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Mental Health and Women's Receipt of Recommended Preventive Care

Melanie M. Race
University of Southern Maine, Muskie School of Public Service

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Introduction

Recent studies have suggested that individuals with mental health conditions experience higher morbidity and mortality than individuals without mental disorders (Colton and Manderscheid, 2006; Osborn et al., 2007). Improving health outcomes for individuals with mental health conditions may require that providers, policymakers, and insurers pay particular attention to the primary care provided to these individuals. High-quality primary care means having a usual source of care and receiving appropriate preventive care, including routine physical examinations and recommended screenings. Some studies suggest that women with mental health conditions receive preventive care at lower rates than women without mental health conditions, they.

Goals and Objectives

This study: (1) examined the receipt of preventive care by women ages 40 and older with mental health conditions; and (2) identified differences between women with and without mental health conditions and among women with different types of mental health conditions. This study is intended to increase researchers' and policymakers' understanding of the association between mental health and preventive care and the implications for policy and practice.

Potential policy implications

This study highlights differences in the receipt of preventive care by women with and without mental health conditions. In large part, these differences depend on how mental health is defined and on the contributions of sociodemographic risk factors. Identifying disparities between groups can help identify targets for interventions and areas for further research. Understanding the relationship between mental health conditions and preventive health care services can contribute to the integration of behavioral health and primary care.

Background

Current efforts to improve the integration of behavioral health and primary care services aim to ensure that individuals with mental health conditions receive consistent, high-quality care (Blount ,1998; Post and Van Stone, 2008). A review of the available literature revealed inconsistent results regarding the receipt of preventive services by women with mental health conditions. Several studies were limited by sampling methodology (e.g., convenience samples) or low response rates. An early study of institutionalized women recommended further investigation into the gynecological needs of women with mental disorders (Handel, 1985), and while a handful of studies have explored the issue, it remains unclear whether women with mental health conditions are receiving adequate preventive health care. The following narrative summarizes this literature.

Differences in care received by women with mental disorders compared to women without mental disorders

Prior research indicates that women with mental health conditions receive preventive health care services at lower rates than women without mental disorders; however, uncertainty exists particularly in relation to sex-specific services, for which some studies have found higher rates among women with mental disorders. One complicating factor in comparing women with and without mental health conditions are the different ways of defining mental health conditions (Mitchell et al., 2009). In their review of the literature on the quality of medical care for individuals with and without comorbid mental and substance use disorders, Mitchell et al. reported that 19 of 27 studies of mental illness and 10 of 10 studies of substance misuse found inequalities in quality of medical care; these inequalities were most apparent in general (internal) medicine and cardiovascular care. Most of the studies they reviewed used psychiatric diagnoses to identify subjects with mental health conditions; some based their definition on admission to a psychiatric hospital or visits to a psychiatric or substance abuse clinic.

In a convenience sample comprising 267 adult patients receiving care for psychiatric or substance use disorders, Carney et al. (2002) found lower rates of self-reported routine care for patients with substance abuse problems than for patients with other psychiatric diagnoses. On the other hand, women in the study reported high rates of sex-specific cancer screening, although immunization and colorectal screening rates were much lower. A small (n=526) clinic-based

study (Lasser et al., 2003) found that women with mental health conditions, identified by the Primary Care Evaluation of Mental Disorders screening instrument, did not have significantly lower mammography rates than women without mental health conditions.

To the extent that preventive health care services can delay or prevent the onset of chronic disease, medical comorbidity may be related to inadequate preventive care. Some studies have found higher rates of medical comorbidity among women with mental health conditions. In a study based on private insurance claims in Idaho, Carney et al. (2006) found that 33% of men and women with mental health conditions had three or more comorbid medical conditions, almost three times more than individuals without mental health conditions. Individuals with mental health conditions had increased odds for a number of medical conditions, and for individuals with substance use disorders, the odd ratios were even higher. Carney et al. concluded that even insured individuals with mental health conditions were at significant risk of delaying care or not receiving needed care.

Some studies show that women with mental health conditions are less likely to use certain preventive services. Depression may reduce the odds of cancer screening for women (Carney et al., 2002) and inhibit treatment adherence and preventive care (Ciechanowski et al. 2000[1]; DiMatteo et al. 2000[2]; Lin et al. 2004[3]; Thorpe et al. 2006[4]). Witt et al. (2009) used data from the 1998 National Health Interview Survey[5] to examine whether psychological distress, insurance status, and having a usual source of care affected women's access to routine periodic health examinations. They found that women with psychological distress were more likely to delay routine care. For all women, not having a usual source of care was associated with delayed care; this effect was stronger for women with psychological distress. Also looking at psychological distress, Thorpe et al. (2006) found that elderly women experiencing distress were

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[1] In this study examining the effects of depression on diabetes care, mental disorders were identified by the results of the self-reported Hopkins Symptom Checklist-90, Revised.

[2] This study was a meta-analysis of 25 studies of the effects of depression and anxiety disorders on treatment adherence.

[3] This epidemiologic study used the Patient Health Questionnaire (PHQ) to identify major depression based on DSM-IV criteria.

[4] This study used the MEPS SF-12 Mental Component Score to examine the effects of psychological distress on receipt of preventive care by non-institutionalized elderly people.

[5] The National Health Interview Survey (NHIS) is an annual household survey of the non-institutionalized U.S. civilian population. The Medical Expenditure Panel Survey (MEPS), which is the data set used for this project, is a subsample of the NHIS.

27% less likely to receive a clinical breast examination, though distress was not significantly associated with screening for colon cancer, mammography, or routine check-ups.

Differences in care received by women with different types and combinations of mental disorders

The presence of comorbid mental health and substance-related conditions may exacerbate deficiencies in the receipt of preventive care services. A VHA study by Druss et al. (2002) found that patients with psychiatric and substance-related disorders (based on treatment for mental diagnoses as indicated by administrative data) scored lower on an index of recommended preventive care services (58%) than patients with only a psychiatric disorder (60%), patients with only a substance-related disorder (65%), or patients with neither a psychiatric nor substance-related disorder (66%). The patterns for each of the eight preventive care measures they used (pneumonia and influenza vaccination; colorectal, breast, cervical, and prostate cancer screening; current tobacco status; and tobacco cessation counseling or referral) were similar, except that patients with a psychiatric disorder, substance use disorder, or both were more likely to receive tobacco screening than patients with no disorder. Druss et al. suggested that poverty, poor nutrition and exercise, obesity, smoking, and difficulties maintaining insurance and complying with medical regimens contribute to the lower level of preventive care received by individuals with mental health conditions. They also noted that differences in screening rates were highest for those procedures requiring several steps and/or participants to complete. This may suggest, as Miller et al. (2007) did, that system barriers, patients' difficulty making and keeping appointments, and communication problems contribute to patients' non-receipt of preventive care.

Study Description

This study examined the recommended preventive care services received by women ages 40 and older, evaluating differences between women with and without mental health problems. Two measures were used to identify women with mental health problems: reported receipt care for a mental health condition and self-perceived mental health status. Using data from the Medical Expenditure Panel Survey (MEPS), a set of quantitative analyses were conducted of five preventive health care services (routine examinations and cancer screenings) received by women with and without mental health problems. The available literature suggests that the MEPS data set has rarely been used to assess the preventive care services received by women with mental health problems.

The MEPS is an annual, national survey that collects demographic and geographic information, information about medical conditions and health status, and health services use and payment information for families and individuals in the United States. Data from the 2005, 2006, and 2007 panels were combined to obtain a robust sample. MEPS data are based on self-reported information from survey respondents.

The MEPS full-year consolidated file includes indicators for the five preventive care services used in this study, as well as sociodemographic information including age, race, educational attainment, and poverty level. The consolidated file also includes data on insurance status, usual source of care, and perceived health and mental health status. Within the MEPS medical conditions file, indicators of mental health conditions include truncated International Statistical Classification of Diseases and Related Health Problems (ICD-9) codes as well as clinical classification codes that aggregate ICD-9 codes into diagnostic groups including mood disorders, schizophrenic and other disorders, and substance-related disorders. The full-year consolidated and medical conditions files were merged to connect the records of reported preventive health care services received to the records of reported conditions.

Theoretical Statement

Mental health problems create barriers to receiving recommended preventive care. Managing appointments, communicating with providers, and navigating the health care system can be challenging for women whose mental health problems affect their cognitive functioning.

This project began with the following hypotheses: (1) women with mental health problems would report receiving fewer or less frequent preventive care services than women who reported no mental health problems; (2) women who reported more than one mental health condition would report fewer or less frequent preventive care services; (3) reported mental health conditions and self-perceived mental health would have similar effects on preventive care; and (3) lack of insurance and/or a usual source of care would negatively affect women's receipt of recommended preventive services.

Ethical Considerations

This study used publicly available data from the federal Agency for Healthcare Research and Quality's Medical Expenditure Panel Survey (MEPS). Study subjects cannot be identified from the available data. The study received an exemption from the University of Southern Maine's Institutional Review Board.

Research Design

Data

The three-year merged dataset contains 99,070 records, with women comprising approximately half. Because two of the preventive care services (mammograms and colonoscopy/sigmoidoscopy) targeted by this study are recommended for women aged 40 or older, the study included only women aged 40 and older. The study population includes 21,565 women aged 40 and older, of whom 3,539 reported one or more mental health conditions.

Variables

The primary independent variables are reported mental health conditions and self-perceived mental health. Mental health conditions were identified using the clinical classification codes in the MEPS medical conditions files. The clinical classification codes are groups of ICD-9 codes. Clinical classification codes 657 (mood disorders), 659 (schizophrenia and other psychotic disorders), 660 (alcohol-related disorders), and 661 (substance-related disorders) were used to identify respondents who reported receiving care for one or more mental health conditions. Within the mood disorders category, it was not possible to separate depressive disorders from bipolar disorders using the ICD-9 codes (truncated to preserve confidentiality) because the two groups share the same first three digits. The alcohol-related and substance-related disorders categories were combined into a single category. This resulted in a four-level variable with possible values of no mental health conditions, mood disorders, schizophrenia/psychotic disorders, and substance-related disorders. A dichotomous variable with possible values of no mental health conditions and one or more mental health conditions was constructed. A seven-level variable comprising single conditions as well as combinations of conditions was also constructed. Due to the small number of subjects who reported schizophrenia/psychotic and substance-related disorders, and the similarly small number of women who reported more than one condition (116), the dichotomous variable indicating care received for one or more mental health conditions was used for most analyses.

In addition to the conditions documented in the medical conditions file, the analysis also employed a self-perceived mental health status variable from the MEPS consolidated file. This variable indicates general mental health status at the time of interview and has five possible

values ranging from poor to excellent. These values were collapsed into a dichotomous variable with values of fair/poor mental health or good/very good/excellent mental health.

Three other variables in the MEPS could be used to identify mental health status. The mental component summary (MCS) of the SF-12v2 health survey created by QualityMetrics requires purchase of a scoring manual and employs a proprietary imputation algorithm; this measure was not considered in this study. The K-6 index comprises six mental health–related questions that assess non-specific psychological distress over the past 30 days with scores ranging from zero to 24. Higher scores on the K-6 index indicate higher levels of distress. Finally, the PHQ-2 summary variable screens for depressed mood over the past two weeks using two questions, with possible values ranging from zero to six. The mental health–related variables, with the exception of the MCS, are compared in Table 1. The mental health variables selected for this study indicated the presence of mental health problems at frequencies above and below (16.4% and 11.3%) that indicated by the PHQ-2 (13.4%); the K-6 index could not be interpreted, but 10.7% of responses scored at or above the midpoint.

Table 1: Mental Health–Related Variables

Variable	*Number of Responses*	*Frequency of Mental Health Issues in Study Population*
Dichotomous variable created using clinical classification codes	21,565	3,539 (16.4%) reported one or more mental health conditions
Dichotomous variable created using self-perceived mental health status	21,455	2,428 (11.3%) reported fair or poor mental health
K-6 index	19,517	2,093 (10.7%) scored 12 or higher
PHQ-2 summary	19,775	2,649 (13.4%) scored three or higher

The dependent variables in the analyses were five preventive care services received by women aged 40 and older (see Table 2). For each preventive care service, a dichotomous variable was constructed to determine whether women who responded to the question received the service within the recommended interval. For colonoscopy, two variables were created—one to indicate whether the subject had ever received a colonoscopy, and another to indicate whether the test had been received within the past five years.

An index variable was created to count the number of preventive care services received on time; a second index variable used three levels to indicate poor preventive care (0 or 1 service

Table 2: Preventive Care Services	
Service	*Recommended Interval*
Routine physical examinations	At least every five years until age 65, then annually[a]
Breast examinations	At least every three years until age 40, then annually[b]
Papanicolau tests	Every one to five years until age 65[a]
Mammograms	Every one to two years age 40 and older[a,c]
Colonoscopy/sigmoidoscopy	Every five to ten years age 50 and older

[a] *Guide to Clinical Preventive Services, 2009: Recommendations of the U.S. Preventive Services Task Force.* AHRQ Publication No. 09-IP006, August 2009. Agency for Healthcare Research and Quality, Rockville, MD.
[b] American Cancer Society. 2010. Can breast cancer be found early? http://www.cancer.org/Cancer/BreastCancer/DetailedGuide/breast-cancer-detection. [Accessed 7/25/2010.]
[c] The U.S. Preventive Services Task Force has since changed the recommendation to every one to two years after age 50.

received on time), fair preventive care (2 or 3 services received on time), or good preventive care (4 or 5 services received on time). Only the first (ever had) colonoscopy variable was used in the construction of the index because the second variable, which is based on the first variable, had a small number of respondents (6,701) and does not accommodate the five-to-ten year frequency interval recommended for colorectal cancer screening. Because low/zero frequencies prevented analysis using the index with six values, only the three-value index was used in the analyses. The list of variables is shown in Table 3.

Control variables included age, race, insurance status (public/private/uninsured and number of months uninsured), employment status, usual source of care, educational attainment, poverty level, and rural/urban residence. Age-group variables were created to accommodate the different age ranges for recommended preventive services. Educational attainment was categorized as zero to eight years, nine to twelve years, and more than twelve years.

Table 3: Analysis Variables (control variables not shown)		
Variable	*MEPS Name(s)*	*Description*
Reported mental health condition	CCCODEX	Three-digit code identifying type of condition for which care was received. 657 (mood disorders), 659 (schizophrenia/psychotic disorders), 660 and 661 (alcohol- and substance-related disorders) used.
Self-perceived mental health	MNHLTH53	-9 Not ascertained -8 Don't know -7 Refused -1 Inapplicable 1 Excellent 2 Very Good 3 Good 4 Fair 5 Poor
Routine physical examination (routine checkup)	CHECK53	*How long since last exam?* -9 Not ascertained -8 Don't know -7 Refused -1 Inapplicable 1 Within past year 2 Within past 2 years 3 Within past 3 years 4 Within past 5 years 5 More than 5 years 6 Never
Breast examination	BRSTEX53	See routine physical exam, above
Papanicolau test (pap test)	PAPSMR53	See routine physical exam, above
Mammogram	MAMOGR53	See routine physical exam, above
Colonoscopy/sigmoidoscopy	BOWEL53 WHNBWL53	*Ever had?* -9 Not ascertained -8 Don't know -7 Refused -1 Inapplicable 1 Yes 2 No *How long since last exam?* -8 Don't know -1 Inapplicable 1 Within past year 2 Within past 2 years 3 Within past 3 years 4 Within past 5 years 5 More than 5 years
Preventive care index	--	0-1 services received = Poor preventive care 2-3 services received = Fair preventive care 4-5 services received = Good preventive care

Analysis

The analysis examined the effects of mental health problems on the receipt of preventive care services. All analyses used the survey-specific procedures in SAS 9.1 to accommodate the MEPS design by taking into account sampling weights, strata, and sampling units. Sampling weights were adjusted for the pooled data, and changes were made to the 2005 and 2006 strata to adjust for survey changes implemented in 2007.

One-way frequency tables were used to compute the distribution of reported mental health conditions within the study population. Cross-tabulations were used to compare the sociodemographic profiles first of women with any reported mental health condition to women with no reported mental health condition, and then of women with fair/poor self-perceived mental health to women with good/very good/excellent self-perceived mental health. Another set of cross-tabulations compared the receipt of each preventive care service first by reported mental health conditions and then by self-perceived mental health. Finally, a third set of cross-tabulations evaluated each group's score on the preventive care index. All cross-tabulations included chi-square tests of association.

Logistic regression models were created for each preventive care service and for the preventive care index. Reported mental health conditions and self-perceived mental health status were considered in separate models. Unadjusted models included only the independent variable, while adjusted models included the independent variable and all sociodemographic variables. When variables appeared insignificant based on *p*-values, a second model was constructed using only variables significant at $p<0.05$. The second models did not result in additional variables becoming insignificant. The regression models that included the independent variable and all control variables were used to evaluate interactions between the independent variable and each control variable.

Results

As indicated in Table 4, 3,539 women in the study population reported having received care for one or more mental health conditions in the three categories of mood disorders (clinical classification code 657), schizophrenia or psychotic disorders (code 659), or substance-related

disorders (codes 660 and 661). Mood disorders were the most commonly reported conditions (n=3,287); substance-related disorders and schizophrenia/psychotic disorders were much less frequently reported (n=77 and 175, respectively). 2,428 women in the study population reported fair or poor self-perceived mental health.

Table 4: Reported Mental Health Conditions		
	%	*SE*
No reported mental health condition	84.02	0.34
Mood disorders	14.80	0.33
Schizophrenia/Psychotic disorders	0.29	0.05
Alcohol/Substance-related disorders	0.90	0.10

Sociodemographic characteristics of study population

The sociodemographic profile of the study population based on reported mental health conditions is shown in Table 5. Chi-square tests on the two-way frequencies indicated an association between reported mental health conditions and all variables except educational attainment and rural/urban residence. Women who reported receiving care for mental health conditions were, on average, slightly younger than women without mental disorders (57.00 vs. 58.43 years). They were more likely to be white, American Indian/Alaska Native, or to report multiple races. They were much less likely to be employed (46.84 vs. 57.30%). Women who reported mental health conditions were more likely to have a usual source of care and to report public insurance coverage (26.59 vs. 18.43%). While they were less likely to be uninsured all year, they were more likely to report periods of uninsurance. Finally, women who reported mental health conditions were more likely to be poor, near-poor, or low-income than women who did not report mental health conditions.

Table 5: Sociodemographic Characteristics of Study Population, by Reported Mental Health Conditions						
	All women		*No Reported Mental Health Condition*		*One or More Reported Mental Health Condition(s)*	
	%	*SE*	*%*	*SE*	*%*	*SE*
Age[a]						
40 to 44	15.59	0.35	15.75	0.84	14.75	0.84
45 to 49	15.97	0.31	15.64	0.80	17.70	0.80
50 to 54	14.78	0.31	14.23	0.79	17.69	0.79
55 to 59	13.46	0.30	13.24	0.73	14.65	0.73
60 to 64	10.58	0.27	10.69	0.67	9.96	0.67
65 to 69	7.84	0.22	7.77	0.65	8.19	0.65
70 to 74	6.45	0.22	6.70	0.49	5.17	0.49
75 to 79	6.35	0.23	6.60	0.49	5.03	0.49
80 or older	8.98	0.30	9.38	0.61	6.86	0.61
Race[a]						
White	82.59	0.54	81.49	0.68	88.35	0.68
Black	11.21	0.43	11.80	0.53	8.13	0.53
American Indian/Alaska Native	0.60	0.10	0.56	0.20	0.81	0.20
Asian	4.12	0.26	4.70	0.20	1.09	0.20
Native Hawaiian/Pacific Islander	0.25	0.04	0.29	0.05	0.05	0.05
Multiple races	1.22	0.10	1.15	0.23	1.57	0.23
Unemployed[a]	44.37	0.49	42.70	1.30	53.16	1.30
Insurance status[a]						
Any private coverage	70.98	0.46	72.23	1.07	64.43	1.07
Public coverage only	19.73	0.39	18.43	0.96	26.59	0.96
Uninsured	9.28	0.27	9.34	0.64	8.98	0.64
Uninsurance duration[b]						
Never uninsured	84.84	0.32	85.15	0.80	83.19	0.80
Uninsured 1-5 months	3.55	0.14	3.32	0.41	4.76	0.41
Uninsured 6-11 months	2.40	0.11	2.26	0.31	3.09	0.31
Uninsured all year	9.21	0.27	9.26	0.64	8.96	0.64
No usual source of care[a]	12.06	0.32	12.82	0.62	8.10	0.62
Years of education						
0-8 years	7.45	0.26	7.55	0.57	6.93	0.57
9-12 years	44.09	0.54	43.84	1.18	45.41	1.18
More than 12 years	48.45	0.57	48.61	1.22	47.66	1.22
Poverty category[a]						
Poor (<100% FPL)	10.18	0.28	9.25	0.76	15.08	0.76
Near poor (100-124% FPL)	4.46	0.17	4.30	0.43	5.30	0.43
Low-income (125-199% FPL)	13.33	0.30	13.16	0.72	14.25	0.72
Middle-income (200-399% FPL)	29.08	0.43	29.35	0.97	27.67	0.97
High-income (≥ 400% FPL)	42.94	0.56	43.94	1.14	37.70	1.14
Non-MSA (rural)	17.76	0.93	17.73	1.22	17.95	1.22

[a] $p < 0.0001$; [b] $p < 0.05$

When the sociodemographic characteristics of the study population were compared using self-perceived mental health status (Table 6), some different patterns emerged. Women who reported fair or poor mental health were older than women who reported good, very good, or excellent mental health (mean 60.54 vs. 57.88 years). Women who reported fair/poor mental health were less likely to be white and more likely to be black or to report multiple races than women who reported good/very good/excellent mental health. The employment status, poverty category, public coverage, and uninsurance trends were similar to but more distinct than those in the analysis based on reported mental health conditions. Women who reported fair/poor mental health were more likely to be uninsured all year, had lower educational attainment, and were more likely to live in non-metropolitan areas than women who reported good/very good/excellent mental health.

Preventive care services received by women in the study population

Table 7 shows the preventive care services received within the recommended intervals by women with and without reported mental health conditions. Chi-square tests indicated signicant associations between reported mental health conditions and routine checkups and colonoscopies. Women with mental health conditions—particularly those with substance-related disorders—were more likely to report having received a routine checkup within the recommended time frame (90.13% vs. 88.13%). Despite the absence of a significant association, the few women with schizophrenia or other psychotic disorders appeared less likely to report having received timely breast exams, pap checks, and mammograms (between one and ten percentage points lower than other women). Women with mood disorders or substance-related disorders, on the other hand, reported receiving these tests on time at rates similar to or higher than women without mental health conditions. Women with mood disorders were more likely to have ever received a colonoscopy than women in any other category; most women (upwards of 80%) who had ever received a colonoscopy reported having received one within the past five years.

Table 6: Sociodemographic Characteristics, by Self-Perceived Mental Health				
	Excellent, very good, or good mental health		*Fair or poor mental health*	
Age[a]	%	SE	%	SE
40 to 44	16.02	0.38	11.97	0.93
45 to 49	16.01	0.34	16.24	0.93
50 to 54	14.80	0.33	14.95	0.88
55 to 59	13.67	0.31	11.98	0.88
60 to 64	10.80	0.28	8.63	0.73
65 to 69	7.92	0.24	6.80	0.67
70 to 74	6.48	0.23	5.94	0.58
75 to 79	6.22	0.23	7.63	0.75
80 or older	8.07	0.30	15.88	1.07
Race[a]				
White	79.67	0.54	76.89	1.06
Black	12.80	0.45	15.56	0.90
American Indian/Alaska Native	0.77	0.12	1.40	0.35
Asian	4.52	0.23	3.55	0.43
Native Hawaiian/Pacific Islander	0.40	0.07	0.25	0.14
Multiple races	1.85	0.11	2.36	0.35
Unemployed[a]	35.74	0.39	65.74	1.17
Insurance status[a]				
Any private coverage	69.86	0.46	46.69	1.17
Public coverage only	19.51	0.35	40.70	1.13
Uninsured	10.63	0.26	12.61	0.71
Uninsurance duration[a]				
Never uninsured	85.17	0.34	80.99	0.99
Uninsured 1-5 months	3.44	0.15	4.76	0.52
Uninsured 6-11 months	2.34	0.11	3.01	0.41
Uninsured all year	9.05	0.28	11.24	0.82
No usual source of care	12.19	0.34	10.92	0.75
Years of education[a]				
0-8 years	6.55	0.24	15.76	1.01
9-12 years	43.38	0.56	50.85	1.44
More than 12 years	50.07	0.58	33.39	1.31
Poverty category[a]				
Poor	12.97	0.30	26.56	0.97
Near poor	4.56	0.15	7.69	0.55
Low-income	13.77	0.28	17.30	0.83
Middle-income	30.92	0.40	27.25	1.02
High-income	37.78	0.53	21.21	0.96
Non-MSA (rural)[b]	17.57	0.93	19.64	1.43

[a] $p < 0.0001$; [b] $p < 0.05$

Table 7: Preventive Services Received on Time, by Reported Mental Health Conditions								
	No Reported Mental Health Condition (n=18,026)		*Mood Disorder (n=3,287)*		*Schizophrenia/Psychotic Disorder (n=77)*		*Substance-Related Disorder (n=171)*	
Service	*% on time*	*SE*	*% on time*	*SE*	*% on time*	*SE*	*% on time*	*SE*
Routine checkup[b]	88.13	0.36	89.82	0.66	89.85	4.54	95.31	1.95
Breast exam	62.90	0.55	63.51	1.05	61.15	6.66	71.74	5.05
Pap test	88.00	0.39	87.91	0.72	83.08	5.85	91.54	2.55
Mammogram	72.77	0.49	74.87	1.09	64.25	6.66	74.58	5.21
Colonoscopy								
Ever received[a]	50.44	0.60	57.41	1.39	49.26	8.30	50.35	6.10
If ever received, received within past 5 years	81.93	0.68	82.72	1.43	83.82	9.14	86.01	5.47

[a] $p < 0.0001$; [b] $p < 0.05$

When the receipt of preventive care services was evaluated based on self-perceived mental health status (Table 8), the patterns of care were reversed. In this analysis, women who reported fair or poor mental health were less likely to report having received preventive care services on time. The association between self-reported mental health status and the timely receipt of preventive care was significant for breast exams, pap checks, mammograms, and having ever received a colonoscopy. The differences in preventive care patterns between the analysis based on reported mental health conditions and the analysis based on self-perceived mental health suggest that the definition of mental health problems will influence study results.

Table 8: Preventive Services Received on Time, by Self-Perceived Mental Health				
	Excellent, Very Good, or Good Mental Health (n=19,027)		*Fair or Poor Mental Health (n=2,428)*	
Service	*% on time*	*SE*	*% on time*	*SE*
Routine checkup	88.52	0.34	87.74	0.88
Breast exam[a]	64.15	0.52	52.19	1.36
Pap test[a]	88.87	0.37	79.01	1.24
Mammogram[a]	74.13	0.45	62.55	1.29
Colonoscopy				
Ever received[b]	51.84	0.62	47.84	1.58
If ever received, received within past 5 years	82.23	0.64	80.63	1.63

[a] $p < 0.0001$; [b] $p < 0.05$

Chi-square tests identified significant associations between the preventive care index and both reported mental health conditions (p=0.0001) and self-perceived mental health (p<0.0001) (Tables 9 and 10). Women who reported mental health conditions were more likely to receive good preventive care and less likely to receive poor preventive care than women with no reported conditions. Conversely, women who reported fair or poor mental health were less likely to receive good preventive care and more likely to receive poor preventive care than women who reported good, very good, or excellent mental health.

Table 9: Preventive Care Index, by Reported Mental Health Conditions

	No Reported Mental Health Condition		*One or More Reported Mental Health Condition(s)*	
	%	*SE*	*%*	*SE*
Poor preventive care (0 or 1 service received)	12.91	0.37	9.79	0.63
Fair preventive care (2 or 3 services received)	35.05	0.45	35.31	0.97
Good preventive care (4 or 5 services received)	52.04	0.59	54.91	1.10

p = 0.0001

Table 10: Preventive Care Index, by Self-Perceived Mental Health

	Excellent, Very Good, or Good Mental Health (n=19,027)		*Fair or Poor Mental Health (n=2,428)*	
	%	*SE*	*%*	*SE*
Poor preventive care (0 or 1 service received)	11.77	0.34	18.70	1.08
Fair preventive care (2 or 3 services received)	34.55	0.44	40.77	1.35
Good preventive care (4 or 5 services received)	53.68	0.57	40.53	1.30

p < 0.0001

Logistic regression models for preventive care services

Unadjusted logistic regression (Table 11) revealed different effects for reported mental health conditions and self-perceived mental health on preventive care. Women who reported one or more mental health conditions appeared significantly more likely to receive routine checkups and colonoscopies on time than women with no reported conditions; there were no significant differences in receipt of the three sex-specific services. Women who reported fair or poor mental health appeared significantly less likely to receive sex-specific preventive care on time than women who reported good, very good, or excellent mental health; there were no significant differences in receipt of routine checkups or colonoscopies. As shown in Table 12, adjusted logistic regression analyses indicated that women who reported a mental health condition were significantly more likely to receive routine checkups (OR 1.178, 95% CI 1.005-1.381), mammograms (OR 1.146, 95% CI 1.016-1.293), and colonoscopies (OR 1.336, 95% CI 1.190-

1.499) within the recommended intervals than women with no reported condition; there were no significant differences between women with and without reported mental health conditions in the timely receipt of breast exams and pap tests. Women who reported fair or poor self-perceived mental health, on the other hand, were significantly less likely than women who reported good/very good/excellent mental health to receive breast exams (OR 0.752, 95% CI 0.666-0.850), pap tests (OR 0.628, 95% CI 0.520-0.758), and mammograms (OR 0.745, 95% CI 0.661-0.839) on time; there was no significant difference in the receipt of routine checkups or colonoscopies (Table 13).

Because the two health insurance variables (coverage type and uninsurance duration) were closely correlated (0.77), coverage type was not included in the logistic regression analyses. The analyses found significant effects for a number of sociodemographic variables. Older women were less likely to receive recommended checkups, breast exams, and pap tests, but more likely to receive colonoscopies. Non-white women were more likely to receive routine checkups, breast exams, and pap tests. Rural residence, unemployment, lower educational attainment, poverty, and uninsurance negatively affected the likelihood of receiving preventive care services on time. As insurance stability increased and education and poverty level rose, the odds of receiving timely care improved. The strongest negative effects on receipt of preventive care were continuous uninsurance and lack of a usual source of care, with odds ratios below 0.5. The effects for sociodemographic variables generally persisted between the mental health conditions and self-perceived mental health models, but the mental health conditions model identified significant negative effects for most control variables on the receipt of mammograms and colonoscopies whereas the model based on self-perceived mental health identified no significant effects on these tests.

Table 11: Logistic Regression Results for Preventive Care Services Received on Time (unadjusted)										
	Routine Checkups		Breast Exams		Pap Tests		Mammograms		Colonoscopies	
Variable (referent group)	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*
Reported one or more mental health conditions	1.230[a]	1.061-1.427	1.045	0.956-1.142	1.006	0.873-1.158	1.104	0.988-1.232	1.299[a]	1.161-1.453
Self-perceived fair/poor mental health	0.928	0.791-1.090	0.610[a]	0.547-0.681	0.471[a]	0.399-0.5560	0.583[a]	0.524-0.647	0.852[b]	0.746-0.973

[a] p<0.0001; [b] p<0.05

Table 12: Logistic Regression Results for Preventive Care Services Received on Time—Reported Mental Health Conditions (adjusted)										
	Routine Checkups		Breast Exams		Pap Tests		Mammograms		Colonoscopies	
Variable (referent group)	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*
Reported one or more mental health conditions	1.178[b]	1.005-1.381	1.059	0.961-1.167	1.093	0.932-1.280	1.146[b]	1.016-1.293	1.336[a]	1.190-1.499
Age	0.984[a]	0.978-0.989	0.988[a]	0.984-0.991	0.953[a]	0.943-0.964	0.998	0.993-1.002	1.025[a]	1.020-1.031
Non-white (white)	1.418[a]	1.219-1.650	1.138[b]	1.039-1.247	1.188[b]	1.011-1.397	1.095	0.989-1.212	0.990	0.890-1.102
Unemployed	0.884	0.768-1.019	0.893[b]	0.813-0.982	0.749[b]	0.645-0.871	0.842[b]	0.761-0.932	1.208[b]	1.072-1.360
Insurance status (never uninsured)										
Uninsured 1-5 months	0.950	0.739-1.222	0.843[b]	0.709-1.003	0.909	0.700-1.179	0.646	0.531-0.787	0.899[b]	0.694-1.166
Uninsured 6-11 months	0.889	0.658-1.203	0.588[b]	0.479-0.721	0.721	0.543-0.957	0.664	0.535-0.824	0.403[b]	0.292-0.557
Uninsured all year	0.486[a]	0.407-0.580	0.458[a]	0.403-0.520	0.470[a]	0.390-0.567	0.444[a]	0.389-0.506	0.471[a]	0.390-0.570
No usual source of care	0.280[a]	0.243-0.324	0.371[a]	0.327-0.420	0.432[a]	0.370-0.504	0.324[a]	0.285-0.369	0.382[a]	0.321-0.454
Education (more than 12 yrs.)										
0-8 years	0.859	0.706-1.044	0.765	0.669-0.874	0.807	0.630-1.033	0.720[b]	0.623-0.832	0.474[a]	0.398-0.564
9-12 years	0.794[b]	0.696-0.906	0.766	0.704-0.834	0.710[b]	0.615-0.819	0.795	0.729-0.867	0.803[b]	0.728-0.884
Poverty category (middle income)										
Poor	0.846	0.710-1.008	0.791[b]	0.698-0.897	0.590[a]	0.473-0.735	0.710[a]	0.624-0.807	0.861	0.748-0.990
Near poor	0.787[b]	0.634-0.976	0.873	0.745-1.022	1.097	0.825-1.460	0.733[b]	0.618-0.871	0.725[b]	0.592-0.887
Low income	0.898	0.766-1.053	0.763[a]	0.683-0.853	0.766[b]	0.631-0.930	0.721[a]	0.641-0.811	0.821[b]	0.708-0.952
High income	1.166[a]	1.011-1.344	1.454[a]	1.323-1.598	1.350[a]	1.147-1.589	1.616[a]	1.449-1.802	1.292[a]	1.156-1.444
Non-MSA (rural)	0.763[b]	0.646-0.901	0.883[b]	0.795-0.980	0.793[b]	0.668-0.942	0.835[b]	0.750-0.930	0.992	0.880-1.118

[a] p<0.0001; [b] p<0.05

Table 13: Logistic Regression Results for Preventive Care Services Received on Time—Self-Perceived Mental Health (adjusted)										
	Routine Checkups		Breast Exams		Pap Tests		Mammograms		Colonoscopies	
Variable (referent group)	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*
Fair/poor self-perceived mental health	1.099	0.925-1.307	0.752[a]	0.666-0.850	0.628[a]	0.520-0.758	0.745[a]	0.661-0.839	0.917	0.790-1.064
Age	0.983[a]	0.978-0.989	0.987[a]	0.983-0.990	0.951[a]	0.941-0.962	0.996	0.992-1.001	1.023	1.018-1.029
Non-white (white)	1.402[a]	1.207-1.629	1.136[b]	1.037-1.244	1.178[b]	1.002-1.386	1.086	0.981-1.201	0.968	0.870-1.077
Unemployed	0.886	0.768-1.021	0.926	0.843-1.017	0.810[b]	0.696-0.941	0.883	0.797-0.978	1.252	1.112-1.409
Insurance status (never uninsured)										
Uninsured 1-5 months	0.956	0.743-1.230	0.850[b]	0.715-1.010	0.908[b]	0.702-1.175	0.652	0.536-0.794	0.913	0.706-1.179
Uninsured 6-11 months	0.898	0.664-1.215	0.590	0.481-0.724	0.717	0.541-0.949	0.668	0.539-0.829	0.407	0.294-0.563
Uninsured all year	0.486[a]	0.407-0.579	0.457[a]	0.402-0.519	0.460[a]	0.382-0.554	0.441	0.387-0.503	0.470	0.389-0.568
No usual source of care	0.277[a]	0.239-0.320	0.369[a]	0.326-0.417	0.429[a]	0.368-0.501	0.321	0.282-0.364	0.373	0.314-0.443
Education (more than 12 yrs.)										
0-8 years	0.849	0.698-1.033	0.779	0.682-0.890	0.813	0.636-1.041	0.732	0.633-0.846	0.477	0.401-0.566
9-12 years	0.791[b]	0.693-0.903	0.769[b]	0.707-0.837	0.716[a]	0.621-0.827	0.798	0.732-0.870	0.802	0.728-0.883
Poverty category (middle income)										
Poor	0.851	0.714-1.014	0.817[b]	0.720-0.926	0.627[a]	0.501-0.785	0.737	0.649-0.837	0.886	0.770-1.018
Near poor	0.791[b]	0.637-0.981	0.883	0.753-1.036	1.114	0.834-1.488	0.744	0.626-0.885	0.738	0.602-0.904
Low income	0.902	0.770-1.057	0.767[a]	0.686-0.857	0.771[b]	0.635-0.936	0.726	0.645-0.816	0.830	0.716-0.962
High income	1.168[a]	1.013-1.346	1.444[a]	1.313-1.586	1.318[a]	1.120-1.552	1.600	1.435-1.785	1.285	1.149-1.437
Non-MSA (rural)	0.762a	0.645-0.900	0.884b	0.795-0.982	0.797b	0.669-0.948	0.836	0.749-0.932	0.987	0.875-1.112

[a] $p<0.0001$; [b] $p<0.05$

Additional analyses of mental health conditions and self-perceived mental health

Additional cross-tabulations and logistic regression models were used to explore the relationship between reported mental health conditions and self-perceived mental health. Tables 14 and 15 show the significant sociodemographic factors contributing to reported receipt of care for a mental health condition and to fair or poor self-perceived mental health status. While many variables had similar effects in both models, there were several differences. Non-white women were approximately half as likely as white women to report receiving care for a mental health condition (OR 0.486, 95% CI 0.428-0.552), but were 33% more likely to report fair or poor mental health (OR 1.333, 95% CI 1.167-1.521). Unemployed women were 1.6 times more likely than employed women to report a mental health condition (OR 1.573, 95% CI 1.388-1.783), but 2.8 times more likely to report fair or poor mental health (OR 2.804, 95% CI 2.444-3.218). In the mental health conditions model, women with no usual source of care were half as likely as women with a usual source of care to report receiving care for a mental health condition (OR 0.546, 95% CI 0.454-0.657); having a usual source of care did not contribute significantly to self-perceived mental health status.

When examined within reported mental health conditions categories, differences in self-perceived mental health status were significantly associated with receipt of preventive care services (Table 16). For women with no reported mental health conditions, women who reported fair/poor mental health were less likely to receive breast exams, pap tests, mammograms, and colonoscopies on time. For women with one or more reported mental health conditions, women who reported fair/poor mental health were less likely to receive checkups, breast exams, pap tests, mammograms, and colonoscopies on time.

Logistic regression analyses (Table 17) showed that for women with no reported mental health conditions, non-white women (OR 0.743, 95% CI 0.632-0.874), unemployed women (OR 0.375, 95% CI 0.314-0.449), women with less than a high school education (OR 0.491, 95% CI 0.394-0.612), and poor (OR 0.490, 95% CI 0.393-0.612) or near poor (OR 0.585, 95% CI 0.442-0.775) women were significantly less likely to report good/very good/excellent mental health, while high income women were significantly more likely to report good/very good/excellent

Table 14: Logistic Regression Results—Factors Contributing to Reported Mental Health Conditions (adjusted)		
Variable (referent group)	*Odds Ratio*	*95% CI*
Fair/poor self-perceived mental health [a]	5.131	4.53-5.811
Age [a]	0.976	0.972-0.981
Non-white (white) [a]	0.486	0.428-0.552
Unemployed [a]	1.573	1.388-1.783
Insurance status (never uninsured)		
Uninsured 1-5 months	1.245	0.992-1.563
Uninsured 6-11 months	1.330	1.052-1.68
Uninsured all year [b]	0.915	0.749-1.117
No usual source of care [a]	0.546	0.454-0.657
Education (more than 12 years)		
0-8 years [a]	0.638	0.522-0.78
9-12 years [b]	0.923	0.824-1.033
Poverty category (middle income)		
Poor [b]	1.408	1.199-1.652
Near poor	1.237	0.983-1.556
Low income	1.172	1.013-1.355
High income [b]	0.927	0.820-1.049

[a] $p<0.0001$; [b] $p<0.05$

Table 15: Logistic Regression Results—Factors Contributing to Fair/Poor Mental Health Status (adjusted)		
Variable (referent group)	*Odds Ratio*	*95% CI*
Reported mental health condition [a]	5.129	4.529-5.808
Age	0.995	0.990-1.000
Non-white (white) [a]	1.333	1.167-1.521
Unemployed [a]	2.804	2.444-3.218
Insurance status (never uninsured)		
Uninsured 1-5 months	1.365	1.021-1.823
Uninsured 6-11 months	1.145	0.829-1.581
Uninsured all year	1.129	0.927-1.376
No usual source of care	0.937	0.788-1.114
Education (more than 12 years)		
0-8 years [a]	2.036	1.707-2.428
9-12 years [b]	1.180	1.031-1.351
Poverty category (middle income)		
Poor [a]	1.836	1.549-2.176
Near poor [b]	1.372	1.086-1.733
Low income	1.155	0.975-1.369
High income [a]	0.681	0.579-0.800

[a] $p<0.0001$; [b] $p<0.05$

Table 16: Preventive Care by Reported Mental Health Conditions and Self-Perceived Mental Health Status								
	No Reported Mental Health Conditions				***One or More Reported Mental Health Conditions***			
	Good/very good/excellent mental health (n=16,574)		*Fair/poor mental health (n=1,359)*		*Good/very good/excellent mental health (n=2,453)*		*Fair/poor mental health (n=1,069)*	
	% on time	SE	% on time	SE	% on time	SE	% on time	SE
Routine checkups	88.1416	0.3707	87.8592	1.0725	91.0178[b]	0.6603	87.5959[b]	1.1499
Breast exams	63.6918[a]	0.5531	50.2187[a]	1.8520	67.1560[a]	1.0736	54.5084[a]	1.8827
Pap tests	88.6074[a]	0.4030	76.3248[a]	1.9280	90.5242[a]	0.7713	81.2434[a]	1.4998
Mammograms	73.6032[a]	0.4764	59.4036[a]	1.7261	77.5675[a]	1.0862	66.2405[a]	1.8491
Colonoscopy (ever received)	50.7754[b]	0.6303	45.3963[b]	2.0122	58.8285[b]	1.5139	51.2222[b]	2.3447

[a] $p < 0.0001$; [b] $p < 0.05$

mental health (OR 1.318, 95% CI 1.063-1.634). For women with one or more reported mental health conditions, older women (OR 1.025, 95% CI 1.017-1.033) and high income women (OR 1.701, 95% CI 1.301-2.224) were more likely to report good/very good/excellent mental health, while non-white women (OR 0.757, 95% CI 0.597-0.961), unemployed women (OR 0.325, 95% CI 0.261-0.405), women with less than a high school education (OR 0.499, 95% CI 0.351-0.710), and poor women (OR 0.685, 95% CI 0.524-0.895) were less likely to report good/very good/excellent mental health. Race, employment status, education, and income appear to predict self-perceived mental health for women in the study population regardless of reported mental health conditions.

The results of logistic regression models exploring differences in preventive care received by women within the two reported mental health conditions categories are shown in Tables 18 and 19. In both categories, uninsurance and lack of a usual source of care appear to most negatively affect receipt of preventive care. Fair or poor self-perceived mental health predicted lower rates for breast exams (OR 0.738, 95% CI 0.609-0.895), pap tests (OR 0.582, 95% CI 0.421-0.804), and mammograms (OR 0.755, 95% CI 0.621-0.918) among women with no reported mental health conditions. For women with one or more reported mental health conditions, fair or poor self-perceived mental health predicted lower rates for breast exams (OR 0.731, 95% CI 0.623-0.858), pap tests (OR 0.565, 95% CI 0.438-0.730), mammograms (OR 0.681, 95% CI 0.580-0.799), and colonoscopies (OR 0.825, 95% CI 0.685-0.994). In addition, women who reported one or more mental health conditions who have less than a college

education or income below 200% FPL appear to be at risk of not receiving one or more preventive care services.

Table 17: Logistic Regression Results—Good/Very Good/Excellent Self-Perceived Mental Health				
	No Reported Mental Health Conditions		***One or More Reported Mental Health Conditions***	
Variable (referent group)	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*
Age	0.995	0.988-1.002	1.025[a]	1.017-1.033
Non-white (white)	0.743[b]	0.632-0.874	0.757[b]	0.597-0.961
Unemployed	0.375[a]	0.314-0.449	0.325[a]	0.261-0.405
Insurance status (never uninsured)				
Uninsured 1-5 months	0.712	0.503-1.008	0.751	0.464-1.215
Uninsured 6-11 months	0.988	0.615-1.587	0.782	0.487-1.255
Uninsured all year	0.854	0.665-1.097	0.883	0.636-1.227
No usual source of care	1.045	0.846-1.292	1.061	0.740-1.521
Education (more than 12 yrs.)				
0-8 years	0.491[a]	0.394-0.612	0.499[b]	0.351-0.710
9-12 years	0.855[b]	0.719-1.016	0.831	0.679-1.016
Poverty category (middle income)				
Poor	0.490[a]	0.393-0.612	0.685[a]	0.524-0.895
Near poor	0.585[b]	0.442-0.775	1.103	0.759-1.603
Low income	0.829	0.666-1.033	0.917	0.687-1.225
High income	1.318[a]	1.063-1.634	1.701[a]	1.301-2.224
Non-MSA (rural)	0.891	0.740-1.073	0.905	0.724-1.130

[a] $p < 0.0001$; [b] $p < 0.05$

Table 18: Logistic Regression Results for Preventive Care Services Received on Time—No Reported Mental Health Conditions (adjusted)										
	Routine Checkups		Breast Exams		Pap Tests		Mammograms		Colonoscopies	
Variable (referent group)	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*
Fair/poor self-perceived mental health	0.792	0.595-1.055	0.738[b]	0.609-0.895	0.582[b]	0.421-0.804	0.755[b]	0.621-0.918	0.871	0.677-1.120
Age	0.983[b]	0.970-0.997	0.996	0.987-1.004	0.942[a]	0.923-0.961	1.006	0.996-1.016	1.023[b]	1.011-1.036
Non-white (white)	1.478[b]	1.025-2.131	1.062	0.837-1.348	1.132	0.826-1.551	0.979	0.761-1.258	0.914	0.708-1.179
Unemployed	0.743	0.536-1.030	0.710[b]	0.567-0.890	0.846	0.568-1.258	0.735[b]	0.581-0.931	1.262	0.965-1.651
Insurance status (never uninsured)										
Uninsured 1-5 months	1.251[b]	0.689-2.271	0.937	0.647-1.357	0.645	0.379-1.098	0.791	0.501-1.249	0.766	0.476-1.230
Uninsured 6-11 months	0.620	0.338-1.138	0.648	0.432-0.974	0.549	0.296-1.020	0.652	0.412-1.033	0.333[b]	0.173-0.643
Uninsured all year	0.407[b*]	0.274-0.604	0.541[b]	0.411-0.713	0.487	0.351-0.675	0.447[b]	0.334-0.600	0.442	0.300-0.651
No usual source of care	0.407[a]	0.279-0.594	0.345[a]	0.248-0.480	0.605[b]	0.408-0.897	0.306[a]	0.214-0.437	0.433[a]	0.285-0.658
Education (more than 12 yrs.)										
0-8 years	1.019	0.650-1.599	0.808	0.582-1.123	0.799	0.443-1.438	0.594	0.418-0.845	0.409[a]	0.286-0.586
9-12 years	0.967	0.715-1.308	0.744[b]	0.619-0.895	0.519[b]	0.387-0.695	0.626[b]	0.514-0.763	0.796	0.637-0.995
Poverty category (middle income)										
Poor	0.940	0.625-1.413	1.112	0.833-1.485	0.698[b]	0.458-1.064	1.044	0.790-1.379	0.993	0.730-1.350
Near poor	0.614[b]	0.361-1.045	1.223	0.839-1.783	1.179	0.662-2.100	0.855	0.603-1.211	0.925	0.611-1.400
Low income	1.073	0.697-1.651	1.026	0.781-1.349	0.812	0.524-1.256	0.901	0.703-1.155	0.846	0.598-1.196
High income	1.008	0.719-1.415	1.609[b]	1.290-2.006	1.106	0.755-1.622	1.809[a]	1.350-2.422	1.538[a]	1.181-2.003
Non-MSA (rural)	0.852	0.602-1.207	0.890	0.726-1.091	0.772	0.571-1.044	0.846	0.692-1.035	1.175	0.946-1.460

[a] $p < 0.0001$; [b] $p < 0.05$; *p=0.0001

Table 19: Logistic Regression Results for Preventive Care Services Received on Time—One or More Reported Mental Health Conditions (adjusted)										
	Routine Checkups		Breast Exams		Pap Tests		Mammograms		Colonoscopies	
Variable (referent group)	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*	*Odds Ratio*	*95% CI*
Fair/poor self-perceived mental health	1.219	0.983-1.511	0.731[b*]	0.623-0.858	0.565[a]	0.438-0.730	0.681[a]	0.580-0.799	0.825[b]	0.685-0.994
Age	0.984[a]	0.978-0.990	0.985[a]	0.981-0.989	0.953[a]	0.942-0.965	0.996	0.991-1.000	1.026[a]	1.020-1.032
Non-white (white)	1.415[a]	1.205-1.662	1.163[a]	1.052-1.287	1.207[b]	1.007-1.446	1.125[b]	1.005-1.260	1.004	0.896-1.124
Unemployed	0.902	0.768-1.060	0.970	0.876-1.073	0.790	0.668-0.934	0.903	0.807-1.010	1.210[b]	1.062-1.380
Insurance status (never uninsured)										
Uninsured 1-5 months	0.903	0.688-1.186	0.821[b]	0.666-1.011	1.017[b]	0.748-1.383	0.617	0.498-0.764	0.947[b]	0.713-1.257
Uninsured 6-11 months	0.962	0.686-1.349	0.575	0.454-0.729	0.749	0.544-1.031	0.664	0.522-0.845	0.423[b]	0.298-0.600
Uninsured all year	0.502[a]	0.414-0.608	0.439[a]	0.381-0.505	0.463[a]	0.378-0.568	0.438[a]	0.379-0.507	0.479[a]	0.391-0.587
No usual source of care	0.267[a]	0.228-0.312	0.375[a]	0.331-0.426	0.415[a]	0.350-0.491	0.327[a]	0.287-0.372	0.376[a]	0.311-0.453
Education (more than 12 yrs.)										
0-8 years	0.831	0.672-1.027	0.784	0.678-0.907	0.841	0.645-1.097	0.773[b]	0.660-0.905	0.496[a]	0.410-0.599
9-12 years	0.768[b]	0.664-0.888	0.777[b]	0.709-0.852	0.771[b]	0.658-0.905	0.837	0.762-0.921	0.805[b]	0.722-0.898
Poverty category (middle income)										
Poor	0.823	0.677-1.001	0.764[b]	0.668-0.872	0.594[a]	0.464-0.761	0.679[a]	0.588-0.783	0.849	0.728-0.989
Near poor	0.821	0.648-1.041	0.829	0.697-0.986	1.096	0.786-1.528	0.725[b]	0.595-0.885	0.696[b]	0.552-0.878
Low income	0.874	0.740-1.032	0.723[a]	0.640-0.817	0.758[b]	0.613-0.936	0.694[a]	0.608-0.792	0.819	0.697-0.963
High income	1.196[a]	1.024-1.398	1.416[a]	1.278-1.569	1.376[a]	1.155-1.640	1.575[a]	1.402-1.770	1.251[a]	1.107-1.413
Non-MSA (rural)	0.745[b]	0.629-0.883	0.886[b]	0.790-0.993	0.797[b]	0.657-0.967	0.840[b]	0.743-0.949	0.964	0.847-1.096

[a] $p < 0.0001$; [b] $p < 0.05$; *p=0.0001

Analysis of interactive effects

In the original regression models (Tables 12 and 13), tests for interactions between the independent variables and control variables identified significant interactions between reported conditions and usual source of care for routine checkups and pap tests; between self-perceived mental health and poverty level for breast exams, pap tests, and mammograms; and between self-perceived mental health and age for checkups and colonoscopies (see Appendix).

Analysis of the interaction between self-perceived mental health and age showed that the negative effect of a one-year increase in age on the odds of receiving a checkup on time was 2% greater for women who reported fair or poor mental health than for women who reported good, very good, or excellent mental health. The positive effect of age on the odds of receiving a colonoscopy on time was 2% lower for women who reported fair/poor mental health than for women who reported good/very good/excellent mental health. At younger ages, women with fair/poor mental health are more likely to receive colonoscopies on time than women with good/very good/excellent mental health, but at older ages they are less likely to receive care on time.

The negative effect of not having a usual source of care on the odds of receiving a checkup on time was 1.49 times greater (95% CI 1.004-2.221) for women with one or more reported mental health conditions than for women with no conditions. Not having a usual source of care had a negative effect on the odds of receiving a pap test on time that was 1.59 times greater (95% CI 1.055-2.403) for women with one or more reported mental health conditions than for women with no conditions.

The interactions between self-perceived mental health and poverty category were analyzed using a dichotomous poverty indicator for poor, near poor, or low income (less than 200% FPL) and for middle and high income (more than 200% FPL). For breast exams, the negative effect of being poor, near poor, or low income was 1.50 times greater (95% CI 1.188-1.904) for women who reported fair or poor mental health than for women who reported good, very good, or excellent mental health. The negative effect of being poor, near poor, or low income on the receipt of pap tests was 1.61 times greater (95% CI 1.113-2.320)for women who reported fair or poor mental health than for women who reported good, very good, or excellent

mental health. Finally, income levels lower than 200% FPL had a stronger negative effect on the receipt of mammograms for women with fair/poor mental health than for women with good, very good, or excellent mental health (OR 1.729, 95% CI 1.366-2.189).

Limitations

The association between severity of illness and receipt of preventive care could not be assessed because the MEPS contains no indicator of the severity of mental health conditions, Furthermore, while the analyses identified associations between mental health conditions and receipt of preventive services, no causal connection can be made. The data in the MEPS are self-reported and therefore rely on subject recall. Cox and Iachan (1987) found a weak association between household- and provider-reported conditions in the MEPS; households are three times more likely to report no conditions than providers. In contrast, a 1994 report by Edwards et al. concluded that self-reporting of chronic conditions (which usually require a doctor's diagnosis) generally aligns with provider reports, particularly for individuals with insurance. In this case, then, self-reported mental health conditions are likely to be either reliable or underestimates. Finally, those most affected by mental health conditions—women who are institutionalized, homeless, imprisoned, or unable to complete a lengthy survey—are not included in the MEPS data set.

Discussion

Comparing the reported mental health conditions in the study population with the prevalence of those conditions in the U.S. adult population indicates that the percentage of reported mood disorders in the study population (14.8%) is approximately 5% higher than the estimate of 9.5% in the U.S. adult population (National Institute of Mental Health, 2010). This may reflect the fact that depression is diagnosed in women more often than in men. The percentage of reported schizophrenia/psychotic disorders and substance-related disorders in the study population is much lower than estimated for the U.S. adult population (1.1% for schizophrenia, 8.9% for substance-related disorders). Individuals with schizophrenia or other psychotic disorders may be more likely to be institutionalized and therefore not participate in the MEPS. It is possible that substance-related disorders are underreported by MEPS respondents, perhaps as a result of stigma, or that women in the study population are less likely to seek

treatment for substance-related problems, or even that providers underdiagnose these conditions in the study population.

The sociodemographic profiles of women who reported mental health conditions and women who reported fair or poor mental health highlight differences between women who receive care for mental health problems and women who do not. Older women, non-white women, and uninsured women who report fair poor mental health are less likely to report receiving care for a mental health condition than women who report good/very/good/excellent mental health. The disparate effects of not having a usual source of care on the preventive health care services received by women with mental health conditions compared to women without mental health conditions hint at the importance of a "medical home" for women with mental health conditions. This finding is consistent with Witt et al.'s (2009) conclusion that not having a usual source of care more negatively affected routine care for women experiencing psychological distress than for women with no distress. The finding that women who reported receiving care for mental health conditions were receiving the same or better preventive care as women who did not report mental health conditions suggests that that initiatives to make mental health care more available to vulnerable women may improve not only their mental health, but also their odds of receiving recommended preventive care.

Women who reported fair or poor mental health but no care for mental health conditions may have been experiencing short-term psychological distress, or they may have untreated mental health conditions. The persistence of differences in preventive care received between women who reported fair/poor mental health and women who reported good/very good/excellent mental health in both the "no mental health condition" and "one or more mental health conditions" categories (Table 15) supports the presence of untreated mental health conditions. Short-term psychological distress seems unlikely to result in such consistent disparities in preventive care. The findings in this study suggest that women aged 40 and older who report fair or poor self-perceived mental health are at significant risk of not receiving recommended sex-specific preventive care services. The findings also suggest that whether they report mental health conditions or not, women who are non-white, are unemployed, are not college-educated, or have income below 200% of the federal poverty level are at risk of experiencing fair or poor self-perceived mental health. This study found no evidence of different rates of receipt between

preventive care services provided in a primary care setting (routine checkups, breast exams, and pap tests) and those requiring separate appointments in a specialty setting (mammograms and colonoscopies).

Conclusions

This study found that self-perceived mental health status was a much stronger predictor of whether women aged 40 and older received preventive care services on time than reported mental health conditions. Women who reported one or more mental health conditions received the same or better preventive care as women with no reported conditions, though not having a usual source of care had a disproportionate negative affect on preventive care for this group. Fair or poor self-perceived mental health had a significant negative effect on the timely receipt of most preventive care services; the strongest effects were on sex-specific preventive care services. The negative effects of fair/poor mental health on preventive care were detected both in women who reported receiving care for a mental health conditions and those who did not. More than half of women who reported fair or poor mental health did not report receiving care for a mental health condition. Making sure mental health treatment is available to these women should be a priority for policymakers and health care providers; connecting these women to mental health treatment may improve their chances of receiving appropriate preventive health care services.

The results of this analysis also indicate that having a usual source of care and continuous insurance are the strongest predictors of whether women aged 40 and older will receive timely preventive care services. Furthermore, interactions between self-perceived mental health and poverty level that exacerbate disparaties in preventive health care may in fact be tied to health insurance and access to care. For some preventive care services (e.g., routine checkups and colonoscopies; see Tables 12 and 13) near poor women received less adequate care than poor women, perhaps because their incomes were too high to qualify for public assistance or free care but too low to purchase insurance. Access and insurance are enduring challenges for health care advocates and policmakers in efforts to promote health and well-being.

This study employed two different methods to identify mental health problems, and found conflicting results for the preventive health care services received by women in the study population based on each method. Other methods of identifying mental health problems could

yield different results as well. In order to make comparisons across studies, particularly where research informs policy, the dynamics of each definition of mental health problems must be understood. Researchers should consider not only what constitutes the "best" definition, but also which definition will further understanding of the intersection of preventive health care and mental health by providing comparable or contrastable data.

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Appendix

Self-Perceived Mental Health Status by Reported Mental Health Conditions				
	No reported mental health condition		*One or more reported mental health conditions*	
Self-perceived mental health status	*%*	*SE*	*%*	*SE*
Fair/poor mental health	6.17	0.22	26.07	0.91
Good/very good/excellent mental health	93.83	0.22	73.93	0.91

Reported Mental Health Conditions by Self-Perceived Mental Health Status				
	Fair/poor mental health		*Good/very good/excellent mental health*	
Reported mental health conditions	%	SE	%	SE
No reported mental health condition	55.40	1.38	86.95	0.32
One or more reported mental health conditions	44.60	1.38	13.05	0.32

Interactive Effects between mental health and sociodemographic variables					
	DF	*Estimate*	*Standard Error*	*Wald Chi-Square*	*Pr > ChiSq*
Routine checkups					
Self-perceived mental health	1	-0.9827	0.4103	5.7372	0.0166
Age	1	-0.0190	0.00302	39.4087	<.0001
Self-perceived mental health * age	1	0.0177	0.00676	6.8613	0.0088
Mental health condition	1	0.0946	0.0868	1.1861	0.2761
Usual source of care	1	-1.3169	0.0781	284.4742	<.0001
Mental health condition * usual source of care	1	0.4012	0.2024	3.9273	0.0475
Breast exams					
Self-perceived mental health	1	-0.4909	0.0953	26.5099	<.0001
Poverty level	1	-0.4442	0.0429	107.0880	<.0001
Self-perceived mental health * poverty level	1	0.4080	0.1204	11.4782	0.0007
Pap tests					
Mental health condition	1	0.0126	0.0873	0.0208	0.8854
Usual source of care	1	-0.8963	0.0857	109.3559	<.0001
Mental health condition * usual source of care	1	0.4651	0.2099	4.9086	0.0267
Self-perceived mental health	1	-0.7498	0.1391	29.0555	<.0001
Poverty level	1	-0.4982	0.0887	31.5458	<.0001
Self-perceived mental health * poverty level	1	0.4743	0.1874	6.4039	0.0114
Mammograms					
Self-perceived mental health	1	-0.5866	0.0889	43.5820	<.0001
Poverty level	1	-0.5918	0.0471	157.8157	<.0001
Self-perceived mental health * poverty level	1	0.5477	0.1202	20.7598	<.0001
Colonoscopy					
Self-perceived mental health	1	1.2271	0.3952	9.6411	0.0019
Age	1	0.0259	0.00300	74.5403	<.0001
Self-perceived mental health * age	1	-0.0198	0.00610	10.4952	0.0012