Published in final edited form as:
Psychiatr Serv. 2009 February ; 60(2): 157–174. doi:10.1176/appi.ps.60.2.157.

Psychotropic Medication Nonadherence Among United States Latinos: A Comprehensive Review of the Literature

Nicole M. Lanouette, MD[1], **David P. Folsom, MD**[1], **Andres Sciolla, MD**[1], and **Dilip V. Jeste, MD**[1,2]

[1]University of California, San Diego, San Diego, CA 92093

[2]VA San Diego Healthcare System, San Diego, CA 92161

Abstract

Objective—Psychotropic medication nonadherence is a major public health problem, but few studies have focused on Latinos. We systematically reviewed the literature on rates of and factors influencing antipsychotic, antidepressant, or mood stabilizer nonadherence among United States (US) Latinos.

Methods—Data Sources: MEDLINE and PsycINFO were searched using keywords *adherence, compliance, Latino, Hispanic, psychotropic*, and related terms, as well as bibliographies from relevant reviews and studies.

Study Selection: 21 studies met inclusion criteria: published since 1980 in English or Spanish; measured psychotropic medication nonadherence rates among US Latino adults.

Data Abstraction: We examined articles for study design and objective, location, population, medication type, participant demographics, adherence measure, adherence rates, and factors related to adherence.

Results and Conclusions—In studies including Latinos and other ethnic groups, mean nonadherence rates were 41%, 31%, and 43% among Latinos, Euro-Americans, and African Americans respectively, with an overall effect size of 0.64 between Latinos and Euro-Americans. In studies including only Latinos, the mean nonadherence rate was 44%. Ten of 16 studies found Latinos had significantly lower adherence rates than Euro-Americans. Risk factors for nonadherence included being monolingual Spanish speaking, lacking health insurance, experiencing barriers to quality care, and having lower socioeconomic status. Protective factors included family support and psychotherapy.

Rates of nonadherence to psychotropic medications were higher for Latinos than for Euro-Americans. Further investigation is needed into the potentially modifiable individual and societal level mechanisms of this discrepancy. Clinical and research interventions to improve adherence should be culturally appropriate and incorporate identified factors.

Introduction

Medication nonadherence is a major barrier to favorable health outcomes in psychiatric disorders such as schizophrenia, bipolar disorder, and depression. Suboptimal adherence to psychotropic medications for these disorders has been associated with: relapse; significantly more psychiatric hospitalizations and emergency room visits; poorer mental functioning; lower life satisfaction; more disability related absences from work; greater substance use; increased suicidal behavior; worsened adherence to medications for comorbid medical conditions; and higher health care costs (1–16).

Unfortunately, nonadherence to antipsychotics, antidepressants, and mood stabilizers is common, with prior reviews of the literature noting rates ranging from 10% to 77% with mean rates of 35–60% (17–20). Previous studies have established risk factors for nonadherence including: limited insight; negative attitude or subjective response towards medication; shorter illness duration; comorbid substance abuse; poorer therapeutic alliance; living alone; more self reported side effects; and limited family support (18–20). However, many prior reports were significantly limited because they were conducted with predominantly Euro-American populations. Ethnic and racial disparities in adherence have been noted, with prior studies finding that non-white patients were more likely to have lower adherence (3, 21–23).

Latinos are the largest and most rapidly growing minority group in the United States, comprising just over 13% of the population (24). More than 40% are foreign born, and 75% are immigrants or children of immigrants (25). Acculturation, “the process by which individuals adopt the attitudes, values, customs, beliefs, and behaviors of another culture” (26), has been found to have mixed health, including mental health, effects for Latinos (27–29); Latinos who are less acculturated have lower prevalence rates of psychiatric disorders, but those with a disorder are less likely to receive mental health treatment (30, 31). Given these health and acculturation relationships, acculturation could potentially affect adherence via, for example, physician/patient communication or health literacy. Ethnic differences in prescriptions for and use of (32, 33), dosing needs (34), response to (35), and tolerability of (36, 37) psychotropics have been previously noted for Latinos. However, to our knowledge, there has not yet been a comprehensive review of the literature examining psychotropic adherence among Latinos living in the United States that includes the frequency of, factors associated with, and influences of language and acculturation on nonadherence. Our objectives were to: assess the rate of nonadherence to psychotropic medications among Latinos living in the United States; compare the rate to that of other ethnic minorities and Euro-Americans; and identify any culturally relevant factors influencing adherence among Latinos.

Methods

Data Sources

We searched MEDLINE and PsycINFO databases using combinations of the following keywords: *antipsychotic, mood stabilizer, antidepressant, lithium, neuroleptic, psychotropic, schizophrenia, bipolar disorder, depression, adherence, compliance, Latino, Hispanic, ethnicity, Spanish-language, acculturation* for articles published since 1980 that measured prevalence of antipsychotic, antidepressant, or mood stabilizer adherence in Latino adults in the United States. Reference lists from recent reviews (18–20, 38, 39) were also examined, as were bibliographies from all potentially relevant articles.

Study Selection

We identified 518 papers in those searches. One author then read through every title and identified 214 potentially relevant articles. During that screening, broad inclusion criteria were used, and the only studies excluded were those which clearly examined adherence in non-psychiatric illnesses or medications only (i.e. adherence to Highly Active Anti-Retroviral Therapy in HIV/AIDS), were not in English or Spanish, were only on pediatric populations, or were from outside the United States. A search of the Spanish language literature revealed no potentially relevant studies as all were conducted on populations outside the United States.

The 214 potentially relevant articles were read in detail by one author. To be included studies had to: 1) be on United States populations (including people living in Puerto Rico – although no studies of psychotropic medication adherence included this population); 2) be in English or Spanish (no studies were in Spanish); 3) include Latinos; 4) measure adherence/nonadherence (including self report and medication discontinuation rates) to antidepressants, antipsychotics, and/or mood stabilizers prescribed for depression, schizophrenia, schizoaffective disorder, or bipolar disorder (even if adherence was not the primary focus of the study); and 5a) examine ethnicity as a variable related to adherence and/or report adherence rates of all ethnic groups in the studies (so we could determine whether there were significant differences between ethnic groups), or 5b) for the studies that included only Latino participants, examine adherence and factors influencing adherence.

We excluded studies if they: 1) did not measure separate adherence rates for Latinos; 2) included only children and adolescents; 3) examined medication adherence only for medications that were not antidepressants, antipsychotics, or mood stabilizers; 4) studied adherence to antidepressants, antipsychotics, or mood stabilizers prescribed for diseases other than those listed above (#4 of inclusion criteria; i.e. we excluded studies of anxiety and dementia); 5) reported only study dropout rates, not medication discontinuation or adherence rates, because many factors causing study dropout do not necessarily cause nonadherence. This led to us excluding a widely cited study that found Latinos were more likely to drop out of a clinical trial than were Euro-Americans and identified the reasons for study discontinuation (36).

Data Extraction

Of the 214 initially identified papers, 193 studies were excluded, and 21 were included in our final analysis (1, 6, 40–60). The results from one study were reported in two different papers (52, 53), so we counted them as one study. One included study (44) examined adherence-related factors in a subset of another (43), so we counted these as one study and used the nonadherence rate reported for the larger sample (43) in our calculation of the mean nonadherence rate of studies including only Latinos. For each of the 21 studies, two authors examined the study design and objectives, the location and patient population, medications studied, participant characteristics (including preferred language of participants and providers, if reported), measures of adherence, rates of adherence overall and by ethnicity, associations between ethnicity and adherence (including statistical measures), and any other adherence-relevant factors identified. For consistency, we use the terms “adherence” and “nonadherence” throughout the review, replacing the terms “compliance” and “noncompliance”.

Calculation of nonadherence rates

For standardization, if studies reported adherence rates, we calculated nonadherence rates and report those. Because most studies examined only adherence and nonadherence, for studies that reported more adherence categories than adherent and nonadherent (6, 40, 58–60), we report all provided rates in Table 1, but for mean nonadherence rate calculations we used the summed partial adherence, nonadherence, and excess filler rates as the nonadherence rate. For the one paper (40) that reported separate adherence rates by ethnicity and diagnosis, we give the separate rates in Table 1, but for calculating mean nonadherence rates, we averaged the rates between diagnoses within each ethnic group. Although no measure of medication adherence is ideal, some have demonstrated more reliability than others. Patient and caregiver reports as well as physician reports of adherence have been shown to underestimate adherence (61, 62), while MEMS caps and calculations from pharmacy fill records (including MPRs, CMPRs, etc.) have been shown to be generally

more objective measures (3, 62). Therefore, we also separately analyzed the 11 papers (1, 6, 46, 48, 51, 52, 54, 56, 58–60) that used these typically more objective measures.

Data Analysis and Statistics

For studies that had the data available but had not compared rates of adherence in all ethnic groups separately, we used chi-squares to test significance of differences in adherence rates by ethnicity. We did secondary calculations on study data for 11 studies (3 nonadherence percentage calculations (51, 55, 56), two chi-square tests (50, 57), and six both percentage calculations and chi-square tests (1, 40, 47, 49, 58, 60)). For the two studies (55, 56) in which the unadjusted and adjusted nonadherence rates yielded conflicting results, we included both findings, but used the results of the multivariate analysis when describing comparisons in rates between ethnic groups. We used 2 methods to compare nonadherence rates between ethnic groups: 1) we examined the mean nonadherence rates across studies, including calculating an effect size of the difference between the rate for Latinos and Euro-Americans; and 2) we counted the number of studies that compared rates among ethnic groups, and we report how many of the studies did and did not find significant differences. To calculate the effect size, we used SPSS version 12.0.1 to pool the non-weighted nonadherence means and standard deviations across the studies, and then used an online effect size calculator (http://web.uccs.edu/lbecker/Psy590/escalc3.html). We used online chi-square calculators (www.graphpad.com, http://www.quantpsy.org) for chi-square calculations, and we used SPSS version 12.0.1 for descriptive statistics.

Racial and ethnic group terminology

The terminology for racial and ethnic groups in the literature is highly varied. For the purposes of this review we use the term US Latino to include anyone residing in the US, including Puerto Rico, with Mexican, Central American, South American, Puerto Rican, or Cuban ancestry. We use the terms African American to refer to US residents who trace their ancestry to Africa and Euro-American for US residents with European ancestry. When the included studies used terms such as “Hispanic,” “black,” or “Caucasian”, we replaced those terms with “Latino”, “African American”, and “Euro-American” respectively for standardization. If country of origin of the participants was specified in a study, we include that information. We understand that these definitions have limitations in that they group together people from highly diverse backgrounds. Very few studies reported separate adherence rates for Asian Americans or other ethnic groups, and the number of Asian American or other patients in those studies was typically very small, so we were unable to draw comparisons between nonadherence rates or risk factors between Latinos and those groups.

Results

Description of included studies and prevalence of psychotropic nonadherence

The 21 studies (1, 6, 40–60) (Table 1) meeting inclusion criteria showed great heterogeneity in terms of study design and objectives and of population studied. Table 1 shows the four investigations that had only Latino participants, and Table 2 shows the 17 studies that included Latinos and other ethnic groups.

In terms of study design, 13 studies were prospective and eight retrospective. Study objectives varied, with some focusing specifically on adherence (1, 6, 41, 44–47, 49, 51–60) while others measured adherence as part of studies addressing different questions. Geographically, eight were based in California (6, 42, 43, 47, 48, 50, 54, 55), two in Texas (41, 51), one in New Mexico (52), one in New York (49), one in Connecticut (56), one in

Ohio (40), and four were from Veteran's Administration National Registries (46, 58–60), and three were national studies (1, 45, 57).

Twelve reports (N= 12) investigated nonadherence to antipsychotics (1, 6, 41–43, 46, 49–51, 54, 58, 59), five antidepressants (45, 47, 52, 55, 57), two mood stabilizers (48, 60), and two a combination of these medications (40, 56). Ten studies focused on schizophrenia or schizoaffective disorder (1, 6, 41–43, 49–51, 59), five on depression (45, 47, 52, 55, 57), three on bipolar disorder (48, 58, 60), and three a combination of those diagnoses (40, 54, 56).

Total *N* ranged from 40 to 44,637 (mean 6024±13268). Four studies included only Latinos. Of the 17 studies that included both Latinos and other ethnic groups, the percent of Latino participants ranged from 2.9% to 56% (mean 20.3±19.5). Of the seven studies that reported preferred language, the proportion of Spanish-speaking participants ranged from 0–100% (mean 45.7±35.0). Seven studies reported country of origin or ancestry of Latino participants, which was primarily Mexico in four (41, 43, 50, 51), primarily Puerto Rico in two (40, 56), and a mix of Mexico, Guatemala, and El Salvador in one (42).

Studies used a range of adherence measures including: patient report (50, 55); chart review or physician report (41); a combination of patient and family report and chart review (43, 49); medication discontinuation (by patient report) (45, 47, 57); pill counts of returned pills (46); Medication Event Monitoring System (MEMS) pill bottle caps (56); calculations from pharmacy records (including CMGR, MPR, CPR) (1, 6, 48, 51, 52, 58–60); urine testing for metabolites (54); and not stated (40, 42). Nineteen studies reported the time period used to examine adherence, which ranged from one week to 48 months (mean 10.2months±10.3).

Nonadherence rates

Three (41, 43, 45) of the four studies including only Latinos (Table 1) reported nonadherence rates, which ranged from 33.0 to 55.0% (mean 44.0±11.0). The fourth explored risk factors for nonadherence in Latinos but did not detail rates and is discussed later (42). Of the 17 studies including Latinos and other ethnic groups (Table 2), 12 (1, 6, 40, 47, 49–52, 56–58, 60) had data available to compare the nonadherence rates between Latinos and Euro-Americans. The mean rates for Latinos and Euro-Americans were 39.4±15.7 and 29.2±16.5, respectively, yielding an overall effect size of 0.64. Ten of these reports also had data available on African Americans (1, 6, 47, 49–51, 56–58, 60) and the nonadherence rates in those studies were: Latinos (range 17.2 – 63.1%, mean 41.0±16.3), Euro-Americans (range 10.0–57.2%, mean 31.3±17.2), and African Americans (22.7 – 65.1%, mean 43.2±16.9). Only one study reported separate rates by ethnicity and diagnosis, and showed no difference between nonadherence rates in Latinos with schizophrenia compared to Euro-Americans with schizophrenia, and a nonsignificant trend ($p = 0.055$) towards Latinos having higher nonadherence rates than Euro-Americans among patients with depression (40).

Comparisons of rates by ethnicity made in individual studies

Sixteen studies evaluated differences in nonadherence rates between Latinos and Euro-Americans. (In addition to the 12 studies that reported nonadherence rates for Latinos and Euro-Americans, 4 other studies measured and compared, but did not detail, nonadherence rates in the two ethnic groups.) Of these 16 studies: six found no statistically significant differences (1, 40, 46, 48, 49, 54); nine reported Latino patients had significantly higher nonadherence rates (6, 47, 50–52, 57–60); and one found monolingual Spanish-speaking patients, but not bilingual patients, were more likely to be nonadherent than Euro-American patients (56). In ten of 14 studies, African-Americans had significantly greater nonadherence

rates than Euro-Americans (1, 6, 46, 49, 51, 54, 56, 58–60), while four found no difference (47, 48, 50, 57). A majority of ten studies comparing rates between Latinos and African Americans found no difference (N=7) (1, 47, 49–51), while three found Latinos had lower nonadherence rates (54, 58, 60).

Results from studies using more objective measures of adherence

Eleven studies (1, 6, 46, 48, 51, 52, 54, 56, 58–60) used MEMs caps, calculations from pharmacy data (including MPR, CPR, CMGR), or urine testing. None of the studies including only Latinos used these methods. Six (1, 6, 51, 56, 58, 60) of the 11 studies had rates by ethnicity available. In those, the mean nonadherence rate among Latinos was 43.7±18.7, for Euro-Americans 36.5±18.9, and for African Americans 49.5±17.7.

Nonadherence related outcomes and factors among Latinos

Five (41–45, 56) of the 21 studies included a majority of Latino participants and examined outcomes of and risk and protective factors for nonadherence specifically for Latinos (Table 3).

Only one study (56) made cross-cultural comparisons of risk factors, investigating the most significant factors for each ethnic group. Thus, we were unable to answer the question of the relative importance of these identified factors for Latinos compared to other ethnic groups, except through comparisons with prior reviews. Also, there was little overlap between the reports in terms of factors examined. Therefore, direct comparisons of the relative importance of the identified factors were not possible. The one study that made cross cultural comparisons identified older age for monolingual Spanish-speaking Latinos and more years of past treatment and fewer depressive symptoms for Euro-Americans as predictive of higher adherence (56). Nonadherence was found to predict worsened illness course in the two studies examining the health-related outcomes of nonadherence (42, 43).

Language, acculturation, and nonadherence

Only two studies explored the relationship between patient preferred language and nonadherence, and both found monolingual Spanish speakers were significantly more likely to be nonadherent (45, 56), even after controlling for important cofactors, such as age and number of symptoms. In the two studies evaluating the interaction between acculturation and nonadherence, one study found that acculturation was not related to adherence (41), and one found that less acculturated patients were significantly less adherent (42). If one uses language as a proxy for acculturation (63–66), then three (42, 45, 56) of four reports (41, 42, 45, 56) found higher nonadherence in less acculturated Latinos. As socioeconomic status is likely a particularly important potential cofactor when examining the relationship between nonadherence and language or acculturation, we examined whether each of these studies controlled for socioeconomic status. Of the studies finding monolingual Spanish speakers were more likely to be nonadherent, one study controlled for socioeconomic status by controlling for education and health insurance status (45), and the other reported that all patients in their study had similar socioeconomic status and access to services (56). In the reports examining acculturation, one controlled for socioeconomic status (41) and found that socioeconomic status, but not acculturation, was significantly associated with nonadherence. The other did not control for socioeconomic status, but the majority of participants were from similarly lower socioeconomic groups (42).

Provider language and ethnicity and nonadherence

One study assessing the effect of provider language found patients who saw a Spanish-speaking non-Latino therapist were less likely to adhere to treatment, but also reported

patients treated by a Latino therapist were more likely to adhere (41). The authors found this surprising, and hypothesized that this may have been due to ubiquitous interpretation and translation services available at their clinic. Possibly ethnic concordance with the provider, not language alone, may influence better adherence for Latino patients.

Socioeconomic status, health insurance status and quality of care and nonadherence

Only one study examined the relationship between socioeconomic status and nonadherence and found higher socioeconomic status associated with lower nonadherence (41). Having public or private health insurance (45) was associated with lower nonadherence in the one study that examined this relationship. That study also reported that barriers to accessing quality care led to a higher likelihood of nonadherence (45).

Other nonadherence risk factors

In the studies examining age, two studies found that younger age predicted higher nonadherence in all Latino respondents (41, 45), whereas in a third study, this relationship was found only for monolingual Spanish-speaking participants (56). One study identified problems with a drug of abuse (45) as a risk factor for nonadherence, however, another study found that abstinence from street drugs (marijuana was excluded from the definition) was not significantly related to adherence (44).

Other nonadherence protective factors

Factors associated with better adherence in individual studies included: greater family instrumental support (task-oriented or hands-on assistance) (44); greater financial support from family (41); more “motivation” (as assessed by coming to appointments, requesting refills when due, asking for medication changes if they felt like their medications were not working) (41); being married (45); having more depressive symptoms (45); taking a serotonin selective reuptake inhibitor (SSRI) as opposed to another type of antidepressant (45); and having made 8 or more visits to a nonmedical therapist (45).

Other culturally relevant findings

Sleath et al. (52, 53) reported that in addition to having higher nonadherence rates, Latino patients were significantly less likely than Euro-Americans to both give and receive antidepressant information with their physicians, and were less likely to express complaints about their antidepressants. A study of patients with schizophrenia or depression (40) found Latinos were significantly less likely to characterize their life situation in terms of mental illness compared to Euro-Americans.

Discussion

We reviewed the literature to examine rates of, risk factors for, and influences of language and acculturation on antipsychotic, antidepressant, and mood stabilizer nonadherence among Latinos living in the United States. We found the mean rate of psychotropic nonadherence among Latinos was 44% in studies including only Latinos, and was approximately 40% in studies including multiple ethnic groups. This was higher than the mean rate of roughly 30% among Euro-Americans and was comparable to the rate of roughly 40% among African Americans. The effect size of the difference between rates for Latinos and Euro-Americans was 0.64, suggesting a medium to large difference. We purposely compared rates among ethnic groups using only studies that had rates available for all groups, so the higher nonadherence rates found in Latinos and African Americans compared to Euro-Americans are not due to differences in study design or adherence measure. A majority of individual studies found Latinos had significantly higher rates of nonadherence than Euro-Americans.

Remarkably, none found that Latinos had lower nonadherence, even in bilingual, culturally tailored settings (56), suggesting that Latinos experience additional barriers to adherence beyond language and cultural barriers.

Consistent with prior studies, nonadherence predicted worsened illness course in studies that investigated outcomes. Risk factors for nonadherence among Latinos identified in individual studies that are similar to those in the wider adherence literature included substance abuse, barriers to access to quality care, lacking health insurance, and limited family support. Two studies identified monolingual Spanish status as a nonadherence risk factor. If one considers poor English proficiency as a proxy for acculturation (63–66), then three of four studies found less acculturation predictive of nonadherence. Protective factors for Latinos included greater family instrumental and financial support, higher socioeconomic status, older age, being married, being more proactive in one's care, having public or private insurance, and having made 8 or more visits to a therapist.

Prior reviews have noted great variability in psychotropic nonadherence rates (10–77%), with mean rates of 35–60% (17–20). The mean rates for Latinos and African Americans were within that mean range, but the Euro-American rate was slightly lower (30%). When examining only studies that used pharmacy data, MEMS caps, or urine testing, the nonadherence rates in all groups were higher (44% for Latinos and 49% for African Americans) and the Euro-American mean nonadherence rate was within the prior literature mean range (37%). Although studies relying on patient or provider report tend to underestimate nonadherence rates, all studies including only Latinos used patient, family, or provider report to measure adherence, yet surprisingly found higher mean nonadherence rates (44%) than studies using more objective measures (40%). This could be due to some using a combination of patient, family and chart review to assess adherence (43, 44). The higher rates could also be due to differences in study design or patient population, or there could be cultural factors that lead to patient and provider report being more reliable in Latino populations than non-Latino populations.

Family likely has a particularly important role in the caring for and health outcomes of Latino patients with mental illness compared to other ethnic groups (24, 38, 67). Two studies investigated which specific types of family assistance were most predictive of adherence and found greater financial support from family (41) and more family instrumental support ("task-oriented" assistance) (44) predictive of better adherence.

Our review has several limitations. Although we conducted a comprehensive search, it is possible we missed a relevant study. This constitutes a comprehensive review of summary data, not a metanalysis. Included studies were heterogeneous with respect to study objectives and design, diagnoses studied, sample size, and proportion of Latino participants. Many of the larger studies were limited by small percentages of Latino patients. Additionally there was extensive variability in adherence measure, time over which adherence was measured (one week to one year), and even the definition of adherence, with some studies using dichotomous measures and others including partially adherent in addition to nonadherent and adherent. This heterogeneity, particularly the variability in time over which adherence was measured, likely led to the wide range in nonadherence rates seen between studies, even among studies using more objective adherence measures, as adherence is known to decrease over time (59). Although this variability could affect the reliability of absolute nonadherence rates, it likely did not affect our ability to compare relative rates between ethnic groups since we included only studies that had rates available for all three groups. Therefore, we know that any ethnic group rate differences were not due to differences in adherence measure or study design. Also, we separately examined studies using only more typically objective adherence measures, and found somewhat higher

nonadherence rates among all ethnic groups, but a similar pattern of relative rates between groups to that in the analysis including all reports. Another limitation of the literature was that none of the reports examined every risk or protective factor identified – in fact, many risk and protective factors were investigated only by one or a few studies – making conclusions about the relative importance of each factor impossible to determine. Only one study conducted cross-cultural comparisons of risk or protective factors. Similarly, we could not compare nonadherence rates or factors most relevant by diagnosis and ethnicity because most studies included participants with only one diagnosis. Additionally, a number of factors that likely significantly influence adherence among Latinos were not investigated, such as cultural attitudes and beliefs about mental illness and treatments, health literacy, stigma (68), insight, efficacy and tolerability of medications, side effects, use of alternative treatments, and dietary and genetic effects on medication metabolism. Only a few studies examined factors unique to Latinos such as language and acculturation. Similarly, potentially modifiable mechanisms influencing adherence, such as socioeconomic status, health insurance, or barriers to quality care were merely examined in single reports. We were only able to draw comparisons in rates between Latinos, Euro-Americans, and African Americans due to the literature generally lacking adherence investigations in other ethnic groups. The US Latino population is quite heterogeneous both culturally and in important indicators of population health (24, 28). Many of these studies were conducted with Mexican-Americans and VA populations, so the results are likely not applicable to all Latino communities living in the United States.

It is important to note that the summary mean nonadherence rates were generally unadjusted for potentially important cofactors, such as socioeconomic status. Therefore these cofactors must be considered possible contributors to the lower nonadherence rates seen among Latinos and African Americans compared to Euro-Americans. Similarly, in considering possible explanations for the relationships between risk and protective factors and nonadherence, cofactors such as access to health care or socioeconomic status must be considered. For example, the relationship between less acculturation and nonadherence noted by three of four studies could be mediated by a variety of factors, including socioeconomic status. This remains an open question; two of the four studies examining acculturation did directly control for socioeconomic status, with one still finding an association between nonadherence and less acculturation (45) and the other finding no association (41). Other ways in which less acculturation could lead to nonadherence include impaired patient-physician communication due to language barriers (45) or difficulty navigating the US healthcare system.

Despite these limitations, our results clearly suggest that Latinos are at higher risk for psychotropic medication nonadherence compared to Euro-Americans. Remarkably, this risk was observed across various study designs, diagnostic categories, medication types, clinical settings, and Latino subgroups. The higher rates of nonadherence seen in Latinos were comparable to the rates in African Americans, another disadvantaged ethnic minority. Although the existing literature limited our ability to answer the question of which risk factors are most relevant for Latinos, we have summarized all the influences on adherence in Latinos investigated to date, and identified factors particularly relevant for Latinos.

Research recommendations

As previously recommended (17, 18, 69), a standard definition and measure of adherence would greatly improve the translation of the broader adherence literature. Since people are less than optimally adherent to medications in different ways and for different reasons, quantifying adherence into more subcategories than simply adherent or nonadherent would be helpful in better understanding adherence and developing interventions to improve it.

This has been done in more recent studies (6, 58–60), one of which, interestingly, found that excess fillers incurred the highest health care costs of all nonadherent patients (6).

In terms of recommendations more specific for studying adherence among Latinos, we first encourage future adherence studies to include more adequate numbers of Latinos. This is consistent with the National Institute of Mental Health's initiative to increase representation of ethnic minority participants in research studies (70). Given the great heterogeneity of US Latino populations (71), we recommend including Latinos from all the diverse cultural and socioeconomic backgrounds that make up the larger US Latino population, and specifying degree of acculturation, country of origin or cultural background, socioeconomic situation, and preferred language, as was done in many of the included studies. This heterogeneity also gives added weight to prior recommendations for local, community-based, participatory research (38, 72) to develop optimally relevant and lasting interventions to improve adherence. Additionally, we recommend cross-cultural comparisons investigating the relative importance of risk and protective factors for different ethnic groups, including Asians and American Indians – who we noted were rarely included in meaningful numbers in adherence investigations.

While adherence measures that rely on pharmacy records do not require translation, pharmacy records may be liable to underestimate adherence for patients in lower socioeconomic groups, who, for example, may rely on free samples from physicians (which would not be displayed in pharmacy records) to bridge gaps in insurance coverage or reduce prescription costs. Pharmacy records will also exclude herbal and over the counter medications which could affect adherence. Therefore, future studies may want to consider supplementing pharmacy or MEMS caps data with other sources of adherence data, such as patient and family report combined with chart review (44), or detailed structured patient interviews (55) to provide a comprehensive examination of nonadherence and its causes.

Ultimately, research needs to identify mechanisms whereby suboptimal adherence occurs among Latinos and ethnic minorities in general. Hypothesis-driven research characterizing the role of moderators and mediators of adherence is needed. Mechanisms thus identified would be the basis for more effective interventions. Our review gives additional support to the National Institute of Mental Health sponsored expert consensus meeting of Latino Mental Health Services researchers recommendation (38) to investigate the effects on adherence of language, acculturation, family support, health insurance, poverty, and access to quality care including therapy. Given the findings that socioeconomic and health insurance status and barriers to quality care were related to adherence, these should be included as potential cofactors in future analyses of adherence. Particular attention should be paid to including these when comparing ethnic groups, because ethnic differences in adherence have been found to disappear when, for example, income was accounted for (73). As previously noted (56, 65), preferred language may be a better predictor of health patterns than ethnicity. It is essential to include adequate numbers of Spanish-speaking as well as bilingual and English-speaking patients and clinicians in future research to better understand these relationships. In addition to further exploring the influence of factors noted in this review, we hope future studies will investigate other likely adherence influences. One such recently identified factor is stigma, which ranked second only to side effects in antidepressant use concerns identified by Latino focus groups (68). Another is the role of culture in shaping the experience and interpretation of mental illness.

The trend noted in one study (40) that Latinos with depression were more likely to be nonadherent than Euro-Americans with depression (but no difference was found for schizophrenia) deserves focused attention in future investigations. We recommend researchers examine nonadherence rates by both ethnicity and diagnosis. Also, cross-cultural

explorations of which factors are most important for which diagnostic groups and whether mechanisms of nonadherence differ between diagnostic and ethnic groups would be a significant new contribution to the literature.

Clinical recommendations

Due to the limitations of the literature described above, we cannot offer specific clinical recommendations at this time. However, the data do provide some general clinical guidelines. Currently there are no evidence-based interventions specifically to improve psychotropic medication adherence among Latinos. However, findings from broader quality improvement interventions (74), adherence interventions in predominantly non-Latino populations (75, 76), adherence interventions for non-psychiatric diseases tested in Latinos (77–79), broader mental health interventions for Latinos (80, 81), from clinical experience (82) and policy papers (39) are potentially applicable.

Since the majority of patients are likely to have adherence problems at some point (59), reassessing adherence regularly and repeatedly is important. Incorporating pharmacy records (3) in addition to patient and family report will increase the likelihood of catching adherence difficulties. The finding that Latino patients were less likely than Euro-Americans to discuss their medications with their physician (52, 53) suggests physicians should be particularly mindful to encourage medication discussions with their Latino patients. That physicians are proactive in these discussions is particularly important given that a common practice in many Latino cultures is to show deference towards physicians (83). Depending on language preference and educational attainment, information about medication should be in Spanish and use simple terms enhanced with visual aids, where appropriate. Similarly, the prominence of stigma and culturally-influenced negative antidepressant associations in recent focus groups with Latinos prescribed antidepressants (68), indicates that inquiring about and addressing these could be useful for improving adherence among Latinos.

Given the high prevalence of nonadherence in all populations, and that the reasons for nonadherence are likely different across patients, we strongly recommend assessing adherence and barriers to and mechanisms of adherence individually for every patient. While some factors identified in our review, such as young age, cannot be modified, other contributors to nonadherence could be addressed in clinical settings. The findings by two studies in this review -- that greater family financial and instrumental support were predictive of better adherence --suggest that involving family members in these specific ways whenever possible might be particularly beneficial to Latino patients. In addition, the increased antidepressant adherence among Latinos having 8 or more visits to a non-medical therapist (45) is consistent with findings from predominantly Euro-American samples (57, 84), and a position paper (39) calling for culturally appropriate practice-initiated quality improvement interventions, including psychoeducational and psychotherapeutic components. The finding that Latinos were more likely than Euro-Americans to want counseling and less likely to want antidepressants (85) suggests therapy may be an especially important adherence enhancer for Latinos.

Latinos are least likely of all US ethnic groups to have public or private health insurance, with uninsured rates of 35.7% (compared to 12.6% for Euro-Americans) (86). This disparity lends added significance to the finding that having public or private health insurance predicted better adherence among Latinos (45). As lower socioeconomic status was associated with lower adherence (41), and Latinos are disproportionately represented in lower socioeconomic strata (24, 86) clinicians should pay particular attention to ensuring their patients can afford the psychotropic medications they prescribe. Given barriers to quality care were associated with worse adherence, clinicians can likely improve adherence simply by ensuring they are providing quality care. These findings also suggest that societal

level interventions increasing access to health insurance, medications, and quality care would improve adherence.

Culturally and linguistically tailored care is likely important for establishing good clinician-patient relationships, which have been associated with improved adherence (7, 18, 19, 87, 88). Clinicians should attend to cultural contexts shaping how their patients interpret and experience mental illness, as these likely affect adherence. As previously noted in several papers (82, 89, 90), and suggested by the findings of two studies in this review (41, 56), even clinics with primarily bilingual, bicultural staff can have cultural divides with their patients due to socioeconomic and health models and beliefs differences. Recognizing those divides and working collaboratively with patients can help overcome these barriers and improve adherence (82, 91).

Conclusions

US Latinos receiving mental health treatment appear to be at increased risk for psychotropic medication nonadherence compared to Euro-Americans. Our findings suggest that as clinicians and researchers examine ways to improve adherence to psychotropic medications among their Latino patients, important considerations include: prescribing treatment regimens that patients can afford; overcoming barriers to quality care, including language, socioeconomic, and cultural barriers; recognizing family involvement and psychotherapy as potentially important adherence enhancers; and assuring interventions to improve adherence are culturally appropriate.

References

1. Ascher-Svanum H, Faries DE, Zhu B, et al. Medication adherence and long-term functional outcomes in the treatment of schizophrenia in usual care. Journal of Clinical Psychiatry. 2006; 67:453–460. [PubMed: 16649833]
2. Weiden PJ, Olfson M. Cost of relapse in schizophrenia. Schizophrenia Bulletin. 1995; 21:419–429. [PubMed: 7481573]
3. Valenstein M, Copeland LA, Blow FC, et al. Pharmacy data identify poorly adherent patients with schizophrenia at increased risk for admission. Medical Care. 2002; 40:630–639. [PubMed: 12187177]
4. Terkelsen KG, Menikoff A. Measuring the costs of schizophrenia. Implications for the post-institutional era in the US. Pharmacoeconomics. 1995; 8:199–222. [PubMed: 10155617]
5. Gilbert PL, Harris MJ, McAdams LA, et al. Neuroleptic withdrawal in schizophrenic patients. A review of the literature. Archives of General Psychiatry. 1995; 52:173–188. [PubMed: 7872841]
6. Gilmer TP, Dolder CR, Lacro JP, et al. Adherence to treatment with antipsychotic medication and health care costs among Medicaid beneficiaries with schizophrenia. American Journal of Psychiatry. 2004; 161:692–699. [PubMed: 15056516]
7. Fenton WS, Blyler CR, Heinssen RK. Determinants of medication compliance in schizophrenia: empirical and clinical findings. Schizophrenia Bulletin. 1997; 23:637–651. [PubMed: 9366000]
8. Goodwin GM. Prophylaxis of bipolar disorder: how and who should we treat in the long term? European Neuropsychopharmacology. 1999; 9 (Suppl 4):S125–S129. [PubMed: 10524839]
9. Mander AJ, Loudon JB. Rapid recurrence of mania following abrupt discontinuation of lithium. Lancet. 1988; 2:15–17. [PubMed: 2898622]
10. Keck PE Jr, McElroy SL, Strakowski SM, et al. Factors associated with pharmacologic noncompliance in patients with mania. Journal of Clinical Psychiatry. 1996; 57:292–297. [PubMed: 8666570]
11. Tondo L, Jamison KR, Baldessarini RJ. Effect of lithium maintenance on suicidal behavior in major mood disorders. Annals of the New York Academy of Sciences. 1997; 836:339–351. [PubMed: 9616808]

12. Johnson RE, McFarland BH. Lithium use and discontinuation in a health maintenance organization. American Journal of Psychiatry. 1996; 153:993–1000. [PubMed: 8678195]
13. Burton WN, Chen CY, Conti DJ, et al. The association of antidepressant medication adherence with employee disability absences. American Journal of Managed Care. 2007; 13:105–112. [PubMed: 17286530]
14. Geddes JR, Carney SM, Davies C, et al. Relapse prevention with antidepressant drug treatment in depressive disorders: a systematic review. Lancet. 2003; 361:653–661. [PubMed: 12606176]
15. Gopinath S, Katon WJ, Russo JE, et al. Clinical factors associated with relapse in primary care patients with chronic or recurrent depression. Journal of Affective Disorders. 2007; 101:57–63. [PubMed: 17156852]
16. Katon W, Cantrell CR, Sokol MC, et al. Impact of antidepressant drug adherence on comorbid medication use and resource utilization. Archives of Internal Medicine. 2005; 165:2497–2503. [PubMed: 16314547]
17. Cramer JA, Rosenheck R. Compliance with medication regimens for mental and physical disorders. Psychiatric Services. 1998; 49:196–201. [PubMed: 9575004]
18. Lacro JP, Dunn LB, Dolder CR, et al. Prevalence of and risk factors for medication nonadherence in patients with schizophrenia: a comprehensive review of recent literature. Journal of Clinical Psychiatry. 2002; 63:892–909. [PubMed: 12416599]
19. Lingam R, Scott J. Treatment non-adherence in affective disorders. Acta Psychiatrica Scandinavica. 2002; 105:164–172. [PubMed: 11939969]
20. Perlick DA, Rosenheck RA, Kaczynski R, et al. Medication Non-adherence in Bipolar Disorder: A Patient-centered Review of Research Findings. Clinical Approaches in Bipolar Disorders. 2004; 3:56–64.
21. Becker MA, Young MS, Ochshorn E, et al. The relationship of antipsychotic medication class and adherence with treatment outcomes and costs for Florida medicaid beneficiaries with schizophrenia. Administration and Policy in Mental Health. 2007; 34:307–314. [PubMed: 17211716]
22. Valenstein M, Blow FC, Copeland LA, et al. Poor antipsychotic adherence among patients with schizophrenia: medication and patient factors. Schizophrenia Bulletin. 2004; 30:255–264. [PubMed: 15279044]
23. Sajatovic M, Elhaj O, Youngstrom EA, et al. Treatment adherence in individuals with rapid cycling bipolar disorder: results from a clinical-trial setting. Journal of Clinical Psychopharmacology. 2007; 27:412–414. [PubMed: 17632236]
24. Ramirez, RR.; de la Cruz, PG. The Hispanic Population in the United States. Available at http://www.census.gov/prod/2003pubs/p20-545.pdf
25. Rumbaut RG. Ages, life stages, and generational cohorts: decomposing the immigrants first and second generations in the United States. International Migration Review. 2004; 38:1160–1205.
26. Abraido-Lanza AF, Armbrister AN, Florez KR, et al. Toward a theory-driven model of acculturation in public health research. American Journal of Public Health. 2006; 96:1342–1346. [PubMed: 16809597]
27. Wells KB, Golding JM, Hough RL, et al. Acculturation and the probability of use of health services by Mexican Americans. Health Services Research. 1989; 24:237–257. [PubMed: 2732058]
28. Lara M, Gamboa C, Kahramanian MI, et al. Acculturation and Latino health in the United States: a review of the literature and its sociopolitical context. Annual Review of Public Health. 2005; 26:367–397.
29. Balls Organista, P.; Organista, KC.; Kurasaki, K. Relationship Between Acculturation and Ethnic Minority Mental Health. In: Chun, KM.; Organista, PB.; Marin, G., editors. Acculturation: advances in theory, measurement, and applied research. Vol. 1. Washington, DC: American Psychological Association; 2003. p. 136-161.
30. Vega WA, Kolody B, Aguilar-Gaxiola S, et al. Gaps in service utilization by Mexican Americans with mental health problems. American Journal of Psychiatry. 1999; 156:928–934. [PubMed: 10360134]

31. Grant BF, Stinson FS, Hasin DS, et al. Immigration and lifetime prevalence of DSM-IV psychiatric disorders among Mexican Americans and non-Hispanic whites in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. Archives of General Psychiatry. 2004; 61:1226–1233. [PubMed: 15583114]
32. Virnig B, Huang Z, Lurie N, et al. Does Medicare managed care provide equal treatment for mental illness across races? Archives of General Psychiatry. 2004; 61:201–205. [PubMed: 14757597]
33. Vitiello B, Burnam MA, Bing EG, et al. Use of psychotropic medications among HIV-infected patients in the United States. American Journal of Psychiatry. 2003; 160:547–554. [PubMed: 12611837]
34. Ruiz P, Varner RV, Small DR, et al. Ethnic differences in the neuroleptic treatment of schizophrenia. Psychiatric Quarterly. 1999; 70:163–172. [PubMed: 10392410]
35. Wagner GJ, Maguen S, Rabkin JG. Ethnic differences in response to fluoxetine in a controlled trial with depressed HIV-positive patients. Psychiatric Services. 1998; 49:239–240. [PubMed: 9575014]
36. Sanchez-Lacay JA, Lewis-Fernandez R, Goetz D, et al. Open trial of nefazodone among Hispanics with major depression: efficacy, tolerability, and adherence issues. Depression and Anxiety. 2001; 13:118–124. [PubMed: 11387731]
37. Marcos LR, Cancro R. Pharmacotherapy of Hispanic depressed patients: clinical observations. American Journal of Psychotherapy. 1982; 36:505–512. [PubMed: 7158673]
38. Vega WA, Karno M, Alegria M, et al. Research issues for improving treatment of U.S. Hispanics with persistent mental disorders. Psychiatric Services. 2007; 58:385–394. [PubMed: 17325113]
39. Lewis-Fernandez R, Das AK, Alfonso C, et al. Depression in US Hispanics: diagnostic and management considerations in family practice. Journal of the American Board of Family Practice. 2005; 18:282–296. [PubMed: 15994474]
40. Jenkins JH. Subjective experience of persistent schizophrenia and depression among US Latinos and Euro-Americans. British Journal of Psychiatry. 1997; 171:20–25. [PubMed: 9328489]
41. Hosch HM, Barrientos GA, Fierro C, et al. Predicting Adherence to Medications by Hispanics with Schizophrenia. Hispanic Journal of Behavioral Sciences. 1995; 17:320–333.
42. Telles C, Karno M, Mintz J, et al. Immigrant families coping with schizophrenia. Behavioral family intervention v. case management with a low-income Spanish-speaking population. British Journal of Psychiatry. 1995; 167:473–479. [PubMed: 8829715]
43. Karno M, Jenkins JH, de la SA, et al. Expressed emotion and schizophrenic outcome among Mexican-American families. Journal of Nervous and Mental Disease. 1987; 175:143–151. [PubMed: 3819710]
44. Ramirez Garcia JI, Chang CL, Young JS, et al. Family support predicts psychiatric medication usage among Mexican American individuals with schizophrenia. Social Psychiatry and Psychiatric Epidemiology. 2006; 41:624–631. [PubMed: 16733631]
45. Hodgkin D, Volpe-Vartanian J, Alegria M. Discontinuation of Antidepressant Medication Among Latinos in the USA. Journal of Behavioral Health Services and Research. 2007
46. Rosenheck R, Chang S, Choe Y, et al. Medication continuation and compliance: a comparison of patients treated with clozapine and haloperidol. Journal of Clinical Psychiatry. 2000; 61:382–386. [PubMed: 10847315]
47. Bull SA, Hu XH, Hunkeler EM, et al. Discontinuation of use and switching of antidepressants: influence of patient-physician communication. JAMA. 2002; 288:1403–1409. [PubMed: 12234237]
48. Li J, McCombs JS, Stimmel GL. Cost of treating bipolar disorder in the California Medicaid (Medi-Cal) program. Journal of Affective Disorders. 2002; 71:131–139. [PubMed: 12167509]
49. Robinson DG, Woerner MG, Alvir JM, et al. Predictors of medication discontinuation by patients with first-episode schizophrenia and schizoaffective disorder. Schizophrenia Research. 2002; 57:209–219. [PubMed: 12223252]
50. Barrio C, Yamada AM, Atuel H, et al. A tri-ethnic examination of symptom expression on the positive and negative syndrome scale in schizophrenia spectrum disorders. Schizophrenia Research. 2003; 60:259–269. [PubMed: 12591588]

51. Opolka JL, Rascati KL, Brown CM, et al. Role of ethnicity in predicting antipsychotic medication adherence. Annals of Pharmacotherapy. 2003; 37:625–630. [PubMed: 12708934]
52. Sleath B, Rubin RH, Huston SA. Hispanic ethnicity, physician-patient communication, and antidepressant adherence. Comprehensive Psychiatry. 2003; 44:198–204. [PubMed: 12764707]
53. Sleath B, Rubin RH, Wurst K. The influence of Hispanic ethnicity on patients' expression of complaints about and problems with adherence to antidepressant therapy. Clinical Therapeutics. 2003; 25:1739–1749. [PubMed: 12860495]
54. Farabee D, Shen H, Sanchez S. Program-level predictors of antipsychotic medication adherence among parolees. International Journal of Offender Therapy and Comparative Criminology. 2004; 48:561–571. [PubMed: 15358931]
55. Ayalon L, Arean PA, Alvidrez J. Adherence to antidepressant medications in black and Latino elderly patients. American Journal of Geriatric Psychiatry. 2005; 13:572–580. [PubMed: 16009733]
56. Diaz E, Woods SW, Rosenheck RA. Effects of ethnicity on psychotropic medications adherence. Community Mental Health Journal. 2005; 41:521–537. [PubMed: 16142536]
57. Olfson M, Marcus SC, Tedeschi M, et al. Continuity of antidepressant treatment for adults with depression in the United States. American Journal of Psychiatry. 2006; 163:101–108. [PubMed: 16390896]
58. Sajatovic M, Valenstein M, Blow FC, et al. Treatment adherence with antipsychotic medications in bipolar disorder. Bipolar Disorders. 2006; 8:232–241. [PubMed: 16696824]
59. Valenstein M, Ganoczy D, McCarthy JF, et al. Antipsychotic Adherence Over Time Among Patients Receiving Treatment for Schizophrenia: A Retrospective Review. Journal of Clinical Psychiatry. 2006; 67:1542–1550. [PubMed: 17107245]
60. Sajatovic M, Valenstein M, Blow F, et al. Treatment adherence with lithium and anticonvulsant medications among patients with bipolar disorder. Psychiatric Services. 2007; 58:855–863. [PubMed: 17535948]
61. Velligan DI, Wang M, Diamond P, et al. Relationships among subjective and objective measures of adherence to oral antipsychotic medications. Psychiatric Services. 2007; 58:1187–1192. [PubMed: 17766564]
62. Grymonpre RE, Didur CD, Montgomery PR, et al. Pill count, self-report, and pharmacy claims data to measure medication adherence in the elderly. Annals of Pharmacotherapy. 1998; 32:749–754. [PubMed: 9681089]
63. Jeste ND, Moore DJ, Goldman SR, et al. Predictors of everyday functioning among older Mexican Americans vs. Anglo-Americans with schizophrenia. Journal of Clinical Psychiatry. 2005; 66:1304–1311. [PubMed: 16259545]
64. Franzini L, Fernandez-Esquer ME. Socioeconomic, cultural, and personal influences on health outcomes in low income Mexican-origin individuals in Texas. Social Science and Medicine. 2004; 59:1629–1646. [PubMed: 15279921]
65. Folsom DP, Gilmer T, Barrio C, et al. A longitudinal study of the use of mental health services by persons with serious mental illness: do Spanish-speaking Latinos differ from English-speaking Latinos and Caucasians? American Journal of Psychiatry. 2007; 164:1173–1180. [PubMed: 17671279]
66. Vega WA, Sribney WM, Achara-Abrahams I. Co-occurring alcohol, drug, and other psychiatric disorders among Mexican-origin people in the United States. American Journal of Public Health. 2003; 93:1057–1064. [PubMed: 12835179]
67. Guarnaccia PJ, Parra P. Ethnicity, social status, and families' experiences of caring for a mentally ill family member. Community Mental Health Journal. 1996; 32:243–260. [PubMed: 8790967]
68. Interian A, Martinez IE, Guarnaccia PJ, et al. A qualitative analysis of the perception of stigma among Latinos receiving antidepressants. Psychiatric Services. 2007; 58:1591–1594. [PubMed: 18048562]
69. Velligan DI, Lam YW, Glahn DC, et al. Defining and assessing adherence to oral antipsychotics: a review of the literature. Schizophrenia Bulletin. 2006; 32:724–742. [PubMed: 16707778]
70. NIMH Five-Year Strategic Plan for Reducing Health Disparities. 2001. Available at http://www.nimh.nih.gov/about/strategic-planning-reports

71. Alegria M, Canino G, Shrout PE, et al. Prevalence of mental illness in immigrant and non-immigrant U.S. Latino groups. American Journal of Psychiatry. 2008; 165:359–369. [PubMed: 18245178]
72. Wells K, Miranda J, Bruce ML, et al. Bridging community intervention and mental health services research. American Journal of Psychiatry. 2004; 161:955–963. [PubMed: 15169681]
73. Gellad WF, Haas JS, Safran DG. Race/ethnicity and nonadherence to prescription medications among seniors: results of a national study. Journal of General Internal Medicine. 2007; 22:1572–1578. [PubMed: 17882499]
74. Miranda J, Duan N, Sherbourne C, et al. Improving care for minorities: can quality improvement interventions improve care and outcomes for depressed minorities? Results of a randomized, controlled trial. Health Services Research. 2003; 38:613–630. [PubMed: 12785564]
75. Zygmunt A, Olfson M, Boyer CA, et al. Interventions to improve medication adherence in schizophrenia. American Journal of Psychiatry. 2002; 159:1653–1664. [PubMed: 12359668]
76. Dolder CR, Lacro JP, Leckband S, et al. Interventions to improve antipsychotic medication adherence: review of recent literature. Journal of Clinical Psychopharmacology. 2003; 23:389–399. [PubMed: 12920416]
77. Betancourt JR, Carrillo JE, Green AR. Hypertension in multicultural and minority populations: linking communication to compliance. Current Hypertension Reports. 1999; 1:482–488. [PubMed: 10981110]
78. van Servellen G, Carpio F, Lopez M, et al. Program to enhance health literacy and treatment adherence in low-income HIV-infected Latino men and women. Aids Patient Care and STDS. 2003; 17:581–594. [PubMed: 14746666]
79. Bonner S, Zimmerman BJ, Evans D, et al. An individualized intervention to improve asthma management among urban Latino and African-American families. Journal of Asthma. 2002; 39:167–179. [PubMed: 11990232]
80. Kopelowicz A, Zarate R, Gonzalez SV, et al. Disease management in Latinos with schizophrenia: a family-assisted, skills training approach. Schizophrenia Bulletin. 2003; 29:211–227. [PubMed: 14552498]
81. Patterson TL, Bucardo J, McKibbin CL, et al. Development and pilot testing of a new psychosocial intervention for older Latinos with chronic psychosis. Schizophrenia Bulletin. 2005; 31:922–930. [PubMed: 16037481]
82. Opler LA, Ramirez PM, Dominguez LM, et al. Rethinking medication prescribing practices in an inner-city Hispanic mental health clinic. Journal of Psychiatric Practice. 2004; 10:134–140. [PubMed: 15330410]
83. Erzinger S. Communication between Spanish-speaking patients and their doctors in medical encounters. Culture, Medicine and Psychiatry. 1991; 15:91–110.
84. Jamison KR, Gerner RH, Goodwin FK. Patient and physician attitudes toward lithium: relationship to compliance. Archives of General Psychiatry. 1979; 36:866–869. [PubMed: 454105]
85. Cooper LA, Gonzales JJ, Gallo JJ, et al. The acceptability of treatment for depression among African-American, Hispanic, and white primary care patients. Medical Care. 2003; 41:479–489. [PubMed: 12665712]
86. Kaiser Family F. The Uninsured: A Primer. Available at http://www.kff.org/uninsured/7451.cfm
87. Cochran SD, Gitlin MJ. Attitudinal correlates of lithium compliance in bipolar affective disorders. Journal of Nervous and Mental Disease. 1988; 176:457–464. [PubMed: 3404137]
88. van Servellen G, Lombardi E. Supportive relationships and medication adherence in HIV-infected, low-income Latinos. Western Journal of Nursing Research. 2005; 27:1023–1039. [PubMed: 16275696]
89. Ruiz P, Ruiz PP. Treatment Compliance Among Hispanics. Journal of Operational Psychiatry. 1983; 14:112–114.
90. Lorion RP. Patient and therapist variables in the treatment of low-income patients. Psychological Bulletin. 1974; 81:344–354. [PubMed: 4840111]
91. Sajatovic M, Davies M, Bauer MS, et al. Attitudes regarding the collaborative practice model and treatment adherence among individuals with bipolar disorder. Comprehensive Psychiatry. 2005; 46:272–277. [PubMed: 16175758]

92. Darnell JC, Murray MD, Martz BL, et al. Medication use by ambulatory elderly. An in-home survey. Journal of the American Geriatrics Society. 1986; 34:1–4. [PubMed: 3941238]

93. Cuellar I, Harris LC, Jasso R. An acculturation scale for Mexican-American normal and clinical populations. Hispanic Journal of Behavioral Sciences. 1980; 2:199–217.

Table 1

Studies including only US Latinos

Study	Study Design and Objective	Study Location/Population	Medications	Participants	Adherence measure	Nonadherence rates	Nonadherence-related findings among Latinos
Karno, M et al. 1987 (43) and Ramirez Garcia, JIR et al. 2006 (44)	**Parent study (Karno et al.):** Prospective longitudinal observational study of family influences on course of schizophrenia in Mexican-Americans **Ramirez Garcia et al.** studied family factors related to antipsychotic adherence in a subgroup of the original population	Southern Californian Mexican-Americans ages 18–50 with schizophrenia living with family were followed for 9 months after hospitalization for acute psychotic episode	Antipsychotics	**Karno et al:** N = 43 Mean age = 26.1±7.2 Male = 57% Country of origin/ heritage = Mexico Participant mean acculturation score = 2.36±0.95[a], Family acculturation score = 1.84±0.85[a] **Ramirez Garcia et al (subgroup of above):** N = 30 patients + 30 primary family caregivers Mean age = 25.7±7.6 Country of origin/ heritage = Mexico Acculturation: 52% of patients and 68% of caregivers were born in Mexico Language: 39% of pts, 68% of caregivers were monolingual Spanish speaking	Adherence = Taking meds at least 75% of time with no 4-wk or longer interval of discontinued use Source (of adherence data) = Psychologists examining charts, doing pt interviews and family monthly phone contact	**Karno et al:** 44% (N= 19) nonadherent 56% (N=24) adherent Over 9 months **Ramirez Garcia et al:** 57% (N=17) nonadherent 43% (N=13) adherent Over 9 months	**Outcomes associated with nonadherence**(43) Nonadherence strongly predicted poor outcomes (sustained psychosis and psychotic relapse). Patients in low EE homes with regular adherence had most favorable clinical outcome – 88% achieved sustained remission. There was no confounding of effects of EE and medication adherence. **Protective factors (factors associated with higher adherence)** (44) More instrumental support from family (# of "task-oriented" assistance statements in audiotaped family interactions). (Instrumental support also predicted drug abstinence, but adherence and drug abstinence were not significantly related.) **Factors studied and found not significantly related to adherence** (44) **1** Emotional support **2** Criticism **3** Emotional over involvement **4** Warmth **5** Years ill **6** Drug abstinence **7** Positive symptoms
Hosch, HM et al. 1995 (41)	Retrospective chart review to determine factors predicting medication adherence in Latinos	Mexican-Americans in El Paso County, TX with schizophrenia treated for a minimum of 10 sessions between 6/30/86 – 6/30/93	All psychiatric medications prescribed by psychiatrist	N = 193 Median age = 38 (SD n/a) Male = 52% Country of origin/ heritage = Mexico Acculturation = On 0–4 scale ranged	Adherence = Adherence was "indexed on a 5-point scale at monthly intervals, and averaged" (Cutoffs for nonadherence were not specified.)	55% nonadherent Over 1 year	**Risk factors (associated with lower adherence)** Seeing a Spanish-speaking therapist **Protective factors** **1** More "motivation" (kept appointments,

Study	Study Design and Objective	Study Location/Population	Medications	Participants	Adherence measure	Nonadherence rates	Nonadherence-related findings among Latinos
				from N=43 at Anglo end to N=28 at extreme Latino end; bicultural subjects towards Anglo end were most common N=79 Language = 35% preferred English, 43% bilingual, 23% monolingual Spanish-speaking	Source = Physician statements in progress notes		requested refills when due, picked up medications at center, asked for medication changes if thought meds not working well) **2** Older age **3** Greater family financial support **4** Higher socioeconomic status (SES) **5** Seeing a Latino therapist **Factors not significant** **1** Acculturation **2** Treatment variables (i.e. # meds, years in treatment, # of treatments other than meds received) **3** Total # therapists ever **4** Gender **5** Family members mentally ill **6** Living setting **7** Financial support from outside family (self supporting, receiving disability, support from others outside family)
Telles, C et al. 1995 (42)	Prospective study comparing behavioral family management versus standard case management in preventing relapse	Spanish-speaking patients ages 18–55 with schizophrenia their families were recruited after inpatient admission to public-sector psychiatric facilities in Los Angeles, CA	Intramuscular haloperidol or fluphenazine decanoate	N = 40 Mean age = 30 (SD n/a) Male = 64% Country of origin/ heritage = Mexico, Guatemala, and El Salvador Acculturation = 88% of patients	Adherence = monthly ratings on 5-point rating scale were averaged after 12 months (Cutoffs for nonadherence were not specified.) Source = Not specified	Actual adherence rates not reported Over 1 year	**Outcomes** Nonadherence predicted illness exacerbation (Intervention type did not) **Risk factors** Less acculturation **Factors not significant** Study treatment group assignment

Study	Study Design and Objective	Study Location/Population	Medications	Participants	Adherence measure	Nonadherence rates	Nonadherence-related findings among Latinos
				and 95% of relatives were 1st generation (Mean acculturation scores: Participants = 1.99, families = 1.63[a]) Language = 100% monolingual Spanish-speaking			
Hodgkin, D et al. 2007 (45)	Prospective cross-sectional study examining rates and factors related to discontinuation of antidepressant medication among Latinos From Latino respondents N = 2,554 in the National Latino and Asian American Study (NLAAS) Interviews in 2002–2003	Latino respondents to NLAAS who reported using at least one antidepressant medication in the past 12 months	Antidepressants	N = 180 Age 18–34 = 28% Age 35–54 = 53% Age 55+ = 19% Male = 29% Country of Origin/ Heritage = not specified (from National sample that included Puerto Ricans, Cubans, Mexicans, and other Latinos) English language proficiency: Poor/fair = 40% Good/excellent = 60%	Nonadherence = discontinuation (having used an antidepressant in the prior 12 months and discontinued it) Source = Patient-report	Discontinuation rate = 33% (N=60) 57% (N=34) of those who discontinued (dc/ed) (19% of total N) dc/ed without prior medical input Over prior 1 year	**Risk Factors** **1** Problems with a drug **2** Barriers to quality care **Protective Factors** **1** Age older than 35 **2** Being married **3** Having public or private insurance **4** Greater # of depressive symptoms **5** Type of antidepressant = SSRI (significant for d/cing only) **6** 8+ visits to non-medical therapist (for d/cing without prior input only) **7** Good/excellent English proficiency (for d/cing only) **Factors not significant** **1** Education **2** Gender **3** Having problems with role functioning **4** Recognizing having a problem

Study	Study Design and Objective	Study Location/Population	Medications	Participants	Adherence measure	Nonadherence rates	Nonadherence-related findings among Latinos
							5 Antidepressant prescribed by a psychiatrist

Table 2

Studies including US Latinos and other US ethnic groups

Study	Study Design and Objective	Study Location/Population	Medications	Participants	Adherence measure	Nonadherence rates	Ethnicity/Adherence Related Findings and Other Findings
Jenkins, JH 1997 (40)	Prospective naturalistic study using ethnographic interviews and observations to cross-culturally examine the subjective experience of long-term psychiatric patients	Northeastern Ohio Latino and Euro-American outpatients with schizophrenia and depression age 20–55 living with or in regular weekly contact with family member(s)	Psychiatric medication	N=80 Mean age = 38.6±8.7 Male = 46% 50% Latino Latino participants: 95% Puerto Rican of which 80% born in PR, 1 Cuban, 1 Honduran) 73% monolingual Spanish-speaking Mean acculturation score = 1.95* 50% Euro-American (EA) EA participants: majority in US for many generations, all spoke English as primary language	Adherence = "regular, somewhat irregular, very irregular, not applicable (n/a = no recent medication)" (Not specified how adherence groups were defined.) Source = Not specified	**Latino schizophrenia rates** 15% somewhat irregular, 80% regular, 5% n/a **Euro-American schizophrenia rates** 5% very irregular, 15% somewhat irregular, 80% regular **Latino depression rates** 5% very irregular, 20% somewhat irregular, 65% regular, 10% n/a **Euro-American depression rates** 5% very irregular, 95% regular To "recent medication" (exact time period not specified)	No difference in adherence rates between Latinos and Euro-Americans with schizophrenia. There was a trend (p = 0.055) towards Latinos with depression having higher rates of nonadherence than Euro-Americans.[b] No adherence related outcomes or factors examined. **Other findings** Latinos were significantly less likely than Euro-Americans to characterize their life situation in terms of mental illness.

Rosenheck, RA et al. 2000 (46)	Prospective randomized double-blind trial comparing medication continuation and adherence in haloperidol and clozapine	Treatment-refractory pts with schizophrenia at 15 Veterans Affairs (VA) Medical Centers with history of high inpatient use (30–364 days of hospitalization during the previous year)	Haloperidol or clozapine	N = 423
				Mean age = 43.6±8
				Male = 98%
				4% Latino
				66% Euro-American
				30% African American
				0.2% Other
					Adherence assessed by both: Medication nonadherence = (#returned pills/ #prescribed pills) × 100 at end of each week and Medication continuation = # of weeks of participation in double-blind treatment with randomly assigned study drug
					Source = pill counts
						Overall nonadherence = 20% first 6 weeks
						15% 6wks-3mos
						12% 3mos-6mos
						Mean continuation = 31.2±20 wks (out of 52 max)
						Rates by ethnicity not reported (and raw data not available to calculate)
							Latino ethnicity was not significantly related to likelihood of discontinuation.
							African Americans were significantly more likely to discontinue than Euro-Americans.

Study	Study Design and Objective	Study Location/Population	Medications	Participants	Adherence measure	Nonadherence rates	Ethnicity/Adherence Related Findings and Other Findings
Bull, SA et al. 2002 (47)	Prospective cross-sectional telephone interviews with patients and surveys of physicians to examine relationship between patient-physician communication about serotonin selective reuptake inhibitors (SSRIs) and SSRI discontinuation	Northern California Kaiser Permanente Medical Care Program patients 18–75 years old who had recently begun an SSRI for a depressive disorder between Dec 15, 1999 – May 31, 2000	SSRIs	N = 401 Mean age = 45.8±15 Male = 29% 10% Latino 67% Euro-American 9% African American 4% Asian 10% Other	Nonadherence = discontinuation Source = Patient-report	Overall discontinuation rate = 20% (79/401) Latino rate = 36% (15/42) Euro-American rate = 16% 43/267 African American rate = 25% (9/36) Asian rate = 20% (3/15)[C] 3 months after initiating therapy	Latinos had significantly higher discontinuation rates than Euro-Americans; all other comparisons of differences in discontinuation rates by ethnicity were non significant.[C]
Li, J et al. 2002 (48)	Retrospective cross-sectional study of cost of treating bipolar disorder	California Medicaid (Medi-Cal) historical paid claims April 1994 – January 1999 for individuals with at least one diagnosis of bipolar disorder in first year of treatment	Mood stabilizers	N = 3349 Mean age = 41.5 (SD n/a) Male = 36% 8% Latino 62% Euro-American 11% African American 19% Other	Adherence = MPR[‡] ≥ 90% Source = Medi-Cal prescription drug claims	Actual adherence rates not reported.	No significant differences in likelihood of use or of adherence by ethnicity/ race
Robinson, DG et al. 2002 (49)	Prospective longitudinal study examining predictors of medication discontinuation in patients with first episode schizophrenia and schizoaffective disorder (parent study was long-term study of first-episode schizophrenia and schizoaffective disorder)	Long Island Jewish Medical Center, NY first-episode pts with schizophrenia and schizoaffective disorder in inpatient, outpatient, day and partial hospital programs	Antipsychotics prescribed according to study algorithm (sequence = fluphenazine, haloperidol, haloperidol plus lithium, either molindone or loxapine, clozapine)	N = 112 Mean age = 25±6.5 Male = 53% 12% Latino 40% Euro-American 38% African American 7% Asian 3% Mixed racial background	Medication nonadherence = discontinuation = failure to take medication for a week or longer Source = Patient, family member and clinician reports	Overall nonadherence rate = 26% Latino rate = 21% (3/14) Euro-American rate = 13%(6/45) African American rate = 41% (17/42) Asian rate = 25% (2/8)[C] Over 1 year	Difference between Latino rate and rates of other ethnic groups not significant. African Americans were significantly more likely to be nonadherent than Euro-Americans[C]

Study	Study Design and Objective	Study Location/Population	Medications	Participants	Adherence measure	Nonadherence rates	Ethnicity/Adherence Related Findings and Other Findings
Barrio, C et al. 2003 (50)	Prospective naturalistic longitudinal study of patients with schizophrenia examining symptom expression on Positive and Negative Symptom Scale by ethnicity	Random selection of English speaking adults with schizophrenia age 18–78 from San Diego county public mental health services	Antipsychotics	N = 351 Mean age = 41±11 Male = 61% 19% Latino (100% English speaking, majority Mexican-American, “fairly well acculturated”) 56% Euro-American 25% African-American	Adherence = rated on 5-point scale (from always take to stopped taking prescribed medication) and then dichotomized into totally adherent and nonadherent (which included partial adherence) Source = Patient-report	Overall nonadherence rate = 25% (88/351) Latino rate = 37% (23/65) Euro-American rate = 23% (45/198) African American rate = 23% (20/88) At study entry (time period not specified)	Latino nonadherence rate was significantly higher than Euro-American rate. All other comparisons between ethnic groups were non significant (Latino rate compared to African-American showed non significant trend)[b]

Opolka, JL et al. 2003 (51)	Retrospective cross sectional study comparing ethnicity in predicting antipsychotic medication adherence	Texas Medicaid patients with schizophrenia/ schizoaffective disorder started on one of 3 antipsychotics January 1997 – August 1998	Olanzapine, risperidone, haloperidol	N = 3583
				Age range = 21–65 (mean not reported)
				Male = not reported
				16% Latino (all Mexican-American)
				45% Euro-American
				39% AA
					Adherence = # days adherent in one year = (# days medication received/365)
					Source = pharmacy claims data
						Overall nonadherence rate = 52%
						Latino rate = 55%
						Euro-American rate = 48%
						African American rate = 54%[e]
						Over 1 year following initiation of treatment
							Latinos and African Americans had significantly higher nonadherence than Euro-Americans.

Sleath, B et al. 2003 (52) and Sleath, B et al. 2003 (53)	Prospective cross-sectional study using audiotaped physician/ patient interviews examining how Latino ethnicity influenced physician-patient communication about antidepressants and antidepressant adherence	Patients prescribed antidepressants in University of New Mexico’s primary care clinics	Antidepressants	N = 73 with adherence data Mean age = 48 (range 23–83) Male = 29% 56% Latino 44% Euro-American	Adherence = % adherence during the 100-day period after the audiotaped visit = (# days of meds dispensed/# days in all refill intervals) × 100 Source = prescription fill records	Overall nonadherence rate = 34% Latino rate = 41% Euro-American rate = 25% Over 100 days	Latino ethnicity predicted antidepressant nonadherence (52) **Ethnic disparities in physician/patient communication about medication** Latino patients were significantly less likely than Euro-Americans to both receive from and give antidepressant information to their physicians.(52) Latino patients were significantly less likely than Euro-Americans to express complaints about their antidepressants to physicians.(53) There were no significant ethnic differences in

Study	Study Design and Objective	Study Location/Population	Medications	Participants	Adherence measure	Nonadherence rates	Ethnicity/Adherence Related Findings and Other Findings
							physician response to patient complaints about medication or expression of adherence problems. (53)
Farabee, D et al. 2004 (54)	Prospective longitudinal study examining program level predictors of antipsychotic medication adherence	California Parolees in psychiatric outpatient clinics with schizophrenia, schizoaffective disorder, or bipolar disorder	olanzapine, haloperidol, risperidone, quetiapine, thioridazine, thiothixene, trifluoperazine, fluphenazine	N = 150 Mean age = 41.1±7.7 Male = 77% 10% Latino 14% Euro-American 71% African American 4% Other race/ethnicity	Adherence = Having positive urinalysis for antipsychotic prescribed Source = Urine testing for metabolites (detects ”recent ingestion”)	Overall nonadherence rate = 29% At baseline, detection of “recent ingestion” Rates by ethnicity not reported (and data not available to calculate)	African American pts had significantly higher rates of nonadherence than Euro-American, Latino, and other patients.
Gilmer, TP et al. 2004 (6)	Retrospective cross-sectional study examining antipsychotic adherence and health care costs of Medi-Cal beneficiaries with schizophrenia	Adults with schizophrenia in San Diego Medi-Cal claims database, 1998–2000	Oral antipsychotics	N = 2,801 person-years Mean age = 42±11 Male = 56% 19% Latino 54% Euro-American 18% African American 6% Asian 4% Other ethnicity/race	Adherence = assessed by cumulative possession ratio[f] (Nonadherent = 0–0.49; Partially adherent = 0.5–0.79; Adherent = 0.8–1.1; Excess fillers >1.1) Source = pharmacy records	Overall rates = 24% nonadherent 16% partially adherent 19% excess fillers 41% adherent Latino nonadherence rate = 63% Euro-American rate = 57% African American rate = 65% Asian rate = 57% Other ethnicity/race rate = 54%[g] Over 1 year	Latino and African American patients had significantly higher nonadherence rates than Euro-Americans.
Ayalon, L et al. 2005 (55)	Retrospective cross-sectional telephone survey to determine factors related to nonadherence to antidepressants among older African American and Latino patients	Latino or African American patients treated through University of California San Francisco with diagnosis of major depression, age > 55, prescribed antidepressant meds in the prior 12 months	antidepressants	N=101 Mean age = 64.6±7.3 (African Americans) and 71.1±8.5 (Latinos) Male = 14% 51% Latino 49% African American	Nonadherence = nonadherent “at least some of the time” Source = Patient report using measure (92) that assessed unintentional nonadherence on a 6-point scale and intentional nonadherence on a 5-point scale	Latino nonadherence rate = 65%[h] African American nonadherence rate = 53%[h] Intentional nonadherence: Latino rate = 29% African American rate = 35% Unintentional nonadherence: Latino rate = 36% African American rate = 18% Over the prior 1 year	Latino patients reported significantly more unintentional nonadherence (by Chi square), but once other predictors were entered into multivariate model, ethnicity did not remain a significant predictor.

Study	Study Design and Objective	Study Location/Population	Medications	Participants	Adherence measure	Nonadherence rates	Ethnicity/Adherence Related Findings and Other Findings

Diaz, E et al. 2005 (56)	Prospective study to examine the effects of ethnicity on psychotropic medication adherence	Recruits from urban Community Mental Health Clinic in New Haven, Connecticut with any psychiatric disorder	Any oral psychiatric medication except clozapine (33% antipsychotic 55% antidepressant 12% mood stabilizer or other)	N = 122
				Mean age = 45±9.6
				Male = 49%
				36% monolingual Spanish-speaking Latino (mostly Puerto Rican)
				20% bilingual Latino (mostly Puerto Rican)
				28% Euro-American
				16% African-American
					Adherence = # bottle openings/# prescribed openings in a month (taking into account openings for pharmacy refills)
					Source = Medication Event Monitoring System (MEMS) pill bottle caps
						Monolingual Latino nonadherence rate = 23%
						Bilingual Latino rate = 24%
						Euro-American rate = 10%
						African American rate = 32%
						Over 1 month after the initial interview
							After controlling for covariates, monolingual Latinos and African Americans had significantly higher nonadherence rates than Euro-Americans and difference was not significant between bilingual Latinos and Euro-Americans.
							Comparison of protective factors (associated with higher adherence) by ethnicity:
							For monolingual Latinos
							Older age
							For Euro-Americans
							1 More years of past treatment
							2 Fewer depressive symptoms (No variables predicted nonadherence in bilingual Latinos or African Americans after controlling for covariates)
							Other Findings
							Acculturative stress > for monolingual Latinos than bilingual Latinos

Ascher-Svanum, H et al. 2006 (1)	Prospective, longitudinal study examining relationship	US Schizophrenia Care and Assessment Program (large, naturalistic, prospective, multi-site study including patients treated for	Any antipsychotic	N = 1906 Mean age = 41.2±11.1 Male = 61% 5% Latino	Nonadherent = MPR[d] < 85% Source = prescription data from patient medical records was	Overall nonadherent = 20% Latino nonadherence rate = 17%	There was no significant difference between Latino nonadherence rates and those of any other ethnic group.

Study	Study Design and Objective	Study Location/Population	Medications	Participants	Adherence measure	Nonadherence rates	Ethnicity/Adherence Related Findings and Other Findings
	between adherence and long-term functional outcomes (which were much worse for nonadherent patients)	schizophrenia spectrum disorders 1997–2003)		49% Euro-American 37% African American 9% Other race/ethnicity	used to calculate MPR[d]	Euro-American rate = 16% African American rate = 22% Other race/ethnicity rate = 27%[c] Over 6 months	African American and other race/ethnicity patients were significantly more likely to be nonadherent than Euro-American patients.[c]
Olfson, M et al. 2006 (57)	Prospective longitudinal study using phone interviews to examine antidepressant discontinuation/	Adults ≥ age 18 who started a new episode of antidepressant treatment for depression during household component of the Medical Expenditure Panel Survey (MEPS) 1996–2001 (National probability noninstitutionalized sample)	Antidepressants	N = 829 Age 18–44 = 47% Age 45–64 = 35% Age ≥65 = 18% Male = 27% 17% Latino 74% Euro-American 7% African American 2% Other race/ethnicity (including American Indian, Alaska native, Asian or Pacific Islander)	Nonadherence = discontinuation = gaps > 30 days Source = Patient-report using diaries and structured interviews	Overall discontinuation rate = 42% (over first 30 days of treatment) (Of those continuing after 30 days, 52% d/ced during the next 60 days. Only 28% continued antidepressants > 90 days.) Latino discontinuation rate = 54% Non-Latino rate = 41% Euro-American rate = 41% African American rate = 47% Other rate= 51% Over first 30 days	Latinos had significantly higher likelihood of discontinuing compared to non-Latinos (even after controlling for age, gender, race, pretreatment mental health status). Latinos had a significantly higher discontinuation rate than Euro-Americans. Difference between Latino rate and African American rate was not significant.[b]
Sajatovic, M et al. 2006 (58)	Retrospective cross-sectional examination of treatment adherence to antipsychotics in patients with bipolar disorder	Bipolar patients prescribed antipsychotics in the VA National Psychosis Registry October 1, 2002 – Sept 30, 2003	Oral antipsychotics prescribed to patients with bipolar disorder (while outpatients)	N = 32,993 Mean age = 51.2±11.9 Male = 88% 4% Latino 66% Euro-American 12% African American 0.4% American Indian 0.2% Asian 18% Unknown race/ethnicity	Fully adherent = MPR ≥ 0.8 Partially adherent = MPR >0.5 – <0.8 Nonadherent = MPR ≤ 0.5 Source = pharmacy data from VA Pharmacy Benefits Management Strategic Healthcare Group used to calculate MPR[d]	Overall: Nonadherent = 27%, Partially adherent = 21%, Fully adherent = 52% Latino pattern[c]: Nonadherent = 28%, Partially = 22%, Fully = 50% Euro-American pattern[c]: Nonadherent = 24%, Partially = 21%, Fully = 55% African American pattern[c]: Nonadherent = 37%, Partially = 25%, Fully = 38% Over 1 year	Controlling for covariates, nonadherent patients were significantly more likely to non Euro-American. Latinos had significantly higher nonadherence rates than Euro-Americans and significantly lower nonadherence rates than African Americans. African Americans had significantly higher nonadherence rates than Euro-Americans and Latinos.[c]

Study	Study Design and Objective	Study Location/Population	Medications	Participants	Adherence measure	Nonadherence rates	Ethnicity/Adherence Related Findings and Other Findings
Valenstein, M et al. 2006 (59)	Retrospective longitudinal examination of antipsychotic medication adherence over time	Patients with schizophrenia prescribed an antipsychotic in the National VA Psychosis Registry 1999–2003	Antipsychotics	N = 34128 Male = 96% Mean age = 51.2±11.2 8% Latino 56% Euro-American 26% African American 1% Other race/ethnicity 9% Unknown race/ethnicity	Consistently good adherence = MPR [d] ≥ 0.8 in all 4 years; Consistently poor adherence = MPR <0.8 in all 4 years; Inconsistent adherence = MPR ≥ 0.8 in some but not all years Source = pharmacy data from VA Pharmacy Benefits Management Strategic Healthcare Group used to calculate MPR[d]	Overall rates: Consistently poor adherence = 18% Inconsistent adherence = 43% Consistently good adherence = 39% Over 4 years Adherence rates by ethnicity were not reported (and data not available to calculate them)	Latinos and African Americans were significantly more likely to have consistently poor adherence than Euro-Americans.
Sajatovic, M et al. 2007 (60)	Retrospective cross-sectional study examining adherence to mood stabilizers in bipolar disorder	VA National Psychosis Registry patients with bipolar disorder prescribed lithium or anticonvulsant during federal fiscal year 2003	Lithium and anticonvulsants	N = 44,637 Mean Age = 51.8±12.2 Male = 89% 3% Latino 65% Euro-American 10% African American 0.3% American Indian 0.2% Asian 21% Unknown race/ethnicity	Fully adherent = MPR[d] ≥ 0.8 Partially adherent = MPR >0.5 – <0.8 Nonadherent = MPR ≤ 0.5 Source = pharmacy data from VA Pharmacy Benefits Management Strategic Healthcare Group used to calculate MPR[d]	Overall pattern: Nonadherent = 21% Partially adherent = 25% Fully adherent = 54% Latino pattern[c] Nonadherent = 26% Partially = 28% Fully = 46% Euro-American pattern[c] Nonadherent = 19% Partially = 24% Fully = 57% African American pattern[c] Nonadherent = 33% Partially = 28% Fully = 39% Over 1 year	Nonadherent patients were significantly more likely to be non-Euro-American. Latinos had significantly higher nonadherence rates than Euro-Americans and significantly lower rates than African Americans[c]

[a] On 1–5 point Acculturation Rating Scale for Mexican Americans (Cuellar et al. 1980 (93)) with 1 = “wholly Mexican”, 5 = “wholly Anglo-American”

[b] Using the raw data in the paper, we calculated Chi-square tests of significance using http://www.quantpsy.org

[c] Using the raw data in the paper, we calculated percentages of nonadherence and Chi-square tests of significance using http://www.quantpsy.org

[d] MPR (medication possession ratio) = # days’ supply of antipsychotic received from outpatient pharmacy/# days’ supply need for continuous outpatient antipsychotic use

[e] Using raw data in the paper, we calculated percentages of nonadherence

[f] Cumulative Possession Ratio = (# days medications were available for consumption/# days patients were eligible for Medi-cal)

[g] For consistency with other studies, we present summary nonadherence rates (which include nonadherent, partially adherent, and excess fillers) by ethnicity. (The paper did not report rates of each adherence category by ethnicity.)

[h] Calculated by adding intentional and unintentional nonadherence rates

Table 3

Factors Potentially Related to Adherence Investigated Among United States (US) Latinos

Factors Investigated	Association between factor and adherence*		
	Better	Worse	None
Patient demographic factors			
Older age	**41,45,56**		
Gender			**41,45**
Education level			**45**
Higher socioeconomic status	**41**		
Living situation			**41**
Being married	**45**		
Having health insurance	**45**		
Good/excellent English proficiency	**45,56**		
Less acculturation		**42**	**41**
Financial support from outside family			**41**
Patient clinical factors			
Years ill			**44**
Co-morbid substance abuse		**45**	**44**
Severity of positive symptoms			**44**
Greater # of depressive symptoms	**45**		
More insight			**45**
Having problems with role functioning			**45**
Having more “motivation”	**41**		
Treatment related factors			
Barriers to quality care		**45**	
Antidepressant prescribed by psychiatrist			**45**
Type of antidepressant (SSRI)	**45**		
8+ visits to non-medical therapist	**45**		
Seeing Spanish-speaking therapist		**41**	
Seeing Latino therapist	**41**		
All treatment variables in one study (years in treatment, # medications)			**41**
Total # of therapists ever			**41**
Family related factors			
Family financial support	**41**		
Family instrumental (“task-oriented”) support	**44**		
Family emotional support			**44**
Criticism			**44**
Emotional over involvement			**44**
Warmth			**44**
Family members mentally ill			**41**

* Numbers in the table are references to the studies that investigated each factor