Published in final edited form as:

Res Sociol Health Care. 2017 ; 35: 171–191.

Nativity, Race-Ethnicity, and Dual Diagnosis among US Adults

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Abstract

Purpose—This study investigated disparities in dual diagnosis (comorbid substance-use and depressive/anxiety disorders) among US adults by nativity and racial-ethnic origin and socioeconomic, cultural, and psychosocial factors that may account for the observed disparities.

Design/methodology—The study drew on data from two waves of the National Epidemiological Survey on Alcohol and Related Conditions. Racial-ethnic categories included African, Asian/Pacific Islander, European, Mexican, Puerto Rican, and other Hispanic/Latino. Substance-use and depressive/anxiety disorders were assessed per DSM-IV. A four-category measure of comorbidity was constructed: no substance-use or psychiatric disorder; substance-use disorder only; depressive/anxiety disorder only; and, dual diagnosis. The data were analyzed using multinomial logistic regression.

Findings—The prevalence of dual diagnosis was low but varied by nativity, with the highest rates among Europeans and Puerto-Ricans born in US states, and the lowest among Mexicans and Asians/Pacific Islanders. The nativity and racial-ethnic effects on likelihood of having dual diagnosis remained significant after all adjustments.

Research limitations—The limitations included measures of immigrant status, race-ethnicity, and stress and potential misdiagnosis of mental disorder among ethnic minorities.

Practical and Social Implications—This new knowledge will help to guide public health and health care interventions addressing immigrant mental and behavioral health gaps.

Originality/value—This study addressed the research gap in regard to the prevalence and correlates of dual diagnosis among immigrants and racial-ethnic minorities. The study used the most current and comprehensive data addressing psychiatric conditions among US adults and examined factors rarely captured in epidemiologic surveys (e.g., acculturation).

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Keywords

immigrants; race-ethnicity; mental health; substance abuse; comorbidity

Introduction

The foreign-born population in the United States is growing rapidly and is becoming more diverse (Camarota, 2012). Past research (Escobar, Hoyos Nervi, & Gara, 2000; Escobar & Vega, 2006) indicates that when most immigrants enter the United States, their risk of alcohol and drug abuse is lower and their quality of mental health is higher than the native population, even among those of the same race-ethnicity. However, the longer immigrants are in the United States, the greater are their risks for substance abuse and psychiatric disorders.

There has been a growing interest in the co-occurrence of substance use disorders (SUDs) and non-substance use psychiatric disorders (Vega, Sribney, & Achara-Abrahams, 2003). This comorbidity, referred to as *dual diagnosis*, is most common for mood disorders, especially depression. For example, in the United States, the lifetime prevalence of illicit drug abuse is estimated at 19.4% in mood disorders and 24% in major depressive disorder (Kessler et al., 2003; Volkow, 2004). Further, the presence of drug abuse has been shown to increase the risk for depression five-fold (Regier et al. 1990). Dual diagnosis is of great concern because it is often associated with a higher psychopathological severity, poor physical and social functioning, more emergency admissions, increased rates of psychiatric hospitalization, and self-destructive behavior including suicides (Hirschfield, Hasin, Keller, Endicott, & Wunder, 1990; Murphy, 1990; Regier et al., 1990; Torrens, Martin-Santos, & Samet, 2006). In addition, comorbid drug users have an increased rate of risk behaviors and sexually transmitted infections (e.g., HIV), more psychosocial impairments such as unemployment and homelessness, and high rates of violent and criminal behavior (Torrens et al., 2006). Clinical management of individuals with dual diagnosis is challenging because of the presence of multiple conditions which tend to be refractory.

Very little information is available on how foreign- and US-born groups differ in their risks for co-occurring SUDs and depressive and anxiety disorders. Immigrant mental health literature is also generally limited because many studies are cross-sectional or fail to consider potential effects of acculturation, social ties, or discrimination on immigrant mental health. To better understand the impact of immigration on the co-occurrence of SUD's and depressive and anxiety disorders, we investigated whether and how comorbidity between SUD's and depressive and anxiety disorders varies by nativity, race-ethnicity, and a range of potential explanatory factors. In addressing these questions, our analyses were conducted for six different groups of racial-ethnic descent: African, Asian/Pacific Islander, European, Mexican, Puerto Rican, and other Hispanic/Latino, using data from Wave 1 and Wave 2 of the *National Epidemiologic Survey on Alcohol and Related Conditions* (NESARC).

Background

The conceptual framework for the study drew on existing theoretical perspectives and research on alcohol and illicit drug use, substance abuse and psychiatric disorders, dual diagnosis, and immigrant and minority health.

Nativity, Immigrant Characteristics, and Substance Abuse

There is longstanding evidence of differences in substance use and abuse between native- and foreign-born individuals in the United States (Odegaard, 1932; Malzberg, 1964), usually showing higher levels of use among the US-born. Patterns of alcohol and drug use, however, vary considerably across ethnicity and country of origin. Research on the new immigrants of the past forty years indicates that drinking among Mexican-American men is more frequent and of a higher quantity than among immigrant Mexican men in the United States (Gilbert, 1991), consistent with studies showing that drinking among US Latinos as a general population becomes heavier with each additional generation (Rebhun, 1998). Further, US-born Hispanics 12 to 74 years old have higher marijuana and cocaine use compared to foreign-born (Amaro, Whitaker, Coffman, & Heeren, 1990). Notably, there is some evidence that drinking among immigrant Mexican women is even less common than among women who remain in Mexico, though as with men, these women's alcohol use increases across subsequent generations (Gilbert, 1991). National data suggest that foreign-born Latinos are less likely than are US-born Latinos to experience SUDs in the last year (Alegria, Mulvaney-Day, et al., 2007).

Similar to Hispanic immigrants, Asian immigrants tend to have lower rates of SUDs than the general population (Breslau & Chang, 2006), but some alcohol use patterns vary by country of origin, gender, and generation since immigration (Marshall, Schell, Elliott, Berthold, & Chun, 2005; Rebhun, 1998). Some exceptions are found among immigrant Japanese women who tend to have higher rates of moderate and heavy drinking than women in Japan, and immigrant Japanese men have *higher* rates of drinking than American-born Japanese men (Rebhun, 1998).

Few studies have considered the impact of nativity status on alcohol and other drug abuse among individuals of African descent. Research using the National Survey of American Life (NSAL) (2001-2003) data indicate that among those of African descent nativity status is significantly related to the likelihood of any SUD in the past year, with the risk being lower for foreign-born men and women (Williams et al., 2007).

Nativity, Immigrant Characteristics, and Psychiatric Disorders

Similar to alcohol and other drug use, the prevalence of substance-use, depressive, and anxiety disorders tends to vary between the native- and foreign-born groups. Foreign-born typically have a lower risk than US-born of having most types of psychiatric and substance-use disorders, except there is no nativity effect for Puerto Ricans and Cuban-Americans with respect to mood (e.g., depression) and anxiety disorders (Alegria, Canino, Stinson, & Grant, 2006; Grant et al., 2004). Studies focusing specifically on immigrants from Latin American countries have also shown that foreign-born Latinos are less likely to have psychiatric

disorders than their US-born non-Hispanic counterparts (Alegria, Mulvaney-Day, et al., 2007). However, among Asian Americans, US-born are at greater risk for mood and anxiety disorders than are foreign-born Asian Americans (Breslau & Chang, 2006), with those entering the United States at older ages having the lowest risk. However, foreign birth does not offer permanent immunity, and rates of disorders appear to increase with length of time in United States for the foreign-born of both Latino (Vega, Kolody, Aguilar-Gaxiola, & Catalano, 1999) and Asian descents (Breslau & Chang, 2006; Breslau et al., 2007).

Few studies have psychiatric disorders among African immigrants. One study reported lower rates of depression for foreign-born Caribbean and African women compared to their US-born African American counterparts (Miranda, Siddique, Belin, & Kohn-Wood, 2005). Another study showed that foreign-born men of African descent are less likely than their US-born counterparts to have had any mood disorder in the last year, though no difference was found for women (Williams et al., 2007). Similarly, immigrant status had no relationship with having any anxiety disorder in the last year for either men or women of African descent.

Nativity, Immigrant Characteristics, and Dual Diagnoses

Only a few studies have addressed the relationship between foreign-born status and the co-occurrence of substance abuse and mood and anxiety disorders. Among these, Vega and colleagues analyzed data from a California sample of Mexican-descent adults (Vega et al., 2003). They found that being foreign-born reduced the risk of lifetime comorbid SUDs and mood and anxiety disorders. In another study, Turner and Gil (Turner & Gil, 2002) analyzed data on psychiatric and substance use disorders among young adults in South Florida. They found that nativity was not related to lifetime comorbidity of substance use or psychiatric disorders among Cubans with any disorders. However, foreign-born Other Hispanics who had experienced a SUD or psychiatric disorder at some point in their life were less likely to experience an additional disorder than were comparable US-born Other Hispanics. Finally, a more recent study has found US-born Latino women and men to be much more likely than their foreign-born counterparts to report dual diagnoses (Vega, Canino, Cao, & Alegria, 2009).

Correlates of Substance Abuse and Mental Health Problems

Immigrant mental health is known to be shaped by socioeconomic, cultural, and psychosocial factors, which can be intertwined. With respect to socioeconomic factors, immigrants typically seek economic opportunities in the United States and a chance to attain higher standards of living. Many immigrants are at economic disadvantage before entry to the United States. That disadvantage often continues in the host country due to limited employment opportunities, low-pay work, discrimination, and segregation. In past research, socioeconomic factors provided some explanation for the association of nativity, race-ethnicity, and alcohol use/abuse or depressive disorders (Szaflarski, Cubbins, & Ying, 2011; Szaflarski et al., 2015).

In terms of cultural factors, immigrant health is known to be shaped by the process of acculturation, or experiences that immigrants have after the arrival in the host country that

can protect against or exacerbate mental health problems. Acculturation may involve learning the language and adapting lifestyles of the host country, but different forms of acculturation -- assimilation, integration, separation, or marginalization -- can lead to different outcomes (Berry, 1992, 2001). Several studies indicate that acculturation increases the risk of substance abuse for both foreign- and US-born Hispanics. For example, among Hispanics the likelihood of marijuana and cocaine increases with the use of English, such that the risk of drug use is lowest among those who primarily speak Spanish and highest among those who speak only English (Amaro et al., 1990). However, other data show that greater proficiency in the English language *lowers* the risks of psychiatric disorders among men of Asian descent (Takeuchi, Alegria, Jackson, & Williams, 2007). Other research shows that acculturative stress may increase the risk of dual diagnosis among Puerto Ricans (Conway, Swendsen, Dierker, Canino, & Merikangas, 2007). Racial-ethnic identity is another indicator of acculturation and refers to a person's subjective sense of belonging to a certain group or culture (Phinney, 1990). Some research shows little association between racial-ethnic identity and depression once gender and socioeconomic status are controlled (Cuellar & Roberts, 1997). In contrast, having a stronger racial-ethnic identity has been found to buffer the negative impact of discrimination on psychological distress (Sellers, Caldwell, Schmeelk-Cone, & Zimmerman, 2003).

Acculturative experience intertwined with major life changes can result in stress which can manifest itself in poor mental health, feelings of alienation, and psychosomatic symptoms (Berry, 1992). Stress is often assessed as stressful life events, perceived stress, and chronic stress (Taylor & Turner, 2002). Chronic stress associated with both drug abuse and depression has been suggested to account for some of their comorbidity while acute stress has been linked to episodes of depression and relapse in drug abuse (Volkow, 2004).

Discrimination and prejudice are additional stressors that have been linked to increased substance use (Yen, Ragland, Greiner, & Fisher, 1999a, 1999b) and adverse mental health risk (Gee, Ryan, Laflamme, & Holt, 2006; Williams, Neighbors, & Jackson, 2003; Williams & Williams-Morris, 2000). Other research suggests that while discrimination may heighten psychological distress, it has less of an impact on depression than recent and chronic stressors such as lifetime adversity or traumatic events (Taylor & Turner, 2002). Traumatic events (Wheaton, 1999; Williams et al., 2003), such as death in a family or job loss, are known to contribute to substance use and abuse (Cooper, Russell, Skinner, Frone, & Mudar, 1992), though their effects may vary by race-ethnicity (Kessler & Neighbors, 1986).

Social ties in the host country can also shape immigrant mental health. Research has found that having a perception of high social support has beneficial effects on mental health by reducing psychological distress and buffering the impact of stressful events (Ritsner & Ponizovsky, 2003; Turner & Marino, 1994) and can reduce the nativity effect on psychiatric disorders (Alegria, Mulvaney-Day, et al., 2007). However, immigrants may have less support than US natives and varying levels based on ethnicity (Rodriguez & DeWolfe, 1990).

As documented here, past studies provide some evidence that foreign-born status reduces the risks of dual diagnosis. The studies, however, often draw on relatively small regional samples and/or on a single racial-ethnic group, and most analyses are of lifetime occurrences

rather than co-occurrence within a recent and more limited time frame. There is also still much to learn about the correlates of dual diagnoses by nativity and racial-ethnic background. The current study addresses some of these gaps.

Methods

Data

The data for the study were drawn from Wave 1 and Wave 2 of the *National Epidemiologic Survey on Alcohol and Related Conditions* (NESARC), a representative sample of the US civilian, non-institutionalized population of individuals 18 years or older (Grant et al., 2009; Grant, Kaplan, Shepard, & Moore, 2003; Ruan et al., 2008). The NESARC sampling procedures included over-sampling of non-Hispanic Black and Hispanic households, and within households it over-sampled 18 to 24 year olds. The sample sizes for Wave 1 (2001-2002) and Wave 2 (2004-2005) were 43,093 and 34,653, respectively. The analysis sample consists of respondents with non-missing data for all covariates (N = 30,322). Preliminary analyses showed no differences in results whether or not multiple imputation was used to address missing values.

Measurement

Dependent variable—Substance (alcohol and illicit drug) abuse or dependence and non-substance use psychiatric disorders – depressive disorders (major depressive disorder and dysthymia) and anxiety disorders (panic with/without agoraphobia, social phobia, specific phobia, and general anxiety disorder) – were assessed using DSM-IV criteria (American Psychiatric Association, 2000). NESARC's diagnostic classifications were based on the Alcohol Use Disorder and Associated Disability Interview Schedule—DSM-IV Version (AUDADIS-IV) (Grant & Dawson, 2006; Ruan et al., 2008). Based on the diagnostic questions, the NESARC constructed dichotomous variables for Wave 2-based diagnoses of substance abuse/dependence, depressive, and anxiety disorders during the last 12 months. We used these indicators to construct a four-category measure of comorbidity: (0) no substance abuse/dependence or psychiatric (depressive or anxiety) disorder, (1) substance abuse/dependence disorder only, (2) psychiatric disorder only, and (3) dual diagnosis (substance abuse/dependence co-occurring with a depressive/anxiety disorder).

Independent variables—*Nativity* was defined as US-born (referent) versus foreign-born. *Racial-ethnic origin* was based on self-reported country of origin or racial-ethnic descent (59 categories). We created six racial-ethnic groups: African, European, Asian/Pacific Islander, Mexican, Puerto Rican, and other Hispanic/Latino.

Several socioeconomic factors were assessed. *Education* was a categorical measure with categories defined by the highest grade completed (less than high school, high school or GED [referent category], some college, and college graduate). *Employment status* was divided into three categories: not working, working part-time, and working full-time (referent category). NESARC assessed *household income* by using 21 categories. The categories were recoded to their midpoint values (divided by \$10,000); the top category was

determined by a Pareto approximation (Hout, 2004). *Insurance coverage* was a binary variable indicating coverage and no coverage (referent category).

Cultural factors included indicators of acculturation and discrimination. *Years in the US* was the difference between year of entry and year of birth for foreign-born and a value of 0 for US-born respondents (with age included in all models). Measures of *language preference* and *racial-ethnic social preference* were constructed based on the Brief Acculturation Rating Scale II (ARSMA-II) (Coronado, Thompson, McLerran, Schwartz, & Koepsell, 2005; Cuellar & Roberts, 1997; Deyo, Diehl, Hazoda, & Stern, 1985; Solis, Marks, Garcia, & Shelton, 1990) and the East Asian Acculturation Measure (Barry, 2001). Seven questions on language preference asked respondents about which language they generally read and speak; spoke as a child; usually speak at home; usually think in; usually speak with friends; and, watch/listen to in TV/radio programming. Response categories used a 5-point scale and were: only non-English language; more non-English language than English; both equally; more English than non-English language; and, only English. Factor analysis was used to generate a single factor on language preference (Cronbach's alpha = 0.97). Higher values indicate greater acculturation.

The NESARC questions on *racial-ethnic social preference* asked respondents about the race-ethnicity of their close friends; people at the social gatherings and parties they prefer to attend; the people they visit with; and, their children's friends if they could choose. The pattern of possible responses was coded as: all from my racial-ethnic group; more from my racial-ethnic group than other racial-ethnic groups; about half and half; more from other racial-ethnic groups than from my racial-ethnic group; and, all from other racial-ethnic groups. Factor analysis produced a score measure of racial-ethnic social preference (Cronbach's alpha = 0.833). Higher values indicate greater acculturation.

For *racial-ethnic orientation* we used questions in the NESARC that were adapted from other scales of racial-ethnic identity (Barry, 2002; Phinney, 1990; Rahim-Williams et al., 2007). Respondents were asked how strongly they agreed or disagreed that they have a strong sense of self as a member of their racial-ethnic group; identify with other people from their racial-ethnic group; racial-ethnic heritage is important in their life; and, are proud of their racial-ethnic heritage. The scale's Cronbach's alpha was 0.829. Higher values on the measure indicate less identification with one's own racial-ethnic group, reflecting greater acculturation and assimilation. Data on acculturation were collected for all respondents regardless of nativity.

Perceived racial-ethnic discrimination was assessed by asking respondents about how often they experienced discrimination related to their race or ethnicity in a variety of situations during the last 12 months. These include experiencing discrimination in their ability to obtain health care or health insurance; in how they are treated when they got health care; in public, (on the street, in stores, or in restaurants); in any other situation (jobs, school or training program, in courts or with police, or obtaining housing); being called a racist name because of their race-ethnicity; and, being made fun of, picked on, pushed, shoved, hit or threatened with harm because of their race-ethnicity. Factor analysis was used to generate two factors indicating perceived discrimination related to health care (Cronbach's alpha =

0.75) and other aspects of life (e.g., in jobs, schooling, housing, in businesses, or by police; Cronbach's alpha = 0.75).

Psychosocial factors included measures of social networks, social support, and social stress. *Social Network Index* (Cohen, Doyle, Skoner, Rabin, & Gwaltney, 1997) indicates the total number of different types of people respondents see or talk to on the phone or via internet at least once every two weeks. The responses were used to create continuous indicators for the number of close ties (e.g., children, parents) and instrumental ties (e.g., teachers, co-workers) respondents have in their social network. Higher values indicate a larger network.

Social support was assessed by using the Interpersonal Support Evaluation List (ISEL12; (Cohen & Hoberman, 1983; Cohen, Mermelstein, Kamarck, & Hoberson, 1985) which had six questions on how true it is respondents could find someone to help them or join them in a variety of situations, including: help with daily chores if sick, seek advice about handling problems with family, go to a movie, deal with personal problems, have lunch, and get ride if stranded 10 miles from home. Factor analysis was used to create a scale of level of social support (Cronbach's alpha = 0.79). Higher values indicate higher levels of social support.

Stressful life events was the total number of the following 12 events that respondents reported experiencing in the 12 months prior to the interview: any family member or close friend died; any family or close friend had serious illness or injury; moved/anyone new came to live with you; fired or laid off from a job; unemployed and looking for a job for more than a month; trouble with their boss or a coworker; changed job, job responsibilities, or work hours; marital separation or divorce or breakup of a steady relationship; had problems with neighbor, friend, or relative; financial crisis, declaration of bankruptcy, or being unable to pay their bills; respondent or family member had serious trouble with the police or law; and, respondent or family member being crime victim.

To assess *perceived social stress* respondents were asked how often, in the past year, they have felt that they were not able to control the important things in their life; felt confident about their ability to handle personal problems; felt things were going their way; and, felt difficulties piling up so high that they could not overcome them. The response categories for each question were: never, sometimes, fairly often, and very often. Factor analysis was used to construct two perceived stress measures: stress related to personal life and a lack of control in life (Cronbach's alpha of 0.64 and 0.70, respectively).

Control variables—Sociodemographic and health-related control variables included age, gender, marital status, number of children in household, region of residence, community type, smoking, and religiosity.

Analysis

The data were analyzed using weighted multinomial logistic regression models with adjustments for complex survey design. A series of models were estimated that introduced successive sets of covariates. Model 1 included just the indicators for racial-ethnic origins and nativity along with the sociodemographic covariates. Model 2 included the socioeconomic covariates. Model 3 included the cultural covariates. Model 4 included the

social support and social stress covariates. Finally, Model 5 included all of the covariates in a single model. In all models, dual diagnosis was treated as the referent category.

We assessed the extent to which socioeconomic, cultural, social support and social stress factors accounted for the observed racial-ethnic origin- and nativity-based disparities in comorbid conditions by calculating predicted probabilities based on Models 1 and 5 along with confidence intervals and comparing the predicted probabilities. This approach is preferred to comparing coefficients across models (Long, 1997).

All statistical analyses were conducted using SAS software (version 9.3; SAS Institute, Cary, NC). Specifically, the survey-related procedures SURVEYMEANS, SURVEYFREQ, SURVEYREG and SURVEYLOGISTIC. For all regression models, odds ratios (OR) are reported along with two-tailed significance tests.

Findings

The prevalence of dual diagnosis was relatively low, but it was three times as high among the US-born (3.1 percent) compared to foreign-born respondents (1.1 percent; see Table 1). With respect to racial-ethnic origin, the lowest prevalence was found among Mexicans (1.7 percent) while the highest was found among Europeans (3.1 percent) and Puerto Ricans (3.0 percent). We now turn to an examination of these bivariate differences in a multivariate framework.

Dual diagnosis versus neither SUD nor psychiatric disorder

The first five columns of Table 2 report the odds ratios for the series of models introducing successive sets of covariates for the contrast between dual diagnosis (the referent) versus having neither a SUD nor psychiatric disorder. From Model 1 we see that even after controlling for the sociodemographic and health-related covariates, people of African (OR = 1.36) and Mexican origin (OR = 1.44) as well as immigrants (OR = 2.38) are more likely to have neither a SUD nor a psychiatric disorder than a dual diagnosis relative to people of European origin and non-immigrants respectively.

These basic patterns remain when either socioeconomic factors or social support and social stress factors are included in the model. When cultural factors are included in the model, however, the odds ratio for Mexicans is no longer statistically significant while the odds ratio for Puerto Ricans becomes significant and indicates that Puerto Ricans (OR = .73) have a lower likelihood of having neither a SUD nor a psychiatric disorder than a dual diagnosis relative to people of European origin.

Despite having a minimal influence on the patterns of racial-ethnic origin- and nativity-based disparities in the likelihood of a dual diagnosis versus neither a SUD nor a psychiatric disorder, many of the socioeconomic, cultural, social support and stress factors had significant associations in the expected directions. For instance, not working (OR = .90) or working part-time (OR = .85) relative to working full-time, a higher degree of acculturation as indicated by English language proficiency (OR = .63), and higher levels of stress in personal life (OR = .84), in control (OR = .47), and in the number of stressful life events

(OR = .71) were all associated with a decreased likelihood of having neither a SUD nor psychiatric disorder relative to having a dual diagnosis.

Dual diagnosis versus SUD only

The second set of five columns of Table 2 report the odds ratios for the series of models introducing successive sets of covariates for the contrast between dual diagnosis (the referent) versus having only a SUD. From Model 1 we see that after controlling for the sociodemographic and health-related covariates, people of African (OR = 1.24) and Mexican origin (OR = 1.56) are more likely to have a SUD than a dual diagnosis relative to people of European origin. In contrast, people from Asian/Pacific Islander origin (OR = .68) and people from Puerto Rican origin (OR = .74) are less likely to have only a SUD than a dual diagnosis relative to people of European origin. We do not observe a significant association for immigrants.

These patterns largely persist as the socioeconomic, cultural, social support and social stress factors are included in the model. The main exception is that the association for Asian/Pacific Islanders is not statistically significant when either cultural factors or social support and social stress factors are added to the model. In addition, the estimate for Puerto Ricans is not statistically significant in the final model, but the point estimate for the odds ratio is quite similar to the estimates from the other models.

Dual diagnosis versus psychiatric disorder only

Finally, the third set of five columns of Table 2 report the odds ratios for the series of models introducing successive sets of covariates for the contrast between dual diagnosis (the referent) versus having only a psychiatric disorder. From Model 1 we see that people of African (OR = 1.21), Mexican (OR = 1.40), Puerto Rican (OR = 1.42), and other Hispanic (OR = 1.20) origin as well as immigrants (OR = 1.76) all are more likely than people of European origin and non-immigrants respectively to have a psychiatric disorder rather than a dual diagnosis. These patterns largely remain when either socioeconomic factors or social support and social stress factors are included in the model. The patterns, however, substantially differ when cultural factors—in particular, two measures of acculturation—are included in the model. After adjusting for cultural factors, the positive association for people of African origin remains, but the associations for people of Mexican (OR = .81) and people of Puerto Rican (OR = .85) origin become negative and the remaining racial-ethnic origin groups along with immigrants are no longer statistically significant. In the final model including all covariates, only people of Mexican origin maintain a significant negative association with dual diagnosis versus only psychiatric disorders.

Do socioeconomic, cultural, and social support/social stress factors account for racial-ethnic origin- and nativity-based disparities?

As noted above, it is necessary to examine predicted probabilities in order to determine the extent to which the various factors account for the observed racial-ethnic origin- and nativity-based disparities in dual diagnoses. Figure 1 illustrates the predicted probabilities based on Models 1 and 5 for each of the four comorbidity statuses for people of different racial-ethnic origins. It is apparent from this figure that adjusting for socioeconomic,

cultural, social support and social stress factors does little to alter the predicted probabilities of each racial-ethnic group with respect to having neither a SUD nor psychiatric disorder, only a SUD, only a psychiatric disorder, or a dual diagnosis. In fact, none of the predicted probabilities are significantly different between Models 1 and 5 for any racial-ethnic group across the four comorbidity statuses. The same pattern is found for nativity status (figure not presented). This suggests that despite the few shifts in statistical significance found in the estimates reported in Table 2 other factors underlie racial-ethnic origin- and nativity-based disparities in comorbid conditions.

Discussion

This study documented significant associations between nativity, race-ethnicity, and dual diagnosis in the US adult population. Immigrants and some racial-ethnic groups (e.g., people of African and Mexican descents) were less likely than US-natives and Europeans to have dual diagnosis versus having no SUD or depressive/anxiety disorder. Conversely, immigrants and minorities were more likely than their native and European counterparts to have a depressive/anxiety disorder alone rather than dual diagnosis. There was no nativity-based difference in having a SUD alone versus dual diagnosis, though people of African and Mexican origins were more likely to have this condition compared with Europeans. Thus, the patterns of dual diagnosis appear to vary based on the specific type of comparison.

Our results confirm and extend prior research in regard to the prevalence of dual diagnosis in minority and immigrant populations. A study of dual diagnoses among US Latinos found lower rates among foreign-born than US-natives as well as variations by country of origin (Vega et al., 2009). While the earlier study examined lifetime prevalence of dual diagnosis and specific Latino backgrounds, our study was able to address a more recent (past 12 months) diagnosis and included a broader range of racial-ethnic groups. A more comprehensive racial-ethnic comparison was possible because of the NESARC's much larger sample size vis-à-vis other psychiatric surveys (Grant & Dawson, 2006).

Our results also indicated that socioeconomic, cultural, and psychosocial factors did not account for the observed nativity- and origin-based disparities in dual diagnoses. Although the estimated odds ratios shifted a bit with the inclusion of measures of these factors—particularly cultural factors—the predicted probabilities of a dual diagnosis were not significantly different between the baseline model and the final model with all of the socioeconomic, cultural, and psychosocial factors. Little information on this is available. Past research has examined these factors either in SUDs or non-SUD mental disorders. Those studies found little support for the socioeconomic and mixed support for the cultural and psychosocial explanations (Brown, Donato, Laske, & Duncan, 2013; Szaflarski et al., 2015). This prior research and our findings suggest that other factors are at the root of the observed disparities. Future research in this area should seek to identify what else might account for differences in rates of dual diagnoses by nativity and racial-ethnic origin. In addition, the nature of the relationship between SUDs and mental disorders is complex and may vary depending on each particular disorder (Torrens et al., 2006). Future research addressing each disorder separately and comparing effects across different disorders could be helpful.

This study had several limitations. For example, this study did not address other factors shaping the patterns of dual diagnoses among US immigrants, such as age at immigration or historical cohort (Alegria, Shrout, et al., 2007; Alegria, Sribney, Woo, Torres, & Guarnaccia, 2007; Breslau, Borges, Hagar, Tancredi, & Gilman, 2009) or age and order of onset for dual diagnoses (Vega et al., 2009). Social stress indicators were also limited. In particular, this study focused on post-immigration social stress and could not address distress due to stressful experiences pre-immigration and during the migration process. Past trauma and other displacement-related factors are known to be associated with poor mental health outcomes (Porter & Haslam, 2005). In addition, there is the potential for misdiagnosis of mental disorders, which increases in dual diagnosis (Schuckit, 2006). Diagnosis can be especially challenging among minority groups because the manifestations of mental disorders, such as idioms of distress and somatization, vary with race, ethnicity, and culture (Kirmayer & Young, 1998; Lin & Cheung, 1999). Further, the survey method and self-reports used in the study can differ from clinical assessments and have its limitations (Schuckit, 2006). Finally, the definition of race-ethnicity was limited in this study. Broad racial-ethnic categories tend to mask cultural heterogeneity of individuals from different countries and cultures. It is also unclear to what extent members of the same ethnic group are similar and different in terms of acculturation modes (Huang et al., 2006).

These limitations notwithstanding, this study provides further insights into social epidemiology of dual diagnoses in US foreign-born and native populations – with attention to racial-ethnic ancestry. The picture is quite complex. More research is needed to disentangle the pathways linking nativity, race-ethnicity, and social factors to the dual diagnosis outcomes and their trajectories over time.

Acknowledgments

This study was funded by a grant from the National Institute on Drug Abuse (R01-IDA023615). Preliminary analyses for this project were supported through funding from the Peter F. McManus Charitable Trust and a faculty research development grant from the University of Cincinnati Research Council.

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Figure 1. Predicted probabilities of comorbidity status based on estimates from models 1 (circle) and 5 (square) – see Table 2

Af = Africa, API = Asia/Pacific Islands, Eu = Europe, Mx = Mexico, PR = Puerto Rico, OH = Other Hispanic. Bars indicate 95% confidence intervals.

Table 1

Prevalence of dual diagnoses by nativity and racial-ethnic origin

	N	Neither	Comorbidity Status (%)		
			Subst. only	Psych. Only	Both
<i>Nativity</i>					
Non-immigrant	25526	74.5%	8.6%	13.8%	3.1%
Immigrant	4796	83.9%	4.2%	10.7%	1.1%
<i>Racial-Ethnic Origin</i>					
Africa	6178	76.3%	7.9%	13.4%	2.4%
Asia/Pacific Islands	1016	83.1%	4.2%	10.8%	2.0%
Europe	17204	74.9%	8.5%	13.6%	3.1%
Mexico	3327	77.7%	8.5%	12.1%	1.7%
Puerto Rico	719	73.5%	6.2%	17.3%	3.0%
Other Hispanic/Latino	1878	78.5%	6.2%	13.2%	2.1%
Total	30322	75.8%	8.1%	13.4%	2.8%

Notes: Percentages weighted by NESARC sample weights. Design-based F-statistic for nativity = 48.76, p-value < 0.001. Design-based F-statistic for race = 4.29, p-value < .0001.

Table 2
Odds ratios from multinomial regression models predicting comorbidity status

	Dual diagnosis vs. neither			Dual diagnosis vs. substance only					Dual diagnosis vs. psychiatric only						
	M1	M2	M3	M4	M5	M1	M2	M3	M4	M5	M1	M2	M3	M4	M5
Racial-Ethnic Origin & Nativity															
Africa	1.36***	1.33***	1.52***	1.90***	1.67***	1.24***	1.30***	1.32***	1.56***	1.49***	1.21***	1.14*	1.17*	1.32***	1.08
Asia/Pacific Islands	1.14	1.18	0.97	1.40	1.08	0.68*	0.70*	0.73	0.81	0.84	0.99	1.03	0.74	1.07	0.79
Mexico	1.44***	1.35***	0.90	1.70***	0.89	1.56***	1.56***	1.57***	1.79***	1.64***	1.40***	1.21***	0.81**	1.59***	0.80*
Puerto Rico	1.05	1.02	0.73***	1.19**	0.76**	0.74**	0.73**	0.74*	0.81*	0.79	1.42***	1.28***	0.85*	1.48***	0.83
Other Hispanic	1.12	1.10	0.84	1.20	0.83	0.96	0.96	0.98	0.97	0.97	1.20*	1.16	0.84	1.25*	0.84
Immigrant	2.38***	2.29***	1.64**	1.97***	1.51*	1.13	1.06	1.08	1.05	0.98	1.76***	1.67***	0.95	1.56***	0.98
Socioeconomic Factors															
Less than high school		1.09*			1.09*		1.05			1.07		1.19***			1.19***
Attended college		0.92**			0.95		0.97			0.98		0.95			0.95
College graduate		0.96			0.93*		1.05			1.02		0.94*			0.90***
Part-time work		0.85***			0.92*		0.89***			0.91*		0.91**			0.96
Not working		0.90***			1.05		0.78***			0.88***		1.04			1.15***
Household income		1.00			0.98***		1.01***			0.99		0.99***			0.98***
Health insurance		0.95			0.76***		0.76***			0.64***		1.08			0.98
Cultural Factors															
Years in the US			0.99		0.99			1.00		1.00			1.00		1.00
English language preference			0.63***		0.67***			0.92		0.95			0.62***		0.68***
Preference for other racial-ethnic groups socially			1.12***		1.13***			0.97		0.95			1.14***		1.17***
Race-ethnic orientation			0.89***		1.01			0.93**		1.01			0.96		1.02
Perceived racial-ethnic discrimination -- health care			1.03		1.06**			1.02		1.05*			1.01		1.00
Perceived racial-ethnic discrimination -- other			0.75***		0.96*			0.90***		1.03			0.99		1.10***
Social Ties & Stress Factors															
Social network -- number of close ties				1.01*	1.01*					1.01**			1.00		0.99

	Dual diagnosis vs. neither					Dual diagnosis vs. substance only					Dual diagnosis vs. psychiatric only				
	M1	M2	M3	M4	M5	M1	M2	M3	M4	M5	M1	M2	M3	M4	M5
Social network -- number of instrumental ties				0.99***	1.00***				1.00	1.00				0.99***	1.00*
Social support				1.19***	1.20***				1.09***	1.09**				1.11***	1.13***
Social Stress															
Perceived social stress -- personal life				0.84***	0.80***				0.80***	0.79***				1.07*	1.02
Perceived social stress -- control				0.47***	0.46***				0.57***	0.57***				0.92***	0.89***
Stressful life events				0.71***	0.71***				0.90***	0.90***				0.87***	0.85***

Notes: All models weighted by NESARC sample weights. All models include the sociodemographic and health related covariates outlined in the text.