

Mental Health Care Consumption and Outcomes:  
Considering Preventative Strategies  
Across Race and Class

Barak Richman, Dan Grossman, Craig Chepke, & Frank Sloan

Duke University Law School  
Duke University Center for Health Policy  
Duke University Medical Center

Abstract: In previous work (Richman 2007), we found that even under conditions of equal insurance coverage and access to mental healthcare providers, whites and high-income individuals consume more outpatient mental health services than nonwhites and low-income individuals. We follow-up that study to determine (1) whether nonwhite and low-income individuals obtain medical substitutes to mental healthcare, and (2) whether disparate consumption leads to disparate health outcomes. We find that nonwhites and low-income individuals are more likely than their white and high-income counterparts to obtain mental health care from general practitioners over mental healthcare providers, and nearly twice as likely not to follow up with a mental health provider after hospitalization with a mental health diagnosis. We further are unable to find any evidence that this leads to adverse health outcomes. These findings echo concern expressed in Richman (2007) that low-income and nonwhite individuals might be paying for health services that primarily benefit their white and more affluent coworkers.

## **Introduction**

The recently passed Mental Health Parity Act of 2007, which purports to expand mental health benefits to 118 million workers, is the most recent manifestation of long-standing legislative efforts to mandate insurance coverage for mental health care. The 2007 Act extends the Mental Health Parity Act of 1996, and most states have instituted their own mental health parity mandates. Unconsidered in debates over parity is the financial impact of expanded mental health benefits on individual workers. If increases in insurance coverage are fully shifted to reductions in take-home pay,<sup>1</sup> then it is important to consider whether insureds are receiving corresponding benefits.

Richman (2007) found that even under conditions of equal insurance coverage and access to mental healthcare providers, whites and high-income individuals consume more outpatient mental health services than nonwhites and low-income individuals. Since consumption of insured healthcare services amounts to an extraction of financial benefits, disparate consumption of healthcare translates into disparate collection of insurance benefits. Richman (2007) found that when controlling for income and other demographic variables, whites on average received four times as many mental health insurance dollars as African Americans and five times as many as Asians; and when controlling for race, the 75<sup>th</sup> percentile wage earner received 65% more mental health services than the 25<sup>th</sup> percentile wage earner.<sup>2</sup> If insurance premiums withhold equal amounts of take-home pay for insured workers of all incomes (and it's not known if and when they do<sup>3</sup>), then insurance mental health insurance benefits facilitate a regressive wealth transfer from low- to high-income workers and from nonwhite to white insureds.

Richman (2007) puts a dollar figure on what most observers surely suspected: that whites and high-income individuals take greater advantage of, and thus extract more financial gain from, a given menu of insurance benefits. Prior research confirms that high-income insureds are less deterred by copayments and other cost-sharing burdens than lower-income individuals with the same insurance benefits (Keeler, et al., 1988; Newhouse et al., 1993). Affluent individuals also are better at navigating through medical bureaucracies to obtain desired providers, high-quality treatment, and medical advocacy (Bloche 2001), and there remains significant evidence that African Americans receive inferior care and attention in the US health system (Institute of Medicine, 2003). Moreover, consumption disparities in mental health services are further explained by different attitudes towards mental healthcare. Nonwhites have been shown to attribute a larger stigma to mental illnesses and seeking mental health care than whites (U.S. Surgeon General, 2001), and there is evidence that nonwhites are more likely than whites to use social support systems and religious participation as alternatives to seeking care from mental healthcare providers (Williams & Neighbors, 2006).

Nonetheless, despite the consequent wealth transfer, mandating coverage for mental healthcare might still be a desirable policy. If it is determined that receiving outpatient mental health care prevents costly mental health hospitalizations, or if receiving services from an outpatient mental health provider is shown to have greater benefits (at lower costs) than receiving services from alternative sources, then perhaps coverage is desirable and low-users of mental health care should be encouraged to consume more. In this paper, we examine whether low-users of insurance-covered mental health benefits – specifically, low-income and nonwhite individuals – obtain

medical substitutes to mental healthcare, and we examine whether those substitutes lead to worse health outcomes than mental health services. We also test, more generally, whether disparate consumption of outpatient mental health services leads to disparate mental health outcomes. We find that nonwhites and low-income individuals are more likely than their white and high-income counterparts to obtain mental health care from general practitioners over mental healthcare providers. We further are unable to find any evidence that this leads to adverse health outcomes. These findings echo concern expressed in Richman (2007) that low-income and nonwhite individuals might be paying for health services that primarily benefit their white and more affluent coworkers.

### **Description of the Data**

Duke University and Duke University Health System (Duke) provide health insurance to more than 20,000 employees in over six counties in central North Carolina.<sup>4</sup> Duke's Human Resources provided limited access to deidentified records of each employee's health claims from 2001 through 2004, yielding almost 92,000 person-year observations. Each health claim includes information on the services provided, the associated diagnosis, and the amounts paid by both the insurer and patient. The data also reveal each individual's race, job category (from which education and income are derived<sup>5</sup>), and insurance benefits.

The demographic profile of the population remains stable for the period under study. Approximately 68% of sample is white and 24% is African American, the median annual income rises gradually from about \$36,000 to \$40,500 over the four years, and the 75<sup>th</sup> and 25<sup>th</sup> percentile incomes range from approximately \$47,800 to \$51,000 and

\$28,600 to \$30,500, respectively. These figures are roughly reflective of the demographic profile of both Durham County (in which Duke University is located) and North Carolina.<sup>6</sup>

Duke offers its employees a menu of insurance coverage options for different employee-paid premiums, including an HMO (selected by over 70% of employees), a more expensive PPO with a wider network of participating providers (selected by about 15% of employees), and other managed care options, some of which were terminated and replaced during the period of study. The different plans offer slightly varying copayments, deductibles, and rates of coinsurance for most medical services, and they also present different copayments for going to out-of-network providers. However, most of these insurance plans offer the same package of mental health benefits, including identical copayments, network, and coverage of services, so there is far less variation across plans for these benefits. In 2004, for example, three of the four insurance plans, subscribed collectively by 87% of the employees, offered identical mental health and substance abuse benefits, with the remaining 13% with a BCBS plan enjoying almost identical financial coverage but for a wider network.<sup>7</sup>

The dataset offers an unusual opportunity to examine healthcare consumption when access is held constant across race and income. Most data sources on healthcare consumption, such as the Medical Expenditure Panel Survey (MEPS), rely on self-reported surveys of populations in which individuals have different insurance benefits and confront assorted barriers to care. In contrast, all of the individuals in the Duke dataset have comprehensive health insurance with nearly uniform mental health coverage. Moreover, the Raleigh-Durham metropolitan area is home to many providers

(including two academic medical centers), so individuals in the data live near a hospital and a physician practice, and since the data includes Duke University Health System employees, a great number of individuals work at or right next to healthcare institutions. Thus, the Duke population faces very few logistical and institutional barriers to care, and observed consumption disparities can be attributed to other factors.<sup>8</sup>

## **Methods & Results**

To examine both the effect and efficacy of insurance coverage for outpatient mental health services, we first examine whether low-income and non-white individuals seek substitutes to mental health services. We then examine whether those substitutes, or forgoing mental health care altogether, lead to adverse health outcomes.

*Consumption Patterns.* We first sought to determine whether race or income is systematically associated with variation in mental healthcare seeking behavior. Our claims data reveals at least three ways insureds can use insurance benefits to obtain outpatient mental health care: receiving care from a mental healthcare professional, filling prescriptions for psychotropic pharmaceuticals, or visiting a general practitioner. The claims data determined whether an insured sought care from a mental health provider or a general practitioner. We separated pharmaceutical claims for psychotropics from other prescriptions based on their NDC codes, and we used International Classification of Diseases 9<sup>th</sup> edition (ICD-9) diagnoses codes – relying only on the primary codes – to determine whether an insured’s visit to a general practitioner included treatment for a mental illnesses.

Insureds were separated into four mutually exclusive categories: (1) individuals who sought care from an outpatient mental healthcare provider (including those who also obtained psychotropic pharmaceuticals and/or sought care from a general practitioner and received a mental illnesses diagnosis), (2) individuals who filled a prescription for psychotropics (including those who sought care from a general practitioner and received a mental illnesses diagnosis) but did not obtain care from an outpatient mental healthcare provider, (3) individuals who sought care from a general practitioner and received a mental illnesses diagnosis but neither obtained care from a mental healthcare provider nor filled a prescription for psychotropics, and (4) individuals who received no form of mental healthcare. We labeled these categories Outpatient Mental Health (OMH), Psychotropics/No-OMH, GP-Only, and No Care.

We employed a multinomial logit test to compare how race and income affected an individual's probability of being in one of the three consumption categories. Table 1 shows the relative risk ratios (RRRs) that capture the comparative probabilities. The 0.29 RRR for African Americans in the OMH category is the probability an African American will consume outpatient mental healthcare divided by the probability he/she will not consume any care. Since whites are the reference group, it means African Americans are only 29% ( $p < 0.001$ ) as likely as whites to be in the OMH group compared to the No Care group. Asians are even less likely than whites to be in the OMH group compared to the No care group, and income is found to increase the relative probability of consuming mental healthcare. These findings, with their significant magnitudes, corroborate those in Richman (2007).

One question raised in Richman (2007) is whether nonwhites and low-income workers obtained mental healthcare through alternative sources. Table 1 indicates that African Americans and Asians are also much less likely to obtain mental healthcare from mental health providers and through psychotropic prescriptions than whites, but are more likely to see a general practitioner for a mental health problem (RRR: 1.24;  $p < 0.001$ ) than not seek treatment at all, compared to whites. Income, however, appears to have an opposite effect on these alternative sources, and lower incomes are associated with greater likelihoods of receiving care from general practitioners and psychotropic prescriptions compared to not seeking help, while higher incomes are associated with greater likelihoods of receiving care from mental health professionals compared to not seeking help. So, while nonwhites are less likely than whites to consume mental health care from mental health providers or through prescription medicines, low-income individuals appear to substitute GPs and prescriptions for mental health providers.

Table 2 further explores different consumption patterns by executing a multinomial logit only for those who seek some kind of care for a mental illness and excludes the No Care group. These findings confirm that rising incomes are associated with declining use of general practitioners for mental health care and increasing use of mental healthcare providers. Also, both Asians (RRR: 2.84;  $p < 0.001$ ) and African Americans (RRR: 2.91;  $p < 0.001$ ) are nearly 3 times as likely to seek care for mental illnesses from GPs than through psychotropic prescriptions compared to whites, while African Americans are just two-thirds as likely (RRR: 0.65;  $p < 0.001$ ) to seek care from mental health providers than through psychotropic prescriptions compared to whites.

These results illustrate that both the race and income variables independently (i.e. when each one is controlled for the other) are associated with different patterns of healthcare consumption. As a general matter, we see significant differences in how individuals of different races and with different incomes seek healthcare for mental illnesses, as low-income and nonwhite individuals are more inclined compared to whites to obtain care from GPs than mental health professionals. We also observe that nonwhites are less likely than whites to seek outpatient mental healthcare or prescription medications, whereas low-income individuals, compared to their more affluent coworkers, appear to substitute care from GPs and prescriptions for psychotropics for outpatient mental healthcare.

***Incidence of Mental Illness and Effectiveness of Mental Healthcare.*** Differences in consumption patterns are difficult to interpret meaningfully without evaluating the effectiveness of the alternative forms of care. We begin by examining whether outpatient mental healthcare, compared to GP visits and psychotropics (which are covered in standard care, not by a mental healthcare benefit) reduce the likelihood of an adverse outcome. We use hospitalizations associated with mental illnesses as an indicator of an adverse outcome, which we gathered from three sources. We identified any individual hospitalized with a primary diagnosis of mental disorder (ICD-9 codes 290-319), any insured who sought treatment at an emergency room and received a primary diagnosis of mental disorder, and any patient who received mental health care with a service code that denoted inpatient treatment (which largely included hospital patients who had an inpatient mental health consult). With these three sources, we identified 297 individuals who were hospitalized at least once.

Since mental illnesses prevent many individuals from maintaining their employment, we employed a competing risk model to compare the probability of hospitalization with the likelihoods that individuals will leave our sample of insured, which occurs when an employee leaves the Duke workplace. The competing risk model permits a comparison of two alternative risks for identical groups while controlling for differences in the sizes of the groups of interest. The results in Table 3 reveal that the probabilities of African Americans, Asians, and whites being hospitalized for a mental illness are statistically indistinguishable, while low-income employees are more likely to be hospitalized than their higher-income co-workers (Hazard ratio (HR): 0.82;  $p=0.001$ ) (high-income employees are also more likely to leave the employment sample, probably because of better outside labor market opportunities).

Table 3 therefore dispels, in part, one potential explanation for the results in Tables 1 and 2, that differences in consumption across race reflect differences in need. Table 3 instead suggests that nonwhites are about as likely to require hospitalization as whites, and thus their lower levels of consumption cannot be solely attributed to differences in the incidence of mental illness. The combined results in Tables 1-3 also conform to research relying on survey data revealing that ethnic and racial minorities experience lower prevalence rates of acute mental illnesses than whites but are equally likely (and often more likely) to present severe major disorders and debilitating mental illnesses (Williams et al. 2007).

The bigger question begged by Tables 3 is whether interventions by medical professionals can reduce the probability of a hospitalization associated with a mental illness, and whether some interventions are more effective than others (Tables 1-3 also

suggest that low-income individuals are more likely to be hospitalized yet are less likely to seek outpatient mental health care, which additionally invite further testing of the efficacy of interventions). Table 4 introduces interventions into the competing risk model and offers little evidence that the interventions work. Individuals who consume outpatient mental healthcare are more than nine times as likely to be hospitalized as individuals who receive no care, and individuals who fill prescriptions for psychotropics are more than three times as likely.

Of course, Table 4's results are readily explained by the endogeneity of the consumption patterns, since individuals who seek mental healthcare of any sort are revealing some mental illness, and individuals with some form of illness are more likely to be hospitalized. The problem of controlling for underlying condition is an enormous empirical challenge throughout all these efforts to evaluate the effectiveness of alternative interventions. In Table 5, we add to the competing risk model our own severity index, in which a psychiatrist assigned a 1-10 value for each mental illness-related ICD9 diagnosis, with 10 being the most severe. Each individual who received a diagnosis from either a general practitioner or an outpatient mental healthcare provider thus received a severity score, and in order to allow the severity index to predict hospitalizations, we based the severity score on the diagnosis individuals received before they were hospitalized (if they were hospitalized at all). The problem with employing this metric, aside from its reliance on approximations, is that it assigns a zero to all individuals who do not receive any diagnosis. Thus, since more than one-quarter of those hospitalized did not visit a GP or mental health provider before being hospitalized, and thus did not receive a diagnosis, the metric is necessarily biased downward. Nonetheless, in Table 5 the severity index is

positively associated with the likelihood of hospitalization, and including it in the model makes the medical interventions less associated with hospitalizations (suggesting that the severity measure does help solve the endogeneity problem). More important, even when controlling for severity, the results do not indicate that receiving care from outpatient mental health providers reduces the likelihood of hospitalization. Receiving care from a general practitioner – a service covered by standard insurance benefits, not by mental health benefits – does appear to reduce the probability of hospitalization.

For a robustness check, and to pursue another path to control for the severity of the underlying medical condition, we examined only the 297 individuals who were hospitalized for a mental illness. Even though these individuals were hospitalized under different conditions and for different illnesses, their severity is much more homogeneous than that of the whole sample. Moreover, each hospitalized individual is, at time of discharge, given an appointment to see an outpatient mental healthcare provider within the first few weeks of discharge, with regular visits scheduled thereafter. We therefore can test to see if these post-hospitalization instructions are followed, and we can test to see if race or income affects the probability an individual will miss, or refuse to attend, those follow-up appointments.

To test for “failure” to attend post-hospitalization outpatient appointments, we determine whether within the first four months of discharge there is a 90-day period in which a formerly hospitalized patient does not visit an outpatient mental health provider. We employ a competing risk model that compares the probability of an adherence failure across race and income, with results shown in Table 6. Here again, African Americans and Asians, controlling for income, exhibit a lower propensity to visit outpatient mental

healthcare providers, even shortly after being discharged for a hospitalization (though the small sample size keeps the Asian coefficient from being statistically significant, with a p-value of 0.23). Income does not affect follow-up behavior, suggesting that the refusals of nonwhites might be a function of cultural preferences rather than financial means.

In Table 7, we test whether the failure to follow post-discharge instructions has adverse consequences. We use rehospitalization as an adverse outcome, and we determine whether discharged individuals are hospitalized after 14 days (to ensure that the second admission reflects a second event, rather than a recurrence) but within one year of the date of initial discharge. We then employ a competing risk model to calculate whether the likelihood of rehospitalization is affected by race, income, or failure to pursue post-discharge outpatient mental healthcare. Table 7 reveals that there is little evidence that failure to follow-up increases the probability of a rehospitalization. In fact, a “failure” to follow-up with an outpatient mental health provider is closer to decreasing, rather than increasing, the likelihood of a rehospitalization (p-value is 0.26), although this also might be a problem of unobserved severity – individuals who fail to follow-up might have less severe illnesses. These analyses that focus on hospitalized insureds, however, have a much smaller sample size, and thus are less likely to produce significant results.

Table 8 reveals where discharged patients seek care, including those who fail to follow-up with mental healthcare providers. Here again, like the results in Tables 1 and 2, African Americans appear to prefer seeking care from general practitioners (or forgo care altogether) than visit mental healthcare providers. These results are even more striking than Tables 1 and 2 since they follow a severe event that was accompanied by instructions to see a mental healthcare provider, and like Table 1, African Americans are more likely

that whites, post-hospitalization, to seek care from a GP. Table 9 offers similar results for the six months prior to an initial hospitalization. Of individuals who are hospitalized for mental illnesses, African Americans are more likely to seek care from GPs than from mental health providers.

### **Discussion & Conclusion**

While policymakers who mandate insurance benefits might think that promoting insurance thereby promotes desirable health outcomes, our results offer little support. Nonwhites and low-income individuals do not take advantage of their mental health benefits at the same rates as their white and more affluent coworkers, and to the degree that they seek care for mental illnesses, they are more likely to seek care from general practitioners. Differences in consumption patterns across race are also evident among those who are hospitalized, both before and after hospitalization. The post-hospitalization findings are especially striking since upon discharge, every patient is instructed to seek outpatient mental healthcare. The variation in adherence rates following hospitalization is a sharp illustration of the fragmentation of delivering mental healthcare, as insureds receive care from GPs, hospitalists, and mental health providers with little coordination.

Despite differences in consumption patterns, especially between African Americans and whites but also between Asians and whites and across income, we find no evidence that these differences affect the probability of hospitalizations for mental illnesses. Specifically, receiving care from a mental health provider does not reduce the

probability of hospitalization, and following a hospitalization, receiving outpatient care from a mental health provider does not reduce the probability of rehospitalization.

In short, we find nothing to temper the provisional conclusions in Richman (2007). It appears that white and affluent workers take greater advantage of the mental health insurance benefit than their nonwhite and lower-income co-workers, that nonwhites, especially African Americans, are significantly more likely to seek care from general practitioners than from mental healthcare providers, and that there is no statistically significant evidence that receiving outpatient care from a mental healthcare provider reduces the likelihood of adverse mental health.

The limitations of these results should be recognized. The studied population works in a university setting, and it is unclear how generalizable the findings are. Moreover, relying on hospitalizations as a measure for adverse mental illnesses is fairly coarse, and more sensitive measurements – such as lost workdays or surveyed responses – would improve our ability to measure effectiveness.

More important, it is not clear what drives these results. The potential causes for the consumption disparities range from different attitudes towards necessary care, enmeshed in ethnic histories with healthcare providers or cultural attitudes towards mental illnesses, to different preferences and needs for care, to discriminatory referral practices and the effectiveness of care. Much more needs to be known about how individuals engage with their insurance benefits and healthcare providers and whether those benefits and providers meet the needs of the insureds. Many of these questions can be further explored with employer claims data, and we also hope to supplement these econometric investigations with surveys and focus groups that inquire into attitudes and

practices that shape healthcare-seeking behavior. Given the complexity of the studied behavior, employing multiple methodologies and several data sources might be necessary before arriving at meaningful conclusions about mental health interventions and benefits policies.

Nonetheless, we continue to produce findings that raise serious questions about the efficacy and fairness of mandating mental health benefits, as Congress (like many state legislatures) has done again. Insurance coverage of this kind continues to appear as transfer payments from non-whites to whites, and from low-income to higher-income individuals. Before insurance expansions spread further, serious attention should be given to studying how insurance benefits and our fragmented healthcare system can improve mental health outcomes without charging vulnerable populations for services they do not want or need.

**Tables**

**Table 1. Multinomial logit: Relative risk ratios (RRR) of receiving mental healthcare from alternative providers compared to receiving no mental healthcare**

	Outpatient Mental Health (OMH)		Psychotropics/ No OMH		General Practitioner only	
	RRR	P value	RRR	P value	RRR	P value
Male	0.56	0.000	0.46	0.000	1.05	0.328
Age	1.02	0.000	1.05	0.000	1.03	0.000
African American	0.29	0.000	0.43	0.000	1.24	0.000
Asian	0.24	0.000	0.23	0.000	0.65	0.001
Income	1.03	0.002	0.94	0.000	0.91	0.000

Source: Duke Human Resources

N = 31640

Omitted reference group is "No Care"

RRR – Relative risk ratio

Covariates not shown include type of insurance, income missing, year of service

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

**Table 2. Multinomial logit: Relative risk ratios (RRR) of receiving alternative forms of mental healthcare for those who obtain some form of mental health care**

	Outpatient Mental Health (OMH)		General practitioner only	
	RRR	P value	RRR	P value
Male	1.26	0.000	2.31	0.000
Age	0.97	0.000	0.98	0.000
Black	0.65	0.000	2.91	0.000
Asian	0.99	0.936	2.84	0.000
Income	1.10	0.000	0.96	0.065

Source: Duke Human Resources

N = 11129

Omitted reference group is "Psychotropics/no MH"

Covariates not shown include type of insurance, income missing, year of service

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

**Table 3. Competing risk between the likelihood of hospitalization versus exiting the sample**

	Hospitalization		Exiting sample	
	HR	P value	HR	P value
Black	0.80	0.148	1.12	0.477
Asian	0.71	0.286	1.63	0.137
Income	0.82	0.001	1.10	0.096

Source: Duke Human Resources

N= 31640

Notes: HR – Hazard ratio

Covariates not shown include gender, type of insurance, income missing, age, year of service

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

**Table 4. Competing risk between the likelihood of hospitalization versus exiting the sample: Effect of mental health consumption**

	Hospitalization		Exiting sample	
	HR	P value	HR	P value
Black	1.22	0.190	0.70	0.017
Asian	1.20	0.572	0.89	0.728
Income	0.80	0.000	1.12	0.071
Outpatient mental health (OMH)	9.01	0.000	0.08	0.000
Psychotropics/No OMH	3.23	0.000	0.22	0.000
General practitioner only	1.60	0.101	0.43	0.003

Source: Duke Human Resources

N= 31640

Notes: HR – Hazard ratio

Covariates not shown include gender, type of insurance, income missing, age, year of service

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

**Table 5. Competing risk between the likelihood of hospitalization versus exiting the sample: Effect of mental health consumption and severity index**

	Hospitalization		Exiting sample	
	HR	P value	HR	P value
Black	1.24	0.152	0.68	0.012
Asian	1.24	0.513	0.86	0.661
Income	0.82	0.001	1.09	0.144
Outpatient mental health (OMH)	0.77	0.429	0.93	0.828
Psychotropics/No OMH	0.58	0.073	1.24	0.490
General practitioner only	0.20	0.000	3.58	0.001
Severity	1.48	0.000	0.67	0.000

Source: Duke Human Resources

N= 31640

Notes: HR – Hazard ratio

Covariates not shown include gender, type of insurance, income missing, age, year of service.

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

**Table 6. Competing risk: Hazard ratios (HR) of failure to adhere to post-hospitalization follow-up treatment versus exiting the sample**

	Treatment failure		Exiting sample	
	HR	P value	HR	P value
Male	1.21	0.265	1.23	0.653
Age	0.99	0.326	0.97	0.073
Black	1.92	0.000	0.52	0.201
Asian	1.64	0.231	2.75	0.287
Income	0.92	0.191	0.66	0.059
Severity	0.83	0.000	1.41	0.012

Source: Duke Human Resources

N=297

Notes: Treatment failure is not seeking mental health outpatient care for a period of longer than 90 days

Included covariates were year of service, type of insurance, and income missing. None were significant.

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

**Table 7. Competing risk: Hazard ratios (HR) of rehospitalization within 1 year following initial hospitalization versus exiting the sample: Effect of Treatment failure**

	Rehospitalization		Exiting sample	
	HR	P value	HR	P value
Male	1.52	0.186	1.20	0.660
Age	1.02	0.186	0.96	0.036
Black	1.05	0.908	1.68	0.357
Asian	1.00	0.997	3.80	0.234
Income	0.92	0.480	1.00	0.982
Severity	1.12	0.277	0.97	0.809
Treatment failure	0.65	0.263	0.36	0.070

Source: Duke Human Resources

N=293

Treatment failure is failure to see mental health provider for a period of 90 days within in the first four months following initial hospitalization.

Included covariates were year of service, type of insurance, and income missing. None were significant.

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

**Table 8. Multinomial logit: Relative risk ratio (RRR) of receiving mental healthcare from alternative providers in the 4 months after initial hospitalization versus exiting the sample**

	Outpatient Mental Health		Psychotropics or general practioner (No OMH)		Exit Sample	
	RRR	P value	RRR	P value	RRR	P value
Male	0.57	0.187	0.74	0.514	1.06	0.903
Age	1.02	0.318	1.01	0.518	1.00	0.953
Black	0.27	0.004	0.57	0.249	0.24	0.008
Asian	0.21	0.177	0.44	0.470	0.66	0.694
Income	1.14	0.346	1.09	0.603	0.97	0.862
Severity	1.38	0.013	1.14	0.366	1.25	0.129

Source: Duke Human Resources  
N=297

Notes: Omitted reference group is "No Care"

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

**Table 9. Multinomial logit: Relative risk ratios (RRR) of receiving mental healthcare from alternative providers in the 6 months prior to initial hospitalization**

	Outpatient Mental Health		Psychotropics/ No OMH		General practitioner only	
	RRR	P value	RRR	P value	RRR	P value
Male	0.50	0.117	0.38	0.035	1.64	0.505
Age	1.04	0.087	1.04	0.087	1.03	0.439
Black	0.08	0.000	0.19	0.000	4.07	0.162
Asian	0.87	0.323	0.94	0.651	0.61	0.179
Income	1.09	0.553	0.96	0.748	0.82	0.512
Severity	0.50	0.117	0.38	0.035	1.64	0.505

Source: Duke human resources  
N=220

Notes: Omitted reference group is "No Care"

Asians were excluded from this analysis due to insufficient sample size

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

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## **NOTES**

<sup>1</sup> See generally Jonathan Gruber, *Health Insurance and the Labor Market* 55 (Nat’l Bureau of Econ. Research, Working Paper No. 6762, 1998) (reviewing the empirical literature and concluding that “the results that attempt to control for worker selection, firm selection, or (ideally) both, have produced a fairly uniform result: the costs of health insurance are fully shifted to wages”).

<sup>2</sup> B.D. Richman, “Insurance Expansions: Do They Hurt Those They Are Designed to Help?” *Health Affairs* 26, no.5 (2007): 1345-1357.

<sup>3</sup> See C.C. Havighurst & B.D. Richman, “Distributive Injustice(s) in American Healthcare,” *Law and Contemporary Problems* 69, no.4 (2006): 44-45 for a discussion of the limited research on this issue.

<sup>4</sup> Duke has employees living in 97 of North Carolina’s 100 counties, but 95% live in the six counties surrounding the Raleigh-Durham area. The region is home to many urban, suburban, and rural residential areas.

<sup>5</sup> To protect employees' privacy, and to ensure that the data remained deidentified, individual salaries were not released. However, Duke HR categorizes each position by job code, each with a fairly precise salary range and required levels of education, which permitted imputing education and annual income for each individual. Income was determined by the mid-point of the income range for each job code, coded in units of \$10,000 in 2004 dollars. For job codes where wages are hourly, the hourly rate was multiplied by the individual's full-time equivalent. Job code salary ranges were not available for 2001, so 2001 incomes were imputed for each job code from the salary ranges in 2002-04. Finally, faculty member salaries and the salaries of certain administrators are not determined by job code, thus individuals with these positions are not included in the sample. Anecdotal evidence suggests that results would be even stronger if these high-income individuals remained in the data. Also omitted from the analyses were individuals with missing race data (N=784).

<sup>6</sup> The dataset is skewed by gender since women are heavily represented in healthcare occupations. Approximately 65% of the individuals in the dataset are female. Female median income in the sample is nearly identical to median income for males, which is just above the median for males in Durham County.

<sup>7</sup> The BCBS plan imposes \$35 copayments for unlimited outpatient office visits, whereas the other three plans impose \$35 copayments for up to twenty in-network visits and a \$100 deductible plus 50% coinsurance for all out-of-network visits. The non-BCBS plans also impose some precertification requirements and laboratory and outpatient charges. However important or unimportant these cost-sharing differences are, we control in each analysis for insurance plan, including controlling separately for the three plans, enjoyed by 87% of the population, that offer identical coverage.

<sup>8</sup> It should be noted that the benefits offices of most large employers should have access to similarly useful data, but very few share their data with researchers. Benefits data of this kind is a valuable resource both to understand healthcare consumption and to explore important health policy questions. We are deeply grateful to Duke Human Resources for its eagerness to explore research questions of both local and national importance. Medicare claims data exhibits some of these advantages, since it follows heterogeneous individuals with known insurance benefits, but it does not cover the working population.