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Adherence to antipsychotics among Latinos and Asians with schizophrenia and limited English proficiency

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Abstract

OBJECTIVES—We examined the relationship between preferred English, Spanish, or an Asian language for mental health services and adherence to treatment with antipsychotic medication and Medi-Cal beneficiaries with schizophrenia in San Diego, California.

METHODS—Data included 31,560 person-years from 1999–2004. Pharmacy records were analyzed to assess adherence to antipsychotic medication, based on the medication possession ratio (MPR). Clients were defined as nonadherent ($MPR < 0.5$), partially adherent ($0.5 \leq MPR < 0.8$), adherent ($0.8 \leq MPR \leq 1.1$), or as an excess filler ($MPR > 1.1$). Regression models were used to examine adherence, hospitalization, and costs by race/ethnicity and language status.

RESULTS—Limited English proficient Latinos were more likely to be adherent to antipsychotic medications than English proficient Latinos (40.8% vs. 35.9%, $P < 0.001$). Limited English proficient Latinos were less likely to be excess fillers than English proficient Latinos (15.1% vs. 20.4%, $P < 0.001$). Limited English proficient Asians were less likely to be adherent than English proficient Asians (40.1% vs. 45.1%, $P = 0.034$). Compared to English proficient Asians, limited English proficient Asians were more likely to be nonadherent (28.7% vs. 22.0%, $P < 0.001$) and less likely to be excess fillers (12.5% vs. 17.4%, $P = 0.004$). Controlling for adherence and comorbidities, limited English proficient clients had lower rates of hospitalization and health care costs than English proficient and white clients.

CONCLUSIONS—Adherence to antipsychotic medications varies among and within ethnic groups by English proficiency. Policies supporting the training of bilingual and multicultural ethnic minority providers, and interventions that capitalize on existing social support networks, may improve adherence to treatment among linguistically diverse populations.

Previous Presentations

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INTRODUCTION

Antipsychotic medications are the foundation of treatment for people with schizophrenia. Despite their demonstrated ability to reduce symptoms and relapse rates and improve health outcomes, nonadherence to antipsychotic medication is common, averaging 40–50% [1–7]. Poor adherence is associated with increased relapse, psychiatric hospitalizations, emergency room visits, and hospitalization costs [3, 6, 8–12]. Nonadherence is also associated with poor social outcomes, including greater risk of arrest, violence, victimization, substance use, and poorer mental functioning and life satisfaction [9].

Numerous factors can influence adherence to a prescribed treatment plan. Osterberg and Blaschke's review of general medication adherence identifies numerous patient (e.g. forgetfulness, other priorities, intentional omission of doses, emotional factors) and provider-level factors (e.g. development of complex medication regimen, failure to explain side effects and benefits associated with medication plan, disregard for patient's lifestyle or economic resources, or poor patient-provider relationships) that may influence adherence [13]. Lacro et. al identify additional patient and provider level factors predictive of nonadherence to antipsychotic medication among persons with schizophrenia including poor insight, negative attitude or subjective response toward medication, substance abuse, shorter illness duration, and inadequate discharge planning or aftercare environment [14]. Potentially related to language proficiency, a patient's knowledge regarding benefits of the medication, side effects, and frequency, duration, and dosing may be affected by providers' explanations for new medications [15]. Similarly, a client's level of health literacy may affect the processing of information provided during clinical visits [16].

Few studies have examined the relationship between adherence to antipsychotic medications among ethnic minority adults diagnosed with schizophrenia [6, 17, 18]. Diaz et al. conducted a community-based study using an electronic monitoring system of bottle openings to assess psychotropic medication utilization behaviors among African Americans (n=19), monolingual (n=44) and bilingual (n=25) Latinos, and Caucasians (n=34) [17]. They found that monolingual Spanish-speaking clients and African Americans were less likely to be adherent than Caucasians [17]. Another study using Texas Medicaid data found that African Americans and Mexican American clients were less adherent than non-Latino whites [18]. A third study in San Diego County found that Latinos and African Americans were significantly less likely to be adherent than non-Latino whites [6].

With the exception of Diaz et al., we are aware of no other study that has examined adherence to antipsychotics by language status. This paper provides a unique contribution by examining the relationship between race/ethnicity and language status, and adherence to antipsychotic medications among Latino and Asian clients with schizophrenia in a large public mental health system. San Diego County is a large, ethnically diverse county located on the U.S.-Mexico border; it is home to large ethnic minority and foreign-born populations, particularly Latinos of Mexican origin and Asians, most of whom are Filipino and Vietnamese. In 2007, San Diego County had a total population of approximately 3.1 million, 29% of whom were Latino, 9% were Asian, and 5% were African American [19].

Expanding on prior research, this objective of this study were to analyze the relationship between race/ethnicity, English proficiency, and adherence to antipsychotic medications among persons diagnosed with schizophrenia; and to analyze the relationships between race/ethnicity, English proficiency, adherence, psychiatric and non-psychiatric hospitalization, and costs.

METHODS

A Conceptual Model of Language, Adherence, and Service Use

We propose an expanded model of adherence that considers the role of language and family support in predicting adherence to antipsychotic medication and use of mental health services. In the literature reviewed above, patient and provider factors interact to affect adherence, and language proficiency affects the exchange of information between these two parties. However, a client's level of English proficiency may also be a signal for migration history, culture, and family and social support. Ramirez-Garcia et al. (2006) found that familial support predicted higher medication adherence among Mexican Americans with schizophrenia [20]. Although a client with low English proficiency may experience difficulty in communicating with their provider, they may also benefit from engagement by family members in the treatment process. Thus, a client's low English proficiency may actually result in increased participation by in their care. Barriers to communication and adherence may be reduced if family members can effectively serve as linguistic and social translators between the patient and provider [21].

Adherence to antipsychotic medications is associated with lower inpatient admissions [3, 6, 8–12]. We propose an additional path between English proficiency and services use [22, 23]. That is, we expect that the set of cultural and social factors associated with English proficiency will have an independent effect on hospitalizations and costs beyond their effects on medication adherence.

Sample and Independent Variables

Data from San Diego County Adult and Older Adult Mental Health Services (AOAMHS) encounter-based Management Information System (MIS) were merged with data from California's Department of Health Care Services to identify Medi-Cal (California's Medicaid program) beneficiaries with schizophrenia who were living in the community and receiving psychiatric services and who filled prescriptions for oral antipsychotic medications during 1999–2004 (N=31,560 person years). The MIS includes demographic information including age, gender, self-reported race/ethnicity, and preferred language for mental health services.

Consistent with our prior research, we use a client's preferred service language as a proxy for limited English proficiency status [22, 23]. Clients report their preferred language for receiving services at admission to each service, and we use a client's revealed preference for service language as a proxy for English proficiency. In California, language is highly correlated with foreign-born status. Data from the California Health Interview Survey (CHIS) show that among Latino adults in San Diego in homes where Spanish is spoken, 73% are born in Mexico; among Asians in homes where Chinese or Vietnamese is spoken, 86% are born in Asia or the Pacific Islands [24]. The study sample is limited to Latinos with a preferred language of English or Spanish, Asians with a preferred Asian language (e.g. Chinese, Vietnamese, Tagalog) or English, and non-Latino whites (hereafter, whites) with a preferred language of English. Among Asian clients, 44% were Filipino, 17% Vietnamese, 8% Japanese, 7% Chinese, and 25% were other Asian ethnicities.

Clients also report their living situation at admission to each service; we classified clients by their most commonly reported living situation. We included persons living independently, residents in assisted living facilities (also known as board-and-care facilities), homeless adults, and adults with unknown living situations. We excluded persons residing primarily in jails or long-term institutional care facilities and the uninsured, since data on medication use, payment, and health services costs were unavailable. Conservatorship status was ascertained from the MIS and Medicare eligibility was identified from the Medi-Cal data; diagnosis of a

substance use disorder was identified over both systems. Medi-Cal has strict requirements to verify residency status. Thus, clients included in this study are either U.S. citizens or documented immigrants.

We used ICD9 diagnosis codes from the Medi-Cal claims to assess co-morbid illness severity using the Chronic Illness and Disability Payment System (CDPS) [25]. CDPS is a diagnostic classification system that is commonly used by Medicaid programs to assess illness severity and to make health-based capitated payments to health plans enrolling Medicaid beneficiaries. The CDPS software assigns diagnostic codes obtained from claims to 56 diagnostic categories within 18 major diagnostic groups corresponding to major body systems (e.g. cardiovascular) or type of disease (e.g. diabetes). CDPS scores then are assigned based on age, gender, and presence of diagnostic categories. These scores reflect illness severity based on predicted future expenditures and are relative to average expenditures across all Medicaid beneficiaries. For example, a 40-year old male with schizophrenia but no physical health comorbidity would have a risk score of 1.2, and therefore would be expected to have 20% greater Medicaid costs than an average beneficiary (Additional information on CDPS and public use software is available at: <http://cdps.ucsd.edu>).

Dependent Variables

Adherence to prescribed regimens was determined by examining Medi-Cal claims by means of medication refill records. Adherence was measured by the annual medication possession ratio (MPR), which was computed for each person in each calendar year. The MPR was calculated by dividing the number of days medications were available for consumption by the number of days adults were eligible for Medi-Cal. For example, a person eligible for Medi-Cal for the entire year but who received a total of 240 days' supply of prescribed antipsychotic medication would have a MPR of 0.66. Quetiapine is commonly used as a sleeping aid; thus, we excluded it when prescribed at low daily dose (200 mg or less) in conjunction with another antipsychotic. We also excluded individuals prescribed depot antipsychotics because the pharmacokinetic profiles of depot antipsychotic medications and oral medications vary considerably and because users of depot medications are typically more nonadherent and heavy recidivist users of inpatient services. We categorized a person-year's adherence on an ordinal scale derived from the MPR using the following designations: nonadherent (ratio=0.00–0.49), partially adherent (ratio=0.50–0.79), adherent (ratio=0.80–1.10), and excess medication fillers (ratio >1.10). Reasons for excess filling of medications include actual overuse, loss, or theft of medications.

We used Medi-Cal claims to determine whether someone was hospitalized in a given year in an acute psychiatric facility, a psychiatric ward of a community hospital, or a medical/surgical ward of an acute care hospital. We calculated the total amount paid by Medi-Cal for health services (i.e. inpatient and outpatient psychiatric and physical health care, laboratory and radiological services, and other non-inpatient acute care); the amount paid for all pharmaceuticals; and the total amount paid for acute care. Costs are reported in 2004 dollars.

This merged MIS-Medi-Cal database has been previously used to examine utilization of mental health services by language status and costs associated with nonadherence to antipsychotic medications [6, 23]. The UCSD Institutional Review Board and the San Diego County Mental Health Services Research Committee approved the use of these data for this study in accordance with the Privacy Rule of the Health Insurance Portability and Accountability Act of 1996.

Statistical Analyses

We used multinomial logistic regression to estimate the probability of being nonadherent, partially adherent, adherent or an excess filler as a function of race/ethnicity and preferred language while controlling for age, gender, conservatorship status, Medicare coverage, living situation, type of antipsychotic medication, CDPS score, and diagnosis of comorbid substance abuse. The resulting parameter estimates were used to calculate estimates of adherence by race/ethnicity and language status that are standardized to the underlying population characteristics. For example, we calculated the probability of being adherent among limited English proficient Latinos as the mean probability of being adherent across all persons as if all had limited English proficiency. Standard errors were estimated by using the nonparametric bootstrap method with 1,000 replications; p-values were computed from the estimated distributions [26]. Data for the bootstrap analysis were sampled by the individual, rather than by observation, to account for potential individual-correlated errors.

We used logistic regression to estimate the probabilities of psychiatric admission, nonpsychiatric admission, and any inpatient admission and to calculate standardized estimates by adherence category and race/ethnicity language status using the methods and controlling for the additional demographic and clinical characteristics described above. Finally, we used generalized linear regression, assuming a gamma distribution and a log link function, to estimate health services costs, pharmaceutical costs, and total costs, and to provide standardized estimates of costs by race/ethnicity and language status using the methods described above [27, 28].

RESULTS

Table 1 provides information on selected characteristics of adults treated for schizophrenia with antipsychotic medications by their English proficiency status. Latinos and Asians who are limited in their English proficiency are older than English proficient Latinos and Asians and roughly the same age as whites. Limited English proficient Latinos are more likely to be female than English proficient Latinos (52% vs. 42%, respectively). Limited English proficient Asian clients are less likely to have dual Medicare-Medi-Cal coverage than English proficient Asian clients (24% vs. 31%, respectively). Across language and race/ethnic groups, the majority of adults (>50%) treated for schizophrenia reside independently. Notably, more than three-quarters of limited English proficient Latinos and Asians reside independently (78% of each), proportions that are higher than those of English proficient Latinos or Asians (65% and 69%, respectively). The mean CDPS score exceeded 3 for each group, indicating that this sample is expected to have health care costs 3 times those of an average Medicaid beneficiary. Fewer limited English proficient adults exhibited comorbid substance use disorders than English proficient adults. For example, 52% of English proficient Latinos had a substance use disorder diagnosis compared to 29% of limited English proficient Latinos; among Asians, differences were less pronounced but nevertheless significant (39% vs. 24%, respectively).

Probability of hospitalization by level of adherence is shown in Table 2. Clients who were adherent to their medications were least likely to experience a psychiatric admission (15%), a non-psychiatric admission (18%), and any admission (28%). Overall, nearly one-half (48%) of nonadherent adults were hospitalized. These results support the validity of the MPR as a measure of adherence.

Adherence to antipsychotic medications by race/ethnicity and English proficiency is shown in Table 3. Notably, a greater proportion of limited English proficient Latinos were adherent compared to English proficient Latinos (41% vs. 36%, respectively, $P=.002$); in contrast, a lower proportion of limited English proficient Asians were adherent compared to their

English proficient counterparts (40% vs. 45%, respectively, $P=.034$). Both limited English proficient Latino and Asian adults were less likely to be rated as excess antipsychotic medication fillers than their English proficient peers. For example, 15% of limited English proficient Latinos met criteria for excess medication filling compared to 20% of English proficient Latinos ($P<.001$). Similarly, 13% of limited English proficient Asians were excess fillers compared to 17% of English proficient Asians ($P=.002$). Notably, the higher rate of adherence among Latinos with limited English proficiency compared to their English proficient peers is entirely due to being less likely to be excess fillers. Whites were most likely to be excess fillers at 22%.

Several of the controlling variables were also related to adherence. The probability of being adherent increased with age, from 25% among those age <25 to 37% among those age 25 to 59 and 43% among those age 60+. Clients who resided in assisted living facilities were highly likely to be adherent (47%) or excess fillers (34%), while clients who were homeless were highly likely to be nonadherent (49%). Clients receiving a diagnosis of substance use disorder were less likely to be adherent than those without such a diagnosis (32% vs. 44%).

Probability of inpatient hospitalization by race/ethnicity and language status, controlling for level of adherence, is shown in Table 4. Limited English proficient Latinos were less likely than English proficient Latinos to experience psychiatric admissions (17% vs. 21%, respectively, $P<0.001$); non-psychiatric admissions (20% vs. 22%, respectively, $P=0.014$); and overall inpatient admissions (33% vs. 38%, respectively, $P<0.001$). Limited English proficient Asians exhibited lower overall inpatient admissions compared to English proficient Asians, although this effect was marginally significant (33% vs. 38%, $P=0.070$).

Table 5 presents costs of health services and pharmacy costs by race/ethnicity and language status, controlling for level of adherence. Limited English proficient Latinos and Asians exhibited the lowest overall costs (\$15,883 and \$15,138, respectively) compared to other groups, an outcome shaped by limited English proficient adults' lower health services and pharmacy costs as compared to their English proficient counterparts.

DISCUSSION

While several studies have examined adherence to psychiatric medications, few have addressed the relationship between antipsychotic medication adherence for racial/ethnic minorities. We know of only one small study examining antipsychotic adherence among monolingual and bilingual Spanish-speaking Latino clients [17] and of none that examines adherence among Asian clients by language status in the U.S. This study addresses these gaps by reporting on the experiences of a large public mental health system providing care to ethnically and linguistically diverse communities. Given the nation's growing immigrant population and plurality among ethnic populations [29], it is critical to understand the factors that influence the mental health outcomes of seriously mentally ill adults.

This study found that Latinos with limited English proficiency were more likely to be adherent than their English proficient peers. The difference in adherence among English proficient and limited English proficient Latinos was entirely due to differences in excess filling. Excess filling is also an indicator of poor medication management; excess fillers of medication were more likely than those who were adherent to be hospitalized, and excess fillers have been shown to have higher costs due to both higher rates of hospitalizations and increased pharmaceutical costs [6]. After controlling for adherence and comorbidity, Latinos with limited English proficiency were less likely to be hospitalized and had fewer pharmaceutical and total costs. In contrast, Asians with Limited English proficiency were

less likely to be adherent than their English proficient peers; although they were also less likely to be hospitalized and experienced lower costs.

One explanation for the higher rate of adherence and lower rate of hospitalization among limited English proficient Latinos is that they benefit from a higher level of familial and social support. Cultural variation within and between groups may produce differential adherence outcomes for by race/ethnicity and English proficiency. Family social support may serve as a cultural buffer and family involvement in the client's life and treatment plan may both improve medication adherence and may independently affect service utilization. Barrio et. al (2007) found that Latino monolingual (Spanish-speaking) clients were often accompanied by English-speaking relatives (e.g. adult children, spouses, or siblings) who advocated on their behalf with providers [21]. Ramirez-Garcia et al. (2006) found that family instrumental (task-oriented) support predicted higher medication adherence among Mexican Americans with schizophrenia living with family members [20]. In contrast, Kopelowicz et al. did not report improved medication adherence among Latino clients who received skills training [30].

However, this hypothesis is inconsistent with our finding of lower adherence and a lower probability of hospitalization among limited English proficient Asians surprising. It may be that familial and social support operate differently among Asians. Perceived susceptibility to disease, perceived benefits of Western medication, perceived benefits of cultural or traditional medication, or stigma around psychiatric medication may serve to reduce adherence among limited English proficient Asians [31, 32]. Culturally appropriate medication therapy management services may prove effective in improving pharmacotherapy adherence among Asian clients.

Unfortunately, we are unable to test explicitly for the independent effects of language proficiency and social support. Our measure is potentially correlated with several aspects of clients' life experiences including heritage, culture, acculturation, physiology, genetics, and preferences in addition to language proficiency and social support. Future data collection efforts may address these limitations by including specific measures that will permit us to more fully explore the mechanisms that are driving these differences in adherence and service utilization.

Our results are limited by the use of administrative data, which lack all dimensions needed to fully study issues related to adherence to antipsychotic medications among ethnic minority populations. At the same time, our large sample size may result in findings that are statistically significant but clinically insignificant. We used medication refill records from claims data to assess adherence; although they are limited by their inability to directly monitor medication administration, they represent an objective and unobtrusive measure of adherence. We lacked clients' self-reported English proficiency status or language most commonly spoken at home, measures which have been employed in other research examining the impacts of language on health service use [33]. The use of alternative treatments by patients was unknown in this study. The use of alternative practitioners by Asian patients is common and may have resulted in lower rates of adherence or service use [34, 35]. Due to sample size limitations, Asians were classified as a single group despite the wide heterogeneity of cultural backgrounds, language, and family dynamics. For these reasons, our findings should be replicated with a larger sample that can disaggregate data by Asian subgroup. Future investigations may examine the role of various levels of family social support (e.g., instrumental vs. emotional) in medication adherence and service utilization across Asian subgroups. Finally, the high rate of excess filling among residents of assisted living facilities warrants further investigation. Medication therapy management (MTM) - a pharmacist led review of clients' pharmacotherapy that includes consideration of

therapeutic goals, interactions, side effects, and adherence – would provide a deeper understanding of the causes for excess filling in this setting and may provide a vehicle for intervention if excess filling is inconsistent with clients' treatment goals.

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Table 1

Comparison of Demographic and Clinical Characteristics of English-Proficient and Limited English Proficient Latino and Asian Patients, and English Proficient Caucasian Patients Treated for Schizophrenia with Antipsychotic Medication (N=31,560 Person Years)

	Non-Latino White (N=22,865)		EP Latino (N=4,671)		LEP Latino (N=2,196)		EP Asian (N=1,201)		LEP Asian (N=627)		P-value EP vs. LEP Latino	P-value EP vs. LEP Asian
	N	%	N	%	N	%	N	%	N	%		
Age (years) Mean $\pm$ SD	49.7 $\pm$ 12.3		44.2 $\pm$ 13.0		49.9 $\pm$ 14.6		43.3 $\pm$ 11.6		49.5 $\pm$ 13.3		<.001	<.001
Female	10187	45	1967	42	1127	51	581	48	292	47	<.001	.463
Conservator	4312	19	545	12	212	10	179	15	76	12	.013	.104
Medicare	11250	49	1677	36	750	34	372	31	153	24	.157	.003
Living Situation												
Independent	12732	56	3052	65	1702	78	827	69	486	78	<.001	<.001
Board-and-Care	4396	19	577	12	162	7	140	12	57	9	<.001	.094
Homeless	1520	7	271	6	21	1	32	3	9	1	<.001	.067
Unknown	4217	18	771	17	311	14	202	17	75	12	.013	.006
Illness Severity												
CDPS Score Mean $\pm$ SD	3.9 $\pm$ 2.6		3.7 $\pm$ 2.6		3.5 $\pm$ 2.2		3.2 $\pm$ 2.2		3.1 $\pm$ 2.1		.006	.932
Substance Use Disorder	11961	52	2426	52	639	29	467	39	151	24	<.001	<.001

Notes: EP refers to English proficient and LEP refers to limited English proficient. SD= standard deviation

Table 2

Probability of Annual Inpatient Admissions by Medication Adherence Category Among Patients Treated for Schizophrenia with Antipsychotic Medication

	Probability of Psychiatric Admission	Standard Error	Probability of Non-Psychiatric Admission	Standard Error	Probability of Any Admission	Standard Error
Nonadherent	26.8	0.4	28.2	0.5	47.9	0.6
Partially Adherent	23.1	0.6	26.1	0.6	42.3	0.7
Adherent	14.8	0.3	17.6	0.3	28.4	0.4
Excess filler	20.4	0.5	23.3	0.4	38.0	0.6

Notes: All estimates are significantly different from adherent at $P < .001$. Percentages are predicted probabilities and are standardized to the underlying population characteristics for age, gender, race/ethnicity and language proficiency, conservatorship status, dual Medicare Medi-Cal coverage status, living situation, medication type, and CDPS score.

Table 3

Probability of Adherence to Antipsychotic Medication by English Language Proficiency Among Patients Treated for Schizophrenia with Antipsychotic Medication

	Non-Latino white (N=22,865)		EP Latino (N=4,671)		LEP Latino (N=2,196)		EP Asian (N=1,201)		LEP Asian (N=627)		P-value EP vs. LEP Latino	P-value EP vs. LEP Asian
	%	SE	%	SE	%	SE	%	SE	%	SE		
Non-adherent	26.4	0.3	27.9	0.6	27.4	0.9	22.0	1.1	28.7	1.7	.686	<.001
Partially Adherent	13.8	0.2	15.8	0.5	16.7	0.7	15.6	1.0	18.7	1.6	.356	.064
Adherent	37.6	0.3	35.9	0.7	40.8	1.0	45.1	1.4	40.1	1.9	.002	.034
Excess filler	22.2	0.3	20.4	0.6	15.1	0.8	17.4	1.1	12.5	1.4	<.001	.002

Notes: EP refers to English proficient and LEP refers to limited English proficient. Percentages are predicted probabilities and are standardized to the underlying population characteristics for age, gender, race/ethnicity and language proficiency, conservatorship status, dual Medicare Medi-Cal coverage status, living situation, medication type, and CDPS score.

Table 4
Probability of Annual Inpatient Admission by English Language Proficiency Adjusting for Adherence to Antipsychotic Medication

	Non-Latino white (N=22,865)		EP Latino (N=4,671)		LEP Latino (N=2,196)		EP Asian (N=1,201)		LEP Asian (N=627)		P-value EP vs. LEP Latino		P-value EP vs. LEP Asian	
	%	SE	%	SE	%	SE	%	SE	%	SE				
Psychiatric Admission	21.1	0.3	21.2	0.5	17.3	0.8	21.2	1.1	19.0	1.5	<.001		.236	
Non - Psychiatric Admission	23.4	0.3	22.0	0.6	19.6	0.9	20.2	1.2	18.9	1.6	.014		.506	
Any Admission	38.2	0.3	37.6	0.7	33.0	1.0	37.5	1.4	33.4	1.9	<.001		.070	

Notes: EP refers to English proficient and LEP refers to limited English proficient. Percentages are predicted probabilities and are standardized to the underlying population characteristics for age, gender, race/ethnicity and language proficiency, conservatorship status, dual Medicare Medi-Cal coverage status, living situation, medication type, and CDPS score.

Table 5
Annual Health Care and Pharmaceutical Costs by English Language Proficiency Adjusting for Adherence to Antipsychotic Medication

	Non-Latino white (N=22,865)		EP Latino (N=4,671)		LEP Latino (N=2,196)		EP Asian (N=1,201)		LEP Asian (N=627)		P-value EP vs. LEP Latino	P-value EP vs. LEP Asian
	%	SE	%	SE	%	SE	%	SE	%	SE		
Health Services Costs	12362	198	11907	325	10956	451	12664	755	10303	792	.088	.036
Pharmacy Costs	6410	37	5791	76	5534	109	5799	122	5227	141	.044	.004
Total Costs	18497	175	17263	279	15883	406	17732	618	15138	699	<.001	.004

Notes: EP refers to English proficient and LEP refers to limited English proficient. Numbers are annual costs and are standardized to the underlying population characteristics for age, gender, race/ethnicity and language proficiency, conservatorship status, dual Medicare Medi-Cal coverage status, living situation, medication type, and CDPS score.