Jing Li
Population Research Center
University of Texas at Austin
1800 Main Building, 1 University Station G1800
Austin TX 78712
jingli@prc.utexas.edu

Recent Immigrant Cohorts, Country of Origin, Duration of Stay, and their Impact on

Immigrant Psychological Distress: Evidence from Hierarchical Analyses of National Health

Interview Surveys (1997-2007)

INTRODUCTION

Immigrants account for a considerable and rapid growing part of the U.S. population, playing a major role in affecting the size, distribution and composition of the population. By the year of 2002, the number of foreign-born people living in the United States reached an all-time high and exceeded 34.2 million, or about 13% of the total U.S. population. (Fix et al. 2003, Bureau of Census 2002). Therefore, the study of migration, immigrants and their concerns, has become an increasingly important topic in social sciences.

It is well documented in the health literature that immigrants have better physical health than native-born Americans and their children are healthier and less likely to die – so called "healthy immigrant effect" (Frisbie, Cho, and Hummer 2001; Landale, Oropesa, and Gorman 2000). A puzzling finding related with "healthy immigrant effect" is that the longer immigrants have lived in the U.S., the worse their health and the higher the risk of death to their infants (Markides and Coreil 1986; Frisbie et al. 20001).

Although there are various studies focusing on immigrants and mental health, many of them are not as systematic as the literature on immigrants and physical health. First, the findings are much less consistent; researchers do not agree on whether immigrants have higher, equal or

1

lower levels of psychological distress than native-born Americans. This problem is partially due to sampling variation. With few exceptions, researchers on immigrant mental health rely on small, geographically limited samples (for example, Cuellar et al. 2004; Kuo and Tsai 1986), so it is not surprising that those findings are not generalizable. Moreover, disparity may be a result of studies on different immigrant groups. Because of differences in culture, location, group sizes, and migration history, the overall influence of immigration on mental health may be positive for one group but negative for another. Secondly, as I will argue later, scholars have not realized the hierarchical nature of the research questions concerning immigrants. This problem is not only relevant to studies of immigrants and health/mental health, but also to many other topics related with immigrant acculturation and adaption (e.g., social mobility and economic assimilation).

This paper has two goals. I first document immigrant-native differentials in psychological distress by using multiple years of National Health Interview Survey (1997-2007). In this baseline analysis, I include demographic characteristics and duration of stay as covariates. Second, I examine the association between the length of the U.S. residence and immigrants' psychological distress among recent cohorts of six major immigrant groups (Mexicans, Puerto Ricans, Cubans, Chinese, Filipinos and Indians). By comparing the results of OLS regressions and three-level hierarchical models, I pay special attention to the strength of associations between temporal factors (i.e., age and duration) and psychological distress after the variation of countries of origin and membership of arrival cohorts has been taken into account.

IMMIGRANT-NATIVE DIFFERENTIALS IN MENTAL HEALTH

As I mentioned earlier, studies on immigration and mental health are not as thorough and established as the literature on physical health. Ideally, research that compares immigrants to

non-immigrants is necessary in order to answer whether immigrants have equal, better or worse

mental health than non-immigrants. However, most mental health research examines variations

among immigrants, depending on their levels of social support, for example, rather than

comparing immigrants to non-immigrants (Kuo 1976; Kuo and Tsai 1986; Noh and Avison

1996). This research leaves unanswered question whether the "healthy immigrant effect" exists

in the dimension of mental and psychological health.

Indeed, the comparative research mostly looks only at one group of immigrants, usually

of Mexican origin. This research sometimes finds that Mexican-origin immigrants have lower

distress and less mental disorders than non-immigrants (Burnam, Hough, Karno, Escobar and

Telles 1987; Golding and Burnam 1990; Vega, Kolody, Aguilar-Gaxiola, Alderete, Catalano and

Anduaga1998), sometimes that immigrants have higher levels of distress and more disorders

than non-immigrants (Burnam et al. 1984); and sometimes that there is no significant mental

health difference between immigrants and non-immigrants (Cuellar et al. 2004; Finch et al. 2000;

Franzini and Fernandex-Esquer 2004). For example, with detailed analysis, Finch and his

colleagues find that Mexican immigrants' levels of depression do not differ significantly from

U.S.-born persons of Mexican heritage, adjusting for sociodemographic precursors like sex and

age, and further adjustment for consequences such as education, income, employment, language

use, perceived discrimination, and social support do not change the coefficient associated with

immigrant status, which remains insignificant (Finch et al. 2000).

Looked at another way, Mexican ethnic identity does appear to be associated with low

levels of psychological distress (Brater and Eschach 2005; Mirowsky and Ross 1980). However,

when the two types of psychological distress – depression and anxiety – are examined separately,

each with adjustment for the other, there is some evidence that Mexican-Americans have lower

3

levels of anxiety than non-Hispanic whites, but higher levels of depression (Mirowsky and Ross 1984). Therefore, research on Mexican immigrants compared to non-immigrants is inconclusive, although most research indicates that immigrants do not have consistently worse mental health than non-immigrants.

Research on multiple immigrant groups is less abundant, but indicates that immigrants in general may have better mental health and lower distress levels than non-immigrants (Sastry and Ross 1998; Williams et al. 2007; Takeuchi et al. 2007; Alegría et al. 2007; Mossakowski 2007; Ali 2002). This group of studies usually focuses on comparing immigrants with native-born persons of the same origin, rather than with general U.S.-born population. For example, using a community survey of San Francisco and Honolulu, Mossakowski (2007) discovers that immigrant Filipinos, a group with high levels of socioeconomic status, have better mental health than their counterparts born in the United States. A similar finding has been documented by another group of researchers headed by Takeuchi (Williams et al. 2007; Takeuchi et al. 2007; Alegría et al. 2007). Using national samples, they find that compared to their native-born counterparts, foreign-born Asians, blacks and Latinos have similar and sometimes lower rates of lifetime and 12-month psychiatric disorders (Williams et al. 2007; Takeuchi et al. 2007; Alegría et al. 2007). Looking at another large immigrant-receiving country, Ali shows that immigrants have better mental health than native-born Canadians, and their advantages are not affected by demographic or socio-economic differences, language barriers, immigrants' unemployment rates, or their lower sense of belonging to the local community (2002). She also finds that Asian immigrants and recent arrivals enjoy the lowest depression rates, but long-term immigrants have the same rates as the Canadian-born (Ali 2002). However, Dey and Lucas (2006) conclude that there is little difference in distress between native-born Americans and immigrants using the

NHIS which includes immigrants from all countries, but they do not show the results with adjustment of socioeconomic status.

In summary, our knowledge of whether immigrants are more mentally robust remains limited. Past literature cannot provide unambiguous answers as to whether and why immigrants show better, worse, or equal levels of mental health as non-immigrants, though the most recent publication seems to indicate an immigrant advantage of mental health.

SELECTIVITY OR ASSIMILATION: DURATION, COHORT AND COUNTRY OF ORIGIN

Selection process is the most referred explanation for the "healthy immigrant effect". The most mentioned is individual selectivity. Immigrants are self-selected; they are usually motivated, energetic, and healthy persons based on measurable and unmeasurable characteristics. They are not a random sample of people from the sending-country.

However, much less theorized is that selectivity is country- and period- specific (Portes and Rambaut 2006; Angel and Angel 1992). This is what my paper aims to elaborate. In particular, immigrants are US. immigration policy-selected. Migration to the United States is directly influenced by its immigration policies, which change from time to time. For example, for much of the early twentieth century, Asians were virtually banned from legal immigration to the U.S. due to exclusionary policies. Since 1960s, emphasis has been given to family unification and employable skills. Consequently, current immigrants are more likely selected based on characteristics indicated in those policies; they are more likely to have family members in U.S. before coming or they are more likely to be highly educated and highly skilled professionals. Nevertheless, it does not mean that immigrants from all countries in the world are equally represented in the U.S. immigrant population based on those characteristics. Given the current

U.S. immigration policies, its impact is felt remarkably differently among countries at different

period of time, depending on individual country's socioeconomic situations, geographic distance,

cultural similarities, etc. Furthermore, some countries such as Cuba, China and former Soviet

Union once had or still have exiting policies, which further reinforces the selection process.

Therefore, immigrants in the U.S. are not only selected on individual's motivation and resources

to move, but also on the sending country and arrival cohort.

Acculturation and assimilation is one of the most referred explanations of later

deterioration of immigrant's health advantage the longer they reside in the United States.

Mechanisms of negative mental health outcomes as a consequence of acculturation include a loss

or partial loss of protective home culture (including strong family and community ties), adoption

of US-based ethos such as individualism and competitiveness, which may increase anomie,

change from immigrant selectivity to minority status and discrimination (Vega et al. 1991;

Wadsworth and Kubrin 2007; Finch et al. 2000).

However, it should be noted that some mental health outcomes such as depression and

psychological distress have a strong association with age (Turner and Lloyd 1999). Because most

immigrants arrive at young age, as they grow older, the effects of age and duration in the U.S. on

psychological distress become extremely difficult to disentangle. Health literature generally

documents a negative association between age and depression/distress1, but whether this

relationship holds for the immigrant population is unknown due to lack of research (Jorm 2000).

In summary, in order to study selectivity and acculturation, numerous studies have

focused on the effects of a handful of individual-level migration variables such as residence in

the U.S., citizenship status and English language proficiency (Brater and Eschach 2005;

Takeuchi et al. 2007; Alegría et al. 2007). Although sometimes immigrant cohorts and country of

origin are also included in the analysis, with no exceptions they are treated as if they only

functioned at the individual level, indistinctive from other person-level characteristics such as

age and sex. Indeed, group-level migration variables such as migration cohorts are so

understudied that it is very hard to find any literature on its effects on immigrant mental

wellbeing. Though using migration cohorts as an individual-level variable, a few studies of

migration and physical health provide empirical evidence of the effect of cohorts (Mutchler,

Prakash and Burr 2007; Antecol and Bedard 2006). For example, using census data Mutchler et

al. (2007) studied disability of older Asian population, whose native-born proportion is less than

a quarter. They found that the risk of being disabled varies great by countries of origin and

period when migrants came to US. Refugees such as Vietnamese have an elevated risk of

disability, while Asians who entered U.S. before 1965, a time when immigration policies to

Asian were especially tight, tend to have a lower risk of being disabled.

DATA AND METHODS

Data

      Our analyses use the data from the 1997-2007 National Health Interview Survey (NHIS).

The NHIS is a nationally representative cross-sectional survey that has been conducted annually

since 1957. Data are collected through personal household interviews by personnel of the U.S.

Bureau of the Census to obtain information about the health and other characteristics of the non-

institutionalized population of the United States. The NHIS consists of a Basic Core (including

the Family Core, the Sample Adult Core and Sample Child Core) and variable Supplements. The

information gathered includes socio-demographic background characteristics, health status,

health care services and behavior.

Since 1997, a six-question screening scale has been included in NHIS to monitor

population prevalence and trends of nonspecific psychological distress, which makes this study

possible. Using eleven years of NHIS ensures sufficient samples sizes for multiple arrival

cohorts and individual immigrant groups. More importantly, the availability of repeated cross-

sectional NHIS made it possible to track cohorts over time as their duration in U.S. increases. I

further restricted the sample to only include adults aged 18 and older. Missing data is negligible

except for poverty measurement described below. Excluding missing cases, the total sample size

is 324,507, including 214,047 non-Hispanic whites, 45,826 non-Hispanic blacks, 54,636 adults

who self-identified as Hispanics and 10,352 respondents who self-identified as single-race or

multi-race Asians.

Measurement

Psychological distress is measured by Kessler 6-item distress measure (Kessler et al.

2002).   Respondents were asked, "During the past 30 days, how often did you feel… (1) so sad

that nothing could cheer you up, (2) hopeless, (3) that everything was an effort, (4) worthless, (5)

nervous, and (6) restless."   Response categories are "all of the time" "most of the time" "some

of the time" "a little of the time" and "none of the time" as 4, 3, 2, 1, 0, respectively; and

responses are summed (alpha=0.87). Since the scale is highly skewed, we take the log to

normalize the distribution.[2]

Length of residence in the U.S. compares durations of 0-4 years, 5 - 9 year, 10 - 14 years,

and more than 15 years in the U.S. socio-demographic controls include age and sex. Age is

measured in years. Sex is coded 1 for male and 0 for female. Socioeconomic status includes

years of education and poverty. Years of education is a continuous variable, ranging from 0 to 21.

To maximize the number of cases with non-missing values and minimize biases, we use three variables for poverty: in poverty if the respondent is below the poverty threshold, not in poverty if it is above the poverty threshold, and a missing category.[3] Marital status is measured by a dummy variable: coded 1 if currently married and 0 if not.

Arrival cohorts are measured based on reported years since U.S. arrival and the survey year. This technique has been used in the labor market literature to study the immigrants' economic assimilation and recently adapted by health researchers (e.g. Borjas 1985; Antecol and Bedard 2006). The restructured cohort data is show in table 1. As shown, by taking mid-point of the arrival period, I assign individuals to five five-year cohorts to maximize the placement of immigrants and meaningful nature of the cohorts. The five cohorts are 1985 or earlier, 1986~1990, 1991~1995, 1996~2000 and 2001~2005. The numbers of cases for six immigrant groups are shown in table 5. Due to group variation and the very nature of the technique used in computing cohorts described above, the sample sizes are bigger for the older cohorts/bigger immigrant groups than recent cohorts or smaller groups. However, except for three groups that have a sample below 100 cases (Cubans arriving during 1986~1990 and 2001~2005 as well as Filipinos arriving during 2001~2005), all other groups have sufficient sample sizes for analysis.

----------------Table 1 inserted about here--------------------------------

Analysis

I first provide summary statistics for five groups – the total population, non-Hispanic whites, non-Hispanic blacks, Hispanics, and Asian. In order to provide an overview of native-immigrant mental health differences, for each group the statistics are first provided by nativity. Then results of OLS regression on psychological distress for each group will be presented and

compared. Only duration of U.S. residence and socio-demographic variables are included in this

analysis.

The second part of analysis examines variations among six immigrant groups and how

length of residence associates with reporting psychological distress after accounting for

immigrant country of origin and cohorts. Summary statistics of sampling attributes are presented

first, followed by conditional means of logged psychological distress by immigrant groups and

arrival cohorts. Then OLS regression coefficients of socio-demographic and duration variables

are shown to provide baseline analysis, followed by a group of three-level hierarchical models.

The first level units are individual immigrants, who are clustered in their arrival cohorts

(the second level) that are nested in the country of origin (the third level) (Raudenbush and Bryk

2002). Specifically, I will first run a null three-level model with random intercepts only to

determine the three parts of variance components. Then a series of three-level hierarchical

models with demographic variables and duration in U.S. will be carried out in order to find out

the strength of the association of duration with reporting higher levels of psychological distress.

In particular, the level-1 or individual level of the full model is estimated by the following form:

$$Y_{ijk} = \pi_{0jk} + \beta_1 AGE_{ijk} + \beta_2 MALE_{ijk} + \beta_3 YRSEDUC_{ijk} + \beta_4 POVERTY_{ijk} + \beta_5 MARRIED_{ijk}$$

$$+ \beta_6 DURATION_{ijk} + \varepsilon_{iijk}, \ \varepsilon_{ijk} \sim N(0, \sigma^2) \tag{1}$$

where Y_{ijk} stands for logged psychological distress of the i th respondent for $i = 1, \ldots,$

n_{jk} immigrants within the j th cohort for $j = 1, \ldots J$ arrival cohort and the k th country of origin

for $k = 1, \ldots,$ K country. AGE denotes age; MALE denotes being male; YRSEDUC denotes

years of education completed; POVERTY denotes being in poverty; MARRIED denotes being

married; and DURATION denotes length of U.S. residence.[4,5,6] π_{0jk} is the intercept indicating

the mean logged psychological distress of immigrants of cohort j from country k and ε_{ijk} is

the random individual effect.

$$\text{Level-2 or cohort-level model is: } \pi_{0jk} = \gamma_{00k} + C_{0jk}, \ C_{0jk} \sim N(0, \sigma_C^2) \qquad (2)$$

where γ_{00k} is the mean logged psychological distress of immigrants from country k and C_{0jk} is

a random "cohort effect". Level-3 or country-level model is:

$$\gamma_{00k} = \mu_{000} + T_{00k}, \ T_{00k} \sim N(0, \sigma_T^2)) \qquad (3)$$

where μ_{000} is the grand mean and T_{00k} is a random "country effect".

RESULTS

Table 2 reports summary statistics by race/ethnic origin for the variables used throughout

the analysis. For the sample as a whole, immigrants have much lower levels of distress than

native-born people. They tend to be younger, male, less educated and are more likely to be in

poverty. Over half of the immigrants have long-term U.S. residence of at least 15 years. White

immigrants do not seem to have a psychological advantage over native-born whites. On the

contrary, black immigrants clearly report much less distress than U.S. blacks. Immigrants who

self-identified as Hispanics or Asians also have the same pattern – the foreign-born have

considerably lower psychological distress than the natives.

-----------------Table 2 inserted about here--------------------------------

Summary statistics show an overall negative bivariate relationship between nativity and

psychological distress. However, are immigrants less psychologically distressed than their native

counterparts? If so, does immigrant mental health deteriorate the longer they stay in U.S., as

reported in physical health literature? To answer these questions, Table 3 presents results of OLS

regression on psychological distress by race/ethnic groups with adjustment of age, sex, education,

poverty level, marital status and duration in the United States.

The first column of Table 3 shows a strong "healthy immigrant effect" in terms of

psychological distress for the total population. Specifically, compared with native-born persons,

immigrants have significant lower levels of psychological distress in spite of length of stay.

Indeed, the effect of duration of U.S. residence has a positive relationship with reporting higher

distress. The longer immigrants live in the U.S., the more distressed they are. However, this

general statement masks a great deal of variation between race/ethnic groups. White immigrants

do not seem to have the same distress pattern describe above; instead, their levels of

psychological wellbeing are not that different from those of native-born counterparts. For black

immigrants, both the recent arrivals and long-term residents are less distressed than native-born

blacks, but there is no significant difference in distress between immigrants living in U.S. longer

than 5 years but less than 10 years and native blacks. Having the largest immigrant groups, it is

Hispanics and Asians that have the same distress differential pattern as found in the total

population.

----------------Table 3 inserted about here--------------------------------

The effects of most demographic variables are as expected – being male, educated,

married, not in poverty are associated with lower levels of distress, while being female, less

educated, not married and in poverty are associated with higher distress. However, the varying

effect of age among race/ethnic groups should be noted. As mentioned above, the general health

literature finds a negative association between age and psychological distress. While this pattern

holds for white, black and Asian groups, it is the opposite for Hispanics. Foreign-born being the

majority, Hispanics report significantly higher levels of psychological distress as they grow older.

Although Asians are also predominantly foreign-born, older age is significantly associated with

less distress.

Overall, results of table 2 and table 3 found evidence of "health immigrant effect" in the

realm of psychological wellbeing. Immigrants are more likely to report lower level of distress,

irrespective of length of stay. This nativity effect is especially salient among blacks, Hispanics

and Asians. In particular, recent arrivals are least distressed, but for most immigrants (Hispanics

and Asians) this psychological advantage declines with time in the United States.

The next part of analysis focuses on variation of psychological distress among

immigrants from six major sending countries/areas: Puerto Rico, Mexico, Cuba, China,

Philippines and India.[6] The goal of this part, as stated earlier, is to examine the strength of the

positive relationship between duration and psychological distress after membership of cohorts

and country of origin has been taken into consideration. Table 4 presents summary statistics by

immigrants' country of origin. Island-born Puerto Ricans have by far the highest psychological

distress than immigrants from other five groups, whose levels of distress are much more similar.

However, by looking closely at conditional means of distress by immigrant groups and arrival

cohorts (in table 5), it is not hard to see there is much variation by arrival cohorts within country

of origin. For example, although table 4 shows that Chinese immigrants as a group report much

lower levels of psychological distress than Puerto Ricans, detailed distress levels by cohorts

reveal that the 1996-2000 cohort Chinese immigrants report even higher levels of distress (-2.651)

than Puerto Ricans who arrived during the same period of time (-2.954).

----------------Table 4 inserted about here--------------------------------

----------------Table 5 inserted about here--------------------------------

The distribution of cohort characteristics by immigrant countries in table 4 shows that

Puerto Ricans and Cubans predominately came before 1985, while Chinese and Indians are more

of younger cohorts with Mexicans and Filipinos in the middle. In terms of the age distribution,

Indians and Mexicans are the youngest groups with an average of 36 years, followed by Chinese

(41 years), Filipinos (44 years), Puerto Ricans (46 years), and Cubans are the eldest immigrant

group with an average of 52.

The baseline OLS analyses on psychological distress for six immigrant groups are

presented in Table 6. As expected, compared with immigrants of more than 15 years of U.S.

residence, model 2 shows that immigrants with less than 15 years of stay have lower levels of

psychological distress (although the relationship between duration and distress is not linear). In

the fully adjusted model, although the coefficient of residence of longer than 10 years but less

than 15 years becomes statistically insignificant, immigrants with less than 10 years of stay have

much lower levels of distress than those who have lived in U.S. for over 15 years. Unexpectedly,

as in the analysis of Hispanics in table 2, OLS regressions show that age appears to have a

positive relationship with psychological distress among immigrants. This effect is statistically

significant and its magnitude is consistent among all models that include age as a covariate. The

effects of other demographic variables are as expected.

----------------Table 6 inserted about here--------------------------------

So far, the analysis above tells a coherent story of the positive effect of duration of U.S. residence on immigrant psychological distress. Specifically, first, compared with U.S.-born population, immigrants generally have lower levels of distress, but this advantage declines the longer immigrants live in the United States. Second, compared with immigrants with long-term stay in the U.S., recent immigrants have lower levels of distress. It is worth emphasizing that opposite to the native-born people age has a statistically positive relationship with being distressed among immigrants. Moreover, results also show that a good deal of variation in psychological distress exists between immigrant groups and arrival cohorts. As a result, while earlier cohorts tend to be older and live in U.S. for a longer period of time, the effect of duration becomes extremely difficult to uncoupled from those of country of origin, cohort and age.

Three-level hierarchical models based on immigrant groups and arrival cohorts provide a feasible way to disentangle intertwining effects of age, cohort, duration and country of origin, as shown in table 7.

----------------Table 7 inserted about here-------------------------------

Examining first the variance components shown at the bottom of the table 7, it can be seen that most of the variance in psychological distress is at the individual level. Within country-of-origin variance component is at the second level, which is the variance between different arrival cohorts of the same sending country. This variance component is statistically significant at the .05 level for all the models in table 7 except model 2, in which it is significant at .10 level. The between-country variance component measures the variability between different countries and it is statistically significant at the .10 level for all models. Given the fact that there are only 6 immigrants countries at level 1, achieving the .10 level statistical significance indicates a great amount of variability of psychological distress among the six countries under study.

Examination of the estimated individual-level coefficients in table 7 reveals two striking findings. First, after immigrant countries and arrival cohorts are taken into account, duration of U.S. residence does not have any significant effects on psychological distress. This is true for both model 2, which includes duration as the only covariate, and model 7, a full adjusted model with age, sex, education, poverty and marital status. This implies that a failure to control for the effects of immigrant country of origin and arrival cohorts in psychological distress could lead to incorrect estimates of the lower psychological distress that are due to duration of stay in the United States. Second, the positive effect of age on psychological distress is confirmed in all the models of table 7. It is highly statistically significant in the fully adjusted model after the variability of country of origin and arrival cohorts is taken into consideration. Taken together, these two findings suggest that, putting the distress differences among immigrant country of origin and arrival cohorts, it maybe the process of aging, instead of the process of assimilation, that accounts for a higher level of psychological distress among long-term immigrants.

CONCLUSIONS

In this preliminary research paper, I tried to extend the literature on immigration and health in two directions. First, by studying the immigrant-native differentials in psychological distress, I explored an area few scholars have investigated. My empirical results suggest the "healthy immigrant effect" also exists in the psychological dimension. At the same time, duration of U.S. residence also appears to have a negative effect on immigrants' mental health. Secondly, by employing three-level hierarchical models to account for variability among immigrant countries of origin and arrival cohorts, I disentangle the intertwining effects of age, cohorts, country and duration of U.S. residence on psychological distress. I did not find evidence

supporting deteriorating effects of long-term stay on immigrant psychological wellbeing. On the

contrary, both results of the OLS regression and the multi-level modeling indicate a worsening

effect of age on psychological health among immigrants, which is the opposite from the findings

of general mental health literature.

NOTES:

1. A number of studies document a u-shaped age pattern in depression or distress (Kessler et al. 1992; Mirowsky and Reynolds 2000; Mirowsky and Ross 1992, 1999a; Wade and Cairney 1997; Schieman et al. 2001).

2.   To include respondents who omit only one question for the scale, I imputed values for the index before taking the natural logarithm by assigning the within-person mean to the missing question. Individuals who failed to respond to more than one questions are excluded from the analysis.

3.   Analysis shows that people with missing poverty category also report significantly less psychological distress.

4.   In preliminary analyses, missing poverty category is strongly associated with lower levels of psychological distress, so in the interest of parsimony of the hierarchical model poverty variable is a dummy variable coded 1 if the respondent is in poverty or 0 otherwise.

5.   Duration of U.S. residence is coded as a continuous variable by taking the middle point of the corresponding range. More than 15 years of residence is top coded as 20.

6.   Although Puerto Ricans are U.S. citizens at birth and thus technically are not immigrants to the United States, I make the usual distinction between island-born and mainland-born Puerto Ricans.

REFERENCES

Alegría, Margarita, Norah Mulvaney-Day, Maria Torres, Antonio Polo, Zhun Cao, and Glorisa Canino. 2007. "Prevelance of Psychiatric Disorders Across Latino Subgroups in the United States." *American Journal of Public Health* 97: 68-75.

Ali, Jennifer. 2002. "Mental Health of Canada's Immigrants." *Statistics Canada, Catalogue 82-003.* Supplement to Health Reports (13).

Antecol, Heather and Bedard, Kelly. 2006. "Unhealthy Assimilation: Why Do Immigrants Converge to American Health Status Levels?" *Demography* 43: 337-360.

Borjas, G.J. 1985. "Assimilation, Changes in Cohort Quality, and the Earnings of Immigrants." Journal of Labor Economics 3:463–89.

Bratter, Jennifer L. and Karl Eschbach. 2005. "Race/ethnic Differences in Nonspecific Psychological Distress: Evidence from the National Health Interview Survey." *Social Science Quarterly* 86: 620-44

Burnam M.A., Dianne M. Timbers, and Richard L. Hough. 1984. "Two Measures of Psychological Distress Among Mexican Americans, Mexicans and Anglos." *Journal of Health and Social Behavior* 25: 24-33.

Burnam, M. A., Hough. R. L., Karno, M., Escobar, J. J. and Telles, C. A. 1987. "Acculturation and Lifetime Prevalence of Psychiatric Disorders among Mexican Americans in Los Angeles." *Journal of Health and Social Behavior* 28: 89-102.

Cho, Y., W. P. Frisbie, R. Hummer and R. Rogers. 2004. "Nativity, Duration of Residence, and the Health of Hispanic Adults in the United States." *International Migration Review* 38: 184-211.

Cuellar, Isreal, Elena Bastida and Sara Maria Braccio. 2004. "Residency in the United States, Subjective Well-being, and Depression in an Older Mexican-Origin Sample." *Journal of Aging and Health* 16: 447-66.

Dey A.N., Lucas J.W. "Physical and Mental Health Characteristics of U.S. - and Foreign-born Adults: United States, 1998-2003." *Advance data from Vital and Health Statistics*; No. 369. Hyattsville, MD: National Center for Health Statistics. 2006.

Finch, Brian K., Bohdan Kolody and William A. Vega. 2000. "Perceived Discrimination and Depression among Mexican-Origin Adults in California." *Journal of Health and Social Behavior* 41: 295-313.

Franzini, Luisa, Maria Eugenia Fernandez-Esquer. 2004. "Socioeconomic, Cultural, and Personal Influences on Health Outcomes in Low Income Mexican-Origin Individuals in Texas." *Social Science & Medicine* 2004: 1629-46.

Frisbie, W. P., Cho. Y., and Hummer, R. A. 2001. "Immigration and the Health of Asian and Pacific Islander Americans in the United States." *American Journal of Epidemiology* 153: 372-380.

Golding, Jacqueline M. and M. Audrey Burnam. 1990. "Immigration, Stress, and Depressive Symptoms in a Mexican-American Community." *The Journal of Nervous and Mental Disease* 178: 161-71.

Hummer, Robert A., Richard G. Rogers, Charles B. Nam, and Felicia B. LeClere. 1999. "Race/ Ethnicity, Nativity, and U.S. Adult Mortality." *Social Science Quarterly* 80: 136-53.

Hummer, Robert A., Daniel A. Powers, Starling G. Pullum, Ginger L. Gossman, and W. Parker Frisbie. 2007. "Paradox Found (Again): Infant mortality among the Mexican-origin population in the United States." *Demography* 44: 441-457.

Kessler, Ronald C., Cindy Foster, Pamela S. Webster, and James S. House. 1992. "The Relationship between Age and Depressive Symptoms in Two National Surveys." Psychology and Aging 7:119-26.

Kessler, R. C., Andrews, G., Colpe L. J., Hiripi, E., Mroczek, D. K., Normand, S. –L.T., Walters, E.E., and Zaslavsky, A. M. 2002. "Short Screening Scales to Monitor Population Prevalences and Trends in Non-Specific Psychological Distress." *Psychological Medicine* 32: 959-76.

Kobasa, S. C., Maddi, S. R., and Courington, S. 1981. "Personality and Constitution as Mediators in the Stress-Illness Relationship." *Journal of Health and Social Behavior* 22:368-78.

Kuo, W. H. 1976. "Theories of Migration and Mental Health: An Empirical Testing on Chinese-Americans." *Social Science & Medicine* 10:297-306.

Kuo, W. H. and Tsai, Y. 1986. "Social networking, Hardiness, and Immigrants' Mental Health." *Journal of Health and Social Behavior* 27: 133-49.

Landale, Nancy S., R.S. Oropesa, Bridget K. Gorman. 2000. "Migration and Infant Death: Assimilation or Selective Migration among Puerto Ricans?" *American Sociological Review* 65:888-909.

Markides, Kyriakos S. and Jeannine Coreil. 1986. "The Health of Hispanics in the Southwestern United States: An Epidemiological Paradox." *Public Health Reports* 101: 253-65.

Markides, Kyriakos S. and Karl Eschbach. 2005. "Aging, Migration, and Mortality: Current Status of Research on the Hispanic Paradox." *Journal of Gerontology* 60B: 68-75.

Mirowsky, John and Catherine E. Ross. 1992. "Age and Depression." Journal of Health and Social Behavior 33:187-205.

Mirowsky, John and Catherine E. Ross. 1999. "Well-being across the Life Course." Pp. 328-47 in Handbook for the Study ofMental Health: Social Contexts, Theories, and Systems, edited by Allan V Horwitz and Teresa L. Scheid. Cambridge, UK: Cambridge University Press.

Mirowsky, John and John R. Reynolds. 2000. "Age, Depression, and Attrition in the National Survey of Families and Households." Sociological Methods and Research 28:476-504

Mirowsky, J. and Ross, C. E. 1980. "Minority Status, Ethnic Culture, and Distress: a Comparison of Blacks, Whites, Mexicans, and Mexican-Americans." *American Journal of Sociology* 86: 479-95.

Mirowsky, J. and Ross, C. E. 1984. "Mexican Culture and Its Emotional Contradictions." *Journal of Health and Social Behavior* 25:2-13.

Mirowsky, J. and Ross, C. E. 2003. *Social Causes of Psychological Distress*. Second Edition. New York: Aldine de Gruyter.

Mossakowski, Krysia. 2007. "Are Immigrants Healthier: The Case of Depression Among Filipino Americans." *Social Psychology Quarterly* 70:290.

Murphy, H. B. M. 1965. "Migration and Major Mental Disorders: a Reappraisal." In *Mobility and Mental Health*, edited by M. B. Kantor. Springfield, IL: C.C Thomas.

Noh, Samuel and William R. Avison. 1996. "Asian Immigrants and the Stress Process: A Study of Koreans in Canada." *Journal of Health and Social Behavior* 37:192-206.

Portes, Alejandro and Rubén G. Rumbaut. 2006. *Immigrant America: a Portrait.* Third Edition. Berkeley: University of California Press.

Raudenbush, S. W. and Bryk, A. S. (2002). Hierarchical linear models: Applications and data analysis methods (2nd ed.). Thousand Oaks, CA: Sage Publications.

Ritsner, Michael and Alexander Ponizovsky. 1999. "Psychological Distress through Immigration: the Two-Phase Temporal Pattern?" *International Journal of Social Psychiatry* 45: 125-39.

Rogler, L. H. 1994. "International Migrations: A Framework for Directing Research." *American Psychologist* 49: 701-8.

Rogler, L. H., Cortes, D. E., and Malgady R. G. 1991. "Acculturation and Mental Health Status among Hispanics". *American Psychologist* 46: 585-97.

Sastry, Jaya and Catherine E. Ross. 1998. "Asian Ethnicity and the Sense of Personal Control." *Social Psychology Quarterly* 61: 101-120.

Schieman, Scott, Karen van Gundy and John Taylor. 2001. "Status, Role, and Resource Explanations for Age Patterns in Psychological Distress." Journal of Health and Social Behavior 42: 80-96.

Sue, Stanley and J. Morishima. 1982. *The Mental Health of Asian Americans*. San Francisco: Jossey-Bass.

Takeuchi, David T., Nolan Zane, Seunghye Hong, David H. Chae, Fang Gong, Gilbert C. Gee, Emily Walton, Stanley Sue, and Margarita Alegría. 2007. "Immigration-Related Factors and Mental Disorders among Asian Americans." *American Journal of Public Health* 97: 84-90.

Turner, R. Jay and Donald A. Lloyd. 1999. "The Stress Process and the Social Distribution of Depression." Journal of Health and Social Behavior 40:374-404.

Vega, William A. and Ruben G. Rumbaut. 1991. "Ethnic Minorities and Mental Health." *Annual Review of Sociology* 17: 351-83.

Vega, William A., B. Kolody, S. Aguilar-Gaxiola, S. E. Alderete, R. Catalano, and J. Caraveo Anduaga. 1998. "Lifetime Prevalence of DSM-III-R Psychiatric Disorders Among Urban and Rural Mexican Americans in California." *Archive of General Psychiatry* 55: 771-78.

Wade, Terrance J. and John Caimey. 1997. "Age and Depression in a Nationally Representative Sample of Canadians: A Prelimin   ary Look at the National Population Health Survey." Canadian Journal of Public Health 88:297-302.

Weeks, John R., Rubén G. Rumbaut, and Norma Ojeda. 1999. "Reproductive Outcomes among Mexico-Born Women in San Diego and Tijuana: Testing the Migration Selectivity Hypothesis." *Journal of Immigrant Health* 1: 77-90.

Williams, David R., Rahwa Haile, Hector M. Gonzalez, Harold Neighbors, Raymond Baser, and James S. Jackson. 2007. "The Mental Health of Black Caribbean Immigrants: Results from the National Survey of American Life." *American Journal of Public Health* 97: 52-59.

Warheit, G. J., Vega, W.A., Auth, J., & Meinhardt, K. 1985. Psychiatric Symptoms and Dysfunctions among Anglos and Mexican Americans: an Epidemiological Study. In J. R. Greenley (Ed.), *Research in Community and Mental Health* (pp.3-32). London: JAI Press.

Table 1: Restructured immigrant cohorts by arriving period and survey year (NHIS: 1997-20007)

Survey Year	D>=15 arriving period	D=[10, 15) arriving period	mid-point	D=[5, 10) arriving period	mid-point	D=(0, 5) arriving period	mid-point
1997	1982 or earlier	1983~1987	1985	1988~1992	1990	1993~1997	1995
1998	1983 or earlier	1984~1988	1986	1989~1993	1991	1994~1998	1996
1999	1984 or earlier	1985~1989	1987	1990~1994	1992	1995~1999	1997
2000	1985 or earlier	1986~1990	1988	1991~1995	1993	1996~2000	1998
2001	1986 or earlier	1987~1991	1989	1992~1996	1994	1997~2001	1999
2002	1987 or earlier	1988~1992	1990	1993~1997	1995	1998~2002	2000
2003	1988 or earlier	1989~1993	1991	1994~1998	1996	1999~2003	2001
2004	1989 or earlier	1990~1994	1992	1995~1999	1997	2000~2004	2002
2005	1990 or earlier	1991~1995	1993	1996~2000	1998	2001~2005	2003
2006	1991 or earlier	1992~1996	1994	1997~2001	1999	2002~2006	2004
2007	1992 or earlier	1993~1997	1995	1998~2002	2000	2003~2007	2005

Note: D=duration of stay

Preliminary

Table 2: Summary statistics by race/ethnicity and nativity (NHIS: 1997-2007)

Variable	Total		Non-Hispanic White		Non-Hispanic Black		Hispanic		Asian	
	native	immigrant	native	immigrant	native	immigrant	native	immigrant	native	immigrant
Psychological distress (log)	-2.678	-3.321	-2.631	-2.845	-2.911	-3.536	-2.657	-3.391	-2.766	-3.494
	(4.105)	(4.095)	(4.084)	(4.087)	(4.171)	(4.023)	(4.164)	(4.117)	(4.071)	(4.011)
Age	47.341	42.897	48.718	50.138	45.027	41.633	39.455	41.107	41.746	41.862
	(18.040)	(16.248)	(18.089)	(18.504)	(17.148)	(14.391)	(16.495)	(15.347)	(19.023)	(15.205)
Male (1=male)	0.432	0.450	0.445	0.438	0.373	0.436	0.420	0.452	0.488	0.469
	(0.495)	(0.498)	(0.497)	(0.496)	(0.484)	(0.496)	(0.494)	(0.498)	(0.500)	(0.499)
Years of Education	13.326	11.442	13.578	13.833	12.614	13.219	12.219	9.781	14.548	14.375
	(2.796)	(4.507)	(2.707)	(3.538)	(2.800)	(3.223)	(3.068)	(4.277)	(2.682)	(3.801)
Married (1=currently married)	0.465	0.559	0.511	0.546	0.269	0.416	0.421	0.565	0.384	0.622
	(0.499)	(0.496)	(0.500)	(0.498)	(0.444)	(0.493)	(0.494)	(0.496)	(0.487)	(0.485)
In poverty	0.105	0.182	0.078	0.083	0.205	0.145	0.175	0.231	0.096	0.119
	(0.307)	(0.386)	(0.267)	(0.277)	(0.403)	(0.352)	(0.380)	(0.422)	(0.295)	(0.324)
Not in poverty	0.679	0.578	0.708	0.667	0.567	0.618	0.620	0.525	0.671	0.663
	(0.467)	(0.494)	(0.455)	(0.471)	(0.495)	(0.486)	(0.485)	(0.499)	(0.470)	(0.473)
Poverty missing	0.209	0.231	0.208	0.242	0.219	0.229	0.198	0.235	0.214	0.201
	(0.406)	(0.421)	(0.406)	(0.428)	(0.414)	(0.420)	(0.398)	(0.424)	(0.411)	(0.401)
Less than 5 years		0.142		0.114		0.130		0.141		0.186
		(0.349)		(0.317)		(0.336)		(0.348)		(0.389)
5~10 years		0.154		0.105		0.160		0.166		0.160
		(0.361)		(0.306)		(0.366)		(0.372)		(0.367)
10~15 years		0.139		0.085		0.154		0.152		0.147
		(0.346)		(0.278)		(0.361)		(0.359)		(0.354)
More than 15 years		0.565		0.697		0.557		0.540		0.507
		(0.496)		(0.460)		(0.497)		(0.498)		(0.500)
Sample Size	270,171	54,336	204,202	9,845	41,924	3,902	21,986	32,650	2,224	8,128

Note: a. Asians are people who self-identified as single-race Asians or multiple-race Asians.

Table 3: Results of OLS regressions on psychological distress by race/ethnicity
(NHIS: 1997-2007)

Variable	Total	White	Black	Hispanic	Asian
Age	-0.009***	-0.014***	-0.008***	0.007***	-0.022***
Male	-0.798***	-0.771***	-0.793***	-1.037***	-0.603***
Years of education	-0.044***	-0.081***	-0.074***	-0.016***	-0.015
Married	-0.551***	-0.599***	-0.453***	-0.637***	-0.798***
In poverty	0.799***	0.934***	0.962***	0.800***	0.673***
Less than 5 years	-1.039***	-0.179	-0.503**	-0.951***	-0.841***
5~10 years	-1.035***	-0.187	-0.234	-0.950***	-0.647***
10~15 years	-0.968***	-0.079	-0.665***	-0.806***	-0.674***
More than 15 years	-0.522***	-0.118*	-0.397***	-0.491***	-0.431***
Intercept	-0.970***	-0.068	-1.223***	-2.021***	-0.879***
N	324507	214047	45826	54636	10352
R-squared	0.040	0.042	0.040	0.050	0.044

Note: a. * $p<0.05$; ** $p<0.01$; *** $p<0.001$

     b. Missing poverty coefficients are ommitted.

Table 4: Summary statistics by the country/area origin (NHIS: 1997-2007)

Variable	Puerto Rican	Mexican	Cuban	Chinese	Filipino	Indian
Psychological distress	-2.071	-3.593	-3.678	-3.215	-3.500	-3.951
(log)	(4.283)	(4.053)	(4.104)	(4.027)	(3.991)	(3.867)
	46.268	36.135	52.469	40.588	43.626	36.087
Age	(16.640)	(13.330)	(17.227)	(15.231)	(15.315)	(12.057)
	0.374	0.483	0.430	0.467	0.401	0.556
Male (1=male)	(0.484)	(0.500)	(0.495)	(0.499)	(0.490)	(0.497)
	10.887	8.607	11.554	14.986	14.449	15.709
Years of Education	(3.900)	(3.980)	(3.988)	(3.867)	(2.962)	(3.396)
Married (1=currently	0.401	0.617	0.544	0.617	0.635	0.684
married)	(0.490)	(0.486)	(0.498)	(0.486)	(0.482)	(0.465)
	0.282	0.277	0.164	0.137	0.077	0.094
In poverty	(0.450)	(0.448)	(0.371)	(0.344)	(0.267)	(0.292)
	0.490	0.477	0.628	0.662	0.723	0.687
Not in poverty	(0.500)	(0.499)	(0.484)	(0.473)	(0.448)	(0.464)
	0.224	0.240	0.206	0.193	0.190	0.208
Poverty missing	(0.417)	(0.427)	(0.405)	(0.395)	(0.392)	(0.406)
	0.121	0.202	0.134	0.246	0.171	0.352
Less than 5 years	(0.326)	(0.401)	(0.341)	(0.431)	(0.376)	(0.478)
	0.111	0.239	0.158	0.247	0.191	0.255
5~10 years	(0.314)	(0.426)	(0.365)	(0.431)	(0.393)	(0.436)
	0.126	0.214	0.090	0.216	0.225	0.189
10~15 years	(0.332)	(0.410)	(0.286)	(0.412)	(0.418)	(0.392)
	0.642	0.345	0.618	0.291	0.414	0.204
More than 15 years	(0.479)	(0.476)	(0.486)	(0.454)	(0.493)	(0.403)
	0.657	0.362	0.621	0.312	0.439	0.220
1985 or earlier	(0.475)	(0.480)	(0.485)	(0.463)	(0.496)	(0.415)
	0.083	0.126	0.040	0.124	0.119	0.098
1986-1990	(0.276)	(0.332)	(0.195)	(0.329)	(0.323)	(0.298)
	0.109	0.208	0.150	0.232	0.209	0.214
1991-1995	(0.312)	(0.406)	(0.357)	(0.422)	(0.407)	(0.410)
	0.098	0.212	0.138	0.231	0.147	0.297
1996-2000	(0.297)	(0.409)	(0.345)	(0.421)	(0.354)	(0.457)
	0.054	0.092	0.051	0.101	0.087	0.170
2001-2005	(0.225)	(0.289)	(0.221)	(0.302)	(0.282)	(0.376)
Sample Size	2,005	14,057	1,861	1,226	1,030	1,394

Note: a. Sample sizes shown are after excluding missing cases on years of education,
       which at most account for 1.5% of the sample.

Table 5. Conditional psychological distress (log) on immigrant groups and arrival cohorts

Immigrant groups	Arrival cohorts	Mean distress (log)	std. dev.	N
	1985 or earlier	-1.868	4.256	1337
	1986-1990	-2.094	4.313	169
	1991-1995	-2.455	4.354	222
	1996-2000	-2.954	4.280	199
Puerto Rican	2001-2005	-2.125	4.251	109
	1985 or earlier	-3.347	4.128	5166
	1986-1990	-3.629	4.050	1798
	1991-1995	-3.696	4.013	2972
	1996-2000	-3.811	3.978	3035
Mexican	2001-2005	-3.781	3.971	1313
	1985 or earlier	-3.681	4.096	1162
	1986-1990	-3.503	4.196	74
	1991-1995	-3.800	4.117	280
	1996-2000	-3.780	4.073	258
Cuban	2001-2005	-3.158	4.215	96
	1985 or earlier	-3.862	3.939	388
	1986-1990	-2.840	4.015	154
	1991-1995	-3.089	4.033	289
	1996-2000	-2.651	4.089	287
Chinese	2001-2005	-3.256	3.943	126
	1985 or earlier	-3.415	4.021	455
	1986-1990	-3.443	4.031	123
	1991-1995	-3.427	3.951	217
	1996-2000	-3.520	4.018	152
Filipino	2001-2005	-4.155	3.855	90
	1985 or earlier	-3.940	3.891	309
	1986-1990	-3.557	4.041	138
	1991-1995	-4.120	3.779	300
	1996-2000	-3.961	3.889	417
Indian	2001-2005	-3.963	3.818	238

Table 6: Results of OLS regressions on psychological distress for six immigrant groups (NHIS: 1997-2007)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age	0.018***		0.016***	0.012***	0.016***	0.013***
Male			-1.150***	-1.123***	-1.114***	-1.112***
Years of schooling				0.004	0.003	0.003
In poverty				0.678***	0.589***	0.605***
Married					-0.645***	-0.640***
Less than 5 years		-0.431***				-0.222**
5~10 years		-0.485***				-0.291***
10~15 years		-0.330***				-0.142
Intercept	-4.156***	-3.200***	-3.530***	-3.622***	-3.213***	-2.944***
R-squared	0.004	0.003	0.024	0.035	0.041	0.042

Note: a. * $p<0.05$; ** $p<0.01$; *** $p<0.001$

b. Missing poverty coefficients are omitted.

c. Missing data of years of schooling are mean imputed (1.3%)

d. N=21,873

Table 7: Results of three-level hierarchical models on psychological distress (NHIS: 1997-2007)

Fixed Effects	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Intercept	-3.364***	-3.354***	-3.665***	-3.126***	-3.292***	-2.994***	-2.98***
Age			0.013***	0.012***	0.011***	0.012***	0.012***
Male				-1.112***	-1.059***	-1.053***	-1.053***
Years of school					0.003	0.004	0.003
In poverty					0.845***	0.783***	0.787***
Married						-0.545***	-0.546***
Duration		0.008					0.006
Random Effects							
Immigrant Groups	0.343$^+$	0.230$^+$	0.344$^+$	0.285$^+$	0.242$^+$	0.208$^+$	0.206$^+$
Immigrant Groups (Cohort)	0.051*	0.046$^+$	0.035*	0.035*	0.023*	0.032$^+$	0.032*
Individual	16.472***	16.473***	16.446***	16.143***	16.021***	15.954***	15.954***

Note: a. $^+$ p<0.10; * p<0.05
   b. Missing data of years of schooling are mean imputed (1.3%)
   c. N=21,873