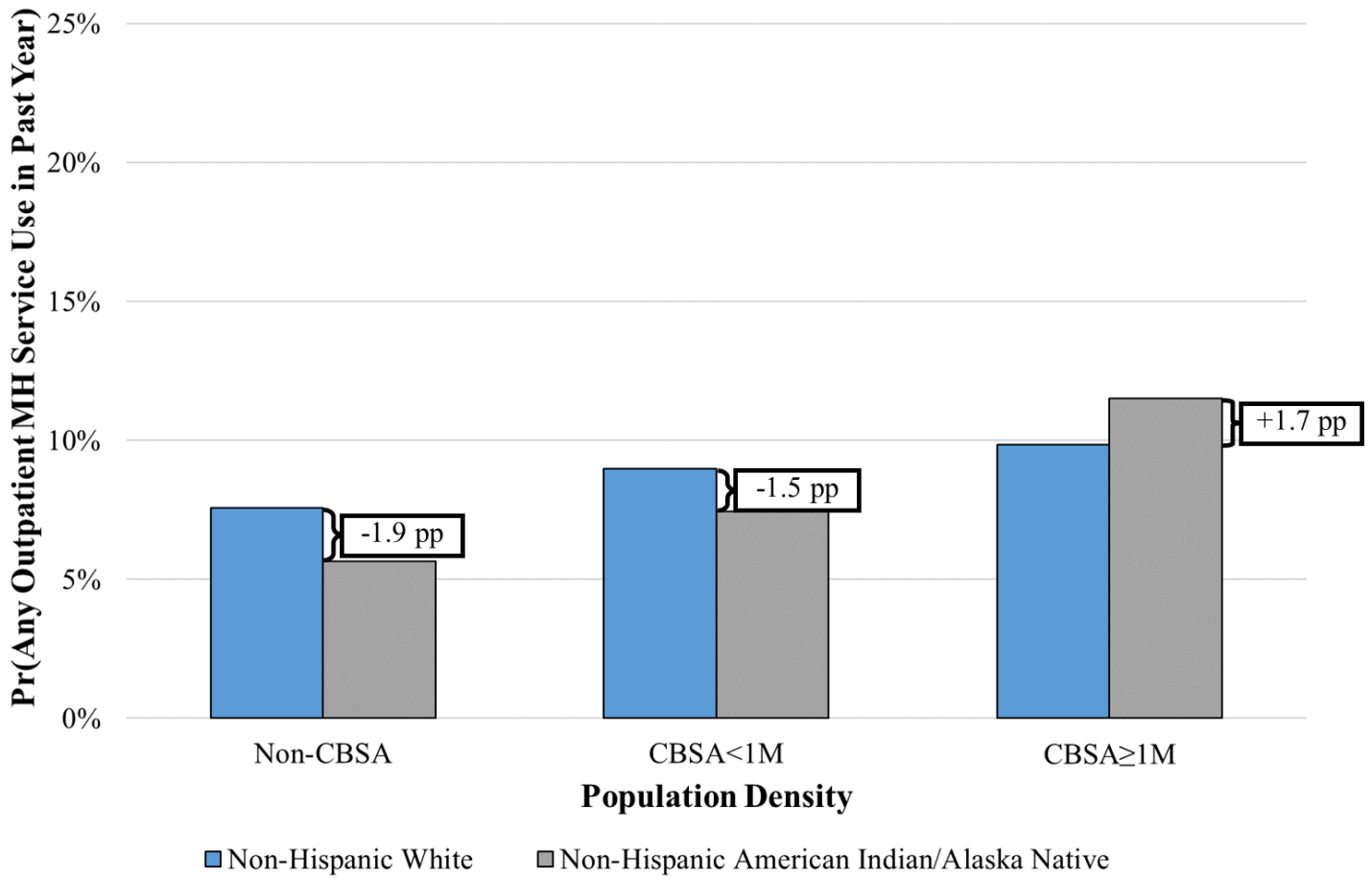
The overall proportion of individuals in the study sample who reported outpatient mental health service utilization in the past year was 9.3%. Table 4 shows the results of a multiple logistic regression model predicting the probability of any outpatient mental health service utilization in the past year. In the model adjusted only for survey year, non-Hispanic AI/ANs had a 2.0 percentage point lower probability of outpatient mental health service use in the past year compared to non-Hispanic whites (H1, p=0.048). This association is similar after adjusting for predisposing demographic characteristics. However, unlike in the model of any past year mental health service utilization, the addition of need-based characteristics does not meaningfully exacerbate the disparity between non-Hispanic AI/ANs and non-Hispanic whites (H2).

When enabling characteristics are added to the model, the association between non-Hispanic AI/AN race/ethnicity and the outcome measure is attenuated and no longer significant (H3). There is no significant interaction between non-Hispanic AI/AN race/ethnicity and population density in this model (H4, non-CBSA: p=0.109 & moderately populated area: p=0.167).

Several control variables were also significantly associated with the likelihood of any past year outpatient mental health service utilization. Female sex, more severe mental illness in the past year, health insurance (vs. uninsured), and higher education were all positively associated with outpatient mental health service utilization in the past year. Better overall health status, employment (full-time employment vs. part-time employment, unemployment, or other employment status), higher family income ($20,000-$49,000 or $50,000-$74,999 vs. less than $20,000), and lower population density were negatively associated with any outpatient mental health service utilization in

the past year. Unlike in the model of any past year mental health service utilization, living in or adjacent to a moderately populated area (vs. living in or adjacent to a densely populated area) was significantly negatively associated with any outpatient mental health service utilization in the past year.

In order to understand how differences between non-Hispanic AI/ANs and non-Hispanic whites vary across categories of population density, Figure 4 shows adjusted predictions of the probability of any outpatient mental health service utilization in the past year for a non-Hispanic white adult and non-Hispanic AI/AN adult who live in or adjacent to a densely populated area, in or adjacent to a moderately populated area, or outside of a CBSA. The average marginal effect of non-Hispanic AI/AN race/ethnicity on the outcome for each level of population density is presented in brackets. These average marginal effects show how the adjusted predictions for non-Hispanic AI/ANs differ from the adjusted predictions for non-Hispanic whites at each value of population density. There was not a significant difference in any past year mental health service use between non-Hispanic AI/ANs and non-Hispanic whites at any value of population density, and no significant differences were detected between pairs of population density areas.



*p <0.05, **p<0.01, ***p<0.001; MH = Mental Health; pp = Percentage Points CBSA = Core-Based Statistical Area; 1M = 1 Million People
Results in this figure were generated as predicted probabilities using the models' coefficient estimates, not the average marginal effect estimates as presented in Table 4; hence the figures are not simply representations of the marginal effects from Table 4.

Figure 4: Adjusted Predicted Probabilities of Any Outpatient Mental Health Service Use in Past Year by Race/Ethnicity and Population Density

D. Results of Logistic Regression Model Predicting Any Prescription Medication Use for Mental Health in Past Year

Table 5. Logit Analysis of Probability of Any Past Year Prescription Medication Use for Mental Health among Non-Hispanic AI/AN and Non-Hispanic White Adults

Characteristic	Model 1[α]		Model 2[β]		Model 3[γ]		Model 4[δ]		Model 5[ε]		Model 6[ζ]	
	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)
Race												
NH White	[Ref]	—	—	—	—	—	—	—	—	—	—	—
NH American Indian or Alaska Native	-0.040 **	(0.012)	-0.039 **	(0.012)	-0.050 ***	(0.010)	-0.044 ***	(0.010)	-0.042 ***	(0.011)	-0.027 *	(0.012)
Census block in an American Indian Area												
Yes									-0.001	(0.018)	3.0E-4	(0.019)
Population Density 2010												
Segment in a CBSA with ≥ 1 Million People									[Ref]	—	—	—
Segment in CBSA with < 1 Million People									-0.002	(0.004)	-0.003	(0.004)
Segment not in a CBSA									-0.014 *	(0.007)	-0.014 *	(0.007)
Interaction Effects												
AIAN#CBSA with <1 Million People											-0.088 **	(0.033)
AIAN#Not in a CBSA											-0.041	(0.028)

*p <0.05, **p <0.01, ***p <0.001; AME = Average Marginal Effects; SE = Standard Error; NH = Non-Hispanic; CBSA = Core-Based Statistical Area; AIAN = American Indian/Alaska Native

[α]Controlled for survey year

[β]Controlled for survey year, age, and sex

[δ]Controlled for survey year, age, sex, mental illness in past year, overall health status, and substance dependence or abuse in past year

[ε]Model 4 plus the variables for American Indian Area and population density

[ζ]Model 5 plus interaction terms for race/ethnicity X population density. Interaction effects are only presented for Model 6 because it is the only model that includes the interaction terms.

The overall proportion of individuals in the study sample who reported prescription medication use for mental health in the past year was 16.6%. Table 5 shows the results of a multiple logistic regression model predicting the probability of prescription medication use for mental health in the past year. In the model adjusted only for survey year, non-Hispanic AI/ANs had a 4.0 percentage point lower probability of prescription medication use for mental health in the past year compared to non-Hispanic whites (H1, $p<0.01$). This association is similar after adjusting for predisposing demographic characteristics. The addition of need-based characteristics to the model exacerbates the disparity to a 5.0 percentage point lower probability of past year prescription medication use for mental health among non-Hispanic AI/ANs relative to non-Hispanic whites (H2, $p<0.001$).

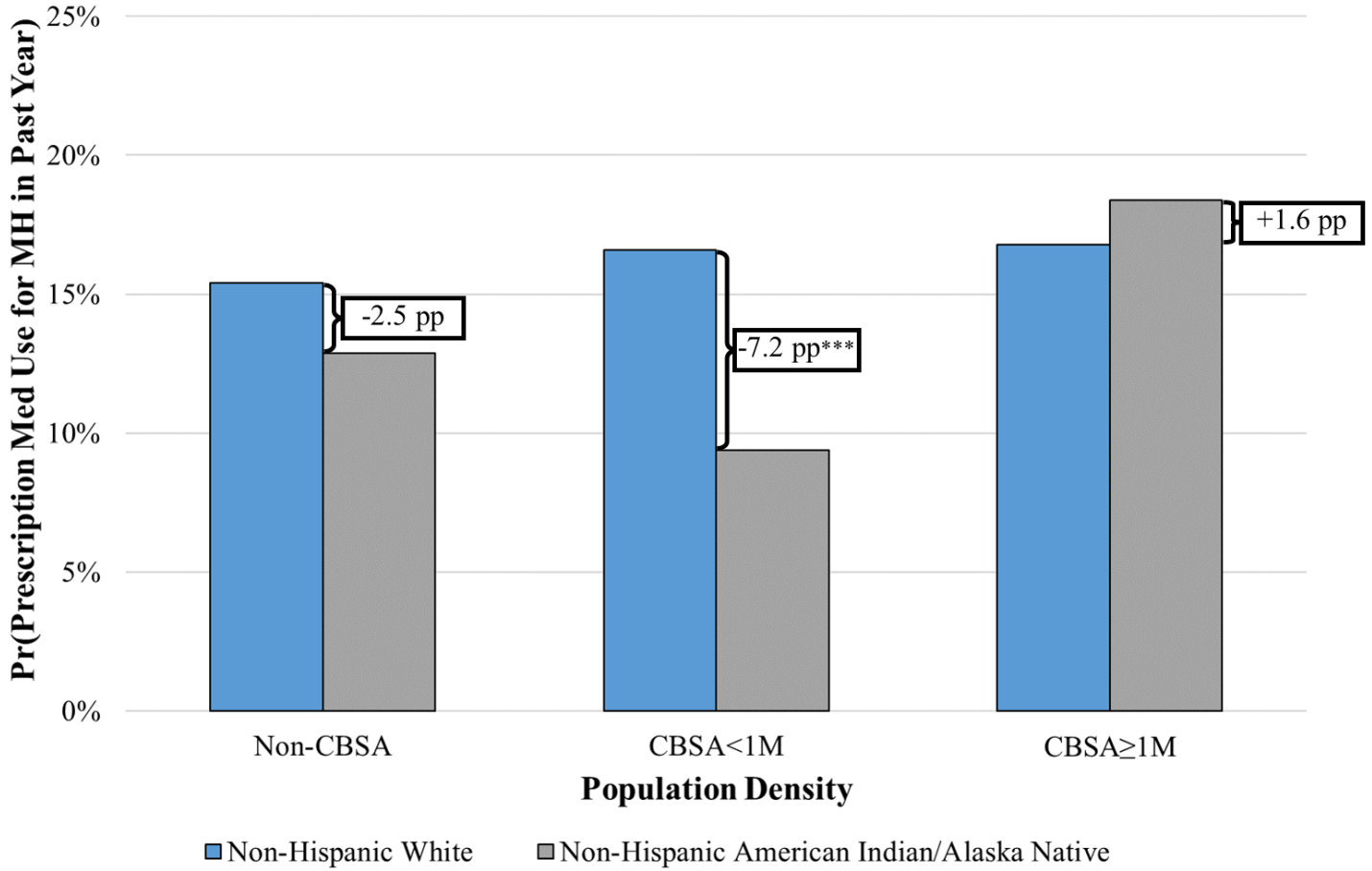
When enabling characteristics are added to the model, the association returns to a 4.4 percentage point lower probability of past year prescription medication use for mental health among non-Hispanic AI/ANs relative to non-Hispanic whites (H3, $p<0.001$). The negative association between non-Hispanic AI/AN race/ethnicity and prescription medication use for mental health in the past year persists after adding the interaction terms for non-Hispanic AI/AN race/ethnicity and population density, but it is weakened. The average change in the predicted conditional probability of any past year prescription medication use for mental health for non-Hispanic AI/ANs compared with non-Hispanic whites differs by 8.8 percentage points between individuals living in a CBSA with fewer than one million people and individuals living in a CBSA with at least one million people (H4, $p=0.007$), with individuals living in CBSAs with fewer than one million people having greater (i.e., more negative) marginal effects of non-Hispanic AI/AN

race/ethnicity on average. The interaction between non-Hispanic AI/AN race/ethnicity and residing in a non-CBSA area was not statistically significant (H4, p=0.122).

Several control variables were significantly associated with the likelihood of prescription medication use for mental health in the past year. Older age, female sex, more severe mental illness in the past year, having abused or been dependent on alcohol, marijuana, cocaine, or heroine in the past year, health insurance (vs. uninsured), and higher education were all positively associated with any mental health service utilization in the past year. Better overall health status, employment (full-time employment vs. part-time employment, unemployment, or other employment status), higher family income ($20,000-$49,000, $50,000-$74,999, or $75,000+ vs. less than $20,000), and living outside of a moderately or densely populated area (vs. living in or adjacent to a densely populated area) were negatively associated with prescription medication use for mental health in the past year. In a similar manner to the model of any mental health service utilization, living in or adjacent to a moderately populated area (vs. a densely populated area) by itself was not associated with prescription medication use for mental health in the past year.

In order to understand how differences between non-Hispanic AI/ANs and non-Hispanic whites vary across categories of population density, Figure 5 shows adjusted predictions of the probability of any prescription medication use for mental health in the past year for a non-Hispanic white adult and non-Hispanic AI/AN adult who live in or adjacent to a densely populated area, in or adjacent to a moderately populated area, or outside of a CBSA. The average marginal effect of non-Hispanic AI/AN race/ethnicity on the outcome for each level of population density is presented in brackets. These average

marginal effects show how the adjusted predictions for non-Hispanic AI/ANs differ from the adjusted predictions for non-Hispanic whites at each value of population density. Among those living in a CBSA with fewer than one million people, the predicted probability of any past year prescription medication use for mental health is significantly lower among non-Hispanic AI/ANs than among non-Hispanic whites ($p<0.001$). There was not a significant difference in predicted probability of any past year prescription medication use for mental health between non-Hispanic AI/ANs and non-Hispanic whites living in CBSAs with at least one million people or in non-CBSAs. The disparity between non-Hispanic AI/ANs and non-Hispanic whites was significantly greater in CBSAs with fewer than one million people than in CBSAs with at least one million people ($p=0.008$). No other significant differences were detected between pairs of population density areas. Results presented in Figure 5 were generated as predicted probabilities using the model's coefficient estimates, not the marginal effects estimates presented in Table 5. Thus, the significant average marginal effect of non-Hispanic AI/AN race/ethnicity presented in Table 5 represents the average across respondents living in all types of population density areas. As shown in Figure 5, the magnitude and significance of the non-Hispanic AI/AN vs. non-Hispanic white disparity in past year prescription medication use for mental health varies across categories of population density.



*p <0.05, **p<0.01, ***p<0.001; MH = Mental Health; pp = Percentage Points CBSA = Core-Based Statistical Area; 1M = 1 Million People
Results in this figure were generated as predicted probabilities using the models' coefficient estimates, not the average marginal effect estimates as presented in Table 5; hence the figures are not simply representations of the marginal effects from Table 5.

Figure 5: Adjusted Predicted Probabilities of Any Prescription Medication Use for Mental Health in Past Year by Race/Ethnicity and Population Density

Chapter V. Discussion

A. Key Findings

Due to the high prevalence and disproportionately poor outcomes of behavioral health conditions suffered by AI/ANs, this study examined mental health service use among non-Hispanic AI/AN adults compared with non-Hispanic white adults. Overall, we found that approximately one fifth of adults in the study sample used any mental health services in the past year, which included less than half of those with any mental illness in the past year. Models examining the likelihood of any mental health service use in the past year and any prescription medication use for mental health in the past year both showed that, on average, non-Hispanic AI/ANs were less likely to have utilized mental health services in the past year compared with non-Hispanic whites even after controlling for predisposing, enabling, and need-based characteristics. Results from the model of any outpatient mental health service use in the past year showed a similar relationship in the model adjusted only for survey year, but racial/ethnic differences in outpatient mental health service use did not persist after adjusting for predisposing, enabling, and need-based characteristics. Overall, these results support our hypothesis that there is a negative relationship between non-Hispanic AI/AN race/ethnicity and overall mental health services utilization in the past year (H1). However, the relationship between non-Hispanic AI/AN race/ethnicity and mental health service use varied with the type of mental health service examined and with population density.

These findings differ from prior research that has found similar utilization of mental health services among AI/ANs and non-Hispanic whites. A descriptive report by

SAMHSA using the 2008-2012 NSDUH results concluded that estimates of any mental health service utilization (AI/AN: 15.6% vs. white: 16.6%), any outpatient mental health service utilization (AI/AN: 7.7% vs. white: 7.8%), and any prescription medication use (AI/AN: 13.6% vs. white: 14.4%) were similar for AI/AN and non-Hispanic white adults (Center for Behavioral Health Statistics and Quality, 2015f). Earlier nationally representative studies of AI/AN mental health service utilization also found similar mental health service utilization between AI/ANs and non-Hispanic whites in adjusted models (Brave Heart et al., 2016; Harris et al., 2005). However, we find that on average, non-Hispanic AI/ANs have significantly lower probability of any mental health service utilization or any prescription medication use for mental health in the past year after controlling for a robust set of confounding measures. In particular, we find that the difference between AI/ANs and non-Hispanic whites is driven by prescription medication use, which is similar to findings in studies focusing on Hispanics and African Americans that racial/ethnic disparities (vs. non-Hispanic whites) were most pronounced for prescription medication use (Han & Liu, 2005; Lê Cook et al., 2013).

Predisposing, need-based, and enabling characteristics were sequentially added to the models to control for confounding and to observe the impact on the association between non-Hispanic AI/AN race/ethnicity and likelihood of mental health service use in the past year. As expected, the difference in the probability of any mental health service use between non-Hispanic AI/ANs and non-Hispanic whites was greater after the addition of need-based characteristics. A similar observation was made when examining any prescription medication use for mental health in the past year. Addition of need-based factors to the model of any outpatient mental health service use did not meaningfully

affect the magnitude of the association between non-Hispanic AI/AN race/ethnicity and the outcome. The observed changes for the mental health service use and prescription medication use models were expected because AI/ANs generally have worse mental health, worse overall health, and higher rates of substance abuse and dependence than non-Hispanic whites, which are all associated with greater mental health service use.

Conversely, the difference between non-Hispanic AI/ANs and non-Hispanic whites was smaller for all three mental health service use outcomes after the addition of enabling characteristics. This was also expected because non-Hispanic AI/ANs collectively have lower socioeconomic status and are less likely to be insured than non-Hispanic whites. When controlling for need, the lack of these enabling characteristics is associated lower mental health service utilization. Similarly, non-Hispanic AI/ANs are more likely to reside outside of densely and moderately populated areas, which is associated with lower mental health service utilization. These observations are consistent with the conceptual framework proposed in Chapter III and with previous findings that adjusting models for sociodemographic characteristics attenuates differences between AI/ANs and non-Hispanic whites in mental health treatment (Brave Heart et al., 2016).

Due to the unique health services context facing AI/ANs on reservations relative to other racial/ethnic groups in similar areas, we were particularly interested in examining the effect of population density on mental health service utilization. Overall, living outside of a densely or moderately populated area (compared to living in or adjacent to a densely populated area) was associated with lower likelihood of any mental health service use, any outpatient mental health service use, and any prescription medication use for mental health in the past year. These findings are consistent with previous reports that

there is a lower probability of receiving treatment for a mental health problem among rural residents (Hauenstein et al., 2007). Rural areas present barriers to mental health treatment such as distance and topography, population bases too small to support services, and confidentiality concerns (Hauenstein et al., 2007). When examining outpatient mental health services, there was also a significant negative association between living in or adjacent to a moderately populated area (vs. living in or adjacent to a densely populated area) and service use in the past year. This finding specific to the outpatient mental health service use outcome may be reflective of a steeper drop off in the availability of specialty mental health services across population density categories relative to the drop off in the availability of primary care services. Other nationally representative studies of AI/AN mental health service utilization have controlled for urbanicity, but did not report the effect of living in a rural area on mental health service use (Brave Heart et al., 2016; Harris et al., 2005).

We specifically focused on population density to determine if this contextual enabling characteristic moderated the relationship between non-Hispanic AI/AN race/ethnicity and mental health service utilization. For outpatient mental health service utilization, differences between non-Hispanic AI/ANs and non-Hispanic whites were negligible across all categories of population density. For any mental health service utilization and any prescription medication use for mental health, differences between non-Hispanic AI/ANs and non-Hispanic whites were negligible in non-CBSAs and in densely populated areas. However, there were significant disparities between non-Hispanic AI/ANs and non-Hispanic whites in moderately populated areas. Furthermore, the

difference between non-Hispanic AI/ANs and non-Hispanic whites was significantly greater in moderately populated areas compared with densely populated areas.

The observation that a significant disparity exists only in moderately populated areas may be explained by the relative lack of AI/AN-specific contextual enabling resources in moderately populated areas compared with densely populated areas and non-CBSAs. IHS facilities are mostly located in rural settings and may improve access to mental health services for AI/ANs residing in rural areas relative to non-AI/AN populations living in rural areas. While the vast majority of AI/ANs lived on reservations in rural areas until the middle of the 20th Century, AI/ANs are now more geographically dispersed with the majority living in or adjacent to moderately or densely populated areas (Indian Health Service, n.d.-b; National Research Council Committee on Population, 1996; Norris et al., 2012). Therefore, provision of geographically proximate healthcare services by the IHS has become increasingly challenging. While movement to large cities with extensive social services, larger proportions of racial/ethnic minority groups, and some Urban Indian Organizations may mitigate the effects of moving away from reservations, AI/ANs who have historically relied on the IHS for services may face acute access challenges if they move to moderately populated areas. While social services in large cities may not appear to be an AI/AN-specific enabling factor, contact with these services may allow AI/ANs to access benefits for which they were already uniquely eligible (e.g., enrollment in individual market health insurance plans with greatly reduced cost-sharing).

The disparity observed in moderately populated areas may also be explained by predisposing characteristics related to health beliefs and preferences. As discussed in Chapter III, these factors include distrust of healthcare providers and institutional sources

of care, preference for complementary and alternative medicine, and stigma associated with utilization of mental health services. All of these factors help determine what constitutes culturally competent care for AI/ANs. Qualitative studies of some groups of AI/ANs have shown that AI/ANs who more strongly identify with AI/AN race/ethnicity are more distrustful of healthcare providers, less likely to utilize Western medical services due to concerns about confidentiality and the stigma associated with utilizing mainstream services, and more likely to pursue alternative medical treatments that align with their traditional AI/AN beliefs about wellness (Bird et al., 2016; Cromer et al., 2017; J. P. Gone, 2013; Kading et al., 2015; Kahn-John, 2010). These pathways may be particularly important in uptake of prescription medication use for mental health because some evidence suggests that resistance to taking prescription medications among racial/ethnic minorities may be an expression of cultural identity (Adams, Chatterjee, Harder, & Mathias, 2018). These factors would contribute to a disparity in moderately populated areas because AI/AN cultural identification decreases with increasing population density while the availability of AI/AN-specific culturally competent services decreases with increasing population density (i.e., as one moves farther away from reservations). Thus, while AI/ANs living in densely populated areas might have the most difficulty accessing services that integrate AI/AN culture, they are also likely to be the most acculturated and accepting of Western health services. Conversely, while AI/ANs living in non-CBSAs are likely to have the strongest identification with AI/AN culture, they are also the most likely to be in close proximity to services geared towards AI/ANs. As a result, AI/ANs living in moderately populated areas may have the greatest unmet need for culturally competent mental health services.

B. Strengths and Limitations

This study has several limitations. First, the exclusion of AI/ANs who identify as Hispanic or as more than one race limits the generalizability of the findings. Specifically, these exclusions leave out the fastest growing segment of the AI/AN population and approximately half of all Americans who identify as AI/AN (Norris et al., 2012). However, since a certain blood quantum level is often required to be a member of a federally recognized tribe and the IHS has a service population that is even smaller than the number of non-Hispanic AI/ANs alone in the United States, the included subpopulation of AI/ANs is likely the most representative of the population that the IHS would consider when making budget requests (Bureau of Indian Affairs, n.d.). Individuals with IHS coverage are, in fact, more likely to report AI/AN as their only race and are less likely to be Hispanic compared with those without IHS coverage (Bhaskar & O'Hara, 2017). Non-Hispanic, single-race AI/ANs are also more likely than other AI/ANs to live in rural areas and historically had worse socioeconomic status and poorer health outcomes (Jacobs-Wingo et al., 2016; Norris et al., 2012).

The generalizability of these findings is also limited because the NSDUH does not include individuals experiencing homelessness, military personnel on activity duty, and people living in institutional group quarters (e.g., jails, prisons). These populations may have particularly high need for mental health services compared to the population included in the study. The exclusion of the unsheltered homeless population may particularly affect the results for densely populated areas, which tend to have higher rates of street homelessness than rural or frontier areas (United States Interagency Council on Homelessness, 2012). However, elevated rates of homelessness in densely populated

areas may be more reflective of the limited definition of homelessness used by the U.S. Department of Housing and Urban Development than of differences in need, as overcrowding and substandard housing are known to be common problems among individuals living on tribal lands (National Health Care for the Homeless Council, n.d.; United States Interagency Council on Homelessness, 2012). Thus, the main impact of excluding the unsheltered homeless and incarcerated individuals is most likely the underestimation of need among AI/ANs who are disproportionately represented among these populations. Underestimation of need among AI/ANs would bias the results towards the null and lead to a conservative estimate of the disparity in mental health service use between non-Hispanic AI/ANs and non-Hispanic whites.

Another major limitation of this study is that dichotomous measures of mental health service use do not account for the quantity or quality of mental health care received. Differences in both service initiation and treatment duration as well as the appropriateness and acceptability of the services rendered will impact health outcomes. However, the cross-sectional nature of this survey does not allow for measurement of treatment duration and continuity or linkage of service utilization to health outcomes. In particular, studies have suggested that racial/ethnic minorities are more likely to drop out of mental health care than whites, so comparison of mental health service utilization in the past year likely does not capture the full extent of disparities between non-Hispanic AI/ANs and non-Hispanic whites (Lê Cook et al., 2013). Still, while basic access does not guarantee the receipt of high quality care, it is a necessary precondition for it and an important point along the continuum of care where the potential for quality care delivery may be lost (Eisenberg & Power, 2000).

Additionally, several omitted variables may bias the results. Provider supply, a contextual enabling characteristic, was not measured and may not have adequately been proxied by residence in an American Indian Area or population density. This omitted variable may bias the results away from the null, leading to estimates higher than the actual population parameter. Conversely, need for mental health services may not have been adequately accounted for by the variables in this study, which used a predictive model to determine mental illness in the past year and a limited measure of substance use or dependence. In contrast to previous studies, no significant difference was detected between non-Hispanic AI/ANs and non-Hispanic whites in mental health status (Brave Heart et al., 2016; Harris et al., 2005). If need for mental health services among AI/ANs was underestimated in this study, the results would be biased toward the null. Therefore, the net effect of these unmeasured confounders on our estimates—positive or negative—is unknown.

In this sample, 9.3% of respondents reported any outpatient mental health service use in the past year while 16.6% of respondents reported any prescription medication use for mental health in the past year. This discrepancy between the proportion of respondents reporting prescription medication use for mental health and outpatient mental health service use is troubling because it could indicate inadequate patient monitoring or misinterpretation of the question by survey respondents. Yet it is consistent with every NSDUH report since 2002. First, this could suggest that many survey respondents are not receiving appropriate medication monitoring or are taking previously prescribed medications without a return visit to a provider. Second, this discrepancy may be due to underreporting of primary care visits in which mental health conditions were diagnosed

or treated. Patients may not consider these visits to be mental health visits, particularly if the initial reason for the visit was not related to mental health. Since most treatment for mental health conditions occurs in primary care settings, there may be many opportunities for respondents to misclassify this treatment (Hauenstein et al., 2007). Third, outpatient mental health service use may have been interpreted to only include treatment modalities where the treatment or counseling is delivered during the outpatient visit (e.g., psychotherapy), which would not include medication monitoring visits or visits in which a medication was prescribed but no other mental health treatment was delivered. The observed proportions would then be consistent with the finding that patients who receive treatment for mental health conditions often receive medication alone and no other interventions (Lê Cook et al., 2013; Olfson & Marcus, 2010). Medication alone may be more likely to be covered under health insurance plans and may be preferred by providers due to convenience (Clay, 2011). However, it is unknown to what degree these explanations account for the observed difference. The lack of clarity surrounding responses to the outpatient mental health service utilization question, which is also observed in other nationally representative surveys (Zibman, 2014), limits our ability to meaningfully interpret the results for this outcome.

Despite these limitations, this study has several strengths. It uses a nationally representative dataset, which allows for generalizability to non-Hispanic AI/ANs living across the United States. While nationally representative studies on AI/AN mental health service use have been done previously, this is the first such study using data more current than 2003 (Harris et al., 2005; Olfson & Marcus, 2010). Since the AI/AN population changed substantially between 2000 and 2010 and health policies adopted since 2003

(e.g., Mental Health Parity and Addiction Equity Act in 2008, ACA in 2010) impact access to mental health services, this study fills an important gap by providing updated information about mental health service utilization among AI/ANs (Frean, Shelder, Rosenthal, Sequist, & Sommers, 2016; National Indian Health Board, 2010; Norris et al., 2012). Furthermore, this is the first nationally representative study of mental health service utilization among AI/ANs to report outcomes by treatment type (i.e., any mental health service use, outpatient service use, prescription medication use). Finally, in consideration of demographic shifts in the AI/AN population over the past few decades, this was the first study to examine whether population density moderated the relationship between AI/AN race/ethnicity and mental health service utilization.

C. Policy Implications

Despite increased appropriations for the IHS, gains in insurance coverage among AI/ANs following the ACA, increased IHS revenue collection following the Indian Health Care Improvement Act reauthorization, and implementation of programs specifically focused on improving behavioral health in Indian Country, disparities in mental health service use persist between non-Hispanic AI/AN adults and non-Hispanic white adults (Frean et al., 2016; Indian Health Service, 2016; National Indian Health Board, 2010). The results of this study suggest that these differences cannot be entirely explained by differential need for mental health services and socioeconomic disadvantage. Importantly, these disparities vary across mental health treatment type and are most evident in moderately populated areas. Thus, it is important to consider how the shift of AI/ANs towards residence in or adjacent to moderately or densely populated

areas affects access to mental health services when making decisions aimed at improving mental health among AI/ANs.

These findings are particularly relevant because the IHS's Fiscal Year 2019 budget request proposes reductions to the Urban Indian Health Program, despite its own report that the program is significantly underfunded (Indian Health Service, 2018a, n.d.-b). Although urban is not specifically defined in the subchapter of the Indian Healthcare Improvement Act that establishes programs in urban centers ("Indian Health Care Improvement Act," 2018), the intended urban Indian service population likely includes the 76% of metropolitan AI/ANs who live in moderately populated areas (Wilson et al., 2012). The Urban Indian Health Program supports contracts and grants to 34 Urban Indian Organizations, covering 35.3% of CBSAs with at least one million people and 1.6% of CBSAs with fewer than 1 million people as defined using 2010 Census data (IHS Office of Urban Indian Health Programs, n.d.; Wilson et al., 2012). The IHS has identified 18 additional cities, including moderately populated areas such as Colorado Springs and Fayetteville-Lumberton, that have large enough AI/AN populations to support an Urban Indian Health Program but currently receive no support (Indian Health Service, n.d.-b). The IHS has noted that Urban Indian Organizations "often provide the only affordable, culturally competent health care services available" in the areas where they are located (Indian Health Service, 2017b). Many characteristics of Urban Indian Organizations, such as having familiarity with the target population, engaging community agencies, having diverse boards, and integrating behavioral health services with programs that meet other patient needs, align with recommendations for eliminating racial/ethnic disparities in behavioral healthcare (Alegría, Alvarez, Ishikawa, DiMarzio, & McPeck,

2016; Pomerville & Gone, 2017; Urban Indian Health Institute, 2012). With the Urban Indian Health Program only funded at 22% of need prior to the proposed budget cuts (Indian Health Service, 2017b, n.d.-b), access to affordable, culturally competent healthcare services is likely to worsen among the growing population of AI/ANs living in or adjacent to moderately and densely populated areas. This is particularly concerning since the results of this study suggest that access to or uptake of an important category of health services is already significantly lower among AI/ANs compared to non-Hispanic whites in moderately populated areas.

If the IHS wants to accomplish its goal of "ensuring comprehensive, culturally acceptable personal and public health services are available and accessible to AI/AN people," it should increase funding of the Urban Indian Health Program so that the level of funding (currently less than 1% of the IHS budget) is more proportionate to the share of the AI/AN population living in and adjacent to moderately and densely populated areas (Indian Health Service, 2018a). The IHS should also continue to encourage Urban Indian Organizations to seek out funds from other sources, such as the Health Resources and Services Administration, to increase their capacity (Indian Health Service, 2017b). Access to care for AI/ANs in moderately and densely populated communities can also be improved through satellite expansion of current grantees, partnership with community health centers, and identification of and collaboration with providers who are already reaching the target population (Office of Urban Indian Health Programs, 2016).

In addition to reducing funding for the Urban Indian Health Program, the IHS's current budget proposal calls for the reduction or outright elimination of several programs that aim to improve the cultural competency of care including the Indian Health

Professions, Health Education, Community Health Representatives, and Tribal Management Grant Programs (Indian Health Service, 2018a). While further research is necessary to understand the relationship between the accessibility of culturally competent care and service utilization among AI/ANs, the findings of this study suggest that, under certain circumstances, patient health beliefs and preferences may merit additional consideration in efforts to improve uptake of mental health services among AI/ANs.

Despite these concerning funding cuts, the IHS has taken other steps that may be useful in addressing mental health disparities affecting AI/ANs. In 2008, IHS set up a Telebehavioral Health Center of Excellence (TBHCE), which provides direct psychiatric and psychological services to IHS- and tribally-run facilities as well as Urban Indian clinics (IHS Telebehavioral Center of Excellence, 2018). Currently, almost all of the telebehavioral health delivery sites are in remote rural areas, but there is one site in an urban area. Expansion of telebehavioral health services may be an avenue for addressing disparities in moderately populated areas that lack culturally competent mental health services. Telehealth interventions have already been accepted by AI/ANs in a variety of contexts, and implementation of telebehavioral health may be easier in moderately populated areas due to fewer telecommunications infrastructure barriers compared with those faced on reservations (Kruse, Bouffard, Dougherty, & Parro, 2016; Sequist, Cullen, & Acton, 2011). TBHCE also serves as a valuable tool for provider training and technical assistance, and the IHS should leverage lessons learned from addressing the opioid crisis in future efforts to increase the accessibility of specialty behavioral health services (*Opioids in Indian Country: Beyond the Crisis to Healing the Community*, 2018). Increased funding to combat the opioid crisis also presents an opportunity for the IHS to

realize its intention to incorporate mental health and substance use disorder services as outlined in its Behavioral Health Integration Initiative (Indian Health Service Division of Behavioral Health, 2017). This approach may be particularly beneficial as evidence suggests that integrated care models improve initiation of mental health care among racial/ethnic minorities (Lee-Tauler, Eun, Corbett, & Collins, 2018).

The IHS's proposed cuts as well as the fact that the majority of its funding continues to support its traditional delivery system of direct provision of services on reservations may further contribute to the lack of accessible, culturally competent healthcare services for the largest group of AI/ANs (i.e., those living in moderately populated areas). To address the current gap between need and funding in moderately populated areas, the IHS should consider increasing the proportion of funding allocated to the Urban Indian Health Program, expanding telebehavioral health services and provider training to moderately populated areas, and building upon delivery system innovations adopted to address the opioid crisis to expand access to integrated behavioral health services. Since the large and significant racial/ethnic disparities in mental health service utilization identified in this paper are likely driven by inaccessibility of culturally competent healthcare services for AI/ANs in moderately populated areas, these recommended actions represent important steps the IHS could take towards narrowing or eliminating these observed disparities.

D. Future Directions

This study suggests several potential directions for future research. An examination of some of the factors that were not measured in this study, especially predisposing factors related to health beliefs and preferences, would be beneficial to understand if they are in fact mediators of the relationship between non-Hispanic AI/AN race/ethnicity and mental

health service utilization. Similarly, use of geographic identifiers to account for actual proximity to IHS-funded facilities would enable evaluation of this enabling factor's contribution to disparities in mental health service utilization in moderately populated areas. If direct measurement of these factors would prove too difficult, carrying out a similar analysis using measures of health service utilization for other conditions may help eliminate or endorse mechanisms specific to mental health services.

Although limited by the availability of a dataset with a large enough sample of AI/ANs, a study done with finer categories of population density would help better identify the subpopulation of AI/ANs that is least likely to utilize mental health services. Although this study represents an improvement over those that use only two categories to describe the size and adjacency of different types of areas, significant differences among moderately populated communities may be obscured by the definition used in this study. Actual measurement of distance from culturally competent sources of mental health services (i.e., IHS facilities, tribal facilities, or Urban Indian Organizations) would enable clearer understanding of whether proximity to these services accounts for the observed differences across levels of population density. To evaluate the effectiveness of proposed interventions, the IHS could partner with tribes and Urban Indian Organizations to determine how expansion of the Urban Indian Health Program or addition of telebehavioral health sites impacts overall mental health service use and prescription medication use for mental health among AI/ANs living in surrounding areas.

Additionally, it would benefit future studies of mental health service utilization to investigate how formulation of outpatient mental health service utilization questions impacts reporting of services that may frequently be omitted or misclassified by survey

respondents (e.g., mental health treatment provided by a primary care provider, visits where psychiatric medications are monitored but no other mental health treatment is received). Findings from this type of study could inform adoption of different question phrasing on nationally representative surveys to enable better understanding of how mental health service utilization patterns may vary across types of treatment and across care settings.

Chapter VI. Conclusion

Non-Hispanic AI/ANs suffer from historically poor and worsening behavioral health outcomes, which makes access to mental health services particularly important for this group. Most studies of mental health service utilization either exclude AI/ANs due to small sample sizes or focus solely on individual tribes or geographic regions. Prior studies of mental health service utilization in nationally representative samples of AI/ANs showed similar utilization patterns to non-Hispanic whites but did not examine different types of mental health treatment or account for changes to health policy and the AI/AN population since 2003. This study uses a recent, nationally representative sample to examine mental health service utilization among non-Hispanic AI/AN and non-Hispanic white adults. This is also the first study to examine the impact of population density on mental health service utilization in a nationally representative sample of AI/ANs.

We find that, on average, non-Hispanic AI/ANs have a significantly lower probability of utilizing any mental health services in the past year than non-Hispanic whites. Importantly, this effect depends on the type of mental health treatment. A significant disparity between non-Hispanic AI/ANs and non-Hispanic whites was found

for any mental health service use in the past year and any prescription medication use for mental health in the past year but not for any outpatient mental health service use in the past year. Furthermore, the difference in any mental health service use in the past year was driven by the difference in prescription medication use for mental health in the past year.

This study also demonstrates that population density moderates the relationship between AI/AN race/ethnicity and mental health service utilization. A significant disparity between non-Hispanic AI/ANs and non-Hispanic whites is only present in moderately populated areas, and the disparity is significantly larger in moderately populated areas than in densely populated areas. In these moderately populated areas, non-Hispanic AI/ANs are less likely to utilize any mental health services and any prescription medications for mental health in the past year than non-Hispanic whites. There are not significant differences in utilization between these racial/ethnic groups in non-CBSAs or in densely populated areas. This study demonstrates a clinically and statistically significant disparity in mental health service utilization between non-Hispanic AI/ANs and non-Hispanic whites in the type of area where the majority of AI/ANs now reside.

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Appendix A

Table 6. Full Results of Logit Analysis of Probability of Any Past Year Mental Health Service Use among Non-Hispanic AI/AN and Non-Hispanic White Adults

Characteristic	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)
Race/Ethnicity												
NH White	[Ref]	—	—	—	—	—	—	—	—	—	—	—
NH American Indian or Alaska Native	-0.049 ***	(0.014)	-0.049 ***	(0.014)	-0.058 ***	(0.011)	-0.049 ***	(0.012)	-0.046 ***	(0.013)	-0.034 *	(0.013)
Year												
2014	[Ref]	—	—	—	—	—	—	—	—	—	—	—
2015	-0.004	(0.005)	-0.004	(0.004)	-0.006	(0.004)	-0.009 *	(0.004)	-0.009 *	(0.004)	-0.009 *	(0.004)
2016	0.004	(0.005)	0.005	(0.005)	-0.001	(0.005)	-0.006	(0.005)	-0.005	(0.005)	-0.005	(0.005)
Age												
18-25 Years Old			[Ref]	—	—	—	—	—	—	—	—	—
26-34 Years Old			0.025 ***	(0.004)	0.018 ***	(0.004)	0.011 *	(0.005)	0.011 *	(0.005)	0.011 *	(0.004)
35-49 Years Old			0.047 ***	(0.004)	0.046 ***	(0.003)	0.037 ***	(0.004)	0.038 ***	(0.004)	0.038 ***	(0.004)
50-64 Years Old			0.032 ***	(0.005)	0.047 ***	(0.005)	0.030 ***	(0.005)	0.031 ***	(0.005)	0.031 ***	(0.005)
Sex												
Male			[Ref]	—	—	—	—	—	—	—	—	—
Female			0.121 ***	(0.004)	0.087 ***	(0.003)	0.077 ***	(0.003)	0.078 ***	(0.003)	0.078 ***	(0.003)
Mental Illness in Past Year												
None					[Ref]	—	—	—	—	—	—	—
Mild					0.236 ***	(0.009)	0.230 ***	(0.009)	0.230 ***	(0.009)	0.230 ***	(0.009)
Moderate					0.368 ***	(0.012)	0.357 ***	(0.012)	0.357 ***	(0.012)	0.357 ***	(0.012)
Severe					0.523 ***	(0.010)	0.512 ***	(0.009)	0.511 ***	(0.009)	0.511 ***	(0.009)
Overall Health Status												
Excellent					[Ref]	—	—	—	—	—	—	—
Very Good					0.027 ***	(0.005)	0.032 ***	(0.005)	0.032 ***	(0.005)	0.032 ***	(0.005)
Good					0.051 ***	(0.005)	0.062 ***	(0.005)	0.063 ***	(0.005)	0.063 ***	(0.005)
Fair					0.072 ***	(0.008)	0.075 ***	(0.008)	0.076 ***	(0.008)	0.076 ***	(0.008)
Poor					0.120 ***	(0.017)	0.103 ***	(0.017)	0.104 ***	(0.017)	0.104 ***	(0.017)
Past year alcohol, marijuana, cocaine, or heroine dependence or abuse												
Yes					0.029 ***	(0.007)	0.034 ***	(0.007)	0.033 ***	(0.007)	0.033 ***	(0.007)

*p <0.05, **p <0.01, ***p <0.001; AME = Average Marginal Effects; SE = Standard Error; NH = Non-Hispanic

Table 6. Continued

Characteristic	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)
Household Income												
Less than $20,000							[Ref]	—	—	—	—	—
$20,000 - $49,999							0.007	(0.007)	0.007	(0.007)	0.007	(0.007)
$50,000 - $74,999							0.004	(0.007)	0.004	(0.007)	0.004	(0.007)
$75,000 or More							0.014 *	(0.007)	0.012	(0.007)	0.012	(0.007)
Health Insurance												
Uninsured							[Ref]	—	—	—	—	—
Any Private							0.043 ***	(0.006)	0.043 ***	(0.006)	0.043 ***	(0.006)
Any Medicaid							0.065 ***	(0.008)	0.065 ***	(0.008)	0.065 ***	(0.008)
Any Medicare							0.084 ***	(0.012)	0.084 ***	(0.012)	0.084 ***	(0.012)
Any Military							0.072 ***	(0.012)	0.072 ***	(0.013)	0.072 ***	(0.013)
Only Other							0.031 *	(0.013)	0.031 *	(0.013)	0.031 *	(0.013)
Education Status												
Less than High School							[Ref]	—	—	—	—	—
High School Graduate							0.022 ***	(0.006)	0.022 **	(0.006)	0.022 **	(0.006)
Some College							0.047 ***	(0.007)	0.046 ***	(0.007)	0.046 ***	(0.007)
College Graduate							0.082 ***	(0.006)	0.080 ***	(0.006)	0.080 ***	(0.006)
Employment Status												
Employed Full-Time							[Ref]	—	—	—	—	—
Employed Part-Time							0.026 ***	(0.006)	0.025 ***	(0.006)	0.025 ***	(0.006)
Unemployed							0.032 **	(0.010)	0.032 **	(0.010)	0.032 **	(0.010)
Other (including not in labor force)							0.043 ***	(0.006)	0.043 ***	(0.006)	0.043 ***	(0.006)
Census block in an American Indian Area												
Yes									-0.002	(0.020)	-0.001	(0.020)
Population Density 2010												
Segment in a CBSA with ≥ 1 Million People									[Ref]	—	—	—
Segment in CBSA with < 1 Million People									-0.006	(0.004)	-0.006	(0.004)
Segment not in a CBSA									-0.022 **	(0.007)	-0.022 **	(0.007)
Interaction Effects												
AIAN#CBSA with <1 Million People											-0.080 *	(0.034)
AIAN#Not in a CBSA											-0.026	(0.028)

*p <0.05, **p <0.01, ***p <0.001; AME = Average Marginal Effects; SE = Standard Error; NH = Non-Hispanic; CBSA = Core-Based Statistical Area; AIAN = American Indian/Alaska Native

Table 7. Full Results of Logit Analysis of Probability of Any Past Year Outpatient Mental Health Service Use among Non-Hispanic AI/AN and Non-Hispanic White Adults

Characteristic	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)
Race/Ethnicity												
NH White	[Ref]	—	—	—	—	—	—	—	—	—	—	—
NH American Indian or Alaska Native	-0.020 *	(0.010)	-0.021 *	(0.010)	-0.022 *	(0.008)	-0.013	(0.010)	-0.008	(0.011)	-0.000	(0.012)
Year												
2014	[Ref]	—	—	—	—	—	—	—	—	—	—	—
2015	0.005	(0.004)	0.005	(0.003)	0.003	(0.003)	0.001	(0.003)	0.001	(0.003)	0.001	(0.003)
2016	0.008 *	(0.003)	0.008 *	(0.003)	0.005	(0.003)	0.002	(0.003)	0.003	(0.003)	0.003	(0.003)
Age												
18-25 Years Old			[Ref]	—	—	—	—	—	—	—	—	—
26-34 Years Old			0.009 *	(0.004)	0.004	(0.003)	-0.003	(0.004)	-0.002	(0.004)	-0.002	(0.004)
35-49 Years Old			0.011 **	(0.004)	0.012 ***	(0.003)	0.004	(0.004)	0.004	(0.004)	0.004	(0.004)
50-64 Years Old			-0.004	(0.004)	0.010 *	(0.004)	-0.005	(0.004)	-0.004	(0.004)	-0.004	(0.004)
Sex												
Male			[Ref]	—	—	—	—	—	—	—	—	—
Female			0.058 ***	(0.002)	0.033 ***	(0.003)	0.026 ***	(0.003)	0.026 ***	(0.003)	0.026 ***	(0.003)
Mental Illness in Past Year												
None					[Ref]	—	—	—	—	—	—	—
Mild					0.136 ***	(0.007)	0.132 ***	(0.007)	0.132 ***	(0.007)	0.132 ***	(0.007)
Moderate					0.253 ***	(0.011)	0.242 ***	(0.011)	0.241 ***	(0.011)	0.241 ***	(0.011)
Severe					0.391 ***	(0.012)	0.375 ***	(0.011)	0.374 ***	(0.011)	0.374 ***	(0.011)
Overall Health Status												
Excellent					[Ref]	—	—	—	—	—	—	—
Very Good					0.006	(0.004)	0.011 **	(0.003)	0.012 **	(0.003)	0.012 **	(0.003)
Good					0.005	(0.004)	0.016 ***	(0.004)	0.016 ***	(0.004)	0.016 ***	(0.004)
Fair					0.016 **	(0.005)	0.023 ***	(0.006)	0.024 ***	(0.006)	0.024 ***	(0.006)
Poor					0.010	(0.008)	0.007	(0.008)	0.008	(0.008)	0.008	(0.008)
Past year alcohol, marijuana, cocaine, or heroine dependence or abuse												
Yes					0.002	(0.004)	0.004	(0.004)	0.003	(0.004)	0.003	(0.004)

*p <0.05, **p <0.01, ***p <0.001; AME = Average Marginal Effects; SE = Standard Error; NH = Non-Hispanic

Table 7. Continued

Characteristic	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)
Household Income												
Less than $20,000							[Ref]	—	—	—	—	—
$20,000 - $49,999							-0.009	(0.004)	-0.009 *	(0.004)	-0.009 *	(0.004)
$50,000 - $74,999							-0.009	(0.005)	-0.010 *	(0.005)	-0.010 *	(0.005)
$75,000 or More							0.001	(0.005)	-0.001	(0.005)	-0.001	(0.005)
Health Insurance												
Uninsured							[Ref]	—	—	—	—	—
Any Private							0.026 ***	(0.003)	0.026 ***	(0.003)	0.026 ***	(0.003)
Any Medicaid							0.040 ***	(0.005)	0.039 ***	(0.005)	0.039 ***	(0.005)
Any Medicare							0.048 ***	(0.010)	0.048 ***	(0.010)	0.048 ***	(0.010)
Any Military							0.046 ***	(0.009)	0.047 ***	(0.009)	0.047 ***	(0.009)
Only Other							-0.004	(0.012)	-0.003	(0.012)	-0.003	(0.012)
Education Status												
Less than High School							[Ref]	—	—	—	—	—
High School Graduate							0.010 *	(0.004)	0.010 *	(0.004)	0.010 *	(0.004)
Some College							0.025 ***	(0.004)	0.024 ***	(0.004)	0.024 ***	(0.004)
College Graduate							0.069 ***	(0.004)	0.066 ***	(0.004)	0.066 ***	(0.004)
Employment Status												
Employed Full-Time							[Ref]	—	—	—	—	—
Employed Part-Time							0.026 ***	(0.005)	0.026 ***	(0.005)	0.026 ***	(0.005)
Unemployed							0.023 **	(0.007)	0.022 **	(0.007)	0.022 **	(0.007)
Other (including not in labor force)							0.033 ***	(0.005)	0.033 ***	(0.005)	0.033 ***	(0.005)
Census block in an American Indian Area												
Yes									-0.006	(0.012)	-0.005	(0.013)
Population Density 2010												
Segment in a CBSA with ≥ 1 Million People									[Ref]	—	—	—
Segment in CBSA with < 1 Million People									-0.009 **	(0.003)	-0.009 **	(0.003)
Segment not in a CBSA									-0.023 ***	(0.004)	-0.023 ***	(0.004)
Interaction Effects												
AIAN#CBSA with <1 Million People											-0.032	(0.025)
AIAN#Not in a CBSA											-0.036	(0.026)

*p <0.05, **p <0.01, ***p <0.001; AME = Average Marginal Effects; SE = Standard Error; NH = Non-Hispanic; CBSA = Core-Based Statistical Area; AIAN = American Indian/Alaska Native

Table 8. Logit Analysis of Probability of Any Past Year Prescription Medication Use for Mental Health among Non-Hispanic AI/AN and Non-Hispanic White Adults

Characteristic	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)
Race/Ethnicity												
NH White	[Ref]	—	—	—	—	—	—	—	—	—	—	—
NH American Indian or Alaska Native	-0.040 **	(0.012)	-0.039 **	(0.012)	-0.050 ***	(0.010)	-0.044 ***	(0.010)	-0.042 ***	(0.011)	-0.027 *	(0.012)
Year												
2014	[Ref]	—	—	—	—	—	—	—	—	—	—	—
2015	-0.008	(0.005)	-0.008	(0.005)	-0.009 *	(0.005)	-0.012 **	(0.004)	-0.012 **	(0.004)	-0.012 **	(0.004)
2016	0.001	(0.005)	0.001	(0.005)	-0.004	(0.005)	-0.008	(0.005)	-0.008	(0.005)	-0.008	(0.005)
Age												
18-25 Years Old			[Ref]	—	—	—	—	—	—	—	—	—
26-34 Years Old			0.031 ***	(0.005)	0.024 ***	(0.004)	0.020 ***	(0.005)	0.020 ***	(0.005)	0.020 ***	(0.005)
35-49 Years Old			0.055 ***	(0.004)	0.052 ***	(0.003)	0.046 ***	(0.003)	0.046 ***	(0.003)	0.046 ***	(0.003)
50-64 Years Old			0.048 ***	(0.005)	0.058 ***	(0.005)	0.043 ***	(0.005)	0.044 ***	(0.005)	0.044 ***	(0.005)
Sex												
Male			[Ref]	—	—	—	—	—	—	—	—	—
Female			0.112 ***	(0.004)	0.081 ***	(0.003)	0.074 ***	(0.004)	0.074 ***	(0.004)	0.074 ***	(0.004)
Mental Illness in Past Year												
None					[Ref]	—	—	—	—	—	—	—
Mild					0.198 ***	(0.009)	0.194 ***	(0.009)	0.194 ***	(0.009)	0.194 ***	(0.009)
Moderate					0.314 ***	(0.012)	0.304 ***	(0.012)	0.304 ***	(0.012)	0.304 ***	(0.012)
Severe					0.467 ***	(0.011)	0.457 ***	(0.011)	0.456 ***	(0.011)	0.456 ***	(0.011)
Overall Health Status												
Excellent					[Ref]	—	—	—	—	—	—	—
Very Good					0.036 ***	(0.004)	0.039 ***	(0.004)	0.039 ***	(0.004)	0.039 ***	(0.004)
Good					0.065 ***	(0.005)	0.071 ***	(0.005)	0.071 ***	(0.005)	0.071 ***	(0.005)
Fair					0.086 ***	(0.007)	0.084 ***	(0.008)	0.084 ***	(0.008)	0.084 ***	(0.008)
Poor					0.133 ***	(0.017)	0.112 ***	(0.016)	0.113 ***	(0.016)	0.113 ***	(0.016)
Past year alcohol, marijuana, cocaine, or heroine dependence or abuse												
Yes					0.018 **	(0.007)	0.023 **	(0.007)	0.023 **	(0.007)	0.023 **	(0.007)

*p <0.05, **p <0.01, ***p <0.001; AME = Average Marginal Effects; SE = Standard Error; NH = Non-Hispanic

Table 8. Continued

Characteristic	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)	AME	(SE)
Household Income												
Less than $20,000							[Ref]	—	—	—	—	—
$20,000 - $49,999							0.014 *	(0.006)	0.014 *	(0.006)	0.013 *	(0.006)
$50,000 - $74,999							0.012 *	(0.006)	0.012 *	(0.006)	0.012 *	(0.006)
$75,000 or More							0.017 **	(0.006)	0.016 **	(0.006)	0.016 **	(0.006)
Health Insurance												
Uninsured							[Ref]	—	—	—	—	—
Any Private							0.037 ***	(0.006)	0.037 ***	(0.006)	0.037 ***	(0.006)
Any Medicaid							0.054 ***	(0.008)	0.054 ***	(0.008)	0.054 ***	(0.008)
Any Medicare							0.076 ***	(0.010)	0.076 ***	(0.010)	0.076 ***	(0.010)
Any Military							0.064 ***	(0.012)	0.064 ***	(0.012)	0.064 ***	(0.012)
Only Other							0.041 **	(0.014)	0.041 **	(0.014)	0.041 **	(0.014)
Education Status												
Less than High School							[Ref]	—	—	—	—	—
High School Graduate							0.025 ***	(0.005)	0.025 ***	(0.005)	0.025 ***	(0.005)
Some College							0.046 ***	(0.006)	0.046 ***	(0.006)	0.046 ***	(0.006)
College Graduate							0.066 ***	(0.005)	0.065 ***	(0.005)	0.065 ***	(0.005)
Employment Status												
Employed Full-Time							[Ref]	—	—	—	—	—
Employed Part-Time							0.017 **	(0.005)	0.017 **	(0.005)	0.017 **	(0.005)
Unemployed							0.028 **	(0.009)	0.028 **	(0.009)	0.028 **	(0.009)
Other (including not in labor force)							0.041 ***	(0.006)	0.041 ***	(0.006)	0.041 ***	(0.006)
Census block in an American Indian Area												
Yes									-0.001	(0.018)	0.000	(0.019)
Population Density 2010												
Segment in a CBSA with ≥ 1 Million People									[Ref]	—	—	—
Segment in CBSA with < 1 Million People									-0.002	(0.004)	-0.003	(0.004)
Segment not in a CBSA									-0.014 *	(0.007)	-0.014 *	(0.007)
Interaction Effects												
AIAN#CBSA with <1 Million People											-0.088 **	(0.033)
AIAN#Not in a CBSA											-0.041	(0.028)

*p <0.05, **p <0.01, ***p <0.001; AME = Average Marginal Effects; SE = Standard Error; NH = Non-Hispanic; CBSA = Core-Based Statistical Area; AIAN = American Indian/Alaska Native