Journal of Affective Disorders 175 (2015) 275–280

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Research report

Generalized Anxiety Disorder in racial and ethnic minorities: A case of nativity and contextual factors

Henna Budhwani [a,c,*], Kristine Ria Hearld [b], Daniel Chavez-Yenter [c]

[a] University of Alabama at Birmingham, Health Care Organization and Policy, 517D Ryals Public Health Building, 1665 University Boulevard, Birmingham, AL 35294, United States
[b] University of Alabama at Birmingham, Health Services Administration, 563 School of Health Professions Building, 1705 University Boulevard, Birmingham, AL 35294, United States
[c] University of Alabama at Birmingham, UAB Sparkman Center for Global Health, 517 Ryals Public Health Building, 1665 University Boulevard, Birmingham, AL 35294, United States

ARTICLE INFO

Article history:
Received 14 December 2014
Accepted 15 January 2015
Available online 22 January 2015

Keywords:
Generalized Anxiety Disorder
Immigrants
Discrimination
Nativity
Gender

ABSTRACT

Background: Minorities comprise more than one third of the U.S., and research on the correlates and causes of depression, anxiety, and other mental illnesses have yielded mixed results in minority groups necessitating an understanding of causes and correlates of health. Thus, the aim of this paper is to evaluate the relationship between minority status, contextual factors, and lifetime Generalized Anxiety Disorder.
Methods: Logistic regression models were implemented, comparing immigrants to their American-born counterparts as well as to American-born Whites.
Results: Foreign-born Afro-Caribbeans exhibited lower rates of lifetime GAD. A lower percentage of foreign-born minorities met the criteria for GAD as compared to their American-born counterparts, and all racial and ethnic groups met the criteria for lifetime GAD at a lower rate as compared to American-born Whites.
Discussion: By using theory proactively and including contextual factors, this multi-faceted approach to health disparities research yielded findings which both supported historic beliefs but created opportunities for supplemental research looking at immigrants and GAD. Key findings were that health lifestyle choices and exposure to discrimination significantly affected the chance of having GAD. Nativity was protective; however, its effect was ameliorated by exposure to discrimination or engagement in alcohol abuse. Thus, this study offers practical insight into environmental factors for clinicians caring for racial and ethnic minorities diagnosed with GAD.

1. Introduction

Over the last three decades, minority populations have grown both through comparatively higher birth rates and via immigration (Passel et al., 2012). These groups now comprise more than one third of the U.S. (U.S. Census Bureau, 2012), necessitating an understanding of the causes and correlates of physical and mental health. Thus, the primary aim of this paper is to evaluate the relationship between minority status and lifetime Generalized Anxiety Disorder (GAD). Contextual factors such as nativity, demographics, socioeconomic status, exposure to discrimination, smoking behavior, and alcohol consumption are included in this analysis to offer a multi-faceted perspective. Mental health research in minorities has produced mixed results, but studies on physical health have often substantiated the notion that immigrants exhibit better health outcomes, as compared to their American-born counterparts (Morales et al., 2007; Perez, 2002; Scribner, 1996). Race, based on biological markers, ethnicity, reflecting an ancestry, cultural or national experience, and nativity (birth place) are known correlates (Morales et al., 2007; Perez, 2002; Scribner, 1996). Studies have found that Blacks, Hispanic Americans, and Asian Americans have similar or better mental health than Whites regardless of economic disadvantage and discrimination (Breslau et al., 2005; McGuire and Miranda, 2008; Rosenfield et al., 2006; Asnaani et al., 2010). In addition, many immigrants come to the U.S. with lower levels of education and survive on a lower income as compared to Whites or American-born minorities (Morales et al., 2007; Kennedy et al., 2006); thereby, creating a health paradox where in those who should be the least healthy by conventional standards are the most healthy. This health advantage is mitigated by exposure to discrimination and other stressors, which have consequences on

* Corresponding author. Tel.: +1 205 975 7613; fax: +1 205 975 7685.
E-mail address: budhwani@uab.edu (H. Budhwani).

http://dx.doi.org/10.1016/j.jad.2015.01.035
0165-0327/

mental health, such as increased rates of GAD (Finch et al., 2000; Szalacha et al., 2003; Pumariega et al., 2005).

This paper contributes to the existing body of health disparities research by offering a holistic analysis of anxiety correlates in minority populations and leverages the Healthy Migrant Effect (HME) in study design rather than applying it post-facto to develop the hypotheses that foreign born individuals will exhibit a lower rate of GAD as compared to American-born Whites and their American-born counterparts, and racial and ethnic minorities will have a lower rate of GAD as compared to Whites. This research evaluates Blacks (racial classification) and Afro-Caribbeans (ethnic identifier) in addition to Asians and Hispanics (ethnic identifiers), with the intent of understanding the relationship between race (Black) or ethnicity (Afro-Caribbean) with GAD, separately.

2. Background

Rates of GAD vary across groups. Historically, Whites are more likely to be diagnosed with GAD than Non-Hispanic Blacks, Hispanics Americans, and Asian Americans (Asnaani et al., 2010); this paper builds on prior health disparities work and segments American-born as compared to foreign-born individuals to provide another layer of knowledge.

2.1. The Health Migrant Effect and Demographic Factors

The Health Migrant Effect (HME) posits those who immigrate are healthier due to a selection bias whereby the less healthy are unable to leave their country of origin. This leads to a health paradox, in that many immigrants survive on less income and with less wealth, but still exhibit lower rates of mental illness. Upon arrival in the U.S., some immigrants (and minorities) may encounter risk exposures, such as discrimination and isolation leading an erosion of their health advantage; even so, those who have immigrated tend to be at less risk of any anxiety disorder compared to their American-born counterparts (Breslau et al., 2009; Alegría et al., 2007; Breslau and Chang, 2006; Takeuchi et al., 2007). Furthermore, age of migration may affect rates of anxiety. Those who immigrate under the age of 13 years may be more at risk for developing some form of anxiety due to differing experiences of immigration at early stages of development; some evidence suggests that Hispanic youth experience more anxiety related behaviors that their White peers (SAMHSA, 2008). Similar to age, research on gender and anxiety with the inclusion of race, ethnicity, and nativity is limited and often reviews anxiety symptoms rather than GAD.

Gender differences are well noted in anxiety outcomes, with women having a significantly higher risk to develop an anxiety disorder compared to men (Bruce et al., 2005; McLean et al., 2011). Psychopathology has noted an important role that race/ethnicity plays in mental health outcomes (Asnaani et al., 2010). For example, Asian Americans consistently have lower rates of anxiety symptoms compared to White women. Certain studies have noted interactions between gender and racial categorization with depression and substance use outcomes (Bracken and Reintjes, 2010; Ames et al., 2010); however, anxiety outcomes have not been as well examined. Due to the varying nature of diagnosis for anxiety, as there are five different categorizations, and multiple criteria, there has been limited consistency across studies to understand the effects of gender and race with anxiety disorders (McLean et al., 2011). This research will address the existing gap by examining the interaction between race, ethnicity, nativity alongside gender and age to GAD.

2.2. Socioeconomic status

Historically, groups with lower education and income were found to have the highest rates of mental disorders (Cockerham, 2006). According to the National Comorbidity Study, the rate of anxiety disorders, including GAD, was found to be higher in groups with less education and lower income (Martins et al., 2012; Muntaner et al., 2004). Researchers found those who had less than a high school education were over two times as likely to have GAD than those with a college-education, and those with an annual income of under $20,000 were also about twice as likely as those with an annual income of over $70,000 (Kessler et al., 1994). A decade later, a similar research team found those with a lower SES were more likely to meet a variety of mental disorder criteria (DSM-IV), supporting previous findings (Kessler et al., 2005; Hwu et al., 1989; Lee et al., 1990; Lepine et al., 1989; Wittchen et al., 1992). Minorities may find themselves part of the socially disadvantaged highlighting increased risk for anxiety.

2.3. Discrimination and social responses

Discrimination is the negative effect felt by one group due to their minority status that may occur at the individual level or may be embedded in a large societal structure, and is meant to be harmful (Finch et al., 2000; Jackson et al., 1998). Discrimination has well documented consequences on mental health. (Finch et al., 2000; Szalacha et al., 2003; Pumariega et al., 2005; Broman et al., 2000; Landrine and Klonoff, 1996). Often, American-born racial and ethnic minorities report more experiences of discrimination compared to their immigrant counterparts (Finch et al., 2000; Krieger et al., 2011; Pérez et al., 2008; Lau et al., 2013). Soto et al. (2011) found racial discrimination increased odds of GAD in American-born Blacks and American-born Whites, but not in foreign-born Afro-Caribbeans, as would be predicted by the HME. Discrimination may play a role in heightening levels of anxiety in American-born minorities due to their increased cognizance of issues related to race and class, prompting them to expect fairer treatment (Lau et al., 2013, Schwartz and Meyer, 2010). Consequently, although immigrants may engage in tobacco smoking and excessive alcohol consumption prior to migration, the intensity and frequency may increase as a response to discrimination and socioeconomic stress (Cockerham, 2005; Caetano et al., 1998).

The HLT (Cockerham, 2005) highlights the influence of alcohol consumption and tobacco use. Cigarette smoking and excessive alcohol consumption have been correlated with mental illness (NIMH, 2009; Arehart-Treichel, 2003). Researchers have suggested that both socioeconomic stress and discrimination stress lead to increased alcohol consumption among minorities (Caetano et al., 1998; Al-Issa, 1997). Anxiety, specifically, has been correlated with increased levels of alcohol consumption across diverse populations (Aneshensel and Huba, 1983; Kushner et al., 1990; Hartka et al., 1991; Thorlindsson and Vilhjalmsson, 1991; Rodgers et al., 2000). More recent work found significant associations between anxiety and alcohol use abuse (Hasin et al., 2007). Additionally, tobacco use is highly prevalent among those with anxiety disorders (Morissette et al., 2007), however, the interrelationships between anxiety, GAD, and tobacco use is not fully understood (Morissette et al., 2007).

Thus, using the HME and HLT to inform the design of this project, we compared the correlates of GAD across racial and ethnic groups to American-born Whites and their American-born racial and ethnic counterparts using data from the Collaborative Psychiatric Epidemiology Surveys (CPES). Potential predictive factors were included.

3. Methods

3.1. Outcome measure

The main outcome being examined was lifetime occurrence of GAD, a psychiatric disorder described by the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) as "DSM-IV Generalized Anxiety Disorder (Lifetime)." An individual was classified as having a GAD if s/he met the following criteria: presence of time in your life when worried a lot more about things than other people with the same problems or a period of time lasting one month or longer with anxiety or worry most days; anxiety occurring more days than not for at least 6 months; anxiety about a number of events or activities (such as work or school performance) occurs in the case of two or more incidents/activities; the person finds it difficult to control the worry; the anxiety and worry were associated with three (or more) of the following six symptoms(with at least some symptoms present for more days than not for the past 6 months) (restlessness or feeling keyed up or on edge, being easily fatigued, difficulty concentrating or mind going blank, irritability, muscle tension, sleep disturbance); the anxiety and worry should not occur exclusively during PTSD; and the anxiety, worry, or physical symptoms cause clinically significant distress.

The lifetime measure of GAD was selected to capture a range of time from initial arrival, early settlement, and establishment of residence, specifically for foreign-born individuals. Since the average age onset of GAD is 31 (Grant et al., 2005), and the estimated age of immigrants is about 27–36 years (Garcia, 2013), this measure covered a range of time where in foreign-born minorities may first arrive in the U.S. with lower levels of SES and first encounter discrimination.

3.2. Independent variables

To assess the validity of the HME's application to lifetime GAD, block one included race, ethnicity, and nativity. Race/ethnicity was measured with five dichotomous categories: non-Hispanic White (referent); Asian; Hispanic; Afro-Caribbean; and Black. Nativity was measured with a dummy variable: American-born (referent) or foreign-born.

Demographics measures included gender and age. Gender was represented by a dummy variable (female=1). Age was grouped into five categories: 18–28 years old (referent); 29–40 years old; 41–50 years old; 51–59 years old; and 60+. SES incorporated another two measures: education and income. Level of education completed was measured at four increments: primary; high school graduate; some college; and college graduate. Annual household income also had four increments: $0–49,999 (referent); $50,000–99,999; $100,000–149,999; and ≥$150,000.

Healthy lifestyle factors were assessed through two variables: heavy alcohol use and cigarette smoking. To account for heavy alcohol consumption, we used a dummy variable (1="Yes") that represented whether a respondent had ever met the criteria for the DSM-IV diagnosis of alcohol abuse, manifested by one (or more) of the following: within a 12-month period, recurrent substance use resulting in a failure to fulfill major role obligations at work, school, or home; recurrent alcohol use in situations in which it is physically hazardous; recurrent alcohol-related legal problems, continued alcohol use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of alcohol; or the symptoms present have never met the criteria for an Alcohol Dependence diagnosis. To assess smoking status, we used a dummy variable (1="Yes")that indicated whether the respondent currently smokes regularly. A current measure of smoking was used rather than a lifetime measure, because smoking behavior may occur as a response to discrimination or social disadvantage (Cockerham, 2005; Caetano et al., 1998).

Discrimination was represented by a composite measure constructed by averaging responses across five measures pertaining to how often respondents encountered discriminatory behavior, attributed to their race or ethnicity. The first item asked how often respondents were treated with less respect than other people; the second asked how often they were threatened or harassed; the third asked how often they were treated as dishonest; the fourth asked how often they were treated as less smart, and the final item asked how often they were called names or insulted. Responses were recorded on a six-point scale: never, less than once a year, a few times a year, a few times a month, at least once a week, and almost every day.

3.3. Analytic tools

Univariate statistics were used to describe variations among individuals in the dataset. The multivariate analysis was performed using logistic regression, which estimated the probability of meeting the criteria for the DSM-IV disorder of lifetime GAD. Measures were allocated into theoretical blocks and were entered into in a stepwise fashion to illustrate impact of each set of measures and highlight shifts in explanatory power with the inclusion of each subsequent block. Five models were included. Race/Ethnicity and nativity were included in Model 1. SES and demographic variables were entered in Model 2. Health lifestyles in Model 3, and Model 4 included an index representing severity of discrimination. Finally, Model 5 included nativity and race/ethnicity interactions.

Weighting of the CPES data is used in all univariate and multivariate analyses, as recommended by ICPSR (2009) to realign the data to national parameters, since the data has been oversampled for racial and ethnic minorities. All analyses were conducted with SAS version 9.3 software.

4. Results

Sample characteristics are found in Table 1. Approximately 7% of the weighted sample met the criteria for the DSM-IV disorder of lifetime GAD. Thirty-four percent of the sample were White, 13% Asian, 20% Hispanic, 8% Afro-Caribbean, and 25% were Black. Twenty-nine percent were foreign-born. In addition, 58% were female, and 49% were between the ages of 18 and 40, 34% between 41 and 59, and 17% greater than or equal to 60 years old. Sixty-five percent of the sample had an average household income less than $50,000, 23% had an annual household income between $50,000 and $99,999, and 12% had an annual household income of $100,000 or greater. Of the health behaviors, 10% were abused alcohol and 63% were smokers. The mean discrimination score was 0.85.

The rate of lifetime GAD varied as a function of nativity in minorities. The highest level of GAD, amongst all classifications, was found in American-born Whites, at a rate of 10.82%. A lower percentage of foreign-born Asians met the criteria for GAD as compared to American-born Asians (2.31% vs. 3.13%). Similarly, a lower percentage foreign-born Hispanics met the criteria than American-born Hispanics (5.94% vs. 6.42%), and a lower percentage foreign born Afro-Caribbeans meet the criteria for GAD than American-born Afro-Caribbeans (2.35% vs. 4.15%). The lowest levels of GAD were found in foreign-born Afro-Caribbeans followed by foreign-born Asians providing directional support for the notion that nativity and GAD are linked, and substantiating both our hypotheses.

Table 2 provides the results of our multivariate analysis which implemented stepwise blocks reflecting five models in logistic

Table 1
Sample characteristics and lifetime Generalized Anxiety Disorder ($N=17,249$).

	Frequency (Percentage)
Race, Ethnicity, Nativity	
Foreign-born	4996 (28.96%)
White	5981 (34.67%)
Asian	2211 (12.82%)
Hispanic	3369 (19.53%)
Afro-Caribbean	1449 (8.40%)
Black	4239 (24.58%)
Ethnicity/Race * Nativity	
Asian * Foreign born	1732 (10.04%)
Hispanic * Foreign born	1920 (11.13%)
Afro-Caribbean * Foreign born	1063 (6.16%)
Black * Foreign born	86 (0.50%)
With lifetime Generalized Anxiety Disorder (GAD)	1172 (6.79%)
GAD * (Race/Ethnicity * Nativity)	
White, American-born	626 (10.82%)
Black, American-born	218 (5.25%)
Black, Foreign-born	2 (2.33%)
Asian, American-born	15 (3.13%)
Asian, Foreign-born	40 (2.31%)
Hispanic, American-born	93 (6.42%)
Hispanic, Foreign-born	114 (5.94%)
Afro-Caribbean, American-born	15 (4.15%)
Afro-Caribbean, Foreign-born	25 (2.35%)
Demographics	
Female	9980 (57.86%)
Age 18–28	3775 (21.89%)
Age 29–40	4758 (57.58%)
Age 41–50	3231 (18.73%)
Age 51–59	2577 (14.94%)
Age 60+	2908 (16.86%)
Socio-economic	
Primary education	3570 (20.70%)
High school graduate	5061 (29.34%)
Some college	4523 (26.22%)
College graduate	84095 (23.74%)
Income less than $50,000 (*N*/%)	11,228 (65.09%)
Income $50,000–99,999 (*N*/%)	3930 (22.78%)
Income $100,000–149,999 (*N*/%)	1184 (6.86%)
Income $150,000 and greater (*N*/%)	907 (5.26%)
Health lifestyles	
Alcohol abuse	1659 (10.13%)
Smoking	1151 (63.42%)
Discrimination	
Discrimination scale (Mean, Standard Deviation)	0.887, 0.828

regression. The 95% confidence intervals and odds ratios were included. For each model we measure the pseudo R2 using the Tjur R2 since it is more similar to linear measures of fit and is not based on the likelihood function (55).

Support for the HME was not found with respect to GAD; nativity, in and of itself, was not significant. However, all racial and ethnic groups were significantly less likely to be meet the criteria for GAD as compared to Whites. In the simple model (Model 1), Asians and Afro-Caribbeans had approximately 77% lower odds and 74% lower odds, respectively, (OR=0.234,$p<0.001$; OR=0.265, $p<0.001$); Blacks had 55% lower odds (OR=0.449,$p<0.001$), and Hispanics had 42% lower odds of meeting the criteria for the disorder of GAD relative to American-born Whites (OR=0.581,$p<0.001$). After adjustments for demographic and socioeconomic differences, all race/ethnicities and foreign-born groups remain significantly less likely to meet the criteria for GAD.

Model 2, which included demographic and socio-economic variables, were statistically significant. Females had approximately 2.4 times higher odds than males of meeting the criteria for GAD after adjusting for other covariates (OR=2.432, $p<0.001$). Once adjusting for both health behaviors and the discrimination index, compared to respondents ages 18–28, respondents ages 29–40, ages 41–50, ages 51–59, and ages 60+ were 40%, 81%, 93%, and 36%, respectively, more likely to meet the criteria for GAD (OR=1.400, $p<0.001$; OR=1.811, $p<0.001$; OR=1.934, $p<0.001$; 1.356, $p<0.01$). Of the socioeconomic variables, only high school education had a significant association with GAD. Relative to respondents with primary education, those with a high school diploma had 19% lower odds of meeting the criteria for GAD (OR=0.813, $p<0.05$).

The health lifestyle measures also provided insight. Controlling for other characteristics, alcohol abuse was significant correlate of GAD. Those who abuse alcohol had over 2 times the odds of having GAD relative to those who did not (OR=2.127,$p<0.001$). Model 4 added the discrimination scale, which was statistically significant. The more frequently respondents were treated as dishonest, treated as less smart, treated with disrespect, threatened, or called names was associated with increases in the likelihood of meeting the criteria for GAD (OR=1.536, $p<0.001$).

The final model, Model 5, included an interaction term of nativity with race/ethnicity to examine how the nativity and ethnicity combination is associated with meeting the criteria for GAD. None were statistically significant except that between nativity and Afro-Caribbean ethnicity. Relative to American-born Whites, the adjusted odds of meeting the criteria for lifetime GAD were 0.144 for foreign-born Afro-Caribbeans and 0.319 for US born Afro-Caribbeans ($p<0.05$). There were no significant interaction effects between nativity and race/ethnicity on meeting the criteria for lifetime GAD for all other race/ethnic groups. The coefficient of discrimination, or Tjur R2 (Tjur, 2009), increases slightly with each successive model, indicating that latter models had marginally better predictive power for the data.

5. Conclusion

This study reveals that lifetime GAD is correlated with many measures and classifications discussed herein. Nativity was protective, but only directionally. When interactions between race/ethnicity and nativity were evaluated, foreign-born Afro-Caribbeans exhibited lower rates of lifetime GAD. A lower percentage of foreign-born minorities met the criteria for GAD as compared to their American-born counterparts, and all racial and ethnic groups met the criteria for lifetime GAD at a lower rate as compared to American-born Whites. Income and education did not function as was expected in the multivariate model; however, females were found to have a 2.4 times higher odds than males of meeting the criteria for GAD after adjusting for other covariates. In addition, although the relationship between excessive alcohol use (alcohol abuse) and GAD was found to be statistically significant, the relationship pertaining to smoking behavior was not. As predicted, discrimination and GAD were highly correlated at the 0.001 level. This study, to the knowledge of the research team, reflects one of the few applications to the Healthy Migrant Effect proactively in research design and in combination with Health Lifestyles Theory, to lifetime GAD across a full set of racial and ethnic minorities.

5.1. Limitations

Four limitations should be noted. First, the CPES was made available in 2007; however, the data were collected between 2001 and 2003. Over the last few years, immigration policies have become more stringent (e.g. HB56 in Alabama) affecting the way immigrants are treated. Second, the HME was formed using Canadian immigration landscape to explain physical health outcomes, not mental health outcomes in the U.S. Third, there are general gaps in the HME in that it does not address the immigration pathway – legal or illegal. Lastly, there are no proper measures of acculturation available in this dataset.

5.2. Future research

Although this research found a number of significant correlates with lifetime GAD, questions remain over macro-level versus

Table 2
Logistic regression results ($N=17,249$).

	Model 1 odds ratio (95% CI)	Model 2 odds ratio (95% CI)	Model 3 odds ratio (95% CI)	Model 4 odds ratio (95% CI)	Model 5 odds ratio (95% CI)
Race, Ethnicity, Nativity					
Nativity	0.863 (0.699, 1.066)	0.826 (0.665, 1.025)	0.932 (0.749, 1.159)	1.071 (0.859, 1.334)	1.418
Caucasian	referent	referent	referent	referent	referent
Asian	0.234 (0.170, 0.322)***	0.238 (0.172, 0.330)***	0.247 (0.178, 0.342)***	0.247 (0.178, 0.343)***	0.301 (0.178, 0.510)***
Hispanic	0.581 (0.478, 0.706)***	0.578 (0.472, 0.707)***	0.584 (0.477, 0.716)***	0.597 (0.488, 0.732)***	0.578 (0.457, 0.731)***
Afro-Caribbean	0.265 (0.186, 0.376)***	0.253 (0.178, 0.361)***	0.262 (0.184, 0.375)***	0.224 (0.157, 0.321)***	0.319 (0.190, 0.534)***
Black	0.449 (0.383, 0.526)***	0.412 (0.349, 0.485)***	0.437 (0.371, 0.516)***	0.395 (0.334, 0.467)***	0.401 (0.339, 0.475)***
Demographics			referent	referent	referent
Gender (Male=0; Female=1)		2.001 (1.752, 2.286)***	2.293 (1.999, 2.631)***	2.432 (2.117, 2.793)***	2.432 (2.117, 2.794)***
Age 18–28		referent	referent	referent	referent
Age 29–40		1.308 (1.084, 1.579)**	1.299 (1.074, 1.570)**	1.400 (1.156, 1.694)***	1.402 (1.158, 1.697)***
Age 41–50		1.711 (1.407, 2.080)***	1.675 (1.376, 2.039)***	1.811 (1.485, 2.208)***	1.818 (1.490, 2.217)***
Age 51–59		1.652 (1.347, 2.025)***	1.689 (1.372, 2.078)***	1.934, 1.568, 2.385)***	1.942 (1.573, 2.396)***
Age 60+		0.969 (0.779, 1.205)	1.059 (0.844, 1.330)	1.356 (1.076, 1.711)**	1.357 (1.076, 1.711)**
Socio-economic					
Primary school education		referent	referent	referent	referent
High school graduate		0.741 (0.616, 0.891)**	0.786 (0.653, 0.946)*	0.813 (0.675, 0.980)*	0.815 (0.676, 0.982)*
Some college education		1.008 (0.840, 1.211)	1.072 (0.892, 1.289)	1.095 (0.910, 1.318)	1.096 (0.910, 1.319)
College graduate		0.903 (0.741, 1.100)	1.002 (0.820, 1.223)	1.024 (0.837, 1.252)	1.024 (0.837, 1.252)
Income $0–49,999		referent	referent	referent	referent
Income $50,000–99,999		0.972 (0.837, 1.130)	0.972 (0.835, 1.131)	0.958 (0.822, 1.116)	0.959 (0.823, 1.118)
Income $100,000–149,999		0.838 (0.647, 1.085)	0.851 (0.656, 1.103)	0.821 (0.632, 1.066)	0.817 (0.629, 1.062)
Income $150,000 and greater		0.816 (0.601, 1.107)	0.816 (0.601, 1.108)	0.792 (0.582, 1.077)	0.795 (0.584, 1.082)
Health lifestyles					
Alcohol abuse (No=0; Yes=1)			2.500 (2.116, 2.954)***	2.127 (1.794, 2.521)***	2.129 (1.797, 2.524)***
Smoking (No=0; Yes=1)			1.022 (0.894, 1.168)	1.007 (0.881, 1.152)	1.007 (0.880, 1.151)
Discrimination					
Discrimination scale				1.536 (1.429, 1.651)***	1.536 (1.429, 1.652)***
Race / Nativity interactions					
Asian*Foreign born					0.589 (0.276, 1.256)
Hispanic*Foreign born					0.816 (0.478, 1.395)
Afro-Caribbean*Foreign born					0.453 (0.206, 0.995)*
Black*Foreign born					0.407 (0.092, 1.800)
Pseudo R2	0.0127	0.0210	0.0266	0.0306	0.0307

micro-level determinants. An analysis looking at GAD which included family structure in addition to race/ethnicity and nativity may prove insightful. Also, performing an analysis of anxiety outcomes which includes internal locus of control, social support and thereby (potentially) resilience, may yield relevant results. And, as was noted in the background section, more anxiety research should be performed situating gender centrally.

Since immigration is a global phenomenon, replicating the design of this project (with appropriate adjustments) in other nations has the potential to inform the wider body of research. The subsequent information may assist governments, which offer nationalized health care, to prioritize immigrant health and may offer insight to social processes which affect the rates of mental illness in their countries.

In conclusion, support was found to confirm some past findings. American-born persons, women, and those encountering discrimination had higher rates of Generalized Anxiety Disorder. By using the Healthy Migrant Effect with Health Lifestyles Theory collaboratively and proactively, a more comprehensive design was adopted which produced these nuanced results, highlighting the impact of each factor individually and in combination with others.

Role of funding source

No additional funding was provided to complete this study; Dr. Henna Budhwani, Dr. Kristine Ria Hearld, and Mr. Daniel Chavez-Yenterreceive salary compensation from the University of Alabama at Birmingham.

Conflict of interest

Dr. Henna Budhwani, Dr. Kristine Ria Hearld, and Mr. Daniel Chavez-Yenter declare they have no conflict of interest with this study.

Acknowledgments

We would like to acknowledge the guidance of Dr. Shelia Cotten in the development of the larger body of work from which this manuscript has been written.

References

Alegría, M., Shrout, P.E., Woo, M., Guarnaccia, P., Sribney, W., Vila, D., Polo, A., Cao, Z., Mulvaney-Day, N., Torres, M., Canino, G., 2007. Understanding differences in past year psychiatric disorders for Latinos living in the US. Soc. Sci. Med. 65 (2), 214–230.

Al-Issa, I., 1997. Ethnicity, immigration, and psychopathology. In: Al-Issa, I., Tousignant, M. (Eds.), Ethnicity, Immigration And Psychopathology. Springer, New York, pp. 3–15.

Ames, S., Stevens, S., Werch, C.E., Carlons, J.M., Schroeder, D.R., Kiros, G., Kershaw, J., Patten, C.A., Ebbert, J.O., Offord, K., 2010. The association of alcohol consumption with tobacco use in Black and White college students. Subst. Use Misuse 45 (7–8), 1230–1244.

Aneshensel, C.S., Huba, G.J., 1983. Depression, alcohol use, and smoking over one year: a four-wave longitudinal causal model. J. Abnorm. Psychol. 92 (2), 134–150.

Arehart-Treichel, J. 2003. Smoking and mental illness: which one's the chicken? Psychiartryonline – psychiatric news. ⟨http://psychnews.psychiatryonline.org/newsarticle.aspx?articleid=106723⟩ {accessed 18.04.14).

Asnaani, A., Richey, J.A., Dimaite, R., Hinton, D.E., Hofmann, S.G., 2010. A cross-ethnic comparison of lifetime prevalence rates of anxiety disorders. J. Nerv. Ment. Disord. 198 (8), 551–555.

Bracken, B., Reintjes, C., 2010. Age, race, and gender differences in depressive symptoms: a lifespan developmental investigation. J. Psychoeduc. Assess. 28 (1), 40–53.
Breslau, J., Aguilar-Gaxiola, S., Kendler, K.S., Maxwell, S., Williams, D., Kessler, R.C., 2005. Specifying race-ethnic differences in risk for psychiatric disorder in a USA national sample. Psychol. Med. 35, 57–68.
Breslau, J., Borges, G., Hagar, Y., Tancredi, D., Gilman, S., 2009. Immigration to the USA and risk for mood and anxiety disorders: variation by origin and age at immigration. Psychol. Med. 39 (7), 1117–1127.
Breslau, J., Chang, D.F., 2006. Psychiatric disorders among foreign-born and US-born Asian-Americans in a US national survey. Soc. Psychiatry Psychtr. Epidemiol. 41, 943–950.
Broman, C.L., Mavaddat, R., Hsu, S.Y., 2000. The experience and consequences of perceived racial discrimination: a study of African Americans. J. Black Psychol. 26 (2), 165–180.
Bruce, S.E., Yonkers, K.A., Otto, M.W., Eisen, J.L., Weisberg, R.B., Pagano, M., Shea, M. T., Keller, M.B., 2005. Influence of psychiatric comorbidity on recovery and recurrence in generalized anxiety disorder, social phobia, and panic disorder: a 12-year prospective study. Am. J. Psychiatry 162, 1179–1187.
Caetano, R., Clark, C.L., Tam, T., 1998. Alcohol consumption among racial/ethnic minorities. Alcohol Health Res. World 22 (4), 233–241.
Cockerham, W.C., 2005. Health lifestyle theory and the convergence of agency and structure. J. Health Soc. Behav. 46, 51–67.
Cockerham, W.C., 2006. Sociology of Mental DisorderPearson Prentice Hall, Upper Saddle River, NJ.
Finch, B.K., Kolody, B., Vega, W.A., 2000. Perceived discrimination and depression among mexican-origin adults in California. J. Health Soc. Behav. 41 (3), 295–313.
Garcia, A. 2013. The Facts on immigration today. Center for American Progress. ⟨http://americanprogress.org/issues/immigration/report/2013/04/03/59040/the-facts-on-immigration-today-3/⟩ (accessed 30.06.14).
Grant, B.F., Hasin, D.S., Stinson, F.S., Dawson, D.A., Ruan, W.J., Goldstein, R.B., Smith, S.M., Saha, T.D., Huang, B., 2005. Prevalence, correlates, co-morbidity, and comparative disability of DSM-IV generalized anxiety disorder in the USA: results from the national epidemiologic survey on alcohol and related conditions. Psychol. Med. 35 (12), 1747–1759.
Hartka, E., Johnstone, B., Leino, E.V., Motoyoshi, M., Temple, M.T., Fillmore, K.M., 1991. A meta-analysis of depressive symptomatology and alcohol consumption over time. Br. J. Addict. 86 (10), 1283–1298.
Hasin, D.S., Stinson, F.S., Ogburn, E., Grant, B.F., 2007. Prevalence, correlates, disability, and comorbidity of DSM-IV alcohol abuse and dependence in the United States: results from the national epidemiologic survey on alcohol and related conditions. Arch. Gen. Psychiatry 64 (7), 830–842.
Hwu, H.G., Yeh, E.K., Cheng, L.Y., 1989. Prevalence of psychiatric disorders in Taiwan defined by the Chinese diagnostic interview schedule. Acta Physiol. Scand. 79, 136–147.
Interuniversity Consortium for Political and Social Research (ICPSR). 2009. Sample design. ⟨http://www.icpsr.umich.edu/cocoon/cpes/using.xml?section=Sample+Design⟩ (accessed 7.12.10).
Jackson, J.S., Brown, K.T., Kirby, D.C., 1998. International perspectives on prejudice and racism. In: Eberha, J.L., Fiske, S.T. (Eds.), Confronting Racism: The Problem and Response. Sage Publication, Thousand Oaks, CA, pp. 101–135.
Kennedy, S., McDonald, J.T., Biddle, N. 2006. The healthy immigrant effect and immigrant selection: evidence from four countries. Australian bureau of statistics and centre for aboriginal economic policy research. 1-44. ⟨http://socserv.mcmaster.ca/sedap/p/sedap164.pdf⟩ (accessed 13.07.10).
Kessler, R.C., Chiu, W.T., Demler, O., Walters, E.E., 2005. Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the national comorbidity survey replication. Arch. Gen. Psychiatry 62 (6), 617–627.
Kessler, R.C., McGonagle, K.A., Zhao, S., Nelson, C.B., Hughes, M., Eshleman, S., Wittchen, H.U., Kendler, K.S., 1994. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: results from the national comorbidity survey. Arch. Gen. Psychiatry 51 (1), 8–19.
Krieger, N., Waterman, P.D., Kosheleva, A., Chen, J.T., Carney, D.R., Smith, K.W., Bennett, G. G., Williams, D.R., Freeman, E., Russell, B., Thornhill, G., Mikolowsky, K., Rifkin, R., Samuel, L., 2011. Exposing racial discrimination: implicit & explicit measures–the study of 1005 us-born black & white community health center members. PLoS ONE 6 (11), e27636. http://dx.doi.org/10.1371/journal.pone.0027636.
Kushner, M.G., Sher, K.J., Beitman, B.D., 1990. The relation between alcohol problems and the anxiety disorders. Am. J. Psychiatry 147, 685–695.
Landrine, H., Klonoff, E.A., 1996. The schedule of racist events: A measure of racial discrimination and a study of its negative physical and mental health consequences. J. Black Psychol. 22 (2), 144–168.
Lau, A.S., Tsai, W., Shih, J., Liu, L.L., Hwang, W.C., Takeuchi, D.T., 2013. The immigrant paradox among Asian American women: Are disparities in the burden of depression and anxiety paradoxical or explicable? J. Consult. Clin. Psychol. 81 (5), 901–911.
Lee, C.K., Kwak, Y.S., Yamamoto, J., Rhee, H., Kim, Y.S., Han, J.H., Choi, J.O., Lee, Y.H., 1990. Psychiatric epidemiology in Korea: part I. Gender and age differences in Seoul. J. Nerv. Ment. Disord. 178, 242–246.
Lepine, J.P., Lellouch, J., Lovell, A., Teherani, M., Ha, C., Verdier-Taillefer, M.H., Rambourg, N., Lempérière, T., 1989. Anxiety and depressive disorders in a French population: methodology and preliminary results. Psychiatry Psychobiol. 4, 267–274.
Martins, S.S., Ko, J., Kuwabara, S., Clarke, D., Alexandre, P., Zandi, P., Mendelson, T., Mortensen, P.B., Eaton, W.W., 2012. The relationship of adult mental disorders to socioeconomic status, race/ethnicity, marital status and urbanity of residence. In: Eaton, WW (Ed.), Public Mental Health. Oxford University Press, New York, pp. 151–200.
McGuire, T.G., Miranda, J., 2008. New evidence regarding racial and ethnic disparities in mental health: policy Implications. Health Aff. 27, 393–403.
McLean, C.P., Asnaani, A., Litz, B.T., Hofmann, S.G., 2011. Gender differences in anxiety disorders: prevalence, course of illness, comorbidity and burden of illness. J. Psychiatry Res. 45 (8), 1027–1035.
Morales, L.S., Kingston, R.S., Valdez, R.O., Escarce, J., 2007. Socioeconomic, cultural, and behavioral factors affecting hispanic health outcomesJ. Health Care Poor Underserved 13 (4), 477–503.
Morissette, S.B., Tull, M.T., Gulliver, S.B., Kamholz, B.W., Zimering, R.T., 2007. Anxiety, anxiety disorders, tobacco use, and nicotine: a critical review of interrelationships. Psychol. Bull. 133 (2), 245–272.
Muntaner, C., Eaton, W.W., Miech, R., O'Campo, P., 2004. Socioeconomic position and major mental disorders. Epidemiol. Rev. 26, 53–62.
National Institute of Mental Health (NIMH). 2009. Expert panel addresses high rates of smoking in people with psychiatric disorders. ⟨http://www.nimh.nih.gov/science-news/2009/expert-panel-addresses-high-rates-of-smoking-in-people-with-psychiatric-disorders.shtml⟩ (accessed 27.07.10).
Passel, J.S., Livingston, G., Cohn, D. 2012. Explaining why minority births now outnumber white births. Pew Research: Social & Demographic Trends. ⟨http://www.pewsocialtrends.org/2012/05/17/explaining-why-minority-births-now-outnumber-white-births/⟩ (accessed 25.06.14).
Pérez, D.J., Fortuna, L., Alegria, M., 2008. Prevalence and correlates of everyday discrimination among US Latinos. J. Community Psychol. 36 (4), 421–433.
Perez, C.E., 2002. Health status and health behaviour among immigrants. Health Rep. 13, 89–100.
Pumariega, A., Rothe, E., Pumariega, J., 2005. Mental health of immigrants and refugees. Community Ment. Health J. 41, 581–593.
Rodgers, B., Korten, A.E., Jorm, A.F., Jacomb, P.A., Christensen, H., Henderson, A.S., 2000. Non-linear relationships in associations of depression and anxiety with alcohol use. Psychol. Med. 30 (2), 421–432.
Rosenfield, S., Phillips, J., White, H.R., 2006. Gender, race, and the self in mental health and crime. Soc. Probl. 53, 161–185.
Schwartz, S., Meyer, I.H., 2010. Mental health disparities research: The impact of within and between group analyses on tests of social stress hypotheses. Soc. Sci. Med. 70 (8), 1111–1118.
Scribner, R., 1996. Paradox as paradigm -the health outcomes of mexican americans. Am. J. Public Health 86 (3), 303–305.
Soto, J.A., Dawson-Andoh, N.A., BeLue, R., 2011. The relationship between perceived discrimination and Generalized Anxiety Disorder among African Americans, Afro Caribbeans, and non-Hispanic Whites. J. Anxiety Disord. 25 (2), 258–265.
Surgeon General's Report (SAMHSA). 2008. Fact Sheets: Latinos/Hispanic Americans. ⟨http://mentalhealth.samhsa.gov/cre/fact3.asp⟩ (accessed 7.30.10).
Szalacha, L.A., Sumru, E., Coll, C.G., Alarcón, O., Fields, J.P., Ceder, I., 2003. Discrimination and Puerto Rican children's and adolescents' mental health. Cult. Divers. Ethn. Minor Psychol. 9 (2), 141–155.
Takeuchi, D., Hong, S., Gile, K., Alegria, M., 2007. Developmental contexts and mental disorders among Asian-Americans. Res. Hum. Dev. 4, 49–69.
Thorlindsson, T., Vilhjalmsson, R., 1991. Factors related to cigarette smoking and alcohol use among adolescents. Adolescence 26, 399–418.
Tjur, T., 2009. Coefficients of determinations in logistics regression models-A new proposal: the coefficient of discrimination. Am. Stat. 63 (4), 366–372.
U.S. Census Bureau. 2012. State and county quickfacts. ⟨http://quickfacts.census.gov/qfd/states/00000.html⟩ (accessed 24.03.14).
Wittchen, H.U., Essau, C.A., von Zerssen, D., Krieg, C.J., Zaudig, M., 1992. Lifetime and six-month prevalence of mental disorders in the Munich follow-up study. Eur. Arch. Psychiatry Clin. Neurosci. 241, 247–258.