Published in final edited form as:
Am J Geriatr Psychiatry. 2011 February ; 19(2): 176–184. doi:10.1097/JGP.0b013e3181e56cfa.

The Effect of Cognitive Impairment on Mental Healthcare Costs for Individuals With Severe Psychiatric Illness

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Abstract

Objective—This study was conducted to determine the effect of cognitive impairment (CI) on mental healthcare costs for older low-income adults with severe psychiatric illness.

Methods—Data were collected from 62 ethnically diverse low-income older adults with severe psychiatric illness who were participating in day programming at a large community mental health center. CI was diagnosed by a neuropsychologist utilizing the Mattis Dementia Rating Scale-Second Edition and structured ratings of functional impairment (Clinical Dementia Rating Scale). Mental healthcare costs for 6, 12, and 24-month intervals before cognitive assessments were obtained for each participant. Substance abuse history was evaluated utilizing a structured questionnaire, depression symptom severity was assessed utilizing the Hamilton Depression Rating Scale, and psychiatric diagnoses were obtained through medical chart abstraction.

Results—CI was exhibited by 61% of participants and was associated with significantly increased mental healthcare costs during 6, 12, and 24-month intervals. Results of a regression analysis indicated that ethnicity and CI were both significant predictors of log transformed mental healthcare costs over 24 months with CI accounting for 13% of the variance in cost data.

Conclusions—CI is a significant factor associated with increased mental healthcare costs in patients with severe psychiatric illness. Identifying targeted interventions to accommodate CI may lead to improving treatment outcomes and reducing the burden of mental healthcare costs for individuals with severe psychiatric illness.

Keywords

Mental healthcare costs; cognitive impairment; severe psychiatric illness; schizophrenia; major depression; community mental health

Psychiatric illness is associated with significant mental healthcare costs, and recent estimates Schizophrenia and major suggest that the annual cost of medical treatment of psychiatric disorders in the United States exceeds 47 billion dollars per year.[1] depression in particular have been strongly linked to significantly increased costs of medical service[2–8] and the mechanisms contributing to these increased costs are multifaceted. Increased medical treatment costs in these patient populations are largely associated with greater utilization of mental healthcare services directly related to these disorders including

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Preliminary data from this investigation were presented at the 36th annual meeting of the International Neuropsychological Society.

inpatient, outpatient, and medication treatments[8,9] but have also been attributed to mental health treatments for concurrent psychiatric conditions[10] and substance abuse disorders.[11] Additionally, increased costs in these patient populations have also been linked to costs related to higher utilization of emergency room services,[9] increased rates of medication nonadherence,[12] and costs of care related to concurrent medical illness.[11,13] Although the pathways contributing to increased mental healthcare costs for individuals with psychiatric illness are complex, the delineation of these factors represents a critical avenue to identify mechanisms to improve treatment outcomes and lower the burden of these costs.

Cognitive impairment (CI) is a commonly co-occurring aspect of both schizophrenia and major depressive disorder,[14–17] but the effect of CI on mental healthcare costs for individuals with psychiatric illness has not been adequately evaluated. CI has been consistently shown to be strongly linked to medication nonadherence[18–25] and other aspects of medical treatment nonadherence,[26] poor medical decision-making capacity,[27] and poor mental health outcomes[28–31] and each of these factors has the potential to significantly increase mental healthcare costs. In addition, CI is also a common clinical feature of older adults presenting to emergency rooms,[32,33] which has been associated with increased rates of inpatient hospitalization,[34] another factor associated with increased mental healthcare costs. As such, there is compelling evidence to suggest that CI may be significantly associated with increased mental healthcare costs for individuals with psychiatric illness. However, to date, the relationship of CI to mental healthcare costs has not been evaluated sufficiently, particularly among older adults with severe psychiatric illness.

Older adults with severe psychiatric illness often receive mental healthcare at community mental health centers, and these individuals frequently have numerous chronic psychiatric illnesses, substance abuse histories, and significant medical comorbidities.[35,36] As such, older adults receiving treatment at community mental health centers have numerous risk factors for CI, and recent findings from our research group suggest that CI occurs in up to 60% of older adults treated at community mental health centers.[37] Although several studies have linked CI to increased overall healthcare costs for older adults with neurodegenerative disease or stroke[38–41] and others have demonstrated additional costs associated with psychiatric symptoms in individuals with neurodegenerative disease with CI,[42–45] the effect of clinically defined CI on mental healthcare costs for older adults with a primary diagnosis of severe psychiatric illness is not yet clear. In one previous study, cognitive performance in younger adults with schizophrenia was found to be associated with cost of overall medical treatment;[46] however, a clinical diagnosis of CI was not utilized in this investigation.

This study was conducted to determine the effect of clinically defined CI on mental healthcare costs for older adults with severe psychiatric illness receiving treatment at a large community mental health center. We hypothesize that CI will be associated with increased mental healthcare costs in this patient population. Such findings would have significant implications for the potential to reduce mental healthcare costs for individuals with severe psychiatric illness by improving mental health outcomes for individuals with CI.

METHODS

Participants

All study procedures for this study received approval by an institutional review board for human research. Participants included 62 older adults (ages 60 years and older) recruited from a large community mental health agency. Participation in this study was voluntary. Participants were provided information about the study by posting fliers in the lobby of the community mental health facility and through brief announcements given by community mental health center staff at the beginning of day programming. Interested individuals

discussed the project with community mental health center staff members and appointments with research staff were subsequently scheduled for participants willing to participate in the study. After complete description of the study was provided to the subjects, written informed consent was obtained.

Procedures

Neuropsychologists or trained research assistants administered cognitive assessments to all study participants. All assessments were conducted at the community mental health agency facility and not all participants completed all measures. Information obtained during research evaluations was not included in patients' clinical record. Two identified staff members from the community mental health center conducted medical chart reviews for participants to obtain current psychiatric diagnoses from participants' medical records. Cost of mental healthcare services was obtained for each participant from the community mental health center.

Measures

Mattis Dementia Rating Scale-Second Edition—The Mattis Dementia Rating Scale-Second Edition (DRS-2) is a measure of overall cognitive functioning for older adults that has been shown to be a valid and sensitive indicator of CI.[47,48] The DRS-2 has established psychometric properties,[47] and age and education-corrected scaled scores for the DRS-2 total score[49] were utilized as criteria for CI in this study.

Clinical Dementia Rating Scale—The Clinical Dementia Rating (CDR) is a screening measure utilized to assess functional declines in older adults caused by CIs to classify stages of dementia. The CDR uses clinician ratings of functional status in six major domains (memory, orientation, judgment and problem solving, community affairs, home and hobbies, and personal care) to obtain a total score of functional status. The CDR total score is a 5-point scale with "0" denoting no CI, and the remaining four points correspond to various stages of dementia (0.5 = very mild/questionable, 1 = mild, 2 = moderate, and 3 = severe). For this study, CDR scores were rated by research clinicians based on the report of case managers working with each participant.

CAGE Questionnaire—The CAGE questionnaire is a measure of substance abuse history derived from the phrasing of four questions about the need to "cut down on your drinking," being "annoyed by people criticizing your drinking," having "felt bad or guilty about your drinking," and "ever having a drink first thing in the morning (eye opener) to steady your nerves or get rid of a hangover." A point is scored for each positive response. For this study, the CAGE questionnaire was modified to also include these four questions about other type of substance abuse including abuse of narcotic drugs. The total score for this eight item questionnaire ranges from 0 to 8; with high scores denoting greater history of substance abuse. This screening instrument assesses lifetime prevalence of alcohol and drug problems; history of alcohol/drug problems and current alcohol/drug problems are not differentiated. The CAGE questionnaire has been shown to be valid[52] and has been demonstrated to have good sensitivity and specificity in detecting history of alcoholism among individuals with a variety of mental illnesses.[53]

Hamilton Depression Rating Scale—The Hamilton Depression Rating Scale is a 24-item instrument utilized to assess severity of depressive symptoms. Scores range from 0 to 75; high scores indicate greater severity of depression. The Hamilton Depression Rating Scale is extensively utilized as a measure of depression symptom severity in older adults and has been shown to be a valid measure of depressive symptoms in individuals with CI.[55,56]

Mental Healthcare Costs—Mental healthcare costs for all participants were obtained for three time intervals (6, 12, and 24 months) preceding the neuropsychological evaluation. Mental healthcare costs included all costs of service billed to the county mental health department, the state mental health department, and Medicaid and Medicare for inpatient and outpatient mental health treatment and psychiatric emergency room services. Pharmacy costs, costs related to supported housing facilities, and any mental health service costs that may have been paid by private insurers or by other counties were not available for review and were not included in this assessment of mental healthcare costs.

Data Analytic Procedure

CI was defined as a total DRS score falling at or below the 10th percentile when referenced to age and education matched peers and evidence of functional impairment related to cognitive difficulties (CDR score ≥0.5). Primary psychiatric diagnosis and men-tal healthcare costs were obtained by community mental health agency staff who did not know the results of participants' cognitive test results. Participants were classified for group comparisons for mental healthcare costs on the basis of cognitive function (cognitively impaired/cognitively intact), psychiatric diagnosis (mood disorders/psychotic disorders), ethnicity (white/nonwhite), and type of housing (independent/ supported). Because mental healthcare cost data were not normally distributed, cost data were log transformed for all subsequent analyses. Analysis of variance procedures were then used to evaluate the effect of gender, ethnicity, psychiatric diagnosis, type of housing, and cognitive function on mental healthcare costs over 6, 12, and 24 months. Analysis of variance procedures were also utilized to evaluate the degree to which cognitively impaired individuals differed from cognitively intact participants with respect to age, education, substance abuse history, and annual income. Nonparametric analyses were then utilized to compare cognitive groups on the basis of gender, ethnicity, and psychiatric diagnosis. Subsequently, a set of three regression models were estimated and tested to determine the degree to which demographic variables (age, education, ethnicity, and type of housing) and clinical variables (psychiatric diagnosis, substance abuse history, and presence of CI) predicted mental healthcare costs over 24 months. To test for multicollinearity, we evaluated the tolerance of independent predictor variables. An alpha of 0.05 was used for all statistical tests.

RESULTS

Twenty-nine participants were male (47%); 64% were white, 15% were Asian, 15% were African American, 2% were Pacific Islanders, and 4% of participants identified as belonging to "other" ethnic groups. The mean age of the sample was 68.9 years (standard deviation [SD] = 7.2), the mean level of education was 13.2 years (SD = 3.0), and the mean annual income for the sample was $12,618 (SD = 12,603). Forty-seven percent of the sample had a primary diagnosis of mood disorder, and 44% were diagnosed with a psychotic disorder. One individual (1%) in the sample had a primary diagnosis of anxiety disorder, and five individuals (8%) did not have a primary mental health diagnosis specified in their medical record. Fifty-nine percent of the sample lived independently and 41% lived in supportive care residences (30% lived in board and care facilities and 11% lived in supportive senior centers or senior residential hotels). Sixty-one percent of the sample met criteria for CI.

Mental healthcare costs for the 6, 12, and 24-month intervals preceding neuropsychological assessments are provided in Table 1. There were no significant T1, group differences on mental healthcare costs on the basis of gender, ethnicity, or type of housing. To evaluate the effect of psychiatric diagnosis on mental healthcare costs, the five individuals without a psychiatric diagnosis and the one individual with a di-agnosis of anxiety disorder were removed from the analysis, and no significant differences were observed in mental

healthcare costs for individuals with mood disorders, when compared with psychotic disorders. Cognitively impaired individuals had significantly higher mental healthcare costs during 6, 12, and 24-month intervals, when compared with cognitively intact individuals (Table 1 and Fig. 1). Cognitively impaired individuals did not differ from cognitive intact individuals on age, education, annual income, gender, ethnicity, or substance abuse history but were less likely to be living independently, when compared with cognitively intact individuals (Table 1).

To evaluate the effect of demographic and clinical variables on mental healthcare costs over 24 months, a regression analysis was conducted. To determine the effect of psychiatric diagnosis on mental healthcare costs, psychiatric status was coded according to primary diagnosis (mood disorder and psychotic disorder). Again, individuals with no specified psychiatric diagnosis (N = 5) and the individual with a primary diagnosis of anxiety disorder (N = 1) were not included in this analysis to maintain dichotomous classification of participants for psychiatric diagnosis. Results of this regression analysis ($F_{[7,50]} = 2.65$, p = 0.026) demonstrated that ethnicity (white) and CI were associated with increased mental healthcare costs during the 24-month interval, but other demographic and clinical variables were not (Table 2).

CONCLUSIONS

In this study, we evaluated the effect of CI on mental healthcare costs in a sample of 62 older, ethnically diverse, low-income participants. Our sample was largely comprised individuals with mood disorders and psychotic disorders, and 61% of the sample demonstrated CI consistent with our previous study evaluating CI in individuals with severe psychiatric illness.[37] Our results indicate that cognitively impaired individuals had mental healthcare costs than were nearly double that of cognitively intact individuals over each of the intervals assessed. Furthermore, when controlling for other demographic and clinical variables, both ethnicity and CI were significant predictors of mental healthcare costs in this sample.

Our finding that CI was significantly associated with mental healthcare costs was expected given numerous studies suggesting the potential for CI to directly affect mental healthcare costs through associations with poor mental health outcomes, treatment nonadherence, poor medical decision making ability, and high rates of emergency room services utilization.[18–31,34,57] Additionally, CI may serve as a phenotypic marker of individuals with greater medical burden and/or neurodegenerative disease,[58–65] which could also strengthen the association between CI and mental healthcare costs given commonly documented relationships between medical burden and psychiatric treatment outcomes.[66] Nonetheless, to our knowledge, this is the first study to investigate the relationship of clinically defined CI to mental healthcare costs specifically for older, low-income adults with severe psychiatric illness, and our results suggest that CI is a significant factor in mental healthcare costs in this population.

In comparison with another recent study evaluating the effect of cognitive functioning on 6-month healthcare costs among younger schizophrenic patients,[46] our sample had significantly lower mental healthcare costs during a 6-month interval ($8,145 versus $23,824). Although direct comparisons of cost of mental healthcare costs between these two studies is difficult due to different methodology used and different clinical characteristics of the sample, it seems that the discrepancies in costs between the two samples studies can largely be accounted for by inclusion of the cost of specialized/inpatient accommodations ($14,882) and medication costs ($1,407) that were included in the study by Patel et al., which were not included in our analyses. After removing these costs, the 6-month mental

healthcare costs for our sample of older adults would be slightly higher than costs for the younger sample. Similarly, when referenced to the costs of medical treatment for individuals with psychiatric symptoms in adults in a Medicaid health maintenance organization sample during a 12-month interval ($6,995),[11] the 12-month mental healthcare costs for individuals with severe psychiatric illness in our sample was significantly higher ($20,615). We would suggest that that these differences are largely due to the fact participants in our sample likely had more severe and chronic psychiatric illness, in addition to a higher incidence of CI, than the Medicaid sample. Taken collectively, these comparisons further support our conclusions that CI in older adults with severe psychiatric illness is a significant contributor to increased mental healthcare costs.

Our finding that ethnicity was a significant predictor of mental healthcare costs is also not surprising given consistent literature suggesting under utilization of mental health treatment among ethnic minority groups,[67,68] which may have contributed to the association between cost of service and ethnicity. However, although our sample comprised ethnically diverse individuals, our sample size did not allow us to adequately evaluate the effect of specific ethnic groups on mental healthcare costs, which is a limitation of the study. Because of this limitation, we are not able to determine whether specific ethnic minority groups in our sample had lower mental healthcare costs relative to other minority groups; but overall, our findings that white participants did not differ significantly on mental healthcare costs from nonwhite participants on group comparisons suggests that the effect of ethnicity on mental healthcare costs was relatively weak in relationship to the effect of CI on these costs.

Our study is not without other limitations, and it is important to discuss these in relationship to our findings. In our view, the most significant limitation of this study is that we evaluated mental healthcare costs for time intervals preceding the neuropsychological assessment. Although we suspect that the CIs demonstrated in this sample are largely due to the sequelae of chronic psychiatric illness, and, therefore, presumed to be relatively stable over time, our study design did not allow us to determine whether CI was present during the entire 24-month period for which mental healthcare costs were calculated. Similarly, for individuals who were not diagnosed with CI, we cannot rule out the possibility that these individuals may have experienced cognitive deficits secondary to psychiatric illness that resolved following successful treatment of psychiatric symptoms at some point during this 2-year interval. Therefore, we believe that our results should be interpreted cautiously and that further study on both the chronicity of CI in this patient population and the degree to which a diagnosis of CI predicts future mental healthcare costs is necessary.

As stated previously, another limitation of our study is the relatively small sample size utilized. Our sample size may have obscured potential differences in mental healthcare costs between individuals with a primary diagnosis of mood disorder, when compared with psychotic disorders and also may have contributed a lack of statistical significance of other clinical and demographic predictors of mental healthcare costs. A further limitation of the study includes our use of psychiatric diagnoses obtained from a medical chart review and while such an approach is routinely utilized to evaluate the effect of psychiatric diagnosis on mental healthcare costs, because we did not conduct detailed psychiatric interviews for participants, we acknowledge that participants may have been misdiagnosed. Similarly, we included five individuals in our study that did not have a documented mental health diagnosis specified in their medical record. We included these individuals in our group comparisons because although a mental health diagnosis was not documented in their medical record, these individuals were receiving treatment at the mental health center and as such were representative of the patient population in these treatment centers. We also did not have access to costs of the medications used to treat psychiatric conditions, which we believe would be an important aspect of these mental healthcare costs given findings that

medication costs are a significant factor in these costs in other samples.[46] Similarly, our study design did not include obtaining information about treatment adherence, concurrent medical conditions, or degree of social support to determine the effect of these factors on mental healthcare costs. An additional limitation of this study was that the cognitive assessment conducted was not comprehensive, and we did not obtain a detailed medical history or obtain an informant history of a decline in the patients' functional ability, which would be required for a formal diagnosis of dementia or mild CI. Finally, we also acknowledge that our investigation is also limited by a potential participant selection bias in that individuals with cognitive difficulties may have been less likely to volunteer to participate in this investigation.

Despite the limitations of this study, we believe that our results provide compelling evidence that CI is significant factor contributing to mental healthcare costs for individuals with severe psychiatric illness receiving treatment at community mental health centers. Future study will be necessary to determine the specific mechanisms contributing to these increased costs and the degree to which targeted interventions for individuals with CI may reduce mental healthcare costs in these treatment settings. Previous studies have demonstrated that cognitively impaired individuals can benefit from mental health interventions but often need more intensive approaches to treatment.[28] Therefore, although targeted interventions may be more costly during shorter time intervals because of more intensive treatment, these interventions may reduce long-term mental healthcare costs by improving outcomes. This potential to reduce mental healthcare costs by developing tailored interventions for individuals with CI is particularly relevant for community mental health centers given the high prevalence of CI in this patient population and the high cost of mental health-care in these settings.

Acknowledgments

The authors thank Eamonn McKay for assisting with data collection, Erin Gillung for her work with participant recruitment and data management, and Adam Koshkin for his work in preparing tables for this manuscript. The authors also thank the staff of the Family Service Agency of San Francisco for their assistance in facilitating this study; in particular, the authors thank Melissa Moore for her contributions to facilitating the implementation of this study and to Treedene Tether for her assistance in obtaining mental health cost data.

This work was supported by NIMH grants K08 MH081065, K24 MH074717, R01 MH63982, and R24 MH077192.

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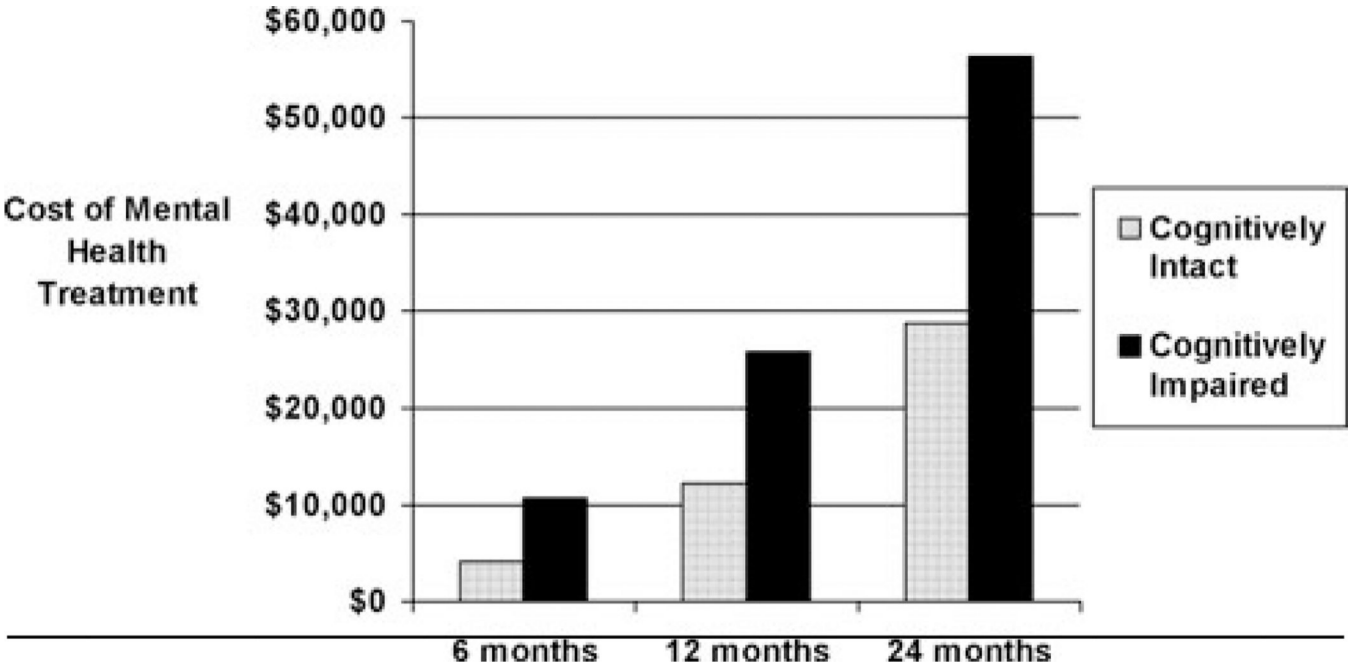

FIGURE 1.
Mental Health Care Costs for Cognitive Intact and Cognitively Impaired Individuals (n = 62)

Am J Geriatr Psychiatry. Author manuscript; available in PMC 2011 December 15.

TABLE 1

Patient Characteristics and Mental Health Treatment Costs (n = 62)

	Total Sample	Cognitively Intact (n = 24)	Cognitively Impaired (n = 38)	Test	p
Gender (male), N (%)	29 (47)	14 (58)	15 (40)	$\chi^2_{[1]}=2.10$	0.147
Ethnicity (white), N (%)	41 (64)	18 (75)	23 (61)	$\chi^2_{[1]}=2.34$	0.126
Housing (independent), N (%)	32 (50)	16 (66)	16 (42)	$X^2_{[1]}=3.98$	0.046
Psychiatric diagnosis (psychotic disorder), N (%)	28 (44)	12 (50)	16 (42)	$\chi^2_{[1]}=0.98$	0.322
Age, mean (SD)	68.9 (7.2)	67.6 (7.3)	69.1 (7.2)	$F_{[1,59]} = 0.70$	0.408
Education, mean (SD)	13.2 (3.0)	13.3 (3.1)	12.6 (3.2)	$F_{[1,59]} = 1.24$	0.272
Annual income, mean (SD)	$12,618 ($12,603)	$16,581 ($19,856)	$10,206 ($3,298)	$F_{[1,36]} = 2.31$	0.138
Hamilton Depression Rating Scale, mean (SD)	10.8 (8.9)	9.6 (8.6)	11.8 (9.1)	$F_{[1,59]} = 0.84$	0.361
CAGE Substance Abuse score, mean (SD)	1.6 (1.9)	1.4 (1.8)	1.8 (2.0)	$F_{[1,60]} = 0.54$	0.464
Dementia Rating Scale-2 total (scaled scores), mean (SD)	6.0 (4.1)	10.6 (2.3)	3.3 (1.9)	$F_{[1,59]} = 170.8$	0.000
6-month cost of medical service[a], mean (SD)	$8,145 ($9,833)	$4,156 ($4,169)	$10,665 ($11,479)	$F_{[1,62]} = 4.42$	0.017
12-month cost of medical service[a], mean (SD)	$20,615 ($19,167)	$12,232 ($12,543)	$25,910 ($20,820)	$F_{[1,62]} = 6.21$	0.004
24-month cost of medical service[a], mean (SD)	$45,670 ($44,846)	$28,689 ($24,479)	$56,394 ($51,363)	$F_{[1,62]} = 5.70$	0.005

[a]Statistical comparisons are based on log transformed mental health cost data.

TABLE 2

Hierarchical Regression Analyses for Demographic, Psychiatric, and Cognitive Variables Predicting Cost of Mental Health Service During 24 Months (n = 56)

	B	Standard Error	Standard Beta	Test Statistic (*df*)	p
Variable					
Step 1, demographic variables					
Age	−0.003	0.010	−0.041	*t*(51) = −0.277	0.783
Education	−0.028	0.020	−0.197	*t*(51) = −1.528	0.133
Residence type	−0.178	0.138	−0.180	*t*(51) = −1.250	0.217
Ethnicity (white)	0.237	0.138	0.236	*t*(51) = 1.746	0.087
Step 2, demographic and clinical variables					
Age	−0.009	0.011	−0.127	*t*(49) = −0.701	0.487
Education	−0.030	0.020	−0.206	*t*(49) = −1.580	0.121
Residence type	−0.233	0.146	−0.236	*t*(49) = −1.625	0.111
Ethnicity (white)	0.304	0.146	0.302	*t*(49) = 2.163	0.036
Psychiatric diagnosis	−0.046	0.138	−0.409	*t*(49) = −0.327	0.745
Total cage score	−0.049	0.037	−0.212	*t*(49) = −1.382	0.174
Step 3, Demographic and clinical variables including cognitive impairment status					
Age	−0.014	0.010	−0.190	*t*(48) = −1.198	0.238
Education	−0.012	0.020	−0.081	*t*(48) = −0.788	0.435
Residence type	−0.120	0.142	−0.121	*t*(48) = −0.843	0.404
Ethnicity (white)	0.405	0.141	0.403	*t*(48) = 2.925	0.006
Psychiatric diagnosis	−0.082	0.130	−0.088	*t*(48) = −0.682	0.499
Total cage score	−0.062	0.034	−0.268	*t*(48) = −1.753	0.087
Cognitive impairment	0.376	0.135	0.401	*t*(48) = 2.811	0.007

Notes: Step 1, R^2 Δ = 0.13.

Step 2, R^2 Δ = 0.04.

Step 3, R^2 Δ = 0.13.