HSR Health Services Research

DOI: 10.1111/j.1475-6773.2011.01253.x
RESEARCH ARTICLE

Disparities

Crowd-out and Exposure Effects of Physical Comorbidities on Mental Health Care Use: Implications for Racial–Ethnic Disparities in Access

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Objectives. In disparities models, researchers adjust for differences in "clinical need," including indicators of comorbidities. We reconsider this practice, assessing (1) if and how having a comorbidity changes the likelihood of recognition and treatment of mental illness; and (2) differences in mental health care disparities estimates with and without adjustment for comorbidities.

Data. Longitudinal data from 2000 to 2007 Medical Expenditure Panel Survey ($n = 11{,}083$) split into pre and postperiods for white, Latino, and black adults with probable need for mental health care.

Study Design. First, we tested a crowd-out effect (comorbidities decrease initiation of mental health care after a primary care provider [PCP] visit) using logistic regression models and an exposure effect (comorbidities cause more PCP visits, increasing initiation of mental health care) using instrumental variable methods. Second, we assessed the impact of adjustment for comorbidities on disparity estimates.

Principal Findings. We found no evidence of a crowd-out effect but strong evidence for an exposure effect. Number of postperiod visits positively predicted initiation of mental health care. Adjusting for racial/ethnic differences in comorbidities increased black–white disparities and decreased Latino–white disparities.

Conclusions. Positive exposure findings suggest that intensive follow-up programs shown to reduce disparities in chronic-care management may have additional indirect effects on reducing mental health care disparities.

Key Words. Access/demand/utilization of services, mental health, racial/ethnic differences in health and health care

Although methods for defining and measuring disparities vary among studies, researchers using survey data generally agree that it is necessary to control or adjust for differences in *clinical need* for medical care services between groups before assessing health care disparities (Institute of Medicine [IOM] 2002;

McGuire et al. 2006; Alegria et al. 2008; Stockdale et al. 2008; Cook et al. 2010). We define clinical need as the level of an individual's health or their severity of illness. "Comorbidities," diseases other than the one under study, are among the variables typically adjusted for. Comorbidities confound the relationship between race/ethnicity and mental health care use because they are correlated with race/ethnicity and they are powerful predictors of mental health care use. Conceptualization of comorbidities in a disparities study will, therefore, influence both the magnitude of measured disparities and the understanding of the factors responsible.

This paper reconsiders the role of comorbidities in health care disparities, both conceptually and empirically. The first goal is to sort out system-level effects of physical comorbidity on access to mental health care, testing both a "crowd-out" effect (a hypothesis related to the limited time within a visit) and an "exposure" effect (a hypothesis about what occurs over numerous visits). The second goal is to connect these findings to racial/ethnic disparities. If comorbidities affect use other than through need for care, how much of the observed disparities between whites and minorities can be accounted for by systems-level mechanisms related to comorbidities?

BACKGROUND

Racial/Ethnic Disparities in Mental Health Care Treatment

Racial/ethnic disparities in mental health care exceed disparities in many other areas of health care services (AHRQ 2009c). Despite similar rates of mental illness as whites (Substance Abuse and Mental Health Services Administration 2008), blacks and Latinos are approximately half as likely as whites to receive mental health care (Cook, McGuire, and Miranda 2007; AHRQ 2009c; Cook et al. 2010). Disparities in service use may contribute to the greater persistence, severity, and disease burden of mental disorders among African Americans and Latinos (U.S. Department of Health and Human Services 2001; Wells et al.

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2001; Breslau et al. 2005; Williams et al. 2007; Alegria et al. 2008). Other studies have investigated differences in socioeconomic status, insurance type and status, language barriers, and regional factors as possible mechanisms explaining these disparities (Kirby, Taliaferro, and Zuvekas 2006; Alegria et al. 2007; Balsa, Cao, and McGuire 2007; Stockdale et al. 2008). To our knowledge, this study is the first to address the differential rates of comorbidities and the differential treatment of individuals with comorbidities as possible mechanisms by which mental health care disparities arise.

Comorbid Mental and Physical Illness and Mental Health Care Disparities

Racial/ethnic differences in the prevalence and treatment of comorbidities may contribute to mental health care disparities simply because individuals with chronic physical health conditions are more likely to have a mental health disorder than those without chronic physical health conditions (Lesperance and Frasure-Smith 2000; Afari et al. 2001; Anderson et al. 2001; de Groot et al. 2001; Thomas et al. 2003). Racial/ethnic differences in the full array of comorbid conditions are not available, but we do know that blacks and Latinos have a greater prevalence of a number of chronic conditions (e.g., diabetes [National Institute of Diabetes and Digestive and Kidney Diseases 2008], kidney disease and hypertension [National Center for Health Statistics 2008]), lower prevalence of other chronic conditions (e.g., cardiovascular disease and cancer [National Center for Health Statistics 2008]), and have an earlier onset of many comorbid conditions (McGee et al. 1996). The presence of a comorbid psychiatric disorder adds an additional burden to managing chronic conditions, contributing to greater severity of illness and functional limitation (Ciechanowski, Katon, and Russo 2000; Ciechanowski et al. 2003; Ludman et al. 2004), and increasing the number and array of health care services necessary to manage the comorbid conditions (Vogeli et al. 2007).

The contribution of comorbidities to mental health care disparities also depends on whether having a comorbidity increases one's probability of being recognized and treated. Empirical findings are inconsistent. Among those with a depression diagnosis, diabetes and other comorbid illness were associated with an increased rate of antidepressant treatment (Sambamoorthi et al. 2006) and greater physician recognition of depression (Teh, Reynolds, and Cleary 2008). On the other hand, among patients with cooccurring diabetes and depression diagnoses that were accepting of depression treatment, severity of physical health problems was negatively correlated with the probability of depression treatment (Nutting et al. 2000). In our view, this relationship

between comorbidities and mental health care use depends upon whether the increased exposure to the health care system increases the chances for referral to mental health care (an "exposure" hypothesis) or whether mental illness raises "competing demands" (Klinkman 1997) or "crowd-out" of time for a discussion of mental health during a primary care provider (PCP) visit.

Conceptual Framework: Comorbidities within the IOM Definition of Disparities

Current Empirical Practice: Comorbidity as an Indicator of Need

Papers assessing health care disparities based on the definition of disparity proposed in the IOM report, *Unequal Treatment,* regard a disparity to be a difference in the health care treatment received by two groups not due to health care need or preference differences between the groups (e.g., McGuire et al. 2006; Cook, McGuire, and Miranda 2007; Stockdale et al. 2008). The IOM approach conceives of the simple difference in rates of use between racial/ethnic minorities and whites to be composed of three sets of factors: (1) clinical appropriateness and need, and patient preferences; (2) the operation of health care systems, and legal and regulatory climate; and (3) discrimination. To apply this definition, the investigator must classify variables available for analysis into one of these three sets, adjusting for differences due to clinical appropriateness and need, and preferences,[1] but not differences due to other factors.

In previous studies, comorbidities have been included among the need-related variables that are adjusted before the measurement of treatment disparities.[2] This interpretation of comorbidity as an indicator of need has a clear rationale. For example, diabetes may worsen the prognosis of an individual with depression, justifying more intensive treatment. The physical comorbidity may also proxy for the prevalence of unmeasured mental illnesses (e.g., individuals with diabetes are more likely to have mental illness). According to the IOM definition, if the presence of physical comorbidity affects use only through need for care, then comorbidities should be adjusted for in disparities analyses.

Comorbidity as a Systems Variable: "Crowd-Out" and "Exposure"

MH care disparities could be caused by differential treatment within the health care system. A PCP caring for a patient with serious physical health issues simply has less time available to identify and treat mental health problems (Tai-Seale, McGuire, and Zhang 2007). PCPs have been shown to be less likely to discuss mental health concerns in the presence of physical symptoms such

as a sort throat or fever (Furedi et al. 2003), and chronic physical comorbidity significantly decreased the odds that physicians and untreated patients discussed depression as a possible diagnosis (Rost et al. 2000). A higher prevalence of comorbidities among minorities thus forges a potential link to disparities. MH problems may be more frequently "crowded out" in primary care office visits among minority than among non-Latino white populations.

Comorbidities may also link to disparities in a countervailing way. People with a chronic illness see their doctors more frequently, and this "exposure" may make it more likely that over a period of time another illness (in this case, mental illness) is recognized and treated. A higher prevalence among minorities of comorbidities could therefore overcome other barriers to access and ameliorate disparities. If the mechanism associated with comorbidities is a crowd-out and/or exposure effect, the comorbidity would be a proxy for a system variable and should be considered as a disparity according to the IOM definition.

In this paper, we investigate whether the presence of physical health problems decreases the likelihood of initial treatment for mental health care because of crowd-out of time during the physician visit, or increases the likelihood of initial treatment through greater exposure. We then assess whether these system-level factors affect the measurement of racial/ethnic disparities, estimating disparities with and without adjustment for comorbidities.

METHODS

Data Source

The data are responses to the Medical Provider and Household Components of the 2000–2007 MEPS, a nationally representative sample of the noninstitutionalized civilian population of the United States. We combined six 2-year longitudinal panels (Panels 5–11), each of which contains five rounds of interviews over 2 years. From this data, we assessed mental health, physical health, sociodemographic characteristics, mental health care, PCP access, and utilization in Rounds 1 and 2 (preperiod) and Rounds 3, 4, and 5 (postperiod) of each respondent's 2-year panel. These pre- and postperiods correspond roughly to Years 1 (preperiod) and 2 (postperiod) of the panel. Splitting the data in this way allowed us to identify patterns of mental health care and PCP visits as well as changes in predictor variables over time.

We include (1) individuals with no mental health care visits in the preperiod; (2) individuals in the lowest tertile of the mental health component score of the SF-12 (MCS SF-12: four items from the SF-12 battery standardized

to a mean of 50 and standard deviation of 10 with higher scores indicating better mental health) (Ware, Kosinski, and Keller 1996) in the postperiod; (3) individuals with at least one PCP visit in the postperiod (needed to test our hypotheses); and (4) non-Latino white, Latino, and African American adults age 18 and older in the preperiod. Our choice of the lowest tertile in self-assessed mental health status is a broad definition of "need" meant to capture persons from among all groups who might benefit from mental health care. To verify that this group had greater need for MH care, we assessed the mental health of respondents from the four years of the MEPS (2004–2007) in which more detailed mental health measures were available. In this subsample, individuals in the lowest tertile of the MCS SF-12 had significantly higher (poorer) scores on measures of psychological distress (K-6 [Kessler et al. 2003] scores were 7.7 versus 1.7) and depressive symptomatology (PHQ-2 [Kroenke, Spitzer, and Williams 2003] scores were 2.0 versus 0.2).

Study Variables

To test for *crowd-out*, we flag an initial mental health care visit within 30 days of the first, second, and third nonmental health PCP visit in the postperiod. To test for *exposure,* we study initiation of mental health care after any nonmental health PCP visit in the postperiod. To assess the influence of comorbidities on estimates of mental health care disparities, we estimate predicted probabilities of mental health care use with and without adjusting for comorbidities.

Mental health care events were office-based or outpatient visits or prescription fills associated with a diagnosis of mental health or substance abuse disorder, codes 291, 292, and 295–314 from the ICD-9/DSM-IV, or if the treatment was coded as psychotherapy or mental health counseling (Zuvekas 2001), a measure sensitive (88 percent) to provider reports of mental health and substance abuse disorders (Machlin et al. 2009). Nonmental health care PCP events were all outpatient, office-based, and prescription drug events not identified as mental health care events using the criteria above. To obtain these details, respondents were asked about each prescribed medicine purchase, provider visit, emergency department visit, and hospital stay for each household member. A diagnosis for each event was also requested and translated to an ICD-9 code. This information was subsequently verified and completed using information from the follow-back surveys with the physicians, hospitals, and pharmacies referred to by the respondents. Timing of prescribed medicine purchases (or "fills"), with the exception of the start date, is not available by date, only by round. To impute the date of a prescription fill, we used a

method similar to that of a recent study of annual out of pocket expenditures (Selden 2009), incorporating the date the respondent started the prescription and the total number of prescription fills during the round (if one fill, we impute the day in the middle of the round, for two fills we impute two dates 1/3 and 2/3 of the way through the round, etc.).

Key independent variables of interest related to physical health status, measured in the postperiod by the physical health component score of the SF-12 (PCS SF-12: four items from the SF-12 battery standardized to a mean of 50 and standard deviation of 10 with greater scores indicating greater physical health) (Ware, Kosinski, and Keller 1996) and the number of the following physical health conditions identified in the MEPS: diabetes, asthma, stroke, emphysema, joint pain, coronary heart disease, angina, myocardial infarction, and other heart disease (categorized into 0, 1, and 2+ conditions). In the exposure analysis, number of *preperiod* nonmental health care PCP visits is used as an instrument for the number of *postperiod* nonmental health care PCP visits.

To adjust for severity of mental illness, we included postperiod MCS SF-12 and self-reported mental health status (excellent, very good, good, fair, and poor) in regression models. Other model covariates were preperiod income (below federal poverty level [FPL], 100–124 percent FPL, 125–200 percent FPL, 200–400 percent FPL, 400+ percent FPL), region of the country (northeast, south, midwest, and west), insurance status (privately insured, publicly insured, and uninsured), an HMO indicator, gender and age (18–24, 25–34, 35–44, 45–54, 55–64, 65–74, and 75+). Census categories were used for questions about race and ethnicity. Individuals of any race claiming to be of Latino/Hispanic origin were identified as Latino in our study. Other respondents were classified as black or non-Latino white by responses to the question about race. Asian American and Native American respondents were excluded because their sample sizes were too small to generate meaningful estimates.

The sample size for Panels 5–11 of the MEPS is 110,555 with overall response rates that varied between 57 percent and 66 percent (AHRQ 2009a). This sample is smaller than the sum of the samples in the cross-sectional datasets in the corresponding years 2000–2007 because approximately 9 percent of respondents did not have data available for all five rounds of data collection (AHRQ 2009b). Using all inclusion criteria described above except for membership in the lowest tertile of the MCS SF-12, the initial subsample was 40,853 respondents. We further trimmed this sample by 2,962 respondents because of missing data on regression covariates, but tracked exclusions and reweighted the included individuals to account for missingness. This was accomplished by estimating a logit regression of the probability of being

missing on race/ethnicity, income, and gender, and interactions between race/ethnicity and income and gender, generating a predicted probability of being missing for each individual. Weights that account for missingness were calculated by multiplying the final sampling survey weight by the inverse of 1 minus the predicted probability of being missing. This method of accounting for missing data assumes that the item's nonresponse occurs at random, conditional on a core set of characteristics. From the remaining respondents, we restricted the sample to individuals in the lowest weighted tertile of the MCS SF-12 for a final sample of 11,496.

Analysis Plan

We first examined characteristics of Panels 5–11 of the 2000–2007 MEPS sample, providing racial/ethnic group means for our main dependent and independent variables for individuals meeting the inclusion criteria described above. We also conducted cross-tabulations of postperiod initiation of mental health care by number of PCP visit, number of comorbidities, and race/ethnicity, assessing significance of differences using chi-square tests.

To test crowd out, we modeled the receipt of any mental health care within 30 days of the first PCP medical visit in the postperiod as a function of the PCS SF-12 and total number of comorbid physical health conditions, adjusting for race/ethnicity, mental health status, and other covariates. The 30-day window intends to capture referrals or prescriptions made during the PCP visit. We also used a 60-day window around the PCP visit to assess the sensitivity of our findings to the length of the window. For those who did not receive initial treatment during/after the first PCP visit, we examined the second visit to a PCP in the postperiod (if a second visit was made) and repeated the analysis. We did the same for third visits for persons who had not received initial treatment through visit two. We estimated separate models for each of visits one, two, and three because of the complex error structure that would emerge were we to combine these into a single analysis. The crowd-out hypothesis posits that physical cormorbidities make it less likely that a patient will receive initial treatment during each of the first three visits.

We tested the exposure hypothesis by studying the effect of the number of postperiod primary care visits on the likelihood of receiving initial treatment for mental health care, controlling for severity of mental and physical health, and other characteristics. We measured exposure by the square root of the number of postperiod PCP visits to allow for diminishing returns to exposure. We instrumented for number of PCP visits in the postperiod using

preperiod PCP visits to avoid correlation of actual visits with unmeasured characteristics of physical and mental health in the postperiod. This instrument was found to be strongly positively correlated with postperiod visits, conditional on other covariates. In the two-stage IV analysis, we first estimated a model of the square root of number of postperiod PCP visits regressed on the square root of number of preperiod visits (our primary instrument), and other covariates. In stage two, we regressed initiation of mental health service after any PCP visit in the postperiod, identifying the independent effect of the instrumented postperiod visits and race/ethnicity, adjusting for mental and physical health status, and other sociodemographic characteristics. All regressions incorporate survey design of the MEPS using the SVY commands in *STATA* 10 software (StataCorp 2008).

Finally, we compared racial/ethnic groups with their predicted probabilities of any postperiod initiation of mental health care with and without adjustment for comorbidities. We used the subpopulation of respondents in the lowest tertile of postperiod MCS with no preperiod mental health care (this is a larger group than previous analyses because we additionally include those with no postperiod PCP visits). We compared two measures of disparities: (a) disparities treating comorbidities as a variable determining need (comorbidities are adjusted when making predictions), and (b) disparities treating comorbidities as a system-level variable (allowing racial/ethnic differences due to comorbidities to enter into the disparity prediction). We operationalized the IOM definition of health care disparities in three steps: (1) estimating a logistic regression of postperiod initiation of mental health care regressed on the covariates described above; (2) adjusting the distribution of need variables using a rank and replace method including comorbidities as need variables in (a) but not in (b); and (3) generating predictions using the original model coefficients and adjusted need variables.

We adjusted for need-related variables using a rank-and-replace method described in McGuire et al. (2006) and Cook et al. (2009) that creates a counterfactual population of black or Latino individuals with the white distribution of need without adjustment for SES covariates. First, multivariate indicators of need were summarized with a univariate *need-based linear predictor* defined as the sum of the terms (coefficient times covariate) of the fitted model corresponding to need variables. Individuals were then assigned survey-weighted ranks within their racial/ethnic group based on this need predictor. The need variable values of each minority individual were then replaced by those of the equivalently ranked white individual. Thus, a black individual with a need-based predictor at the pth percentile for blacks would be reassigned the need variable values of the white individual at the pth percentile for whites.

We used this three-step estimation process to compare disparity predictions with and without adjustment for comorbid physical health conditions. Variance estimates for predicted expenditures, rates, and disparities were calculated using a balanced-repeated-replication procedure (Wolter 1985). This method repeats the estimation process that was used on the full sample on the 128 subsamples of the population, each of which is half of the full sample size, and calculates the variance of these 128 estimates.

RESULTS

In unadjusted analyses, compared with their white counterparts, blacks in all comorbidity categories (0, 1, 2+) were less likely to initiate mental health care within 30 days of the first postperiod PCP visit (Table 1). Latinos with one comorbid condition were less likely to initiate mental health care after a second postperiod PCP visit. Blacks in all comorbidity categories, and Latinos with no and multiple comorbidities, were less likely than their white counterparts to initiate mental health care at any time after a postperiod PCP visit. Regarding the crowd-out hypothesis, there were no differences by number of comorbidities in initiation, 30 days after the first three PCP visits within racial/ethnic categories. Assessing the exposure hypothesis within racial/ethnic group, whites and Latinos with multiple comorbidities and Latinos with one comorbidity were more likely than their counterparts with zero comorbidities to initiate mental health care in the postperiod. Overall rates of initiation, after any visit during the year were relatively low for all groups, considering these individuals were in the lowest tertile of self-rated mental health care use.

Blacks were younger, had lower income, were more likely to have multiple comorbidities, in worse physical health on the PCS SF-12, less likely to be privately insured, more likely to belong to an HMO, and more likely to live in the South than their white counterparts (complete descriptive statistics are found in Appendix SA2). Latinos were in worse mental health on the MCS SF-12, more likely to be female, younger, lower income, to have fewer comorbidities, to be uninsured, and more likely to live in the West and in urban areas than whites.

Regression coefficients for indicators of comorbidities test for crowd-out after each of the first three postperiod PCP visits (comorbidity coefficients are hypothesized to be negative) (Table 2). After adjustment for covariates, comorbidities were not significant predictors of initiating mental health care after the first, second, or third visits. In the first PCP visit regression, the coefficients on the interaction between black or Latino race/ethnicity and total number of

Table 1: Percent Initiating Mental Health (MH) Care within 30 Days of PCP Visit among Respondents with Probable Postperiod MH Disorder, >1 Postperiod PCP Visit, and No Preperiod MH Treatment

	Race/Ethnicity		
	White (n = 6,620)	*Black (n = 2,004)*	*Hispanic (n = 2,872)*
Crowd-out hypothesis			
After first PCP visit			
No comorbidities	3.1%	1.7%**	2.9%
1 comorbidity	2.6%	1.3%**	2.5%
Multiple comorbidities	2.9%	0.9%**	2.8%
After second PCP visit			
No comorbidities	0.8%	0.2%**	0.4%
1 comorbidity	1.7%	0.1%**	0.4%**
Multiple comorbidities	1.0%	0.8%	0.7%
After third PCP visit			
No comorbidities	0.8%	0.5%	0.3%
1 comorbidity	0.7%	0.9%	0.9%
Multiple comorbidities	1.0%	0.7%	0.8%
Exposure hypothesis			
After any postperiod PCP visit			
No comorbidities	11.3%	7.9%**	6.6%**
1 comorbidity	11.8%	5.1%**	11.7%†
Multiple comorbidities	16.3%†	10.0%**	10.6%**,†

**Significantly different from whites in the same comorbidity category at the $p < .05$ level.
†Significantly different from group with no comorbidities in same racial/ethnic group at the $p < .05$ level.
PCP, primary care provider.
Source: MEPS Panels 5–11 (2000–2007).

comorbidities suggest a negative (though insignificant) relationship between greater number of comorbidities and initial postperiod mental health care for blacks and Latinos.

Turning to the exposure hypothesis, the preperiod number of PCP visits is a good instrument for postperiod number of PCP visits. It is both a very strong predictor of postperiod number of PCP visits ($\rho = 0.52$) and appears to satisfy the exclusion restriction (was an insignificant predictor in a regression of any initiation of mental health care, conditional on postperiod PCP visits and other covariates). We found that number of (instrumented) postperiod PCP visits was a significant positive predictor of initiation of postperiod mental health care after a PCP visit, controlling for other covariates (Table 3). Having greater number of comorbidities was also a significant positive predictor of postperiod initiation of mental health care. Significance tests from instrumental

Table 2: Logit Regression of Initial Visit of Mental Health (MH) Care on Race and Sociodemographic Characteristics, and Insurance Status among Respondents with Probable Postperiod MH Disorder, >1 Postperiod PCP Visit, and No Preperiod MH Treatment

	Probability of Initial MH Visit after First Visit (n = 11,496)		*Probability of Initial MH Visit after Second Visit (n = 11,188)*		*Probability of Initial MH Visit after Third Visit (n = 11,081)*	
	Coefficient	*SE*	*Coefficient*	*SE*	*Coefficient*	*SE*
Race/ethnicity						
Black	−0.97**	0.23	−1.23**	0.42	0.02	0.38
Hispanic	−0.13	0.17	−0.98**	0.34	−0.07	0.47
Comorbidity						
Number of comorbidities	−0.04	0.06	0.10	0.08	0.14	0.10
Number comorbidities × black race	−0.25	0.17	0.15	0.16	−0.11	0.17
Number comorbidities × Hispanic ethnicity	−0.10	0.11	0.02	0.16	0.03	0.18
Physical health component score of SF-12	0.002	0.01	0.01	0.01	0.02	0.02
Mental health						
MH component score of SF-12	−0.05**	0.01	−0.03**	0.01	−0.04**	0.02
Self-reported MH status (referent excellent)						
Very good	0.44	0.26	1.52**	0.56	0.05	0.51
Good	0.69**	0.25	1.80**	0.57	0.54	0.45
Fair	1.17**	0.28	1.71**	0.63	1.06	0.55
Poor	0.81**	0.40	1.89**	0.86	1.85**	0.70
Sociodemographics						
Gender (referent male)						
Female	0.06	0.15	0.30	0.24	0.69**	0.32
Age (referent 35–44)						
18–24	−0.44	0.27	0.49	0.59	0.27	0.61
25–34	−0.27	0.22	1.00**	0.46	0.20	0.51
45–54	−0.34	0.21	0.63	0.44	0.55	0.45
55–64	−0.74**	0.26	0.76	0.51	0.11	0.50
65–74	−0.86**	0.30	0.22	0.56	−1.85**	0.91
75+	−1.14**	0.37	0.31	0.51	−0.49	0.66
Income (referent below FPL)						
100–125% FPL	−0.47	0.33	0.94	0.48	0.08	0.74
125–200% FPL	−0.11	0.25	0.90**	0.36	0.80	0.43
200–400% FPL	−0.20	0.24	0.61	0.39	0.22	0.49
>400% FPL	−0.17	0.28	0.69	0.44	0.63	0.52

continued

Table 2. *Continued*

	Probability of Initial MH Visit after First Visit (n = 11,496)		*Probability of Initial MH Visit after Second Visit (n = 11,188)*		*Probability of Initial MH Visit after Third Visit (n = 11,081)*	
	Coefficient	*SE*	*Coefficient*	*SE*	*Coefficient*	*SE*
Insurance status						
(referent private insurance)						
Public	0.06	0.21	0.46	0.32	0.17	0.37
Uninsured	0.01	0.19	−0.21	0.44	−0.42	0.46
HMO (referent no HMO)						
HMO	−0.12	0.16	−0.14	0.26	−0.08	0.33
Geographic area						
Region (referent northeast)						
Midwest	−0.43	0.24	0.27	0.44	−0.61	0.48
South	−0.56**	0.23	0.17	0.42	−0.01	0.40
West	−0.45**	0.24	0.57	0.43	−0.10	0.43
Urbanicity (referent non-MSA)						
MSA	−0.18	0.20	−0.03	0.27	−0.47	0.29
Constant	−1.55**	0.76	−7.16**	1.39	−5.40**	1.31

**Significant at $p < .05$.

FPL, federal poverty level; PCP, primary care provider.

Source: MEPS Panels 5–11 (2000–2007).

variable probit regression reach identical conclusions as the 2SLS IV regression (results not shown).

We found that estimates of disparities in initiation of mental health care differed depending on whether we adjusted for comorbidities (Table 4). Adjusting comorbidities significantly increased black–white disparities from 9.2 percent to 9.7 percent and significantly decreased Latino-white disparities from 8.9 percent to 8.4 percent. We combined this information with associations derived from model coefficients to arrive at the following interpretation: for both blacks and Latinos, comorbidities were positively associated with initiation of mental health care. If comorbidities are considered to be indicators of "need," then we adjust for comorbidities, reducing blacks' higher levels of need down to the level of whites, decreasing predicted black use, and increasing black–white disparities. For Latinos, adjustment of comorbidities increases Latinos' lower need for care up to the level of whites, predicted use increases, and disparities decrease. Alternatively, if comorbidities are considered to be indicators of greater exposure to the health care system, as we find evidence that they are, then we allow differences in rates of comorbidities to enter into the disparities

Table 3: Second Stage Results from 2 Stage Least Squares IV Regression of Initiation of Mental Health (MH) Care among Respondents with Probable Postperiod MH Disorder, >1 Postperiod PCP Visit, and No Preperiod MH Treatment ($n = 11{,}496$)

	Initiation of MH Care after Any PCP Visit	
	Coefficient	*SE*
Exposure instrument		
Number of postperiod PCP visits (instrumented by preperiod PCP visits)	0.23**	0.05
Race/ethnicity		
Black	−0.47**	0.13
Hispanic	−0.23**	0.11
Comorbidity		
Number of comorbidities	0.09**	0.03
Number comorbidities × black race	−0.05	0.07
Number comorbidities × Hispanic ethnicity	0.01	0.07
Physical health component score of SF-12	0.01**	0.005
Mental health		
MH component score of SF-12	−0.04**	0.01
Self-reported MH status (referent excellent)		
Very good	0.52**	0.15
Good	0.86**	0.15
Fair	1.36**	0.16
Poor	1.33**	0.25
Sociodemographics		
Gender (referent Male)		
Female	0.34**	0.09
Age (referent 35–44)		
18–24	−0.18	0.17
25–34	0.08	0.14
45–54	−0.19	0.12
55–64	−0.24	0.14
65–74	−0.57**	0.16
75+	−0.57**	0.18
Income (referent below FPL)		
100–125% FPL	−0.19	0.19
125–200% FPL	0.06	0.14
200–400% FPL	−0.17	0.13
>400% FPL	−0.12	0.16
Insurance status (referent private insurance)		
Public	−0.03	0.12
Uninsured	−0.13	0.13
HMO (referent no HMO)		
HMO	−0.07	0.09

continued

Table 3. *Continued*

	Initiation of MH Care after Any PCP Visit	
	Coefficient	*SE*
Geographic area		
Region (referent northeast)		
Midwest	0.004	0.14
South	− 0.07	0.13
West	0.11	0.14
Urbanicity (referent non-MSA)		
MSA	− 0.10	0.10
Constant	− 2.23**	0.47

Notes: Models include dummy variables indicating panel number but coefficients are not shown. All main effects involved in interaction terms (race/ethnicity and number of comorbidities) are centered around their mean in order to be directly interpretable.

**Significant at $p < .05$.

FPL, federal poverty level; PCP, primary care provider.

Source: MEPS Panels 5–11 (2000–2007).

predictions, and disparities are approximately 5 percent lower (in relative terms) for blacks and 6 percent higher (in relative terms) for Latinos.

DISCUSSION

Unlike some previous studies (Rost et al. 2000; Furedi et al. 2003; Tai-Seale, McGuire, and Zhang 2007), we found no evidence for the crowd-out

Table 4: Predicting Postperiod Initiation of Mental Health Care with and without Adjusting for Comorbidities ($n = 17{,}269$)

	Predicted Initiation of Mental Health Care without Adjusting for Comorbidities		*Predicted Initiation of Mental Health Care Adjusting for Comorbidities*	
	%	*SE*	*%*	*SE*
White	17.8%	(0.6%)	17.8%	(0.6%)
Black	8.6%	(0.4%)	8.1%	(0.4%)
Disparity	9.2%	(0.8%)	9.7%	(0.8%)
Difference due to adjustment	0.5%	(0.1%)		
Hispanic	8.9%	(0.5%)	9.4%	(0.5%)
Disparity	8.9%	(0.8%)	8.4%	(0.8%)
Difference due to adjustment	− 0.5%	(0.1%)		

All disparities and differences due to adjustment are significant at $p < .05$.

Source: MEPS Panels 5–11 (2000–2007).

hypothesis associated with initiation of mental health care use after the first, second, and third PCP visits. It seems undeniable that dealing with other conditions takes time within a primary care visit. Future research examining the actual content of provider–patient interaction within a visit is necessary to make progress on the question of the behavior of patients and physicians around information exchange and problem presentation.

No detection of a crowd-out effect may also be due to limitations in our data. Our data could not identify whether a mental health care referral was made at the PCP visit, possibly a better indicator of whether crowd-out occurred. We thus cannot be sure whether the patient's failure to initiate mental health care was due to a lack of referral or the patients' failure to act upon the clinician's advice. Initiation of mental health treatment is ultimately a patient decision and action, and an interaction among comorbidity and race/ethnicity around following up on a referral might diminish the crowd-out effect. Another limitation of the MEPS data is that, except for prescription drug start dates, only the round of each prescription drug fill is known and dates had to be imputed. However, we remain confident in the direction of our findings because we expect that errors in prescription fill date imputations will not differ by comorbidity status or racial/ethnic group, and because findings from sensitivity analyses comparing mental health care initiation for 60 days post PCP visit were similar to 30 days post PCP visits. Additionally, understanding racial/ethnic differences in rates of chronic health conditions such as cancer and cardiovascular care is complicated by the fact that racial/ethnic minorities are more likely to be diagnosed at later, more aggressive stages of these diseases. Relying upon self-report of clinician diagnosis as opposed to medical examination data may lead to the misclassification of a number of blacks and Latinos as having no comorbidities. It is unclear in what direction this biases our results but improved diagnostic data would help to improve our understanding of whether blacks and Latinos experience crowd-out differently from whites.

We found evidence that the increased exposure to physicians due to the care needed to treat comorbid physical health conditions improved the likelihood of initiation of mental health care for those in need for care. This is consistent with two previous studies that showed positive associations between physical illness and mental health care treatment (Sambamoorthi et al. 2006; Teh et al. 2008). One clinical implication is that improving the rates at which individuals keep their check-up appointments will not only benefit the treatment of the chronic physical illness but also improve the ability of providers to recognize and treat or refer to treatment for comorbid mental illness. Another possible implication is that increasing the number or length of visits may be a

straightforward and relatively inexpensive way of improving recognition of need for mental health care for racial/ethnic minorities with comorbidities.

Our findings suggest three potential pathways by which disparities in access to mental health may arise and be addressed. First, greater exposure to the health care system for racial/ethnic minorities with comorbidities improves initiation of mental health care. Given these results, intensive follow-up care and disease management are likely, not only to reduce disparities in chronic disease outcomes (Hypertension Detection and Follow-Up Study 1979; Goldman and Smith 2002; Franks and Fiscella 2008) but also to have favorable spillover effects into initiation of needed mental health care treatment. Second, disparities may arise simply because whites have higher rates of a number of comorbid conditions than Latinos and African Americans which translate to their greater need for and use of services. Third, the coefficients measuring the interaction between comorbidities and racial/ethnic group were negative (though not significant) in the first PCP visit and in the exposure analyses. This result provides marginal evidence that blacks and Latinos were less likely to benefit from greater exposure to the health care system than whites, perhaps because of racial/ethnic minority patients' greater difficulty in communicating with their providers (Roter et al. 1997; Van Ryn 2002; Johnson et al. 2004).

Our exposure conclusions are predicated upon the validity of the use of number of preperiod visits as an instrument of number of postperiod visits. We have demonstrated evidence of the validity of two main assumptions of IV analysis: that preperiod visits have a *nonzero association* with postperiod visits and the *exclusion restriction*—that preperiod PCP visits are related to the outcome only through their effect on postperiod PCP visits. Instrumental variable analysis rests on other assumptions as well (Landrum and Ayanian 2001). Among these are that we assume assignment of the instrument is *ignorable*, meaning that survey respondents that differ in number of preperiod PCP visits are similar on observed and unobserved characteristics as if number of PCP visits was randomly assigned. We also assume that the number of postperiod visits for one subject does not affect the likelihood of initial mental health treatment of another subject. Potential correlation of our instrument with unobserved variables is a threat to the validity of our interpretations.

How the investigator chooses to treat comorbidities matters when measuring mental health care disparities. Black–white disparities in initiation of mental health care services increased and Latino–white disparities decreased when racial/ethnic differences in comorbidities were adjusted for in the calculation of disparity. The choice of whether to adjust or not in the context of the IOM definition depends on whether comorbidity is considered as a need variable

or a systems variable. We should adjust for physical illness if we are confident that it affects use only through need for care. We should allow differences due to comorbid physical illness if we think differences in exposure for individuals with comorbidities are driven by factors within the health care system.

Disparities in health care use are only a concern when the services are needed. The "white standard" may include some unnecessary as well as needed services. By confining our analysis to persons with low self-assessed mental health status, we can be reasonably sure that initiation of some mental health care is potentially useful among our study group.

Other variables, in addition to comorbidity, have ambiguous interpretation in models of health care use for purposes of disparities measurement, such as insurance, marital or employment status. Insurance status, for example, can be correlated with unmeasured health status. Minorities and whites differ on these characteristics, and these measures tend to have large effects on rates of use. As in the case of comorbidities, careful examination of the role of these factors (Are they correlated with need? Are they indicators of social support or time costs?) would pay dividends in terms of clarifying the magnitude of disparities as well as the forces responsible for them.

ACKNOWLEDGMENTS

Joint Acknowledgment/Disclosure Statement: This research was supported by grants R01 MH091042 (PI Cook) and P50 MHO73469 (PI Alegria) from the National Institute of Mental Health.

Disclosures: None.

Disclaimers: None.

NOTES

1. Patient preference measures are to be adjusted in the IOM definition and are conceptually distinct from clinical need, representing a desire for treatment based on a patient's values, beliefs, and attitudes, and prior experiences. However, adjusting for preferences is problematic because patients are rarely "fully informed" about their health care options (Ashton et al. 2003), and survey measures do not take into account different levels of knowledge and experience with the health care system (Cooper-Patrick et al. 1997) or the extent to which the expressed preferences might represent a realistic response to inferior access and quality of health care, rather than an exogenously determined preference.
2. For example, in regression equations that assess the significance of the race coefficients, Stockdale et al. (2008) adjust for the Charlson–Deyo comorbidity index,

McGuire et al. (2006) adjust for a list of 17 chronic conditions, the PCS SF-12, and activity limitation, and Alegria et al. (2008) adjust for number of chronic conditions.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.

Appendix SA2: Sample Characteristics, Panels 5–11 of Medical Expenditure Panel Survey (2000–2007) Respondents with Probable Post-Period MH Disorder, $\geq$ 1 Post-Period PCP Visit, and No Pre-Period MH Treatment.

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