Published in final edited form as:
J Nerv Ment Dis. 2007 March ; 195(3): 189–195.

Risk for Psychiatric Disorder among Immigrants and Their US-Born Descendants: Evidence from the National Comorbidity Survey-Replication

Joshua Breslau, PhDScD[1], **Sergio Aguilar-Gaxiola, PhD**[2], **Guilherme Borges, PhD**[3], **Kenneth S. Kendler, MD**[4], **Maxwell Su, PhD**[1], and **Ronald C. Kessler, PhD**[1]

1*Department of Health Care Policy, Harvard Medical School, Boston, Massachusetts, United States of America*

2*Department of Internal Medicine, University of California, Davis, School of Medicine*

3*Mexican Institute of Psychiatry, Mexico City, Mexico*

4*Departments of Psychiatry and Human Genetics, Medical College of Virginia/Virginia Commonwealth University.*

Abstract

Background—Studies find lower lifetime risk for psychiatric disorder among immigrants than among the US-born population, but we do not know how these differences arise over time.

Methods—DSM-IV anxiety, mood, impulse control and substance use disorders were assessed in a nationally representative survey of the US household population, the National Comorbidity Survey Replication (NCS-R). Differences in risk for disorder between immigrants (n=299) and 5124 natives (n=5124) were estimated by generation, age of immigration, and duration of residence in the United States.

Results—Immigrants had lower lifetime risk of having a psychiatric disorder than natives (OR=0.7, 95%CI (0.5-0.9). Risk for disorder was inversely related to age at immigration and directly related to duration of residence in the United States.

Conclusions—Differences in risk for psychiatric disorder emerge within a single generation following immigration, consistent with a strong influence of environmental factors on increases in risk among immigrant populations.

Keywords

Immigration; Epidemiology; Psychiatric Disorders; Acculturation

Studies conducted in the United States since the early 1980s have consistently found that immigrants have lower lifetime prevalence of anxiety, mood and substance use disorders than US-born natives of the same national origin. This has been found in studies of Mexican-Americans (Burnam et al, 1987;Grant et al, 2004;Vega et al, 1998), Hispanics in general (Ortega et al, 2000), and Non-Hispanic Whites (Grant et al, 2004). Similarly, in the United Kingdom, the current prevalence of depression has been found to be lower among immigrants from Asia and the Caribbean than among UK-born descendants of Asian and Caribbean immigrants (Bhugra, 2003;Nazroo, 2001). This consistent finding suggests that changes that

Address comments to Joshua Breslau, Department of Health Care Policy, Harvard Medical School, 180 Longwood Avenue, Boston, MA 02115. Voice: 617-432-3587; Fax: 617-432-3588; Email: breslau@hcp.med.harvard.edu.

occur among immigrant communities in the process of adaptation to the host country lead to increases in risk for these disorders across generations. Understanding the processes by which this happens has important implications both for public health and for understanding the environmental causes of mental disorders (Bhugra, 2004;Rogler, 1994). The foreign born population of the United States is larger today than it has ever been in the history of the country (Schmidley, 2001). Furthermore, US-born children of immigrants comprise one of the fastest growing segments of the US population (Suro et al, 2003).

One way to improve our understanding of the process of increasing risk is to examine how differences in risk for mental disorders emerge over generations in immigrant populations. Differences in risk for mental disorders between immigrants and natives may arise gradually over several generations, implying that protective factors are partially transmitted across generations of US-born descendants of immigrants. On the other hand, these differences might occur quickly, with all natives having equally high prevalence relative to immigrants. This finding would imply that early socialization in the US confers high risk for psychiatric disorders irrespective of the country in which one's parents were born. Indeed, there is evidence from studies of immigrant acculturation, which is highly correlated with time spent in the. United States, that suggest that increasing risk begins within the lifetime of immigrants themselves (Escobar et al, 2000a;Escobar et al, 2000b). For instance, a study of Mexican-Americans in Fresno County, California, found that immigrants who had lived in the US for more than 13 years had higher lifetime prevalence of psychiatric disorder than more recently arrived immigrants (Vega etal, 1998).

Differences may also exist among immigrants depending on the age of immigration. Immigrants who arrive as children, sometimes referred to as the 1.5 generation (Rumbaut, 2004), experience early socialization within American society, attend American schools and are more likely to become fluent speakers of English as adults (Kim et al, 2003;Zhou, 1997). Immigrants who arrive as adults, by comparison, are more likely to experience loss of cultural integration and challenges in adapting to a new environment (Berry et al, 1987;Rogler et al, 1991).

The goal of the present paper is to investigate how differences in prevalence between immigrants and natives arise over time by building and evaluating survival models that include information about nativity, number of generations in the US among natives, and age of immigration among immigrants as joint predictors of lifetime risk of mental disorders. Data come from the nationally representative sample of the US population obtained in the US National Comorbidity Survey Replication (NCS-R), a recently completed survey of DSM-IV disorders and their correlates (Kessler et al, 2004b).

METHODS

Sample

As detailed elsewhere, (Kessler et al, 2004a) the NCS-R is a nationally representative survey of English-speaking household residents ages 18 and older in the coterminous United States based on a multi-stage clustered area probability sample of the household population in the coterminous United States. Face-to-face interviews were carried out by professional interviewers from the Institute for Social Research at the University of Michigan between February, 2001 and April, 2003. The response rate was 70.9%. Interviewers explained the study and obtained verbal informed consent prior to beginning each interview. Recruitment and consent were approved by the Human Subjects Committees of Harvard Medical School and the University of Michigan.

The survey was administered in two parts. Part I included a core diagnostic assessment of all respondents (n = 9282) that took an average of about one hour to administer. Part II included questions about risk factors, consequences, other correlates and additional disorders. Part II was administered to 5692 of the 9282 Part I respondents, including all Part I respondents with a lifetime disorder plus a probability sub-sample of other respondents. Part II respondents who were Hispanic, Non-Hispanic Black or Non-Hispanic White were included in this analysis (n=5423).

Measures

Diagnostic assessment—NCS-R diagnoses are based on Version 3.0 of the World Health Organization Composite International Diagnostic Interview (CIDI), (Kessler et al, 2004c) a fully structured lay-administered diagnostic interview that generates DSM-IV (American Psychiatric Association, 1994) diagnoses. Diagnoses examined here include: anxiety disorders [panic disorder, agoraphobia without panic disorder, specific phobia, social phobia, generalized anxiety disorder (GAD), post-traumatic stress disorder (PTSD), obsessive-compulsive disorder (OCD),], mood disorders [major depressive disorder, dysthymia, bipolar I and II disorders], impulse control disorders [intermittent explosive disorder, oppositional-defiant disorder, conduct disorder, attention-deficit/hyperactivity disorder, Pathological Gambling, Bulimia], and substance use disorders [alcohol abuse, drug abuse, alcohol dependence, drug dependence]. As described elsewhere, (Kessler et al, 2004a) blind clinical re-interviews with the Structured Clinical Interview for DSM-IV (SCID) (First et al, 2002) found generally good concordance with WMH-CIDI diagnoses for anxiety, mood, and substance use disorders. Impulse-control diagnoses have not been validated.

Age of Onset—Retrospective age of onset reports were obtained in the WMH-CIDI using a question series designed to avoid the implausible response patterns obtained in using the standard CIDI age of onset question (Simon et al, 1995). The sequence began with a question designed to emphasize the importance of accurate response: “Can you remember your exact agethe very first timeyou (HAD THE SYNDROME)?” Respondents who answered “no” were probed for a bound of uncertainty by moving up the age range incrementally (e.g., “Was it before you first started school?” “Was it before you became a teenager?” etc.)- Age of onset was set at the upper end of the bound (e.g., age 12 for respondents who reported that onset was before they became teenagers). Experimental research shows this question sequence yields responses with a much more plausible age of onset distribution than the, standard CIDI question (Knauper et al, 1999).

Immigration—Respondents were asked whether they were born in the United States. Those who where not born in the United States were asked how old they were when they arrived in the United States. Duration of residence in the US was coded as a time varying covariate based on this information: person-years were categorized as pre-immigration, 0-5 years post-immigration, 6-10 years post-immigration and more than 10 years post-immigration.

Generation—Respondents were asked whether their parents and grandparents were born in the United States. This information was used to categorize natives into 5 groups: 2 foreign born parents, 1 foreign born parent, 2 native parents and 3 foreign born grandparents, 2 native parents with 1 or 2 foreign born grandparents, 4 native grandparents.

Race-Ethnicity—Respondents were asked if they were of Hispanic or Latino descent and which of the following categories best described their race: White/Caucasian, Black/African-American, American Indian, Alaska Native, Asian, Native Hawaiian, or Pacific Islander. Respondents with Hispanic or Latino descent were classified as Hispanic. Non-Hispanics were classified according to the category which best described their race. Hispanics, Non-Hispanic

Blacks and Non-Hispanic Whites together constitute 95.3% of the Part II sample. The remaining 4.7% of respondents were excluded from the analyses reported here.

Statistical Analysis

The data were weighted to adjust for differential probabilities of selection, differential non-response, and residual differences between the sample and tract-level 2000 Census population on socio-demographic variables. An additional Part II weight adjusted for over-sampling of Part I cases. Weighting is described in more detail elsewhere (Kessler et al, 2004a). Lifetime prevalence was estimated as the proportion of respondents who ever had a given disorder up to their age at interview. Differences in lifetime risk between immigrants and natives were examined using discrete-time survival analysis with person-year the unit of analysis (Efron, 1988). Sex, age and race-ethnicity were statistically controlled.

Standard errors of prevalence estimates and survival coefficients were estimated using the Taylor series linearization method (Wolter, 1985) implemented in the SUDAAN software system. (Research Triangle Institute, 2002) Multivariate significance tests were made with Wald χ^2 tests using Taylor series design-based coefficient variance-covariance matrices. All significance tests were evaluated at the .05 level with two-sided tests.

RESULTS

Sample Characteristics

Immigrants did not differ in age or sex from the US-born (Table 1). Reflecting the US population, immigrants were more likely to be Hispanic than Non-Hispanic Black or Non-Hispanic White (Schmidley, 2001).

Comparison of Lifetime Prevalence and Lifetime Risk

Immigrants had lower lifetime prevalence and lifetime risk for all classes of disorder than native-born respondents (Table 2). These differences were statistically significant for mood and substance use disorders and for any disorder.

Variation across race-ethnic groups

To examine whether the difference between immigrants and natives depends on race-ethnicity we tested the significance of interactions between immigrant status and race-ethnicity. None of these tests was significant (χ^2_2=-l 15-.606, p=.892-.55O).

Change across Generations

We next tested whether the difference in risk between immigrants and natives varied across generations. Variation across generations was not significant for anxiety, mood and impulse control disorders (x^2_4=2.53-9.09, p=.640-.059). For substance use disorders, variation across generation was significant (χ^2_4=l 1.64, p=.020). However, there was not a trend in risk for substance use disorders across successive generations: compared with immigrants, natives with 2 immigrant parents had equally high risk as natives with 4 native grandparents (χ^2_1=.19O, p=.663).

Age at Immigration

For both mood and impulse control disorders, lower risk among immigrants was found for those immigrants who arrived as adolescents (age 13-19) and as adults (age 20+), but not for immigrants who arrived as children (age 0-12) (Table 3). In contrast, risk for substance use disorders was consistently lower among immigrants, regardless of their age at immigration.

Duration of Residence in the US

For mood, impulse control and substance use disorders, risk was lowest among immigrants relative to natives in years prior to their arrival in the United States. Risk increases among immigrants relative to natives after their arrival in the US, but the pattern of change associated with duration of residence in the US is not consistent across classes of disorder. For mood disorders, low risk among immigrants continues through the initial post-immigration period, but then increases to equality with natives. After 10 years of residence in the US, immigrants had an intermediate level of risk for mood disorders, higher relative to natives than in earlier periods but still significantly lower than natives. For impulse control disorders, lower risk among immigrants was restricted to pre-migration periods: risk was equal among immigrants and natives in all post-migration time periods. For substance use disorders, low risk among immigrants relative to natives continues through the first 10 years post-immigration. However, after 10 years of residence in the US there is a trend towards equality in risk for substance use disorders between immigrants and natives.

DISCUSSION

These results should be understood in light of two limitations. First, we have used data on immigrants and natives in a cross-sectional design to examine a process that occurs over time. This interpretation of the data is supported by the fact that the difference between immigrants and natives has been stable across the past several decades during which comparable data has been collected, from the early 1980s when the ECA study was conducted (Burnam et al, 1987) to the present time. Second, our sample of immigrants is not representative of the total US foreign born population. Immigrants in this sample all spoke English well enough to complete the diagnostic interview and had on average longer duration of residence in the US than in the census which includes people who did not speak English (Malone et al, 2003). Adding statistical control for educational attainment did not alter the findings (results not shown). Our results for Hispanics are similar to those of the NESARC, which offered respondents the option of being interviewed in Spanish (Grant et al, 2004). Since English language proficiency is associated with higher risk for disorder (Ortega et al, 2000), our results are probably overestimates of risk for disorder among immigrants.

Consistent with previous research, immigrants to the US in this study had significantly lower risk for psychiatric disorders than US born natives. We found that both early age at immigration and longer duration of residence in the US were both associated with higher risk among immigrants relative to natives. This pattern of differences suggests two distinct causal pathways leading to changes in risk among immigrant groups: early socialization in the US for immigrants who arrive as children and post-migration factors for immigrants who arrive as adolescents or adults.

Five specific findings in this study are consistent with a causal role for early socialization in the US. First, we found that US-born children of immigrants are at equally high risk for disorder relative to immigrants than natives with 4 native grandparents. This suggests that protective factors are not preserved across generations among immigrant communities. Second, immigrants who arrived in the US as children (prior to age 13), and thus experienced a portion of early socialization within the US, had risk for mood and impulse control disorders that was equally as high as that of natives. Third, lower risk among immigrants is equally present among those who immigrate as adolescents (age 13-19) and those who immigrate as adults (age 20 or higher). This implies that after age 12, there is no effect of additional time spent outside the US prior to immigration on risk for disorders.

Fourth, we found that the difference between immigrants and natives did not vary across race-ethnic groups. Consistency across race-ethnic groups was also reported in another recent

national survey, the NESARC, which found that differences in risk for disorder between immigrants and natives of Mexican origin were of similar magnitude as differences between Non-Hispanic White immigrants and natives (Grant et al, 2004). This finding suggests that the transition from low to high risk is not a result of specific social adversities faced by immigrants who become members of socially disadvantaged race-ethnic groups, i.e. Hispanics or Non-Hispanic Blacks, and not by immigrants who become members of the majority group, Non-Hispanic Whites. Consistency across groups seems to conflict with sociological research, which has found that the process of incorporation into American society is markedly different across race-ethnic groups (Portes et al, 1993;Waters et al, 1995). In this study we cannot rule out the possibility that there are group-specific effects, which are small in magnitude relative to the effect shared across groups of early socialization in the US.

Fifth, the largest differences favoring immigrants relative to natives occurred in the years prior to immigration for those immigrants who arrived as adults. This finding suggests that immigrants benefit from spending their childhood years, during which risk for disorders is high (Kessler et al, 2005), outside of the US. Lower risk prior to arrival in the US might also be explained by selective migration of healthy individuals, i.e. a healthy migrant effect (Burnam et al, 1987), but this hypothesis cannot be tested without comparable data from immigrants' countries of origin. In addition, the finding from cross-national surveys that risk for psychiatric disorders is highest in the US (Demyttenaere et al, 2004) suggests that lower risk in years prior to immigration may reflect general levels of risk in the populations of origin, rather than selective migration.

The pattern of differences across age at immigration was different for substance use disorders than for mood and impulse control disorders. The transition from low to high risk for substance use disorders was found between immigrants and natives, rather than between immigrants who arrived after age 12 and immigrants who at age 12 or earlier. This implies that among families with 2 immigrant parents, children who are born outside of the US are at low risk for substance disorder while children born inside the US are at high risk for substance use disorder. It is not clear why this pattern might exist despite the fact that both groups are likely to have equal access to substances from an early age. It may be the case that children of immigrants who are themselves immigrants are more likely to share their parents' focus on social integration and mobility than are US-born children of immigrants and their descendants. This may provide immigrant children with alternative activities and motivations that protect them from substance use disorders (Chen et al, 2004). Further insight into this process could be gained from analyses focusing on specific stages in the progression from the use of substances to the development of substance use disorders and on comparisons of immigrant and native siblings within immigrant families.

The trend for mood, impulse control and substance use disorders toward risk that is equal to that of natives is consistent with the hypothesis that post-immigration factors promote onset of mental disorders. Two processes may combine to produce these effects. First, there may be stressors specific to the immigrant experience, acculturative stressors, which lead to higher risk for disorder over time. Studies of immigrants from Latin America to the US that have found an association of acculturative stressors with psychological distress and disorder provide evidence of this process (Kaplan et al, 1990;Lara et al, 2005). Second, socialization to the US cultural context continues throughout adulthood and may lead to higher risk for disorder among immigrants who have spent long periods of their adult life in the US. The role of adult socialization as opposed to acculturative stress is supported by the finding that increasing risk for disorders is not specific to immigrants who are minorities in the US but is also found among Non-Hispanic Whites.

These findings also suggest an explanation for the apparent discrepancy between findings concerning the relationship between immigration and psychotic versus non-psychotic disorders. Evidence from the US (Malzberg et al, 1956), Australia (Cade et al, 1962;Krupinski et al, 1965), the UK (Harrison et al, 1997), The Netherlands (Selten et al, 1997;Selten et al, 2001) and Sweden (Zolkowska et al, 2001) suggests that immigrants to these countries are at higher risk for psychotic disorders relative to natives, contrasting with our finding regarding non-psychotic disorders. Our finding of an association between increasing risk for non-psychotic disorder relative to natives and longer duration of residence in the US suggests that post-migration factors do lead to increased risk for these disorders among immigrants, despite their lower lifetime risk. The apparent discrepancy might arise from a combination of two factors. First there may be greater cross-national variation in prevalence of non-psychotic disorders compared with psychotic disorders, so that the initial gap between immigrants and US-born natives is larger for non-psychotic disorders. Second, non-psychotic disorders tend to have an earlier age of onset (Kessler et al, 2005) than psychotic disorders so that immigrants who arrive in the US as adults have already lived through periods of high risk in countries with lower prevalence of non-psychotic disorder.

CONCLUSION

Evidence from this cross-sectional study suggests that the process of change from relatively low risk for psychiatric disorders among immigrants to relatively high risk among natives occurs within a single generation. In this regard, psychiatric disorders are similar to physical characteristics, such as height and weight, which have also been found to change rapidly as immigrants converge with the native US population (Bogin et al, 2003;Goel et al, 2004;Malina et al, 2004). The factors of early socialization in the US that are responsible for this increase in risk for psychiatric disorders are not understood. Given the dramatic change in levels of risk for disorder that occur over such short periods of time, studies of immigrants and their descendents offer a strategic opportunity for future studies of environmental causes of psychiatric disorders, as they have for physical disorders (Gibson et al, 2003;Syme et al, 1975). Our findings also suggest that despite the relatively low risk for psychiatric disorder among immigrants, there is a continued need to improve prevention and treatment of psychiatric disorders in this group whose risk of disorder increases over time.

Acknowledgements

The National Comorbidity Survey was supported by the National Institute of Mental Health (NIMH; R01 MH46376, R01 MH49098, and RO1 MH52861) with supplemental support from the National Institute of Drug Abuse (NED A; through a supplement to MH46376) and the W.T. Grant Foundation (90135190). The National Comorbidity Survey Replication (NCS-R) is supported by NIMH (U01-MH60220) with supplemental support from NED A, the Substance Abuse and Mental Health Services Administration (SAMHSA), the Robert Wood Johnson Foundation (RWJF; Grant 044708), and the John W. Alden Trust. Collaborating investigators include Ronald C. Kessler (Principal Investigator, Harvard Medical School), Kathleen Merikangas (Co-Principal Investigator, NIMH), James Anthony (Michigan State University), William Eaton (The Johns Hopkins University), Meyer Glantz (NEDA), Doreen Koretz (Harvard University), Jane McLeod (Indiana University), Mark Olfson (Columbia University College of Physicians and Surgeons), Harold Pincus (University of Pittsburgh), Greg Simon (Group Health Cooperative), Michael Von Korff (Group Health Cooperative), Philip Wang (Harvard Medical School), Kenneth Wells (UCLA), Elaine Wethington (Cornell University), and Hans-Ulrich Wittchen (Max Planck Institute of Psychiatry). The views and opinions expressed in this report are those of the authors and should not be construed to represent the views of any of the sponsoring organizations, agencies, or U.S. Government. A complete list of NCS publications and the full text of all NCS-R instruments can be found at http://www.hcp.med.harvard.edu/ncs. Send correspondence to NCS@hcp.med.harvard.edu. The NCS-R is carried out in conjunction with the World Health Organization World Mental Health (WMH) Survey Initiative. We thank the staff of the WMH Data Collection and Data Analysis Coordination Centres for assistance with instrumentation, fieldwork, and consultation on data analysis. These activities were supported by the John D. and Catherine T. MacArthur Foundation, the Pfizer Foundation, the US Public Health Service (R13-MH066849, R01-MH069864, and ROl DA016558), the Pan American Health Organization, Eli Lilly and Company, and GlaxoSmithKline. A complete list of WMH publications can be found athttp://www.hcp.med.harvard.edu/wmh/. Support for this analysis was provided by NIMH (KOI MH66057-02).

References

American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4. Washington DC: American Psychiatric Association; 1994.

Berry JW, Kim U, Minde T, Mok D. Comparative studies of acculturative stress. International Migration Review 1987;21(3):491–511.

Bhugra D. Migration and depression. Acta Psychiatr Scand 2003;108(Suppl 418):67–72.

Bhugra D. Migration and mental health. Acta Psychiatr Scand 2003;109(4):243–258. [PubMed: 15008797]Bhugra D. Migration and mental health. Acta Psychiatr Scand 2004;109(4):243–258. [PubMed: 15008797]

Bogin B, Rios L. Rapid morphological change in living humans: Implications for modern human origins. Comp Biochem Physiol A Mol Integr Physiol 2003;136(1):71–84. [PubMed: 14527631]

Burnam MA, Hough RL, Karno M, Escobar JI, Telles CA. Acculturation and lifetime prevalence of psychiatric disorders among Mexican-Americans in Los Angeles. J Health Soc Behav 1987;28(1):89–102. [PubMed: 3571910]

Cade JF, Krupinski J. Incidence of psychiatric disorders in Victoria in relation to country of birth. Med J Aust 1962;49(1):400–404. [PubMed: 13875471]

Chen CY, Dormitzer CM, Bejarano J, Anthony JC. Religiosity and the earliest stages of adolescent drug involvement in seven countries of Latin America. Am J Epidemiol 2004 ;159(12):1180–1188. [PubMed: 15191935]

Demyttenaere K, Bruffaerts R, Posada-Villa J, Gasquet I, Kovess V, Lepine JP, Angermeyer MC, Bernert S, de Girolamo G, Morosini P, Polidori G, Kikkawa T, Kawakami N, Ono Y, Takeshima T, Uda H, Karam EG, Fayyad JA, Karam AN, Mneimneh ZN, Medina-Mora ME, Borges G, Lara C, de Graaf R, Ormel J, Gureje O, Shen Y, Huang Y, Zhang M, Alonso J, Haro JM, Vilagut G, Bromet EJ, Gluzman S, Webb C, Kessler RC, Merikangas KR, Anthony JC, Von Korff MR, Wang PS, Brugha TS, Aguilar-Gaxiola S, Lee S, Heeringa S, Pennell BE, Zaslavsky AM, Ustun TB, Chatterji S. Prevalence, severity, and unmet need for treatment of mental disorders in the World Health Organization World Mental Health Surveys. JAMA 2004;291(21):2581–2590. [PubMed: 15173149]

Efron B. Logistic regression, survival analysis and the Kaplan-Meier Curve. Journal of the American Statistical Association 1988;83:414–425.

Escobar JI, Nervi CH, Gara M. Immigration and mental health: Mexican Americans in the United States. Harv Rev Psychiatry 2000a;8(2):64–72. [PubMed: 10902095]

Escobar JI, Vega WA. Mental health and immigration's AAAs: Where are we and where do we go from here? J Nerv Ment Dis 2000b;188(11):736–740. [PubMed: 11093375]

First, MB.; Spitzer, RL.; Gibbon, M.; Williams, JBW. Structured Clinical Interview for DSM-IV axis I disorders, research version, non-patient edition (SCID-I/NP) . New York: Biometrics Research, New York State Psychiatric Institute; 2002.

Gibson PG, Henry RL, Shah S, Powell H, Wang H. Migration to a western country increases asthma symptoms but not eosinophilic airway inflammation. Pediatr Pulmonol 2003;36(3):209–215. [PubMed: 12910582]

Goel MS, McCarthy EP, Phillips RS, Wee CC. Obesity among US immigrant subgroups by duration of residence. JAMA 2004;292(23):2860–2867. [PubMed: 15598917]

Grant BF, Stinson FS, Hasin DS, Dawson DA, Chou SP, Anderson K. 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. Arch Gen Psychiatry 2004;61(12):1226–1233. [PubMed: 15583114]

Harrison G, Glazebrook C, Brewin J, Cantwell R, Dalkin T, Fox R, Jones P, Medley I. Increased incidence of psychotic disorders in migrants from the Caribbean to the United Kingdom. Psychol Med 1997;27 (4):799–806. [PubMed: 9234458]

Kaplan MS, Marks G. Adverse effects of acculturation: psychological distress among Mexican American young adults. Soc Sci Med 1990;31(12):1313–1319. [PubMed: 2287960]

Kessler RC, Berglund P, Chiu WT, Demler O, Heeringa S, Hiripi E, Jin R, Pennell BE, Walters EE, Zaslavsky A, Zheng H. The US National Comorbidity Survey Replication (NCS-R): Design and field procedures. Int J Methods Psychiatr Res 2004a;13(2):69–92. [PubMed: 15297905]

Kessler RC, Berglund P, Demler O, Jin R, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. Arch Gen Psychiatry 2005;62 (6):593–602. [PubMed: 15939837]

Kessler RC, Merikangas KR. The National Comorbidity Survey Replication (NCS-R): Background and aims. Int J Methods Psychiatr Res 2004b;13(2):60–68. [PubMed: 15297904]

Kessler RC, Ustun TB. The World Mental Health (WMH) survey initiative version of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI). Int J Methods Psychiatr Res 2004c;13(2):93–121. [PubMed: 15297906]

Kim BS, Brenner BR, Liang CT, Asay PA. A qualitative study of adaptation experiences of 1.5-generation Asian Americans. Cultur Divers Ethnic Minor Psychol 2003;9(2):156–170. [PubMed: 12760327]

Knauper B, Cannell CF, Schwarz N, Bruce ML, Kessler RC. Improving the accuracy of major depression age of onset reports in the US National Comorbidity Survey. Int J Methods Psychiatr Res 1999;8(l): 39–48.

Krupinski J, Stoller A. Incidence of mental disorders in Victoria Australia, according to country of birth. Med J Aust 1965;2(7):265–269. [PubMed: 5825080]

Lara M, Gamboa C, Kahramanian MI, Morales LS, Bautista DE. Acculturation and Latino health in the United States: A review of the literature and its sociopolitical context. Annu Rev Public Health 2005;26:367–397. [PubMed: 15760294]

Malina RM, Pena Reyes ME, Tan SK, Buschang PH, Little BB, Koziel S. Secular change in height, sitting height and leg length in rural Oaxaca, southern Mexico: 1968-2000. Ann Hum Biol 2004;31(6):615–633. [PubMed: 15799230]

Malone, N.; Baluja, K.; Costanzo, J.; Davis, C. Census 2000 Brief . Washington DC: US Census Bureau; 2003. The foreign born population: 2000.

Malzberg, B.; Lee, ES. Migration and mental disease: A study of first admissions to hospitals for mental disease, New York, 1939-1941. New York: Social Science Research Council; 1956.

Nazroo, JY. Ethnicity, class and health. London: Policy Studies Institute; 2001.

Ortega AN, Rosenheck R, Alegria M, Desai RA. Acculturation and the lifetime risk of psychiatric and substance use disorders among Hispanics. J Nerv Ment Dis 2000;188(11):728–735. [PubMed: 11093374]

Portes A, Zhou M. The new 2nd generation: Segmented assimilation and its variants. Annals of the American Academy of Political and Social Science 1993;530:74–96.

Research Triangle Institute. Software for survey data analysis (SUDAAN). Version 8.1. Research Triangle Park, NC: Research Triangle Institute; 2002.

Rogler LH, Cortes DE, Malgady RG. Acculturation and mental status among Hispanics: Convergence and new directions for research. Am Psychol 1991;46(6):585–597. [PubMed: 1952420]

Rumbaut RG. Ages, life stages, and generational cohorts: Decomposing the immigrant first and second generations in the United States. International Migration Review 2004;38(3)

Schmidley, AD. Current Population Reports, Series P23-206. Washington DC: US Cenus; 2001. Profile of the foreign born population of the United States: 2000.

Seleten JP, Slaets JP, Khan RS. Schizophrenia in Surinamese and Dutch Antillean immigrants to The Netherlands: Evidence of an increased incidence. Psychol Med 1997;27(4):807–811. [PubMed: 9234459]

Selten JP, Veen N, Feller W, Blom JD, Schols D, Camoenie W, Oolders J, van der elden M, Hoek HW, Rivero VM, van der Graaf Y, Kahn Y. Incidence of psychotic disorders in immigrant groups to The Netherlands. Br J Psychiatry 2001;178(4):367–372. [PubMed: 11282817]

Simon GE, VonKorff M. Recall of psychiatric history in cross-sectional surveys: Implications for epidemiological research. Epidemiol Rev 1995;17(l):221–227. [PubMed: 8521941]

Suro, R.; Passel, J. The rise of the second generation: Changing patterns in Hispanic population growth. Washington, DC: Pew Hispanic Center; 2003.

Syme SL, Marmot MG, Kagan A, Kato H, Rhoads G. Epidemiologic studies of coronary heart disease and stroke in Japanese men living in Japan, Hawaii and California: Introduction. Am J Epidemiol 1975;102(6):477–480. [PubMed: 1202949]

Vega WA, Kolody B, Aguilar-Gaxiola S, Alderete E, Catalano R, Caraveo-Anduaga J. Lifetime prevalence of DSM-III-R psychiatric disorders among urban and rural Mexican Americans in California. Arch Gen Psychiatry 1998;55(9):771–778. [PubMed: 9736002]

Waters MC, Eschbach K. Immigration and ethnic and racial inequality in the United States. Annu Rev Sociol 1995;21:419–446.

Wolter, KM. Introduction to variance estimation . New York: Springer-Verlag; 1985.

Zhou M. Growing up American: The challenge confronting immigrant children and children of immigrants. Annu Rev Sociol 1997;23:63–95.

Zolkowska K, Cantor-Graae E, McNeil TF. Increased rates of psychosis among mmigrants to Sweden: Is migration a risk factor for psychosis? Psychol Med 2001;31(4):669–678. [PubMed: 11352369]

Table 1

Characteristic of immigrants and natives in the NCS-R*

	All immigrants %	(se)	All US born %	(se)	Total %	(se)
Sex						
Female	57.1	(4.0)	52.6	(1.0)	52.9	(1.0)
χ^2_1(p-value)		1.1(.294)				
Age						
18-29	23.5	(3.1)	23.2	(1.1)	23.2	(1.1)
30-44	35.6	(3.4)	28.2	(0. 9)	28.6	(0.8)
45-59	20.0	(3.2)	26.9	(1.1)	26.5	(1.0)
60+	20.7	(3.0)	21.8	(1.1)	21.7	(1.0)
χ^2_3 (p-value)		5.7(.143)				
Race-Ethnicity						
Hispanic	50.7	(4.9)	9.0	(1.0)	11.5	(1.2)
Non-Hispanic Black	11.0	(2.9)	13.0	(1.2)	12.9	(1.1)
Non-Hispanic White	38.3	(4.4)	78.1	(1.7)	75.6	(1.8)
χ^2_2 (p-value)		31.8(<001)				
(n)	(299)		(5124)		(5423)	

* Includes Part II respondents who were either Hispanic, Non-Hispanic Black or Non-Hispanic White.

Table 2

Lifetime prevalence and lifetime risk for psychiatric disorders among immigrants and natives

	Lifetime prevalence				Lifetime risk[1]	
	Immigrants		Natives			
	%	(se)	%	(se)	OR	(95% Cl)
Anxiety	22.5	(2.9)	28.6	(1.0)	0.9	(0.6-1.2)
Mood	13.1	(1.8)	21.3	(0.8)**	0.6	(0.4-0.8)**
Impulse control	12.4	(2.0)	16.3	(0.8)	0.7	(0.5-1.0)
Substance use	6.1	(1.2)	15.0	(0.5)**	0.3	(0.2-0.6)**
Any	34.8	(3.5)	46.8	(1.2)**	0.7	(0.5-0.9)**

* Differences between immigrant and natives significant at p=.05

** Differences between immigrants and natives significant at p=.01

[1] OR and 95% Cl estimated in discrete time survival models with control for sex, age, and ethnicity

Table 3

Comparison of risk for disorders among immigrants and natives by age at immigration and duration of residence in the US[1]

	Anxiety		Mood		Impulse Control		Substance Use	
	OR	(95% Cl)	OR	(95% Cl)	OR	(95% Cl)	OR	(95% Cl)
Age at immigration								
0-12(n=119)	1.0	(0.6-1.5)	0.8	(0.5-1.2)	1.1	(0.7-1.7)	0.5*	(0.3-0.8)
13-19 (n=73)	0.8	(0.5-1.5)	0.4*	(0.2-0.7)	0.4*	(0.2-0.9)	0.3*	(0.1-0.9)
20+(n=107)	0.8	(0.5-1.1)	0.5*	(0.3-0.8)	0.5*	(0.3-1.0)	0.2*	(0.1-0.6)
χ^2_2(p-value)	1.0 (.595)		5.8 (.054)		8.6 (.013)		3.2 (.199)	
Duration of residence in US[2]								
Pre-USA (n=4725)	1.0	(0.7-1.4)	0.4*	(0.2-0.8)	0.5*	(0.3-0.8)	0.1*	(0.0-0.5)
0-5 (n=1448)	0.8	(0.4-1.6)	0.3*	(0.2-0.9)	1.0	(0.5-2.1)	0.1*	(0.0-0.7)
6-10 (n=1347)	0.7	(0.3-1.2)	1.0	(0.6-1.7)	1.0	(0.4-2.2)	0.2*	(0.0-1.0)
11+(n=5078)	0.7	(0.4-1.3)	0.6*	(0.4-1.0)	1.0	(0.4-2.4)	0.8	(0.4-1.3)
χ^2_3 (p-value)	2.1 (.554)		10.8 (.005)		4.8 (.191)		12.3 (.007)	

*Significant at p=.O5

[1]Based on discrete-time survival analysis with person-year as the unit of analysis. Odds ratios adjusted for age and sex. Reference group is natives.

[2]Duration of residence in the US is entered as a time varying covariate.