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Preventive Service Uptake in Women With Mental Illness:

Results From the 2011 Medical Expenditure Panel Survey

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Bachelor of Science

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2011

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An abstract of

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Abstract

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Dorian Gittleman

Objective: This study uses the 2011 Medical Expenditure Panel Survey (MEPS), a nationally representative subsample of the National Health Interview Survey, to examine women's preventive health service use in women with mental illness and mental distress. The study seeks to determine if women with mental illness are at additional risk for lower uptake of clinical breast exams (CBE), Pap smears, and mammograms, and if their health insurance status mediates that relationship.

Methods: The sample was restricted to 13,498 women aged 18 or older. Mental illness was determined by ICD-9 insurance code, score on the SAQ-42 symptom screening measure, and report of overall mental wellness. Receipt of service was measured by self-report and dichotomized to receipt within the recommended period. Final analyses of the relationship between mental health and service receipt were a series of logistic regressions with service type as the dependent variable.

Results: After controlling for demographic variables and entering care access variables and insurance categories into the regression, mental wellness perception was significantly predictive of each kind of service uptake. Women with low perceived mental wellness were 39% less likely to receive mammograms, 27% less likely to have CBEs, and 21% less likely to have Pap smears. Diagnosis of mental illness was not statistically significant with service use. Insurance category was statistically significant with service uptake and a partial mediator for breast-related screening but not for Pap smear.

Conclusions: There is an independent relationship between mental health and service use, even after controlling for other factors such as income, education, and race. After examining the relationship between mental health, insurance category, and service use, it appears that while insurance might be partially mediating for breast-related screening services, it is not so for Pap smears. The results show that women without insurance are significantly less likely to use services, and women with public insurance are significantly less likely to receive CBEs or mammograms. Women with low perceived mental health are much more likely to have public insurance than private, although they do not significantly differ from women with stronger mental health in percentage of women without insurance.

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Introduction

Background

According to the Centers for Disease Control and Prevention, breast cancer is the most common type of cancer in women, discounting certain skin cancers (CDC, 2014). The Surveillance, Epidemiology, and End Results Program (SEER) of the National Cancer Institute (2013) estimates that there are approximately 2,829,041 women in the United States currently diagnosed with breast cancer. There were 232,340 new cases in 2013 alone. SEER estimates that there are 249,496 women with cervix uteri cancer in the United States, with 12,340 new cases in 2013. Data from SEER presents the vital importance of early detection for surviving breast and cervical cancers. The five-year survival rate for breast cancer, if caught while still local to the breast, is 98.6%. If caught after it has spread to the lymph nodes, the survival rate drops to 84.4%. For cervical cancer, the difference in survival rates is more severe. When cervical cancer is found at an early stage, confined to the primary site, the five-year survival rate is 90.9%. However, if the cancer spreads regionally, the five-year survival rate drops to 57.1%. For the 232,340 new cases of breast cancer in 2013, the 14.2% difference in survival rates between local and regional detection equals more than 32,000 lives.

The CDC (2012) estimates that in 2010, the overall rate for receiving a mammogram in the previous two years was 72.4%. However, there are disparities for certain subpopulations like women who are uninsured, uneducated, or in poverty. The American Cancer Society's Cancer Prevention and Early Detection Facts and Figures 2013 report, utilizing data from the National Health Interview Survey 2010, compares percentages of receipt of mammograms between different education levels, and whether

someone is covered by insurance. The percentage of women who had received a mammogram within two years with 16 or more years of education was 74.6, while those with 11 or fewer years was only 51.7%. Compared to 31.5% of women without health insurance who received a mammogram in the past two years, 70.7% of women with health insurance received one during that time. Kjerulff, Frick, Rhoades, and Hollenbeak (2007) in their analysis of three years of data from the Medical Expenditure Panel Survey corroborate the CDC's estimations. For 25,361 women over age 14, they found that female-specific conditions affected more than one fifth of women annually across all ages. Being insured all or even part of the year increased the chances that a woman would seek treatment for a female specific condition by 60%.

Persons with mental illness are another subset of the population at risk for disparate receipt of care, and have high overlap with other at-risk populations. The results of the 2012 National Survey on Drug Use and Health: Mental Health Findings published by SAMHSA and the NIMH (2013) estimate that in 2012, 9.6 million adults had a serious mental illness (SMI) in 2012, representing 4.1% of the adult population. If broadened to any mental illness (AMI), an estimated 43.7 million or 18.6% of adults were diagnosed. Women are at greater overall risk than men: 4.9% of women were diagnosed with SMI, and 22% with AMI. In the overall adult population, 25.5% of unemployed persons have AMI. Among adults with a family income below the poverty level, 26.8% have AMI. Persons with mental illness are much more likely than persons without to have public insurance or no insurance. Likewise, people in those categories of insurance coverage are much more likely to have AMI. Thirty point five percent of adults

covered by Medicaid have AMI as well as 22.3% of adults without health insurance, compared to 15.4% with private health insurance.

There is a robust body of literature detailing a history of lack of access to preventive services in people with mental illness. Bradford et al. (2008) in their analysis of the 1994 and 1995 National Health Interview Survey (NHIS) found that individuals with psychotic disorder and bipolar disorder were less likely to report having a primary care physician. After adjusting for demographic factors, people with those disorders still reported a far greater likelihood of being unable to get necessary care or being unable to afford care. The authors interpreted their findings to mean that people with certain SMIs have difficulty accessing or navigating the medical system. Cradock-O'Leary, Young, Yano, Wang, and Lee (2002) examined all patients ($n = 175,653$) under treatment in 2000 at seven Veterans Health Centers in Nevada. Patients with a mental illness diagnosis had significantly fewer visits than patients without. Patients with schizophrenia or bipolar had the least visits. The authors also note that patients who were female or older used fewer services. Berren, Santiago, Zent, and Carbone (1999) examined claims for physical health care in Medicaid enrollees with and without mental illness. Of patients with mental illness, 14% made claims for outpatient settings compared to 26% of patients without; however, patients with SMI were more than twice as likely to be treated in ERs. Howard et al. (2010) in their systematic review of cancer diagnosis in people with SMI posit that people with SMI did not use services for the same reasons as people without SMI: "low income, increasing age, lack of transport, embarrassment, lack of reminders, and lack of familiar care providers" (p. 798). The care provider's response to mental illness as well as what kind of illness it is may also be significant factors in care for people with mental

illness. Wittink and Bogner (2008), in their study of 216 women in primary care offices, found that women with anxiety were more likely to receive a recommendation for a mammogram, while women with depression were not. Women who reported that their physician had recommended a mammogram were more likely to seek one.

The issue of service utilization by women with mental illness is an important one because of the excess morbidity and mortality in the population, as highlighted by Druss, Zhao, Esenwein, Morrato, and Marcus (2011), and Colton and Manderscheid (2006). Colton and Manderscheid (2006) analyzed state-specific mortality rates for eight states from 1997 through 2000, and found public mental health clients to have a higher relative risk of death in every state. Most mental health clients died of "typical" natural causes such as heart disease and cancer. Druss et al. (2011) in their follow-up of participants of the 1989 National Health Interview Survey (80,850 participants), found that people with mental illness died more than eight years earlier, on average, than people without mental illness. However, after adjusting for socioeconomic variables, health system factors, and clinical variables, the relationship between mental illness and excess mortality disappeared, demonstrating that mental illness is not the "cause" of excess mortality, but rather, that this is a population highly at risk and in continued need of public health intervention. Druss et al. state, "The largest contributing factor to excess mortality was the group of clinical factors, which alone accounted for 70% of the excess mortality attributable to mental disorders" (2011, p. 603).

Women with mental illness may be at elevated risk for female-specific cancer relative to women without mental illness. Halbreich, Shen, and Panaro (1996) analyzed the records of all mammograms performed by the Buffalo Psychiatric center between

1988 and 1993. They compared the results of those mammograms with the results of a nearby general hospital where mammograms were performed by the same radiologist. The breast cancer incidence rate at the psychiatric center was 3.5 times that of the general hospital. McGinty et al. (2012) calculated risk ratios for a cohort of 3,317 adult Medicaid beneficiaries in Maryland with schizophrenia or bipolar who were followed between 1994 and 2004. Compared to the general U.S. population, people with schizophrenia were 2.9 times as likely to have breast cancer; people with bipolar were 1.9 times as likely. Osborn et al. (2013) had contradictory findings in the United Kingdom. In their analysis of the Health Improvement Network Primary Care Database between 1990 and 2008, for a cohort of 20,632 people with SMI, they found no significant association between SMI and breast cancer, including for schizophrenia and bipolar disorder. Bushe, Bradley, Wildgust, and Hodgson (2009) performed a systematic review of schizophrenia and breast cancer incidence, which included 13 studies on a collective 6,000 patients from 1986 to 2008. Results from the studies varied widely, from a 52% increase in risk to a 40% decrease.

There are potential explanations for an elevated breast cancer risk among women with mental illness. Cotterchio, Kreiger, Darlington, and Steingart (2000), and Halbreich and Kahn (2003) found links between chronic use of mental illness medications and elevated risk for breast cancer. A CDC feature on smoking among adults with mental illness (2013) states that 34% of women with mental illness smoke—far above the national average. Also of particular concern is that 48% of people with mental illness who live below the poverty line smoke, putting them at additional risk for lack of care as well as for developing cancer.

Theoretical Framework

Because women with mental illness are at risk for underuse of care and increased risk of breast cancer—as well as having considerable overlap with other populations at risk such as the uninsured—this study hopes to flesh out the relationship between those factors that most strongly contribute to lower service uptake. The foundation for the analyses of this study is drawn from two theoretical frameworks:

Aggarwal, Pandurangi, and Smith (2013) wrote a systematic literature review on disparities in breast and cervical cancer screening in women with SMI, and created a theoretical model to demonstrate the relationship between illness and uptake of screening (Figure 1). They based their model partially on Freeman and Chu (2005), who state that the causes of health disparities are culture, poverty, and social injustice. Aggarwal et al. (2013) point to four main determinants of cancer prevention behaviors in their model: Demographic characteristics, genetic predisposition, social determinants, and mental illness (Figure 1).

Aggarwal et al.'s model closely corresponds to the Individual determinants of the Andersen model (Andersen & Newman, 1973), which is the other theoretical framework to be used in this analysis. The Andersen model posits that health services utilization will be based on three determinants: Societal determinants, the health services system, and individual determinants (Figures 2 and 3). These three parts lead to health services utilization, which is defined by type, purpose, and unit of analysis. Because of the nature of the data available, and the questions posed in the analysis, this study will focus on the individual determinants in Andersen's model.

Aggarwal et al., and Andersen and Newman imagine the process leading to health services uptake as a multifaceted and often dynamic interaction between an individual and the system around him or her. I have created a unique, specific model to test from the juxtaposition of Aggarwal and Andersen (Figure 4). Although Aggarwal et al. (2013) created their model with a strong grounding in the literature, it has not been tested on a population.

Measures from the Medical Expenditure Panel Survey (MEPS), the source of data for this research, map on to the appropriate constructs in Figure 3. Within the framework of the model, the measures assess the association of mental illness to preventive service use; the strength of insurance as an explanatory variable for the relationship between mental illness and service use; and other significant variables that moderate or confound the relationship between mental illness and service use.

Hypotheses

1. There is a relationship between mental illness or distress and uptake of preventive health services, and that women with symptoms of mental illness will have lower preventive service uptake than women without mental illness.

2. Because having a mental health diagnosis indicates a prior interaction with the health services system, I predict that a screening for acute mental distress will better predict uptake of preventive health services than diagnosis. Because studies to be outlined in the following literature review use either screening measures or diagnosis records to indicate presence of mental illness, and the MEPS contains both, I will test the strength of each indicator to predict service uptake. This may contribute some

explanation for conflicting data on the potential relationship between mental illness and receipt of services.

3. The relationship between mental illness and service uptake is mediated by having health insurance and what category of insurance it is. Data distributed by SAMHSA and AHRQ point to insurance as a huge health disparity for people with mental illness (SAMHSA, 2013). Insurance is to be analyzed as a mediating variable between having symptoms of mental illness or distress and low service uptake, because it is not only predictive but also explanatory for the relationship between having symptoms and likelihood of uptake. Mediation is also appropriate because of the linear path of having insurance before one acquires services.

Background

This literature review will focus primarily on specific studies examining the uptake of women's preventive services by adult women with serious mental illness. It will be divided into five main sections. The first four are focused on the relationship between the independent and dependent variables:

1. Broad epidemiologic studies with large representative data sets

2. Community-based studies

3. Smaller studies on specific mental health diagnoses

4. Qualitative and focus group studies

Within sections, the articles are ordered through a balance of how recently the study was conducted and the rigor and strength of that study.

Section V will examine what literature there is on the relationship between mental illness and insurance, as well as further fleshing out how insurance affects uptake. It will also examine representative studies on the effects of income and access to care.

Section I

Druss, Rosenheck, Desai, and Perlin (2002) performed a cross-sectional study of 113,505 veterans with chronic conditions who had made at least three visits to VA medical providers. They determined that for breast and cervical cancer screenings, having either a diagnosis of substance abuse disorder or a dual diagnosis for mental and substance abuse, made a woman less likely to receive preventive services. Female veterans may not be representative of the female population in general, and their rates of service use were in general above the general population average. Mental illness diagnosis was determined by ICD-9 code.

Egede, Grubaugh, and Ellis (2010) examined data from 16,754 participants with diabetes in the Behavior Risk Factor Surveillance Survey. Women with major depression were less likely to have had a mammogram in the past two years, and this disparity was seen to increase with age. Women with depression were also 6% less likely to have had a Pap test in the past three years. This population, with a significant physical comorbidity, also may not be representative of the general population. Depression was determined by score on the BRFSS depression module (PHQ-8).

Carney and Jones (2006) conducted what may be the best or most representative analysis of service uptake by women with mental illness. They examined 100% of Blue Cross Blue Shield of Iowa administrative claims from 1996 to 2001 to determine possible differences in rates of receiving mammograms. Before adjusting for additional variables,

their data show that only women with a high-severity mental disorder received fewer

mammograms than women without a mental disorder. However, after adjusting for age,

number of non-mental health care visits to primary care providers (PCPs) or OB/GYNs,

months of eligibility, and residence, they determined that women with medium severity

(OR = .62) or high severity (OR = .38) received fewer mammograms. There were not

enough details in their methods regarding how they adjusted for number of visits. The

potential implication is that although women with mental illness may receive the same

services as women without mental illness, they require more visits in order to receive the

same quantity of care. Severity and/or acuteness of mental illness—difficult to measure

in a large data set—appear to be a potentially important factor in predicting service use.

Mental illness was determined by ICD-9 code.

Section II

Werneke et al. (2006) and Edwards and Jones (2000) both studied uptake of

women's services in Great Britain, which limits the generalizability of their findings to

American women but does allow for control of insurance as a factor. Werneke et al.

(2006) found that overall, women with mental disorders were as likely as women without

to attend breast screening, but that specifically patients with a history of multiple

detentions in psychiatric units or a diagnosis of psychosis were less likely to attend

screenings. Edwards and Jones (2000) also found in their random sample of 1604 women

in Wales, that anxiety and depression were not significantly associated with having

previously been screened for breast cancer. Depression was significantly associated with

a lower potential uptake of future screenings, while anxiety was associated with higher

intention.

Ritsher, Coursey, and Farrell (1997) administered questionnaires to 107 women and 59 men at 10 Maryland psychiatric rehabilitation centers. Similar to the general population at the time, 71% of female patients reported receiving breast exams. At a roughly similar point in time in a different state, Steiner et al. (1998) surveyed a random sample of women receiving psychiatric services from five clinical programs in Connecticut (*n* = 54), and compared them with women from a nearby primary care center (*n* = 17). 87% of the psychiatric patients had public insurance (13% were uninsured) and all of the primary care comparison group had public insurance. Rates for preventive care did not differ between psychiatric patients and primary care patients, although regardless of psychiatric history, women with a history of abuse were less likely to have received health care services.

Xiong, Bermudes, Torres, and Hales (2008) examined 229 patients with SMI in Sacramento County mental health clinics. In the past three years, 69% of women had received a Pap test but only 44% had received a mammogram, and 59% had received a clinical breast exam (CBE). The researchers emphasize that the results may not be generalizable. Friedman, Puryear, Moore, and Green (2005) had similar findings in their examination of 196 women with low income from two psychiatric settings (inpatient unit and outpatient clinic) attached to a university hospital in Houston, TX. In the previous year, 49% of patients had received mammograms and 66% had received CBEs. The strongest predictor of receipt of services for their study was physician recommendation. Friedman et al. concluded that women with low income receiving psychiatric services receive screenings at similar rates to financially similar women without mental illness. Carney, Allen, and Doebbeling (2002), analyzing a convenience sample of 267

psychiatric and substance abuse patients in Iowa found that while female psychiatric patients reported strong rates of gender-specific cancer screening, patients with substance abuse had lower rates of care. With the exception of Steiner et al. (1998), none of the aforementioned U.S. studies made use of a local control/comparison group. Steiner et al. (1998) were also the only random sample.

Lasser et al. (2003) compared mammography rates for 526 new female patients at 13 primary care centers serving a multicultural, low-income population in Cambridge, MA. After using a modified version of the Primary Care Evaluation of Mental Disorders instrument, 233 patients screened positive for mental illness. There was no significant difference between service uptake for women who screened positive (52.8%) and those who screened negative (55.6%). It is necessary to note that there is a significant error/typo in the data table for this study, calling its results into question. It is also the only study in this review that determines mental illness/distress through screening to have nonsignificant results. As it is only comparing results in a low-income, mostly uninsured sample, its results are not generalizable.

Salsberry, Chipps, and Kennedy (2005) examined service use in persons with severe and persistent mental illness enrolled in Medicaid from 1996 to 1998. Patients were enrolled in only Medicaid for all three years, and because of statistical power limitations, the only diagnoses examined were schizophrenia, affective disorders, paranoid disorders, and anxiety disorder. With the exception of likelihood of receiving a mammogram for patients with paranoid disorders, all other rates were significantly lower than the average found by the National Health Interview survey for those years. Patients with schizophrenia had the lowest rates of service use.

Masterson, Hopenhayn, and Christian (2010) using survey data from the 2002 Kentucky Behavioral Risk Factor Surveillance System, examined the relationship between mental health status and likelihood of having had a mammogram in the past two years in 2781 women over age 40. Mental health was measured by reported number of days that mental health was not good, number of days where the respondent felt depressed, and number of days they felt anxious. Using logistic regression, they created odds ratios comparing women reporting 0 poor mental health days with women reporting 30 poor mental health days. The OR for "poor mental health days" was 1.68, with a 95% confidence interval of 1.08–2.63. Odds ratios for days depressed and days anxious only approached significance. While the sample size is large, and researchers controlled for age, race, education, income, and insurance status, the extreme dichotomization of the mental health variables makes the data more difficult to interpret or generalize.

Section III

Chochinov et al. (2009) examined claims data from all women ages 50 to 69 in Manitoba Canada from 2002 to 2004. Women diagnosed with schizophrenia totaled 1,448 out of a sample of 108,792. The two-year mammography rate was 44.8% for women with schizophrenia. The odds ratio for mammography was .64 after adjusting for region, age, income, continuity of care and physical morbidity. Age and physical comorbidity did not influence the likelihood of mammography, although income and continuity of care were significant. There was a 17% difference in service uptake between women with schizophrenia who had continuity of care and those who did not.

Lindamer et al. (2003) and Lindamer, Wear and Sadler (2006) analyzed small convenience samples of women with schizophrenia ($n = 65$ and $n = 46$ respectively).

The 2003 study utilized a control group recruited through advertisements and the 2006 compared results to statewide averages at the time. Both studies showed significantly lower rates of Pap tests and mammograms relative to comparison groups.

Stecker and Prajapati (2007) extracted data for a cohort of 860 female patients with a diagnosis of depression, hypertension, or both, from the electronic health records of a university based family practice clinic. Women with a diagnosis of depression were 8% more likely to receive a Pap test than those with hypertension. Overall, 46.8% of women with depression received a mammogram, compared to 53.2% with hypertension. 63% of women with a diagnosis of depression over the age of 40 received a mammogram. Depression was determined via a clinical DSM-IV diagnosis.

Ludman et al. (2010) used a stratified sampling design to recruit 2163 women age 40 to 65 from an integrated health plan in Washington State. Using a phone survey, data was collected on BMI and depression. Automated data from the health plan showed rates of mammography and Pap smears. In simple bivariate logistic regressions, both obesity and depression showed relationships with receipt of mammograms and Pap tests. However, in multivariate models, depression remained significantly associated only with mammography. Obesity and depression did not significantly interact. This study assessed depression using screening (PHQ-9).

Pirraglia, Sanya, Singer, and Ferris (2004) analyzed the Study of Women's Health Across the Nation cohort of 3302 women between the ages of 42 and 52. They categorized women into high, medium, and low depression burden categories. Women with high depression burden had statistically significant lower uptake of mammography but not Pap smear in the previous year. After controlling for age, race, insurance, medical

history, smoking, obesity and income, depression was shown to be a "modest independent risk factor lack of subsequent mammography" (p. 731). The authors emphasize that other factors, such as socioeconomic status and insurance status, had a stronger apparent impact on service uptake. Depression was determined through screening, using the Center for Epidemiologic Studies Depression Scale.

Section IV

Borba et al. (2012) conducted interviews with 30 low-income women with a diagnosis of serious mental illness, recruited from a larger National Institute of Mental Health (NIMH) randomized control trial (RCT), on their perceived barriers and facilitators to accessing medical care. The women were majority African American, with high school as their highest level of education, and an average age of 46. The participants reported having an SMI as a significant barrier to accessing services, and that they were less likely to seek services when they were mentally unwell. Continuity of care/having a usual source of care was perceived as a facilitator. Socioeconomic status was another potential barrier/facilitator.

Miller, Lasser and Becker (2007) recruited participants for a qualitative follow up from a large Boston teaching hospital. They interviewed 16 women with at least one ICD-9 diagnosis of mental illness. They also conducted interviews with women in a primary care setting who completed a PRIME-MD mental health screening. Identified systems barriers to seeking care were transportation/access and limited time with the primary care provider. Personal barriers were beliefs about mammograms, shame or embarrassment, and fears of positive findings. Identified facilitators were family encouragement and relationships with primary care providers.

Section V

Smith, Hochhalter, Ahn, Wernicke, and Ory (2011) examined survey data from a random sample of 1242 women in Central Texas. They examined demographics, health status, and healthcare access as predictor variables for the dependent variable of most recent mammogram (in the past 12 months, between one and two years, or longer than two years.) 76.2% of the women surveyed had received a mammogram in the past two years. Participants who reported not having a routine checkup in the past year, having a lapse in insurance in the past three years, or living in an area with a shortage of healthcare providers, were significantly less likely to be screened within the past two years.

Almeida, Dubay, and Ko (2001) took data from the 1997 National Survey of America's Families, to examine rates of breast exams and Pap tests in nonelderly, low-income women. The final sample was 14,197 women with family incomes below 200% of the poverty line. There was a contradiction in service use, where women with Medicaid had higher average levels of service utilization, but were also more likely to have postponed or not received needed care than women with private insurance. The rates for receipt of clinical breast exams were lower for uninsured women than for private or Medicaid patients: 31% compared to 51.2% and 44.6% respectively. The results were similar for Pap tests; however unlike breast exams, women with Medicaid were more likely to receive a Pap than women with private insurance. 42.5% of uninsured women received Paps, 56.5% of privately insured women received Paps, and 64.5% of women with Medicaid received Paps. Regardless of type of insurance, women in low-income households receive disparate levels of preventive care.

The relationship between service uptake and insurance rate is consistent throughout the literature (Patel, Bae & Singh 2010; Sambamoorthi & McAlpine 2003).

Similarly consistent is the visible difference in uptake between categories of insurance (Magge, Cabral, Kazis, & Sommers, 2013; Rhodes et al., 2014; Ward & Martinez, 2014; DeLaet, Shea, & Carrasquillo, 2000; Decker, 2011). The difference is access to care between types of insurance was demonstrated by Rhodes et al. (2014). Trained research staff systematically made 12,907 calls to 7788 primary care practices in 10 states asking for new patient appointments. The callers would claim they had either private insurance, Medicaid, or no insurance. Accepted appointment rates were 84.7% for private insurance but only 57.9% for public insurance. Acceptance of uninsured patients varied sharply depending on how much the caller claimed they were willing to pay. This data fits the findings by Decker, who used the 2011 National Ambulatory Medical Care Survey Electronic Medical Records Supplement (the same year as the data from this study) to show that although 96% of physicians in the United States claimed they were taking new patients, only 69% would take Medicaid patients. As a contrast to the negative findings on Medicaid, Magge, Cabral, Kazis, and Sommers (2013) examined insurance status in participants from 4 years of the MEPS (2005–2008) and found that in low-income adults, those with Medicaid were less like to be "under-insured," IE their out-of-pocket expenses exceeded 5% of their income, than those with private insurance.

As was demonstrated by data published by SAMHSA and the NIMH (2014) as well as descriptive data from the 2011 MEPS (tables 12–14), persons with mental illness are more likely to have public insurance than their "well" peers. The National Survey on Drug Use and Health report implies that the link between mental illness and insurance category is due to lower employment status and income. McAlpine and Warner (2001) also demonstrated that persons with psychiatric illnesses are the largest category of

people receiving disabilities for mental illnesses. They comprised 37% of the adults

receiving supplemental security income and 27% of adults receiving social security

disability insurance in 1999, making them much more likely to be reliant solely on

Medicare or Medicaid.

Data examining the relationship between mental illness and distress and insurance

is limited. Is the entirety of the relationship between mental health and insurance status

dependent on the greater likelihood of persons who are mentally ill to be unemployed, on

disability, and/or lower income? Ward and Martinez (2014) used National Health

Interview Survey data from 2001 to 2010 to examine the relationship between mental

distress and insurance category. People with public health insurance had higher levels of

mental distress than people with no insurance, who in turn had higher distress than those

with private insurance. They primarily viewed the directionality of the relationship as

insurance status causing distress, although with the number of factors influencing both

insurance status and mental health, and given only cross-sectional data, it is difficult to

assess the primary causal factor in the relationship.

To summarize the primary findings of this review, a number of studies testing the

relationship between mental illness and service uptake demonstrate contrary findings.

Even in this limited review, there were seven studies that demonstrated either no or

minimal relationship and nine studies which said there was. Studies occurred in multiple

kinds of settings, including the general population (representative sample or insurance

sample) and psychiatric outpatient. Studies tested for mental illness both using screenings

and diagnosis, as well as recruiting patients who were actively seeking care. Sample sizes

ranged from 16 to over 100,000. Other variables found to be significant by these studies

were substance abuse, physical comorbidity, age, number of nonmental health visits, access to care, income, education, and insurance. Studies and national sampling data demonstrated relationships between mental illness and insurance, and insurance and service uptake. This background serves as a basis to demonstrate that, at least in part, the relationship between mental illness and service uptake may be mediated by the greater likelihood of those with mental illness or distress to have public insurance.

Methods

Design

The design of the study is a quantitative, secondary analysis of the Medical Expenditure Panel Survey, based on a modification of theoretical models by Aggarwal et al. (2013) and Andersen and Newman (1973).

Survey Description

The data from this study was taken from participants in the Medical Expenditure Panel Survey, a survey conducted by the Agency for Healthcare Research and Quality (AHRQ). The MEPS collects household and personal level data on medical service use, including acute and preventive, insurance, prescription drugs, diagnoses, and self-ratings of health. It also includes demographic data such as age, race, region of the country, and whether the household is located in a metro or nonmetro area. There are three components to the MEPS: the Household component, the Insurance Component, and the Provider component. The "Household" portion of the data is collected in interviews, and the households interviewed are a nationally representative subsample of participants in the National Health Interview Survey. Policy-relevant groups such as Racial/Ethnic

minorities and low-income households are oversampled. Participants are interviewed 5 times over multiple years, providing information on two years of healthcare related activity. This study will use data only from the Household Component.

Participants

The women whose data was used in this analysis participated in the 2011 MEPS. Data for this study came from two merged 2011 MEPS files: the consolidated Household data and the Conditions household data. The overall Household component consisted of 35,313 persons from 22,762 households. Data analysis was restricted to women who were 18 or above by the end of 2011. Included in bivariate analyses were 13,498 women.

Procedures

Because research in the MEPS is conducted at five different points in time, aspects of it are longitudinal and the participants are a randomized cohort. However, this analysis will focus on cross-sectional data. Participants provided information through in-person, computer-assisted interviews. For any variable, participants who answered, "Don't know" or "Not applicable" were not included in analysis. Variables were not considered if more than 20% of participants either did not provide an answer (missing) or their answer was not analyzable.

Measures

Participants gave their sex (male or female). Their age was recorded in years, and they listed the age that they were at the end of the calendar year for which they were providing information. The age variable was kept continuous. When conducting analyses

with mammogram uptake as the dependent variable, participant age was limited to 40 or above.

Hypothesis 1: Relationship between mental illness and uptake of preventive health services

Mental health was measured in three different ways in the MEPS. Participants were asked to list any medical diagnoses they had, and these were recorded as ICD-9 codes. Codes 290–319 indicate mental disorders. Participants could list multiple diagnoses. Mental disorder was recoded in two ways. First it was recorded as a dichotomous variable based on whether or not the participant had received a diagnosis of a mental illness. Second, mental illness was broken down into broad illness categories based on the ICD-9 codes. If more than 100 participants fit in the condition group, it was accepted as having power for analysis. If there was not a sufficient number of persons for a group, it was not analyzed. Diagnoses with sufficient power were Episodic mood disorder (bipolar, major depressive and other associated disorders ICD-9 code 296); Neurotic/Anxiety disorder (Anxiety, panic, obsessive-compulsive and other related disorders ICD-9 code 300); Acute reaction to stress (ICD-9 code 308); and Depression Not Otherwise Specified (ICD-9 code 311). Each diagnosis was coded as an independent dichotomous variable (a participant had received a particular diagnosis, yes or no), to allow for participants having multiple mental illnesses.

Participants responded to multiple health questionnaires. The second measure of mental health was a cumulative total of the mental-health related questions from a 12-item quality of life scale. The scale was a combination of questions from the Kessler 6 Questionnaire, the SF-12 Questionnaire, and the PHQ-2. Participants were asked to rate

items such as how often they accomplished less because of mental problems; how often their work was limited because of mental problems; how often they felt calm and peaceful; how often they had a lot of energy; how often they felt downhearted or depressed; and how often their health stopped their social activities. Scores on individual questions ranged from 1 to 5. The possible responses were "All of the time" (5); Most of the time" (4); Some of the time" (3); A little of the time" (2); and "None of the time" (1). A higher cumulative score on the scale was indicative of better mental health. Cronbach's Alpha was run for individual items on the scale and was acceptable ($> = .80$ for all items). The scores were then dichotomized into two groups: the lower 20% of scores and the higher 80% of scores.

The third measure of mental illness was a cumulative score of a single measure, perceived health status, taken during three different rounds of questions (i.e., at three different points in time). Participants were asked to rate their perceived mental health status as excellent, very good, good, fair, or poor. This measure was recoded into a dichotomous variable, the bottom 20% of scores and the top 80% of scores, in order to compare persons with "low" mental health status and "high" mental health status. Participants were asked to rate their perceived mental health status as excellent, very good, good, fair, or poor. This measure was recoded into a dichotomous variable, the bottom 20% of scores and the top 80% of scores, in order to compare persons with "low" mental health status and "high" mental health status. The scores were split along this line for two reasons: first, that 20% matches the approximately 20% of women who have mental illness (SAMHSA, 2013) and second, because that was the distribution after those

who averaged "good" or lower were divided into one group and those who averaged higher than "good" were put into the other group.

There are three different preventive service variables: receipt of mammogram, receipt of Pap smear and receipt of clinical breast exam (CBT). For each of those services, participants were asked how recently they had received the test. The possible responses were as follows: "Within one year"; "Within two years"; "Within three years"; "Within five years"; "More than five years"; "Never"; "Don't know"; or "N/A." First, "Don't know" or "N/A" responses were recoded as missing, and not included in analysis. Because this is a secondary data analysis, it is impossible to glean from the data any further explanation for those responses. Analyzable responses for receipt of Pap smear were recoded into a dichotomous variable of whether or not the participant had received a Pap smear within the past two years, yes or no. Receipt of a mammogram was recoded similarly, however analysis was restricted to women 40 years or older. Receipt of a CBT was recoded similarly, however the dichotomous variable was receipt within one year or greater than one year. In order to assess the relationships between the independent variables and dependent variables, Chi-square analyses were used to compare variables.

Hypothesis 2: Acute symptoms compared to diagnosis as predictive variable

Comparison of bivariate results from Hypothesis 1, no new variables introduced.

Hypothesis 3: Insurance Mediation Variable

The independent and dependent variables of Hypothesis 3 were described previously.

Controlled, Mediating and Moderating Variables

Controlled variables for Hypothesis 3, which is the analysis of the model (Figure 3) map on to the predisposing/demographic characteristics and enabling characteristics aspects of the model. These are potentially confounding variables, IE potential other causative explanations for increased or decreased service use. Measurement of the age variable was already described.

If an answer was missing for all questions besides those pertaining to race, answered as "Don't know" or answered as "Not applicable," the answer was coded as missing. Participants were first asked to give their race, with a follow-up question of whether the participant was also Hispanic. Responses to these questions were combined and then recoded so that Hispanic could be its own category, and so that each race category would have sufficient power ($n> = 100$). The five categories were white, black, Hispanic, Asian, and multiracial or other. Those answers that could not be coded because they were missing or N/A were recoded into the *Other* category. Participants were asked to give the approximate before-taxes income for their household. Family income was then reported as a continuous variable. Based on zip code, participants' location was coded as a dichotomous variable of living in a metro or rural area. Participants were asked how many years of education they had received. This variable was recoded as a discrete ordinal variable. Ranked categories of years of education were as follows: 0–8 years; 9–11 years; 12 years; 13 years; 14–15 years; 16 years; 17+ years. Participants were asked if they were employed. Response options were as follows: "Employed at interview date"; "Job to return to at interview date"; "Was employed during reference period"; "Not employed during reference period." Those who answered "N/A," "Don't know," "Refused," or "Inapplicable" were recoded as missing. Participants were asked if there

was a spouse present in the house as of the end of the year. This became a dichotomous yes/no variable because the third possible response "Under 16 – not applicable" did not apply to the sample, which was restricted to 18 and above.

Patients were asked if they had a usual source of care or place they typically went to receive care. Potential answers were "Yes," "No," "Don't know," or "N/A." "Don't know" and "N/A" were coded as missing. Participants were also asked how many visits they had made to a medical office for care in the past year. Possible answers were "0," "1," "2," "3," "4," "5–9," or "6 or more." Participants who answered "don't know" or "refused" or for whom answered were not ascertained were coded as missing. Participants who answered "inapplicable" were coded as zero visits.

Much of the MEPS is given over to questions on insurance coverage. This analysis will utilize a summary question that asks what kind of insurance a participant had in the past year. The options were "1 – Less than 65 years of age, private insurance"; 2 – Less than 65 years of age, public insurance"; 3 – Less than 65 years of age, no insurance"; 4 – 65+ Medicare or other public insurance"; 5 – 65+ Medicare and other private insurance"; and "6 – 65+ No Medicare."

In order to determine which variables to include in the final analyses, chi-squares, logistic regressions, and t-tests were used to examine potential relationships between potential control, moderator and mediator variables and dependent variables. Variables that fit the model and literature or were significant at $p < .20$ were included. The final analyses were block enter method logistic regressions.

Results

Analysis

IBM SPSS Statistics v. 21 was used for data analysis. Descriptive statistics (n, median, standard deviation, range) were used to describe the study population. Hypotheses 1 was answered through descriptive statistics. Chi-squares and logistic regressions were used to examine the relationships between mental health variables and the dichotomous service uptake variables. Hypothesis 2 compared the strength of the chi-square results and odds ratios for each type of measure of mental illness in Hypothesis 1. For all equations, significance was set at $p < = .05$, two-sided.

In order to determine which variables to include in the final model (Hypothesis 3), bivariate analyses (chi-square and logistic regressions) were run between demographics variables and the dependent dichotomous variables. A logistic regression was also used to determine a relationship between the proposed mediating variable of insurance category and the dependent variables. Three final bivariate regressions tested the model: one to test breast exams, one to test Pap smears, and the last for the stratified 40+ sample on mammogram uptake.

Results

Demographics

A total of 13,498 women over 18 were initially included in analyses. Ages ranged from 18 to 85 (Median = 44, SD = 17.92). When the sample was limited to women 40 and older ($n = 7934$), the median age was 56, SD = 12.50. Participants reporting family income totaled 13,491 (seven missing). Median income was $40,000, SD = $52,638.68, and incomes ranged from $0 to $462,118. The sample had the following racial

breakdown: 43.9% White (*n* = 5926); 21.3% Black (*n* = 2873); 25.3% Hispanic (n =

3420); 7.2% Asian (*n* = 978); 2.2% Other/Missing (*n* = 301). Those who reported living

in a metropolitan area totaled 86.3% of the population sample (*n* = 11655) and 13.7% did

not (*n* = 1843). Women who gave their level of education totaled 13,208 (290/2.1%

missing). Of those who reported, 14.1% (*n* = 2857) had received less than 12 years of

education, 31.1% only completed high school (*n* = 4105), 23.9% (*n* = 3222) attended

some college, and 22.4% (*n* = 3024) of the sample had a college degree or higher. With

regard to marital status, 57.3% of the sample was unmarried (*n* = 7741) and 42.0% were

married (*n* = 5669); .7% (*n* = 88) chose not to answer with regard to marital status. With

regard to employment status, 55.1% of the sample (*n* = 7435) reported being employed

and 44.9% (*n* = 6055) reported they were not employed; eight were missing.

Mediator and Moderators

Among women sampled, 47.7% (*n* = 6440) were under age 65 with private health

insurance; 16.4% (*n* = 2217) had public insurance only, and 18.9% (*n* = 2552) were

uninsured. Among women 65 and over, 9.5% (*n* = 1284) had Medicare or Medicare plus

other public insurance, 7.1% (*n* = 952) had Medicare and private insurance, and .4% (*n* =

53) reported not having Medicare. Usual source of care was reported for 13,498 women

(473/3.5% missing); 23.9% (*n* = 3113) reported having no usual source of care, and

73.4% (*n* = 9912) reported having a usual source of care. Those sampled who reported

having made zero visits to a medical office for care in the past year comprised 33.2% (*n* =

4482); the median number of visits was 2, SD = 2.05 (*n* = 13155, 343 missing).

Independent Variables

Of the 13,498 women in the sample, 19.0% (*n* = 2,559) were diagnosed with a

mental illness. Women reported having episodic mood disorders totaled 206, 1,121

women reported neurotic disorders, 335 women reported acute reaction to stress, 1,368

women reported depression NOS, and 100 women reported an attention deficit disorder.

Individual disorders were coded as independent dichotomous variables, and in logistic

regression

Women who completed the mental health symptoms questionnaire totaled 12,046

(1,462 missing). The overall median score was 52.07 and scores ranged from .22 to

74.98. After the scores were dichotomized and participants were divided into two groups,

there were 2,413 women in the bottom 20% of scores, and their median score was 35.38.

There were 9,623 women in the top ~80% of scores, with a median score of 54.69. There

was a 19.31-point difference between the two groups.

For the third mental health measure, the three combined ratings of overall mental

wellness, 13,147 completed all three mental health rating assessments (351 missing). The

median score was 12 and scores ranged between 3 and 15. After the scores were

dichotomized and participants divided into two groups, there were 2,633 women in the

lower group with a median score of 8, and 10,503 women in the upper group with a

median score of 13. There was a 5-point difference between the two groups.

<u>Dependent Variables</u>

Of the 12,373 women who reported on whether or not they had received a

mammogram (1,125 missing), 57.6% (*n* = 7,131) had received a clinical breast exam in

the past year, and 42.4% had not. Of the 12,304 women who reported on receipt of Pap

testing (1,194 missing), 70.0% had received a Pap test within the past two years, and

30.0% had not. Of the 7,293 women over 40, 64.9 ($n = 5,146$) had received a

mammogram in the past two years, and 27.1% ($n = 2,147$) had not.

Hypothesis 1

For the chi-square test of independence between having a diagnosis of mental

illness and having received a clinical breast exam, $\chi2 = 6.17$, p = .014, which was

significant. Women with a mental illness diagnosis were slightly more likely than women

without to have had a clinical breast exam in 2011. There was not a statistically

significant relationship between mental illness diagnosis and receipt of a Pap smear ($\chi^2 = $

1.79 p = .18) or mammogram ($\chi^2 = .577$ p = .46). For individual mental illness diagnoses,

there was only one statistically significant finding: Diagnosis of depression NOS (ICD-9

code 311) was significant with receipt of a clinical breast exam in the past year, $\chi^2 = 5.88$,

p = .015 (Table 1).

Score on the mental health symptoms questionnaire was significant with

preventive health screening. For receipt of clinical breast exam, $\chi^2 = 17.69$, $p < .001$. For

receipt of Pap smear, $\chi^2 = 8.13$, p = .004. For receipt of mammogram, $\chi^2 = 30.65$, $p < $

.001 (Table 2).

Score on the overall mental wellness rating was significant with preventive health

screening uptake. For receipt of clinical breast exam, $\chi^2 = 42.80$, $p < .001$. For receipt of

a Pap smear in the past two years, $\chi^2 = 62.34$, $p < .001$. For receipt of a mammogram

within the past two years, $\chi^2 = 67.02$, $p < .001$ (Table 3).

Hypothesis 2

Consistently, the mental health symptoms scale and the overall rating of mental

wellness were much stronger predictors of preventive health service use than a mental

health diagnosis. All three variables (diagnosis, screening score, and self-assessment of

mental health) were highly significant with each other in individual chi square tests ($p <$

.001 for each; Tables 1–3).

Hypothesis 3

In order to be considered for inclusion in the final analyses, variables needed to

show a potential relationship with the dependent variables of receipt of clinical breast

exam, receipt of Pap smear, and receipt of mammogram ($p < .20$). Chi-squares were run

between dichotomous variables and the dichotomous dependent variables and logistic

regressions were run between categorical variables with three or more categories or

continuous variables and the dichotomous dependent variables. An independent t-test was

used to test the relationship between family income and service uptake. Of the

demographics variables, race, education, family income, age, having a spouse,

metro/rural status, and employment status were significant with receipt of clinical breast

exam, receipt of Pap smear, and receipt of mammogram.

With white women as the reference variable, black women were statistically more

likely to receive a breast exam (AOR = 1.225, $p < .001$); Hispanic women were less

likely to receive a breast exam (AOR = .789, $p < .001$); Asian women were less likely to

receive a breast exam (AOR = .699, $p < .001$); and the "other" or missing group was also

less likely to receive breast exams (AOR = .649, $p < .001$). With white women as the

reference variable, black women were statistically more likely to receive a Pap smear

(AOR = 1.568, $p < .001$) and Hispanic women were more likely to receive a Pap smear

(AOR = 1.288, $p < .001$). Neither the Asian nor the "other" category was statistically

significant. With white women as the reference variable, black women were statistically

more likely to receive a mammogram (AOR = 1.228, *p* = .003); Hispanic women were less likely to receive a mammogram (AOR = .853, *p* = .017); Asian women were less likely to receive a mammogram (AOR = .769, *p* = .011); and the "Other" or missing group was also less likely to receive a mammogram (AOR = .657, *p* = .014). (Table 4)

Education was statistically significant with receipt of a breast exam. For each unit increase in education, a woman was 17.7% more likely to have a CBE (AOR = 1.177, *p* < .001). Education was statistically significant with Pap smear. For each step up in education, a woman was 20.6% more likely to have a Pap smear (AOR = 1.206 *p* < .001). Education was also statistically significant with receipt of mammogram. For each point increase in education, a woman was 20% more likely to receive a mammogram (AOR = 1.20, *p* < .001; Table 5).

Family income was statistically significant with preventive service uptake. Levene's test for equality of variance was significant for each equation; however, this did not affect results. For CBE, the mean difference was 11,659.07 (*F* = 121.85, *t* = 12.30, *p* < .001). For Pap smear, the mean difference was 11,267 (*F* = 116.55, *t* = 10.00, *p* < .001). For mammogram, mean difference was 17,132.69 (*F* = 121.19, *t* = 13.75, *p* < .001). (Table 5)

Age was statistically significant with service uptake. For each unit increase in age, likelihood of having a CBE increased .3% (AOR = 1.003, *p* = .01). For each unit increase in age, likelihood of having a CBE decreased 2.6% (AOR = .974, *p* < .001). Age was not statistically significant with receipt of mammogram in the 40 and up sample tested. (Table 5)

Having a spouse was statistically significant with increased service uptake. For receipt of clinical breast exam, $\chi^2 = 111.39$, $p < .001$. For receipt of Pap smear, $\chi^2 = 142.23$, $p < .001$. For receipt of mammogram, $\chi^2 = 88.93$, $p < .001$ (Table 6). Employment was statistically significant with increased service uptake. For receipt of clinical breast exam, $\chi^2 = 111.39$, $p < .001$. For receipt of Pap smear, $\chi^2 = 408.11$, $p < .001$. For receipt of mammogram, $\chi^2 = 31.96$, $p < .001$ (Table 7). MSA status was statistically significant with increased service uptake. For receipt of clinical breast exam, $\chi^2 = 17.83$, $p < .001$. For receipt of Pap smear, $\chi^2 = 54.12$, $p < .001$. For receipt of mammogram, $\chi^2 = 31.96$, $p < .001$ (Table 8).

The moderating variables of having a usual source of care (Table 9) and number of medical visits over the past year (Table 5) were statistically significant with service uptake. Having a usual source of care was statistically significant with increased service uptake. For receipt of clinical breast exam, $\chi^2 = 353.72$, $p < .001$. For receipt of Pap smear, $\chi^2 = 84.48$, $p < .001$. For receipt of mammogram, $\chi^2 = 7.94$, p = .005. As number of medical visits increased, so did likelihood of receipt of preventive care, as tested in logistic regressions. For each unit increase in number of visits, likelihood of having a CBE increased 18.3% (AOR = 1.183, $p < .001$). For each unit increase in number of visits, likelihood of having a Pap smear increased 8% (AOR = 1.080, $p < .001$). For each unit increase in number of visits, likelihood of having a mammogram increased 21.2% (AOR = 1.212, $p < .001$).

Whether someone had health insurance and what kind of insurance was statistically significant with service uptake. (Table 10) With age <65 with private insurance as the reference variable, participants with all other categories of insurance or

no insurance were statistically less likely to receive a Pap smear. Women with public insurance were 16.1% less likely to receive a Pap smear in the past two years (AOR = .839, p = .004). Women with no insurance were 59.9% less likely (AOR = .401, $p <$ .001). Women over 65 with Medicare/other public insurance were 83.5% less likely (AOR = .165, $p < .001$). Women over 65 with Medicare and private insurance were 76% less likely (AOR = .24, $p < .001$). Women with no Medicare were 79.9% less likely (AOR = .201, $p < .001$).

With age <65 with private insurance as the reference variable, participants with most other categories of insurance or no insurance were statistically less likely to receive a clinical breast exam. Women with public insurance were 28% less likely to receive a CBE in the past year (AOR = .72, $p < .001$). Women with no insurance were 63.3% less likely (AOR = .367, $p < .001$). Women over 65 with Medicare/other public insurance were 47% less likely (AOR = .530, $p < .001$). Women with no Medicare were 59.8% less likely (AOR = .402, p = .008). Women over 65 Medicare and private insurance were not statistically significantly less likely to receive a breast exam.

For women over 40, with age <65 with private insurance as the reference variable, participants with most other categories of insurance or no insurance were statistically less likely to receive a mammogram. Women with public insurance were 39.3% less likely to receive a mammogram in the past two years (AOR = .607, $p < .001$). Women with no insurance were 71.7% less likely (AOR = .283, $p < .001$). Women over 65 with Medicare/other public insurance were 50.7% less likely (AOR = .493, $p < .001$). Women with no Medicare were 70% less likely (AOR = .300, $p < .001$). Women with Medicare

and private insurance were not statistically significantly less likely to receive a

mammogram.

Because all non-independent variables were statistically significant, all were kept

in the final regressions. Although having a diagnosis of mental illness was largely

insignificant with service uptake, because it fit the theoretical model and to test its effect

on the overall regression, it was included.

The three final logistic regressions were run using the enter method with blocks to

test insurance as a possible mediator and to reflect the theoretical model. For each

regression, there were three blocks. Block 1 was independent variables (symptoms scale,

mental health rating, diagnosis) and confounding/demographic variables (race, age,

employment, income, spouse, metro/urban status and education level). Block 2 was other

Medical System Interaction variables: Having a usual source of care and Number of

medical visits made over the past year. Block 3 was the potential mediator: Insurance

category.

The regression demonstrating the relationship between mental health and receipt

of a clinical breast exam demonstrated many significant relationships (Table 14). In the

final analysis, 11,623 women were included with 1,875 (13.9%) missing. After the first

step, all independent variables were statistically significant and all demographic/control

variables were significant except for metro/rural status. However, although the mental

wellness rating and symptoms scales indicated a positive relationship between increased

wellness and increased service uptake, having a diagnosis of a mental illness also

predicted increased service uptake.

After the second block, which included the medical service use variables, having a diagnosis of mental illness ceased to be statistically significant. Scoring in the lowest 20% on perceived mental health continued to be predictive of lower service uptake ($p <$ .001, AOR = .708). Scoring in the lowest 20% on the symptoms of mental illness scale also continued to be predictive of lower service uptake ($p < .001$, AOR = .793). All control/demographic variables continued to be statistically significant.

The third and final block included insurance category. Perceived mental wellness ($p < .001$, AOR = .732) and symptoms of mental illness ($p = .001$, AOR = .829) continued to be predictive, and in the same direction, and mental illness diagnosis continued to be insignificant ($p = .152$, AOR = 1.081). There were small decreases in the strength of the relationship between the mental health variables and service uptake, indicating the potential for partial mediation. With <65 private insurance as the reference variable, all categories of insurance were significant at $p < .001$ except being over 65 with private insurance and the "No Medicare" category. The results for women without Medicare were likely insignificant because of the small n. Not having private insurance predicted lower service uptake. Having private insurance, having a usual source of care (AOR = 1.49), being married (AOR = 1.34) and being black (AOR = 1.45) were most strongly predictive of increased service uptake. Being Asian (AOR = .699), being under 65 with public insurance (AOR = .79) or no insurance (AOR = .49), or being over 65 with public insurance (AOR = .68), most strongly predicted lower service uptake. The Cox and Snell Pseudo R^2 for the regression was .104 and the Nagelkerke Pseudo R^2 was .139.

The regression demonstrating the relationship between mental health and receipt of a Pap smear in the past two years demonstrated many significant relationships. In the final analysis, 11,560 women were included with 1,938 (14.4%) missing. After the first step, perceived mental wellness were insignificant and diagnosis of mental illness ($p <$ .001, AOR = 1.268) was significant with service uptake. All demographic/control variables except for income were significant.

After the second medical service use block, having a diagnosis of mental illness ceased to be statistically significant. Scoring in the lowest 20% on perceived mental health was predictive of lower service uptake ($p = .005$, AOR = .845). Scoring in the lowest 20% on the symptoms of mental illness scale continued to be not significant (p = .248, AOR = .933). All control and demographic variables continued to be statistically significant except family income.

In the final step, perceived mental wellness ($p < .001$, AOR = .792) continued to be predictive, and in the same direction, and the other mental health variables continued to be insignificant. There was a small increase in the strength of the relationship between perceived mental wellness and service uptake, indicating no mediation with insurance. With <65 private insurance as the reference variable, all categories of insurance were significant except for women over 65 who said they did not have Medicare. However, for some categories, the direction of the relationship was different than with CBEs. Women with public insurance were 17% more likely to have Pap smears than women with private insurance (AOR = 1.172, p = .024). Women with no insurance were 41.2% less likely (AOR = .588, $p < .001$). Women over 65 were statistically less likely to have Pap smears regardless of what kind of insurance they had. Living in a metro area (AOR = 1.265, $p <$

.001), being *black* (AOR = 1.94, $p < .001$), being Hispanic (AOR = 1.57), being married

(AOR = 1.79, $p < .001$), being employed (AOR = 1.48, $p < .001$), and having a usual

source of care (AOR = 1.64, $p < .001$) most strongly predicted service uptake. Similar to

CBEs, number of appointments in the past year was statistically significant (AOR = 1.14,

$p < .001$). The Cox and Snell Pseudo R^2 was .268, and the Nagelkerke Pseudo R^2 was

.357.

The regression demonstrating the relationship between mental health and receipt

of a mammogram in the past two years demonstrated many significant relationships.

Having selected women over age 40, the final analysis included 6,830 women with 1,104

(13.9%) missing. After the first step, employment status and Metro status were not

significant. Similar to the CBE and Pap smear regressions, lower perceived mental

wellness and score on the symptoms scale indicated less service uptake, while having a

diagnosis of mental illness predicted higher service uptake.

After the second medical service use block, having a diagnosis of mental illness

ceased to be statistically significant. Scoring in the lowest 20% on perceived mental

health continued to be predictive of lower service uptake ($p < .001$, AOR = .566).

Scoring in the lowest 20% on the symptoms of mental illness scale continued to be

significant ($p < .001$, AOR = .718). Mental illness diagnosis, metro status, and

employment status continued to be insignificant.

In the final step, perceived mental wellness (AOR = .614, $p < .001$) continued to

be predictive, and in the same direction. Score on the symptoms scale continued to be

predictive (AOR = .769, $p = .001$). There was a small decrease in the strength of the

relationships between perceived mental wellness and symptoms of mental illness and

service uptake, indicating some potential for partial mediation. With <65 private insurance as the reference variable, all categories of insurance were significant at $p < .05$, except being over 65 with private insurance or claiming to not have Medicare, which still approached significance. Women under 65 with public insurance were 31% less likely to have a mammogram (AOR = .694, $p < .001$). Uninsured women under 65 were 54.2% less likely (AOR = .458, $p < .001$). Women over 65 with only Medicare or other public insurance were 30.6% less likely (AOR = .694, $p < .001$) and women over 65 who claimed not to have Medicare were 52% less likely ($p = .079$). Metro status, being Asian, and Employment status were not significant with mammogram uptake. Having a usual source of care was by far the strongest predictive variable and women were more than twice as likely to report having a mammogram in the past two years if they had a usual source of care (AOR = 2.08, $p < .001$). Being *black* (AOR = 1.78, $p < .001$) or Hispanic (AOR = 1.52, $p < .001$) were predictive of greater service uptake. For each unit increase in number of doctor visits, there was a 17.5% increase in mammogram uptake (AOR = 1.175, $p < .001$), similar to uptake of CBEs and Pap smears. People with a spouse were 35% more likely to have a mammogram (AOR = 1.35, $p < .001$). The Cox–Snell Pseudo R^2 was .255, and the Nagelkerke R^2 was .340.

Discussion

In bivariate analyses, having acute symptoms of mental illness or perceiving oneself to be mentally unwell was found to be significant with different kinds of women's preventive health service uptake. This fit well with the majority of the background literature that utilized screening to identify its mental illness sample (Egede et al., 2010; Ludman et al., 2010; Pirraglia et al., 2004). While in later regressions it

proved insignificant, this was the first research I am aware of to point to a diagnosis of mental illness as a potentially protective variable. It is most likely to be predictive of service uptake only in that having a diagnosis of illness implies that a person has already has a history of engaging with services. As the latter regressions showed, other variables indicative of a history of engaging with services, such as having a usual source of care and making more total visits to medical care, increased the likelihood of receiving women's preventive services.

A participant's perception of their mental health was more strongly and consistently predictive of service uptake than either screening for symptoms or diagnosis. There are several potential reasons for this, first being that it was the only measure taken at multiple points in time, allowing it to be a more reliable picture of a person's health throughout the year. The screening questions focused mainly on depression and anxiety related symptoms, and mental health, in general and as it affects daily functioning, is more broad and encompasses more factors than depression. A number of studies in the literature associated psychological factors such as fatalism with low service uptake, which can be difficult to pinpoint with a screening (Behbakht et al., 2004; Nelson et al., 2002; Otero-Sabogal et al., 2003; Sambamoorthi & McAlpine, 2003). A broad single question variable may account for unspecified factors. The National Alliance on Mental Illness (2014) describes a mental illness as "a medical condition that disrupts a person's thinking, feeling, mood, ability to relate to others and daily functioning." Functioning would include a woman's ability to take proactive steps towards maintaining her health. A participant could have been rating their mental health as lower in part *because* they

were not seeking care, calling the direction of the relationship between variables into question.

The results of the blocked logistic regression fit closely with Aggarwal et al.'s (2013) model and with Andersen and Newman (1973). The demographic and social variables they predicted would be significant with service uptake and that could be represented through MEPS data were for the most part highly significant. Metro area status was perhaps not an appropriate variable for measuring access to care (IE someone living in a metro area would have greater access to doctors/care). Score on overall perceived mental health continued to consistently be more strongly predictive of service uptake than screening after controlling for other variables. The AOR for perceived mental health was 10% stronger for prediction of clinical breast exams, 11% stronger for prediction of Pap smear, and 15% stronger for prediction of Mammogram.

My prediction that not only having insurance but what kind of insurance a participant had would predict service use was correct. However, despite predictions from some of the literature (Almeida et al., 2001), I did not expect that having public insurance would make someone more likely to receive a Pap smear. For clinical breast exams and mammograms, having public insurance made someone significantly less likely to receive service. Women under 65 with public insurance were 22% less likely to receive a breast exam and 29% less likely to receive a mammogram. With the regression for mammogram rerun with "women over 65 with private insurance" as the reference variable, women over 65 with Medicare and/or public insurance only were 40% less likely to have had a mammogram. Women with no insurance were consistently the least likely to receive

services. They were 52% less likely to receive a CBE, 40% less likely to receive a Pap

smear, and 56% less likely to receive a mammogram.

From the data, it is difficult to see conclusive evidence of a direct mediating

relationship between mental illness, insurance, and service uptake. Certainly there is a

strong relationship between mental illness, in each way it is measured, and insurance

(Tables 11–13), just as there is a strong relationship between insurance and service

uptake. From the final logistic regressions, it is possible to see the potential for insurance

as a mediation variable for breast-related screenings, as the relationship between the

mental wellness variable and service uptake variable was weakened. However, it was

only weakened 2.9% for CBE and 3.6% for mammogram, indicating only a small partial

mediation at most. This mediation was based on the Baron and Kenny (1986) theory of

mediation, which accounts primarily for direct effects. It is possible that a different

mediation model, utilizing indirect effects, could show a stronger relationship.

Score on the perception of mental wellness variable was strongly predictive of

service uptake, but there were other important variables. Being married was hugely

important to service uptake. Another reason this particular finding is important is that it

points to the social variables that are largely missing from the MEPS, and could explain

more of the variance in service use. Traditional social theory such as those posited by

Bandura or Ajzen would point to social norms and significant others as strong influences

on healthy behavioral intentions and actions (Ajzen 2011; Bandura 2011). As mediation

did not prove to be a strong mediating variable, it is possible that these social variables

could be the missing link in care uptake.

Insurance and having a Usual Source of Care were by far the most consistently influential variables towards preventive service use. Having a usual source of care was particularly influential on uptake of mammograms. This could be because a mammogram would require a referral to an outside location, and a person might need a usual source of care to make that referral. A woman might also be more likely to get a mammogram if she were told to have one by her own doctor, as suggested by the literature (Miller et al., 2007).

Limitations

There were a number of limitations to this study. It was a secondary data and so I had no control over what questions were asked or how they were asked. The data collected for the portion of the MEPS used in this study is self-report, which may lead to over or under reporting. However, in Rauscher, Johnson, Cho, and Walk's (2008) meta-analysis of self-reported screenings, they demonstrated that sensitivity (the likelihood of true positives) was highest for mammograms, clinical breast exams and Pap smears. One of the overall strengths of the MEPS is that data is collected over a two-year period*;* however*,* because of how the data is collected and the variables, I chose to use, the analysis should be interpreted as cross-sectional and cannot determine causation. While the MEPS is an excellent source of service use and insurance data, it is weak on psychosocial variables and does not collect any qualitative data. There are no "explanatory" variables such as why someone chose not to receive a Pap smear. This also made use of social theory difficult for this analysis.

Many variables that might have been important, in particular variables about specific kinds of care, had too many missing responses to be used. Specific variables not

included were whether the provider was a facility, person, or person in provider; Whether the USC was a hospital clinic, ER, or nonhospital office; and What kind of medical person was the USC.

It was my choice to examine having a usual source of care and number of visits in the past year not as dependent variables but as moderators of a relationship between mental illness and receipt of preventive services. In future research, a MANCOVA with identical variables—but with those service use variables run as dependent variables along with the service received—should be attempted.

Perhaps the greatest limitation to the data set is the inability to target individual mental health diagnoses. Because the ICD-9 codes were general categorical codes, I could not, for instance, differentiate between bipolar disorder and major depressive disorder. It could also not be determined when and from whom a person had received their diagnosis.

The data was nationally representative; however, while it could be broken down into broad regions, it could not be broken down into states or more specific kinds of urban, suburban, or rural areas. There was very little information on the kind of environment participants lived in.

Conclusions

It is apparent from these analyses that mental health is strongly related to service uptake. However, the directionality of that relationship is unlikely to be one way and has not been firmly elucidated by this study. Is mental distress leading to lower service uptake, or has lower service uptake, in conjunction with insurance status, income, and other psychosocial variables, lead to higher distress in some portion of the sample. If you

are operating under the assumption that symptoms of mental illness leads to lower service uptake, these findings imply that it is very difficult to target that population that is at risk, who may not have an official diagnosis and may not reveal themselves with a screening. In bivariate chi-square analyses, the three different measures of mental illness were heavily correlated with each other. When the "perception of mental wellness" variable, was placed into bivariate analyses with service use, but stratified by receipt of mental illness diagnosis, having a mental illness diagnosis appeared protective (Tables 17–19). Those people with poor mental health who have not been identified as such may be the ones at greatest risk. This is the continuing problem with the field of mental health in general. The majority of people with symptoms of mental illness do not receive adequate treatment for their care (SAMHSA, 2013). How do you help someone who has not identified themselves as being in need of help? Additional screening measures may be doing some good. Additionally, a significantly higher percentage of the overall sample received other preventive care such as blood pressure and cholesterol screenings than women's preventive care. Ensuring more consistent screening for mental health measures and providing those women with extra reminders about other women-specific care may be helpful.

While not targeting mental illness specifically, greater integration of women's health services into general care and a greater emphasis on women's health in the Patient Centered Medical Home (PCMH) model would lead to improvements. Ensuring more people have insurance will make improvements. Particularly in the older female population, it is painfully clear that public insurance does not provide the same care as private insurance. The disparity in mammogram uptake between women over 65 with

private and public insurances was surprising and bleak. Mammogram uptake was also the variable where someone having a low mental health score had the strongest effect. Despite the relationship between insurance category and likelihood of mammogram, and a strong relationship between usual source of care and receipt of mammogram, women with public insurance were *not* statistically less likely to report having a usual source of care than women with private insurance. Post-hoc bivariate analyses did not offer any additional insights into potential differences between the usual sources of care. Why public insurance is failing so many women in breast exam uptake is an area in need of future research. In the future, more questions about access should be included in the MEPS, and more efforts should be made into ensuring that people can answer the questions fully.

This study calls into question how we define mental illness for the purpose of research. It provides some potential insight into why some studies found a link between mental illness and service uptake and some did not, as suggested by Aggarwal et al. (2013). For the improvement of future research in mental illness, more research could be done into screening/patient selection methods, and how researchers select their participant pools.

There are two primary findings to this study. First, women in poor mental health are at risk for failing to address their physical health. Second, insurance is vital to the uptake of preventive services and public insurance is failing many women in providing services they need and which should be available to women with no cost sharing under current health care law (U.S. Department of Health and Human Services, 2014; The Patient Protection and Affordable Care Act H.R. 3590). From a practical policy

perspective, ensuring that women's preventive screenings are more closely integrated into all office visits could quickly improve uptake.

References

Aggarwal, A., Pandurangi, A., & Smith, W. (2013). Disparities in breast and cervical

cancer screening in women with mental illness: a systematic literature review. *Am

J Prev Med, 44*(4), 392-398. doi: 10.1016/j.amepre.2012.12.006

Ajzen, I. (2011). The theory of planned behaviour: reactions and reflections. *Psychol

Health, 26*(9), 1113–1127. doi: 10.1080/08870446.2011.613995

Almeida, R. A., Dubay, L. C., & Ko, G. (2001). Access to care and use of health services

by low-income women. *Health Care Financ Rev, 22*(4), 27–47.

American Cancer Society (2013). American Cancer Society Cancer Prevention and Early

Detection Facts and Figures 2013. Atlanta, GA: National Home Office American

Cancer Society.

Bandura, A. (2001). Social cognitive theory: an agentic perspective. *Annu Rev Psychol,

52*, 1–26. doi: 10.1146/annurev.psych.52.1.1

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in

social psychological research: conceptual, strategic, and statistical considerations.

J Pers Soc Psychol, 51(6), 1173–1182.

Behbakht, K., Lynch, A., Teal, S., Degeest, K., & Massad, S. (2004). Social and cultural

barriers to Papanicolaou test screening in an urban population. *Obstet Gynecol,

104*(6), 1355–1361. doi: 10.1097/01.AOG.0000143881.53058.81

Berren, M. R., Santiago, J. M., Zent, M. R., & Carbone, C. P. (1999). Health care

utilization by persons with severe and persistent mental illness. *Psychiatr Serv,

50*(4), 559–561.

Bogner, H. R., & Wittink, M. N. (2004). Depression as a Risk Factor for Underuse of

Mammography. *Journal of Women's Health, 13*(6), 739–742. doi:

10.1089/jwh.2004.13.739

Borba, C. P. C., DePadilla, L., McCarty, F. A., von Esenwein, S. A., Druss, B. G., &
Sterk, C. E. (2012). A qualitative study examining the perceived barriers and
facilitators to medical healthcare services among women with a serious mental
illness. *Women's Health Issues, 22*(2), e217–e224. doi: 10.1016/j.whi.2011.10.001

Bradford, D. W., Kim, M. M., Braxton, L. E., Marx, C. E., Butterfield, M., & Elbogen, E.
B. (2008). Access to medical care among persons with psychotic and major
affective disorders. *Psychiatric Services, 59*(8), 847–852. doi:
10.1176/appi.ps.59.8.847

Bushe, C. J., Bradley, A. J., Wildgust, H. J., & Hodgson, R. E. (2009). Schizophrenia and
breast cancer incidence: a systematic review of clinical studies. *Schizophr Res,
114*(1-3), 6-16. doi: 10.1016/j.schres.2009.07.012

Carney, C. P., Allen, J., & Doebbeling, B. N. (2002). Receipt of clinical preventive
medical services among psychiatric patients. *Psychiatric Services, 53*(8), 1028–
1030. doi: 10.1176/appi.ps.53.8.1028

Carney, C. P., & Jones, L. E. (2006). The Influence of Type and Severity of Mental
Illness on Receipt of Screening Mammography. *Journal of General Internal
Medicine, 21*(10), 1097–1104. doi: 10.1111/j.1525-1497.2006.00565.x

Center for disease control and prevention. (2012). Morbidity and Mortality Weekly
Report for Cancer Screening 2010. Atlanta, GA: Centers for Disease Control and
Prevention.

Center for disease control and prevention (2013). Smoking Among Adults with Mental
Illness. from http://www.cdc.gov/features/vitalsigns/smokingandmentalillness/

Center for disease control and prevention. (2014, February 18th, 2014). Breast Cancer
    Statistics. 2014, from http://www.cdc.gov/cancer/breast/statistics/index.htm

Chochinov, H. M., Martens, P. J., Prior, H. J., Fransoo, R., & Burland, E. (2009). Does a
    diagnosis of schizophrenia reduce rates of mammography screening? A Manitoba
    population-based study. *Schizophrenia Research, 113*(1), 95–100. doi:
    10.1016/j.schres.2009.04.022

Colton, C. W., & Manderscheid, R. W. (2006). Congruencies in increased mortality rates,
    years of potential life lost, and causes of death among public mental health clients
    in eight states. *Prev Chronic Dis, 3*(2), A42.

Cotterchio, M., Kreiger, N., Darlington, G., & Steingart, A. (2000). Antidepressant
    medication use and breast cancer risk. *Am J Epidemiol, 151*(10), 951–957.

Cradock-O'Leary, J., Young, A. S., Yano, E. M., Wang, M., & Lee, M. L. (2002). Use of
    general medical services by VA patients with psychiatric disorders. *Psychiatric
    Services, 53*(7), 874–878. doi: 10.1176/appi.ps.53.7.874

Decker, S. L. (2012). In 2011 nearly one-third of physicians said they would not accept
    new Medicaid patients, but rising fees may help. *Health Aff (Millwood), 31*(8),
    1673–1679. doi: 10.1377/hlthaff.2012.0294

DeLaet, D. E., Shea, S., & Carrasquillo, O. (2002). Receipt of preventive services among
    privately insured minorities in managed care versus fee-for-service insurance
    plans. *J Gen Intern Med, 17*(6), 451–457.

Druss, B. G., Rosenheck, R. A., Desai, M. M., & Perlin, J. B. (2002). Quality of
    preventive medical care for patients with mental disorders. *Med Care, 40*(2), 129-
    136.

Druss, B. G., Zhao, L., Von Esenwein, S., Morrato, E. H., & Marcus, S. C. (2011).

    Understanding excess mortality in persons with mental illness: 17-year follow up

    of a nationally representative US survey. *Med Care, 49*(6), 599-604. doi:

    10.1097/MLR.0b013e31820bf86e

Edwards, N. I., & Jones, D. A. (2000). Uptake of breast cancer screening in older women.

    Age Ageing, 29(2), 131–135.

Egede, L. E., Grubaugh, A. L., & Ellis, C. (2010). The effect of major depression on

    preventive care and quality of life among adults with diabetes. *General Hospital*

    Psychiatry, 32(6), 563–569. doi: 10.1016/j.genhosppsych.2010.08.002

Friedman, L. C., Puryear, L. J., Moore, A., & Green, C. E. (2005). Breast and Colorectal

    Cancer Screening Among Low-income Women with Psychiatric Disorders.

    Psycho-Oncology, 14(9), 786–791. doi: 10.1002/pon.906

Halbreich, U., & Kahn, L. S. (2003). Hyperprolactinemia and schizophrenia: mechanisms

    and clinical aspects. *J Psychiatr Pract, 9*(5), 344–353.

Halbreich, U., Shen, J., & Panaro, V. (1996). Are chronic psychiatric patients at increased

    risk for developing breast cancer? *Am J Psychiatry, 153*(4), 559–560.

Kahn, L. S., Fox, C. H., Krause-Kelly, J., Berdine, D. E., & Cadzow, R. B. (2005).

    Identifying barriers and facilitating factors to improve screening mammography

    rates in women diagnosed with mental illness and substance use disorders.

    Women Health, 42(3), 111–126.

Kjerulff, K. H., Frick, K. D., Rhoades, J. A., & Hollenbeak, C. S. (2007). The cost of

    being a woman: A national study of health care utilization and expenditures for

    female-specific conditions. *Women's Health Issues, 17*(1), 13–21. doi:

10.1016/j.whi.2006.11.004

Lasser, K. E., Zeytinoglu, H., Miller, E., Becker, A. E., Hermann, R. C., & Bor, D. H. (2003). Do women who screen positive for mental disorders in primary care have lower mammography rates? *Gen Hosp Psychiatry, 25*(3), 214–216. doi: S0163834303000148 [pii]

Lindamer, L. A., Buse, D. C., Auslander, L., Unützer, J., Bartels, S. J., & Jeste, D. V. (2003). A Comparison of Gynecological Variables and Service Use Among Older Women With and Without Schizophrenia. *Psychiatric Services, 54*(6), 902–904. doi: 10.1176/appi.ps.54.6.902

Lindamer, L. A., Wear, E., & Sadler, G. R. (2006). Mammography stages of change in middle-aged women with schizophrenia: An exploratory analysis. *BMC Psychiatry, 6*. doi: 10.1186/1471-244X-6-49

Ludman, E. J., Ichikawa, L. E., Simon, G. E., Rohde, P., Arterburn, D., Operskalski, B. H., . . . Jeffery, R. W. (2010). Breast and cervical cancer screening: Specific effects of depression and obesity. *American Journal of Preventive Medicine, 38*(3), 303–310. doi: 10.1016/j.amepre.2009.10.039

Magge, H., Cabral, H. J., Kazis, L. E., & Sommers, B. D. (2013). Prevalence and predictors of underinsurance among low-income adults. *J Gen Intern Med, 28*(9), 1136–1142. doi: 10.1007/s11606-013-2354-z

Masterson, E. A., Hopenhayn, C., & Christian, W. J. (2010). Self-reported mental health status and recent mammography screening. *Journal of Women's Health, 19*(8), 1569–1576. doi: 10.1089/jwh.2008.1106

McAlpine, D. D., & Warner, L. (2001). Barriers to Employment among persons with

mental impairments: a review of the literature. New Brunswick, N.J.: Institute for Health, Health Care Policy and Aging Research.

McGinty, E. E., Zhang, Y., Guallar, E., Ford, D. E., Steinwachs, D., Dixon, L. B., . . . Daumit, G. L. (2012). Cancer incidence in a sample of Maryland residents with serious mental illness. *Psychiatr Serv, 63*(7), 714-717. doi: 10.1176/appi.ps.201100169

Miller, E., Lasser, K. E., & Becker, A. E. (2007). Breast and cervical cancer screening for women with mental illness: Patient and provider perspectives on improving linkages between primary care and mental health. *Archives of Women's Mental Health, 10*(5), 189–197. doi: 10.1007/s00737-007-0198-4

Nelson, K., Geiger, A. M., & Mangione, C. M. (2002). Effect of health beliefs on delays in care for abnormal cervical cytology in a multi-ethnic population. *J Gen Intern Med, 17*(9), 709–716.

Osborn, D. P., Limburg, H., Walters, K., Petersen, I., King, M., Green, J., . . . Nazareth, I. (2013). Relative incidence of common cancers in people with severe mental illness. Cohort study in the United Kingdom THIN primary care database. *Schizophr Res, 143*(1), 44-49. doi: 10.1016/j.schres.2012.11.009

Otero-Sabogal, R., Stewart, S., Sabogal, F., Brown, B. A., & Pérez-Stable, E. J. (2003). Access and attitudinal factors related to breast and cervical cancer rescreening: why are Latinas still underscreened? *Health Educ Behav, 30*(3), 337–359.

Patel, N., Bae, S., & Singh, K. P. (2010). Association between utilization of preventive services and health insurance status: findings from the 2008 Behavioral Risk Factor Surveillance System. *Ethn Dis, 20*(2), 142–147.

Pirraglia, P. A., Sanyal, P., Singer, D. E., & Ferris, T. G. (2004). Depressive symptom

burden as a barrier to screening for breast and cervical cancers. *J Womens Health

(Larchmt), 13*(6), 731–738. doi: 10.1089/1540999041783190

Rauscher, G. H., Johnson, T. P., Cho, Y. I., & Walk, J. A. (2008). Accuracy of self-

reported cancer-screening histories: a meta-analysis. *Cancer Epidemiol

Biomarkers Prev, 17*(4), 748–757. doi: 10.1158/1055-9965.EPI-07-2629

Rhodes, K. V., Kenney, G. M., Friedman, A. B., Saloner, B., Lawson, C. C., Chearo, D., .

. . Polsky, D. (2014). Primary Care Access for New Patients on the Eve of Health

Care Reform. *JAMA Intern Med*. doi: 10.1001/jamainternmed.2014.20

Ritsher, J. E. B., Coursey, R. D., & Farrell, E. W. (1997). A survey on issues in the lives

of women with severe mental illness. *Psychiatric Services, 48*(10), 1273-1282.

Salsberry, P. J., Chipps, E., & Kennedy, C. (2005). Use of General Medical Services

Among Medicaid Patients With Severe and Persistent Mental Illness. *Psychiatric

Services, 56*(4), 458–462. doi: 10.1176/appi.ps.56.4.458

Sambamoorthi, U., & McAlpine, D. D. (2003). Racial, ethnic, socioeconomic, and access

disparities in the use of preventive services among women. *Preventive Medicine:

An International Journal Devoted to Practice and Theory, 37*(5), 475–484. doi:

10.1016/S0091-7435(03)00172-5

Shen, C., Sambamoorthi, U., & Rust, G. (2008). Co-occurring mental illness and health

care utilization and expenditures in adults with obesity and chronic physical

illness. *Disease Management, 11*(3), 153–160. doi: 10.1089/dis.2007.0012

Smith, M. L., Hochhalter, A. K., Ahn, S., Wernicke, M. M., & Ory, M. G. (2011).

Utilization of screening mammography among middle-aged and older women. *J

Womens Health (Larchmt), 20(11), 1619–1626. doi: 10.1089/jwh.2010.2168

Stecker, T., Fortney, J. C., & Prajapati, S. (2007). How depression influences the receipt

of primary care services among women: A propensity score analysis. *Journal of*

Women's Health, 16(2), 198–205. doi: 10.1089/jwh.2006.0105

Steiner, J. L., Hoff, R. A., Moffett, C., Reynolds, H., Mitchell, M., & Rosencheck, R.

(1998). Preventive health care for mentally ill women. *Psychiatric Services,*

49(5), 696–698.

Substance abuse and mental health services association. (2013). Results from the 2012

National Survey on Drug Use and Health: Mental Health Findings (Vol. NSDUH

Series H-47, HHS Publication No. (SMA) 13-4805). Rockville, MD: Substance

Abuse and Mental Health Services Administration.

Surveillance, Epidemiology and End Results Program (2013). SEER Stat Fact Sheets.

Bethesda, MD: Surveillance, Epidemiology and End Results Program, National

Cancer Institute.

Ward, B. W., & Martinez, M. E. (2014). Health Insurance Status and Psychological

Distress among US Adults Aged 18–64   Years. *Stress Health*. doi:

10.1002/smi.2559

Werneke, U., Horn, O., Maryon-Davis, A., Wessely, S., Donnan, S., & McPherson, K.

(2006). Uptake of screening for breast cancer in patients with mental health

problems. *J Epidemiol Community Health, 60*(7), 600–605. doi: 60/7/600 [pii]

10.1136/jech.2005.039065

Wittink, M. N., & Bogner, H. R. (2008). Primary care physicians' assessments of older

patients' health and psychological status and recommendation of mammography.

J Am Board Fam Med, 21(1), 17–23. doi: 10.3122/jabfm.2008.01.070015

Xiong, G. L., Bermudes, R. A., Torres, S. N., & Hales, R. E. (2008). Use of cancer-screening services among persons with serious mental illness in Sacramento County. *Psychiatric Services, 59*(8), 929–932. doi: 10.1176/appi.ps.59.8.929

Appendices

Figures

Figure 1 Aggarwal et al. Model
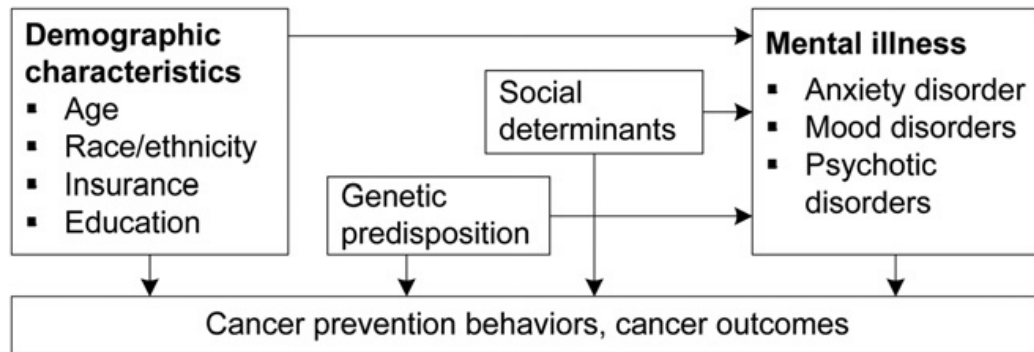
Figure 2 Andersen Model

Figure 3 Anderson Model

Predisposing ———————→ Enabling ———————→ Illness Level

Demographic

Age
Sex
Marital Status
Past Illness

Social Structure

Education
Race
Occupation
Family Size
Ethnicity
Religion
Residential
Mobility

Beliefs

Values Concerning
Health and
Illness
Attitudes toward
Health Services
Knowledge about
Disease

Family

Income
Health Insurance
Type of Regular
Source
Access to Regular
Source

Community

Ratios of Health
Personnel and
Facilities to
Population
Price of Health
Services
Region of Country
Urban-Rural
Character

Perceived

Disability
Symptoms
Diagnoses
General State

Evaluated

Symptoms
Diagnoses

Figure 4. Gittleman model
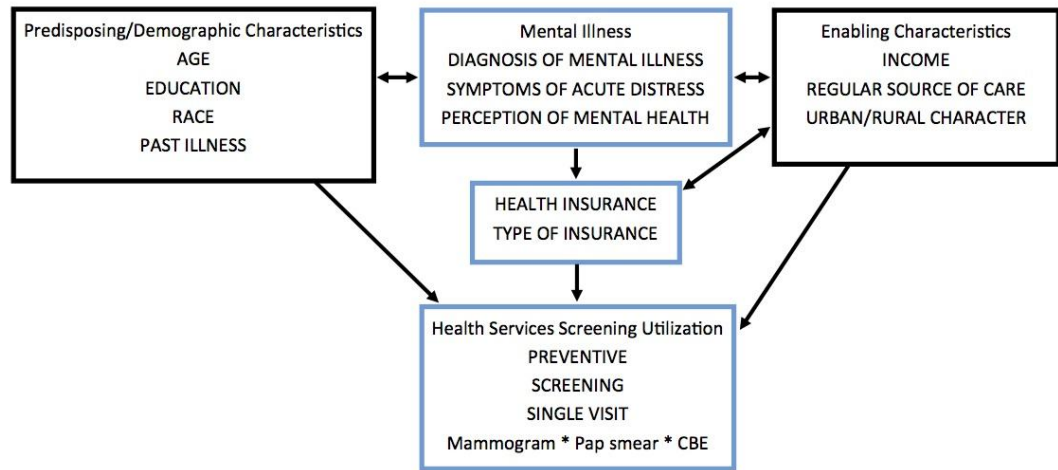
Tables

Table 1

Chi-Square Test of Significance for Mental Illness Diagnosis and Service Uptake

% Service Received	No MID	MID	Chi-Square	*p*-Value (two-sided)
Clinical breast exam	57.1% (5671)	59.9% (1460)	6.171	.014
Pap smear	70.3% (6946)	68.9% (1667)	1.791	.181
Mammogram	70.3% (3980)	71.3% (1166)	.577	.460

Table 2

Chi-Square Test of Significance for Mental Illness Symptom Screening Score and Service Uptake

% Service Received	Top 80% Score	Bottom 20% Score	Chi-Square	*p*-Value (two-sided)
Clinical breast exam	58.5% (5915)	41.5% (4193)	17.690	<.001
Pap smear	70.6% (7094)	67.5% (1519)	8.133	.005
Mammogram	72.0% (4228)	64.6% (918)	3.650	<.001

Table 3

Chi-Square Test of Significance for Perception of Mental Health Score and Service Uptake

% Service Received	Top 80% Score	Bottom 20% Score	Chi-Square	*p*-Value (two-sided)
Clinical breast exam	59.1% (5743)	51.8% (1269)	42.800	<.001
Pap smear	71.5% (6931)	63.3% (1533)	62.338	<.001
Mammogram	73.2% (4008)	63.0% (1099)	67.023	<.001

Table 5

Logistic Regression of Race and Receipt of Preventive Services with White as the Reference Variable

Variable	Receipt of clinical breast exam			Receipt of Pap smear			Receipt of mammogram		
	AOR	CI	p-Value	AOR	CI	p-Value	AOR	CI	p-Value
White (5522)			<.001			<.001			<.001
Black (2608)	1.225	(1.112–1.348)	<.001	1.568	(1.410–1.743)	<.001	1.228	(1.07–1.41)	.003
Hispan. (3154)	.789	(.723–.862)	<.001	1.288	(1.170–1.418)	<.001	.853	(.749–.972)	.017
Asian (811)	.699	(.603–.810)	<.001	9.42	(.807–1.101)	.454	.769	(.628–.942)	.011
Other (278)	.649	(.510–826)	<.001	1.016	(.785–1.316)	.904	.657	(.469–.918)	.014

Table 5

Logistic Regression of Continuous Variables and Receipt of Preventive Services

Variable	Receipt of clinical breast exam			Receipt of Pap smear			Receipt of mammogram		
	AOR	CI	p-Value	AOR	CI	p-Value	AOR	CI	p-Value
Age	1.003	(1.00–1.01)	.010	.974	(.972–.976)	<.001	1.000	(.997–1.01)	.589
Education	1.177	(1.15–1.20)	<.001	1.206	(1.17–1.23)	<.001	1.200	(1.16–1.24)	<.001
Family income	1.000	(1.00–1.00)	<.001	1.000	(1.00–1.00)	<.001	1.000	(1.00–1.00)	<.001
# of medical office visits	1.183	(1.16–1.21)	<.001	1.080	(1.06–1.10)	<.001	1.212	(1.18–1.24)	<.001

Table 6

*Chi-Square Test of Significance for Spouse, Percentage (*n*) who Received Service*

Service Received	Spouse	No Spouse	Chi-Square	*p*-Value (two-sided)
Clinical breast exam	62.8% (3529)	53.4% (3602)	111.388	<.001
Pap smear	75.4% (4210)	65.5% (4403)	142.234	<.001
Mammogram	75.5% (2789)	65.5% (2357)	88.621	<.001

Table 7

*Chi-Square Test of Significance for Employment, Percentage (*n*) who Received Service*

Service Received	Employed	Unemployed	Chi-Square	*p*-Value (two-sided)
Clinical breast exam	61.2% (4361)	52.8% (2762)	88.930	<.001
Pap smear	77.1% (5480)	60.2% (3123)	408.11	<.001
Mammogram	73.5% (2776)	67.4% (2365)	31.960	<.001

Table 8

*Chi-Square Test of Significance for Metro–Rural Status, Percentage (*n*) who Received Service*

Service Received	MSA	Not MSA	Chi-Square	*p*-Value (two-sided)
Clinical breast exam	58.4% (*n* = 6225)	53.0% (*n* = 906)	17.826	<.001
Pap smear	71.2% (*n* = 7550)	62.4% (*n* = 1063)	54.115	<.001
Mammogram	71.2% (*n* = 4407)	67.0% (*n* = 739)	7.9360	.005

Table 9

Chi-Square Test of Significance for Usual Source of Care

Service Received	Has USC	No USC	Chi-Square	*p*-Value (two-sided)
Clinical breast exam	62.2% (*n* = 5791)	42.2% (*n* = 1187)	353.72	<.001
Pap smear	72.1% (*n* = 6660)	63.0% (*n* = 1767)	84.48	<.001
Mammogram	74.6% (*n* = 4514)	48.8% (*n* = 545)	301.93	<.001

Table 10

Logistic Regression of Insurance and Receipt of Preventive Services With <65 Private Insurance as Reference Variable

Insurance (*N*)	Receipt of clinical breast exam			Receipt of Pap smear			Receipt of mammogram		
	AOR	CI	*p*-Value	AOR	CI	*p*-Value	AOR	CI	*p*-Value
Private <65 (5940)			<.001			<.001			<.001
Public <65 (2070)	.720	(.650–.798)	<.001	.839	(.744–.946)	.004	.607	(.514–.717)	<.001
No insurance (2259)	.367	(.332–.405)	<.001	.401	(.360–.445)	<.001	.283	(.244–.328)	<.001
Medicare/public (1120)	.530	(.467–.602)	<.001	.165	(.144–.189)	<.001	.493	(.426–.569)	<.001
Medicare/private (879)	.911	(.787–1.054)	.211	.240	(.207–.278)	<.001	1.060	(.886–1.269)	.525
No Medicare (36)	.402	(.206–.788)	.008	.201	(.104–.390)	<.001	.300	(.154–.585)	<.001

Table 11
Percentage and Count of Participants With Low/High Mental Health Perception Scores in Different Insurance Categories

Percentile	<65 Private Ins.	<65 Public Ins.	<65 No Ins.	65+ Public Only	65+ w/Private	65+ No Medic.
Bottom 20%	33.5% (886)	27.6% (731)	17.7% (469)	14.4% (380)	6.1% (161)	.6% (17)
Top 80%	51.8% (5442)	13.6% (1430)	18.7% (1969)	8.2% (862)	7.1% (934)	.3% (44)

Table 12
Percentage and Count of Participants With Low/High Mental Illness Symptoms Scores in Different Insurance Categories

Percentile	<65 Private Ins.	<65 Public Ins.	<65 No Ins.	65+ Public Only	65+ w/Private	65+ No Medic.
Bottom 20%	37.8% (912)	27.0% (652)	20.1% (485)	9.9% (239)	4.7% (114)	.5% (11)
Top 80%	49.9% (5528)	14.1% (1565)	18.6% (2067)	9.4% (1045)	7.6% (838)	.4% (42)

Table 13
Percentage and Count of Participants With and Without Mental Illness Diagnosis in Different Insurance Categories

Percentile	<65 Private Ins.	<65 Public Ins.	<65 No Ins.	65+ Public Only	65+ w/Private	65+ No Medic.
MI diagnosis	45.1% (1153)	24.3% (621)	11.9% (304)	10.4% (266)	8.2% (210)	.2% (5)
No MI diagnosis	48.3% (5287)	14.6% (1596)	20.6% (2248)	9.3% (1018)	6.8% (742)	.4% (48)

Table 14

Logistic Regression of Uptake of Clinical Breast Exams

Insurance (*N*)	Block 1 ($R^2 = .079$)			Block 2 ($R^2 = .121$)			Block 3 ($R^2 = .139$)		
	AOR	CI	*p*-Value	AOR	CI	*p*-Value	AOR	CI	*p*-Value
Mental health self-rating	.776	(.700–.861)	<.001	.708	(.637–.787)	<.001	.732	(.657–.815)	<.001
MH symptoms screening	.864	(.779–.959)	.006	.793	(.713–.882)	<.001	.829	(.745–.923)	.001
MH diagnosis	1.284	(1.16–1.43)	<.001	1.080	.970–1.20)	.161	1.08	(.971–1.21)	.152
MSA status	.957	(.865–1.06)	.398	.884	(.796–.981)	.020	.973	(.874–1.08)	.608
Age	.997	(.996–.999)	.005	.989	(.987–.991)	<.001	.993	(.990–.996)	<.001
Race (White)	(ref)		<.001	(ref)		<.001	(ref)		<.001
Race (African-American)	1.354	(1.22–1.50)	<.001	1.310	(1.18–1.45)	<.001	1.453	(1.30–1.62)	<.001
Race (Hispanic)	.838	(.763–.920)	<.001	.866	(.787–.953)	.003	1.064	(.960–1.18)	.239
Race (Asian)	.623	(.532–.730)	<.001	.673	(.573–.791)	<.001	.699	(.594–.822)	<.001
Race (other)	.639	(.498–.820)	<.001	.620	(.481–.799)	<.001	.665	(.515–.860)	.002
Spouse	1.367	(1.25–1.49)	<.001	1.344	(1.24–1.46)	<.001	1.341	(1.23–1.46)	<.001
Employment status	1.113	(1.03–1.21)	.008	1.119	(1.03–1.21)	.007	1.112	(1.02–1.21)	.018
Education level	1.070	(1.05–1.10)	<.001	1.034	(1.01–1.06)	.005	1.034	(1.01–1.06)	.005
Family income	1.000	(1.00–1.00)	<.001	1.00	(1.00–1.00)	.021	1.00	(1.00–1.00)	.722
Usual source of care				1.617	(1.47–1.78)	<.001	1.494	(1.36–1.65)	<.001
# appointments made				1.165	(1.14–1.19)	<.001	1.148	(1.12–1.17)	<.001
Insurance (<65 private)							(ref)		<.001
Insurance (<65 public)							.788	(.701–.887)	<.001
Insurance (none)							.486	(.434–.543)	<.001
Insurance (65+ public)							.682	(.565–.823)	<.001
Insurance (65+ private)							.968	(.798–1.17)	.737
Insurance (65+ no medic)							.643	(.290–1.42)	.277

Note. Block 1 contains independent and control variables. Block 2 contains independent, control, and service use variables. Block 3 contains all variables including insurance-mediating variable.

Table 15

Logistic Regression of Uptake of Pap Smears

Insurance (*N*)	Block 1			Block 2			Block 3		
	AOR	CI	*p*-Value	AOR	CI	*p*-Value	AOR	CI	*p*-Value
Mental health self-rating	.922	(.823–1.03)	.163	.845	(.753–.949)	.005	.792	(.703–.892)	<.001
MH symptoms screening	1.006	(.897–.1.13)	.914	.930	(.827–1.05)	.229	.899	(.798–1.014)	.082
MH diagnosis	1.268	(1.13–1.42)	<.001	1.054	(.936–1.19)	.385	.997	(.884–1.13)	.965
MSA status	1.384	(1.24–1.54)	<.001	1.287	(1.15–1.44)	<.001	1.265	(1.13–1.42)	<.001
Age	.980	(.979–.982)	<.001	.971	(.969–.973)	<.001	.982	(.979–.986)	<.001
Race (White)	(ref)		<.001	(ref)		<.001	(ref)		<.001
Race (African-American)	2.096	(1.87–2.36)	<.001	2.034	(1.81–2.29)	<.001	1.942	(1.71–2.20)	<.001
Race (Hispanic)	1.437	(1.29–1.60)	<.001	1.507	(1.35–1.68)	<.001	1.568	(1.39–1.76)	<.001
Race (Asian)	.794	(.667–.947)	.010	.866	(.725–1.04)	.113	.839	(.700–1.01)	.056
Race (other)	1.122	(.851–1.48)	.413	1.108	(.836–1.47)	.477	1.073	(.808–1.43)	.626
Spouse	1.893	(1.73–2.08)	<.001	1.875	(1.71–2.06)	<.001	1.791	(1.63–1.97)	<.001
Employment status	1.627	(1.49–1.78)	<.001	1.637	(1.50–1.79)	<.001	1.475	(1.40–1.63)	<.001
Education level	1.191	(1.16–1.22)	<.001	1.152	(1.12–1.18)	<.001	1.135	(1.11–1.17)	<.001
Family income	1.000	(1.00–1.00)	.382	1.000	(1.00–1.00)	.516	1.000	(1.00–1.00)	.149
Usual source of care				1.848	(1.67–2.05)	<.001	1.641	(1.48–1.83)	<.001
# appointments made				1.150	(1.12–1.18)	<.001	1.138	(1.11–1.17)	<.001
Insurance (<65 private)							(ref)		<.001
Insurance (<65 public)							1.172	(1.02–1.35)	.024
Insurance (none)							.588	(.521–.664)	<.001
Insurance (65+ public)							.411	(.336–.503)	<.001
Insurance (65+ private)							.465	(.381–.568)	<.001
Insurance (65+ no medic)							.622	(.280–1.38)	.243

Note. Block 1 contains independent and control variables. Block 2 contains independent, control, and service use variables. Block 3 contains all variables including insurance-mediating variable.

Table 16
Logistic Regression of Uptake of Mammograms

Insurance (*N*)	Block 1			Block 2			Block 3		
	AOR	CI	*p*-Value	AOR	CI	*p*-Value	AOR	CI	*p*-Value
Mental health self-rating	.672	(.588–.768)	<.001	.583	(.507–.670)	<.001	.614	(.533–.707)	<.001
MH symptoms screening	.801	(.695–.923)	.002	.726	(.627–.840)	<.001	.769	(.663–.893)	.001
MH diagnosis	1.391	(1.21–1.60)	<.001	1.112	(.959–1.29)	.159	1.129	(.972–.131)	.113
MSA status	.974	(.840–1.13)	.729	.918	(.788–1.07)	.269	.973	(.834–1.14)	.732
Age	1.003	(1.00–1.01)	.047	.989	(.986–.992)	<.001	.992	(.988–.997)	.001
Race (White)	(ref)		<.001	(ref)		<.001	(ref)		<.001
Race (African-American)	1.590	(1.37–1.84)	<.001	1.578	(1.36–1.84)	<.001	1.779	(1.52–2.08)	<.001
Race (Hispanic)	1.082	(.937–1.25)	.284	1.219	(1.05–1.42)	.009	1.523	(1.30–1.79)	<.001
Race (Asian)	.701	(.561–.875)	.002	.764	(.608–.960)	.021	.819	(.650–1.03)	.091
Race (other)	.733	(.514–1.04)	.084	.718	(.499–1.04)	.076	.763	(.528–1.11)	.152
Spouse	1.379	(1.23–1.55)	<.001	1.338	(1.19–1.51)	.000	1.351	(1.19–1.53)	<.001
Employment status	1.006	(.896–1.13)	.922	.983	(.873–1.11)	.784	1.007	(.879–1.15)	.924
Education level	1.109	(1.07–1.15)	<.001	1.075	(1.04–1.11)	<.001	1.070	(1.03–1.11)	<.001
Family income	1.000	(1.00–1.00)	<.001	1.000	(1.00–1.00)	<.001	1.000	(1.00–1.00)	<.001
Usual source of care				2.369	(2.04–2.75)	<.001	2.080	(1.79–2.42)	<.001
# appointments made				1.192	(1.16–1.23)	<.001	1.175	(1.14–1.21)	<.001
Insurance (<65 private)							(ref)		<.001
Insurance (<65 public)							.759	(.620–.929)	.007
Insurance (none)							.458	(.385–.544)	<.001
Insurance (65+ public)							.694	(.546–.884)	.003
Insurance (65+ private)							1.220	(.950–1.57)	.120
Insurance (65+ no medic)							.476	(.209–1.08)	.076

Note. Block 1 contains independent and control variables. Block 2 contains independent, control, and service use variables. Block 3 contains all variables including insurance-mediating variable.

Table 17

Percentage of Persons With High and Low Mental Health Perception who Received Service, Stratified by Receipt of Mental Illness Diagnosis

Category	Received Pap Smear	Did Not Receive Pap Smear
Low mental health perception, no diagnosis	61.7% (803)	38.3% (499)
Low mental health perception, mental illness diagnosis	65.2% (730)	34.8% (389)
High mental health perception, no diagnosis	71.5% (6012)	28.5% (2397)
High mental health perception, mental illness diagnosis	71.9% (919)	28.1% (359)

Table 18

Percentage of Persons With High and Low Mental Health Perception who Received Service, Stratified by Receipt of Mental Illness Diagnosis

Category	Received CBE	Did Not Receive CBE
Low mental health perception, no diagnosis	49.3% (652)	50.7% (671)
Low mental health perception, mental illness diagnosis	54.7% (617)	45.3% (512)
High mental health perception, no diagnosis	58.3% (4915)	41.7% (3522)
High mental health perception, mental illness diagnosis	64.3% (828)	35.7% (459)

Table 19

Percentage of Persons With High and Low Mental Health Perception who received Service, Stratified by Receipt of Mental Illness Diagnosis

Category	Received Mammogram	Did Not Receive Mammogram
Low mental health perception, no diagnosis	62.3% (586)	37.7% (354)
Low mental health perception, mental illness diagnosis	63.7% (513)	37.0% (646)
High mental health perception, no diagnosis	72.2% (3360)	27.8% (1291)
High mental health perception mental illness diagnosis	78.7% (648)	21.3% (175)