

Department of International Health and Development

Working Papers in International Health and Development

No. 2009-02

Department of International Health and Development
Tulane University School of Public Health and Tropical Medicine
1440 Canal Street, Suite 2200
New Orleans, LA 70112
ph. 504-988-3655 | fax 504-988-3653
www.sph.tulane.edu/~inhl

Mental Health Consequences of International Migration for Vietnamese Americans and the Mediating Effect of Social Networks: Results from a Natural Experiment Approach

Hongyun Fu, Ph.D.
Mark J. VanLandingham, Ph.D.

Version: February 3, 2009

The *Working Papers in International Health and Development* aim to provide limited but speedy circulation of recent research by Faculty members of Tulane's Department of International Health and Development. To facilitate rapid circulation of new research findings, papers in the series are released as-is, without editing. Papers released in the series are intended for subsequent publication in peer-reviewed journals.

Suggested Citation: Fu, Hongyun, and Mark VanLandingham. 2009. Mental Health Consequences of International Migration for Vietnamese Americans and the Mediating Effect of Social Networks: Results from a Natural Experiment Approach. Tulane University International Health and Development Working Paper 2009-02.

Corresponding author:

Mark J. VanLandingham, Ph.D.
Tulane University, School of Public Health and Tropical Medicine
Department of International Health and Development
1440 Canal Street, Suite 2200
New Orleans, LA 70118
mvanlan@tulane.edu

**Mental Health Consequences of International Migration for Vietnamese Americans
and the Mediating Effect of Social Networks:
Results from a Natural Experiment Approach**

Hongyun Fu, Ph.D.
Mark VanLandingham, Ph.D.

Abstract:

The existing literature on immigrant mental health is extensive; however, there are several major gaps, both substantive and methodological. Substantively, we know less about the mental health status of Vietnamese than about immigrants from other countries. Furthermore, while a fairly wide range of mental health problems among immigrants have been identified, the potential causal or mediating mechanisms remain elusive. The latter substantive shortcoming is related to a key methodological challenge involving the potentially confounding effects of selection on migration-related outcomes. This paper addresses these key problems by employing a “natural experiment” research design, involving comparisons among three population-based samples of Vietnamese immigrants, never-leavers, and returnees (those forcibly repatriated; total n=736). Data were collected in Ho Chi Minh City and in New Orleans between 2003 and 2005. The study investigates the long-term impact of international migration on Vietnamese mental health, and the potential mediating effects of social networks on these migration-related outcomes. The results reveal both mental health advantages and disadvantages among immigrants relative to the two groups of Vietnamese nationals. Selection can be effectively ruled out for some of these differences, and social networks are found to play an important explanatory role.

Acknowledgements:

The study has been supported by a grant from the National Institutes for Child and Human Development, National Institutes of Health (VanLandingham PI; R03HD042003). The NICHD program officer, Dr. Rebecca Clark, has been immensely helpful on numerous scientific and administrative issues throughout the project. Assistance with the fieldwork from the Southern Institute for the Social Sciences in Ho Chi Minh City (SISS), Vietnamese Initiatives in Economic Training (VIET) in New Orleans, and from Dinh Tran is gratefully acknowledged. The paper also benefited from helpful comments from Dr. Janet Rice, Dr. Carl Bankston, and Dr. Fran Norris.

INTRODUCTION

International migration appears to have a wide range of health impacts on migrants. One major set of health outcomes of interest is mental health. While the existing literature on immigrant mental health is extensive, there are several major gaps, both substantive and methodological. A major substantive gap in this literature is that we know less about the Vietnamese, one of the principal immigrant groups to the U.S. over the past two decades, than about immigrants from other countries. Methodologically, one major problem in this general literature involves the potentially confounding effects of selection bias, i.e., outcomes are influenced by the fact that immigrants are not a random sample of those in the countries of origin. Selection effects might explain in part what some studies conducted in Canada and in the United States refer to as an epidemiological paradox or the "healthy immigrant effect" – as some immigrant groups from resource-poor countries turn out to have better than expected health outcomes, given their relatively low socioeconomic status (Rumbaut and Weeks 1996; Abraido-Lanza *et al.* 1999; Franzini *et al.* 2001). A second methodological shortcoming is that although a fairly wide range of mental health problems among immigrants have been identified, less work has focused on the potential causal or mediating mechanisms. A third such problem is that studies related to mental health issues among Vietnamese-American immigrants have been conducted on non-representative clinic samples, rather than on population-based samples.

This study addresses these key problems above by using a “natural experiment” research design, which involves population-based samples of Vietnamese immigrants, never-leavers, and returnees. The overall objective is to explore the long-term impact of international migration on the mental health of Vietnamese Americans and the potential mediating effect of social networks in migration-health dynamics. More specifically, it examines whether the mental health status of

Vietnamese working age adults differs systematically by migration status; whether selection effects can be effectively ruled out for at least some key differences that are found; and whether social networks can help explain some of the effects of migration *per se* upon mental health outcomes.

BACKGROUND

A. Vietnamese migration stemming from the war in Indochina

Large scale population migration was very rare in Vietnam until the 1954 partition which resulted in the exodus of around one million refugees from the northern part of the country (Jones 1982; Jones and Fraser 1982; Duiker 1984). Around two decades later, the upheaval near the end of the Southeast Asian wars in the 1970s displaced countless Vietnamese families from their homes (Banister 1993; Zhang *et al.* 2001), many permanently. Many Vietnamese emigrated to the U.S. and other receiving countries during this period (Montero 1979; Kelly 1977; 1986; Davis 2000). This influx has resulted in the Vietnamese becoming the fastest-growing minority population in the 1980's and 1990's (US Census Bureau 2000). The United States Census has documented over 1.2 million Vietnamese Americans in the United States by 2000, among whom around 923,000 are foreign born Vietnamese immigrants (Reeves and Bennett 2004).

This recent Vietnamese immigration into the U.S. is often characterized as occurring in three waves (Stone and McGowan 1980; Kelly 1986; Gold 1992; Campi 2005). The initial wave started right before the collapse of the South Vietnamese government in 1975 and included former South Vietnamese military and civilian officials and their families, who escaped with the help of the U.S. The second wave which occurred between 1978 and the late 1980s, was a

massive exodus of clandestine emigrants by both land and sea resulting from discontent with the new regime and post-war political and societal upheaval. This wave included more rural farmers or fisherman as well as many ethnic Chinese. Many suffered terribly during their escape, and untold numbers perished (Fox *et al.* 1995). In part to stem this dangerous exodus of “boat people” from Vietnam, the United Nations convened the First Geneva Conference on Indochinese Refugees in July 1979 (Stein 1979), resulting in the Orderly Departure Program (ODP). The underlying principle of the ODP was that countries of first asylum would continue to accept refugees with the understanding that all would be accepted for resettlement in the West. This understanding collapsed in May 1988, when the countries of ultimate destination implemented much more selective criteria (UNHCR 1989; Helton 1993). This new policy, the Comprehensive Plan of Action (CPA), was established in June 1989, and recommended that "mechanisms should be developed to determine the claims of new arrivals to refugee status on a regional basis" (UNHCR 1989; Bronee 1992). This was a dramatic change in policy, before which, newly all refugees were accepted for re-settlement in the West; and after which, only about quarter of newly arriving refugees were accepted for resettlement (Robinson 1998). This change in policy makes possible the “natural experiment” research design employed for the study, which is explained in the Methods section. The third wave of re-settlement consists of a fairly small number of immigrants (about 20,000) accepted for resettlement under the goal of family reunification with relatives already in the United States (Zhou and Bankston 1998). It is important to note that many who attempted to leave Vietnam were not successful: over 110,000 rejected asylum seekers have been repatriated back to Vietnam by the end of 1997 (UNHCR 2002).

B. Health profile of Vietnamese immigrants

In general, Asian immigrants are considered by many to be a model minority in many respects, including better health outcomes (Chen 1995; Lee 1998; Frisbie *et al.* 2001). Indeed past epidemiological studies showed that Asian immigrants in the United States reported lower level of health problems (except for tuberculosis and smoking) than their U.S. born counterparts (Zane *et al.* 1994). Results based on the analyses of the 1992 to 1995 National Health Interview Survey showed significant health advantages among Asian immigrants in terms of activity limitation, bed days due to illness, and self-reported health (Frisbie *et al.* 2001).

However, many of these general health advantages do not seem to hold for Vietnamese immigrants (Gold *et al.* 1989; CDC 1992; Frisbie *et al.* 2001). Vietnamese-Americans typically arrive poor, and live in marginal urban areas (Bankston 1997; Zhou and Bankston 1994; 1998). The U.S. Census Bureau (2004) reports a higher poverty rate (16%) among Vietnamese immigrants, as compared with the overall rate of total population (12.4%) as well as the rate among all Asian immigrants population (12.6%) in the U.S. (US Census Bureau 2004). About a quarter of the Vietnamese-Americans report their overall health status as being only fair or poor, compared to only 13% of whites (Frisbie *et al.* 2001). In addition, health knowledge among Vietnamese Americans seems to be lower than that of the other Asian American groups (Carrey *et al.* 1997).

A sizable literature has documented significant mental health problems among Vietnamese immigrants including depression, stress, anxiety, psychiatric symptoms and PTSD (Lin *et al.* 1979; 1985; Kinzie *et al.* 1980; 1990; Kroll *et al.* 1989; Beiser *et al.* 1993; Buchwald *et al.* 1993; 1995; Hinton *et al.* 1993; 1994; 1997; Nelson *et al.* 1997; Dong 2003). Lin *et al.* (1979) was one of the first to report a very high rate of mental dysfunction among Vietnamese

refugees. Other studies documented a very high prevalence of depression or PTSD (around 52%) in clinical health screening clinics and other primary care settings (Lin *et al.* 1985). Several studies of Southeast Asian refugees revealed an initial euphoria characterized the first year following migration, followed by a strong disenchantment and demoralization reaction, and then a gradual improvement towards well-being and satisfaction (Rumbaut 1985; 1989; Beiser 1988; Beiser *et al.* 1989).

Vietnamese immigrants generally access health services, particularly mental health care, at a lower rate than the general population in the United States (Strand and Jones 1983; Holzer *et al.* 1989). Mental illness is highly stigmatizing in Vietnamese traditional culture (Brown 1987; Phan 2000; Chen 2005). Confucian and collectivist tradition discourage open displays of emotions in order to maintain social and familial harmony or to avoid exposure of personal weakness. Those cultural beliefs about mental illness as well as its related stigma and shame prevent Vietnamese immigrants from seeking help and treatment (Uba 1992; Phan 2000; Abe-Kim *et al.* 2007). Language barriers and lack of information about available resources are other major barriers to health care access for Vietnamese, especially among women (Young *et al.* 1987; D'Avanzo 1992; Gellert 1995; Leong and Lau 2001; Ngo-Metzger *et al.* 2003, 2004; Green *et al.* 2005). Lack of insurance and financial constraints may further keep the Vietnamese from utilizing health care (Gellert *et al.* 1995; Le 2004). Additional barriers include unfamiliarity with modern approaches to mental disorders, limited trust of health care providers, communication issues, lack of culturally sensitive services, and perceived bias against Vietnamese (Uba 1992; Leong 2001; Ngo-Metzger *et al.* 2003; Le 2004; Woodall *et al.* 2006).

In summary, the vast literature on health disparities of minorities has paid relatively little attention to the health needs of Vietnamese-Americans, in spite of the fact that this group has

been a major source of immigrants into the United States over the past two decades. While little is known about the physical health of Vietnamese-Americans, even less is known about mental health issues in this population. The small number of studies that do exist are mostly speculative; tend to focus on extreme outcomes, e.g., PTSD; and are usually based on very small clinic or other nonrandom convenience samples, which have well-known biases (Lin *et al.* 1979; 1985; Kroll *et al.* 1989; Kinzie *et al.* 1990; Beiser *et al.* 1993; Buchwald *et al.* 1993; 1995; Hinton *et al.* 1993; 1994; 1997; Dong 2003). Population-based assessments of longer-term impacts of migration on general mental health (as opposed to extreme outcomes) are sorely lacking. This absence of information is unfortunate, since there are likely significant and unique stresses in the lives of working-age adult Vietnamese-Americans as they adjust to life in the United States.

C. Theoretical and empirical perspectives on migration and mental health

A basic underlying theme in the existing literature linking migration and mental health is that the disruptions of moving to a new environment can negatively affect health, including mental well-being (Kuo and Tsai 1986; Massey and Espana 1987; Vega *et al.* 1987; Shuval 1993). Migration is thought to lead to “acculturative stress”, which is manifested by a reduction in health status among individuals/groups undergoing a cultural change (Berry *et al.* 1987). For example, language problems and loneliness can lead to stress and poor psychological health among immigrants; health care services in the receiving countries may be more expensive or less familiar for immigrants to access (Findley 1988); pre-existing trauma related to the migration experience may predispose a migrant to poor outcomes should they experience subsequent trauma or difficulties (Silove *et al.* 1997; Ryan *et al.* 2008). Assimilation issues may be

especially problematic for immigrants from non-Western countries, like Vietnam (Rumbaut 1985; Massey 1995; Zhou and Bankston 1998).

Empirical work has confirmed many of these central hypotheses. Traumatic experiences prior to/accompanied with migration, separation from family and community, and language barriers have been identified as risk factors related to increased risk of mental disorder (Kantor 1969; Ho 2004); and failure to find employment, lack of opportunities to enhance incomes and build wealth, and experiences of discrimination have all been found to jeopardize migrant mental well-being (Beiser and Hou 2001; Gee *et al.* 2007a; 2007b). Among Asian immigrants specifically, increasing anti-immigration sentiment and chronic exposure to discrimination have been linked with chronic health conditions, poorer quality of life and symptoms of mental disorders (Gee *et al.* 2007a; 2007b). Engaging in a smaller set of social networks providing less instrumental and emotional support than at origin is also associated with elevated mental health risks among immigrants (Beiser and Hou 2001; Ho 2004; Takeuchi *et al.* 2007a). Recent work finds that the stresses related to migration results in immigrants having more serious mental problems than natives (Newbold and Danforth 2003; Newbold 2005).

More positively, other studies highlight how protective social networks buffer the effects of these adverse social and economic conditions facing immigrant populations (Kuo and Tsai 1986; Walsh and Walsh 1987; Landale *et al.* 1999; Landale and Oropesa 2001). New migrants might also experience advantages related to their continued patterns of more traditional beliefs, practices, and social relationships that serve to protect them from the more alienating features of the environment (Aido-Lanza *et al.* 1999; Landale *et al.* 1999; Newbold 2006). Social relationships are well known to moderate or buffer potentially deleterious health effects of psychosocial stress (Cassel 1974; Cobb 1976; House *et al.* 1988; Aneshensel 1992). Individuals

with strong social networks tend to function better in crisis situations than those with a weak support system (Brown *et al.* 1986; Kessler *et al.* 1994; Brugha 1995; Terry *et al.* 1995).

Immigrant families in the U.S. tend to participate in larger kin networks and are engaged in higher rates of visitation and reciprocal exchange compared to the natives (Keefe 1984; Rumbaut 1997). Rumbaut (1997) emphasized the role of social networks in migration and the emergence of family solidarity as an adaptive response to stress. Perceived social support may act as stress-buffer, ameliorating the deleterious effect of stressful events (Wilcox 1981).

Alternatively, these mental health impacts related to migration might also occur through a self selection process in the origin countries (Hull 1979; Abraido-Lanza *et al.* 1999; Newbold and Danforth 2003; Newbold 2005). Those who choose to emigrate are likely to be individuals who are quite healthy, or otherwise robust enough to undertake the rigors that immigration entails (Hull 1979; Frisbie *et al.* 2001; Ali 2002). In other words, migrants are unlikely to be a representative sample of individuals from a sending country, since the migrants represent those who have weighed the perceived costs and benefits of migration and then decided to go. If any of these special features of migrants are related to the health outcomes of interest – a prospect that seems quite likely - the relationship between migration and health would be mis-specified.

To summarize, reported associations between migration and mental health, while extensive, largely fail to account for preexisting group differences. The “healthy immigrants paradox”, in particular, highlights the need for innovative approaches to these problems (Kuo and Tsai 1986; Landale and Orapesa 2001). A more accurate measure of the effects of migration on mental health would compare the mental health of migrants to individuals with similar backgrounds, characteristics, and propensities (both observed and unobserved) who by chance did not or were not allowed to emigrate (Lindstrom and Massey 1994; Stillman *et al.* 2006).

This study takes advantage of a natural experimental research design that makes possible such a comparison.

CONCEPTUAL FRAMEWORK

The conceptualization of how international migration affects the mental health of Vietnamese immigrants is outlined in Figure 1. Based on the prior work reviewed above, we anticipate that the disruptions of moving, unfamiliarity and the stress of functioning in a new environment will take a toll on the mental health of immigrants, both directly and indirectly through the mediating factor physical health. The measure of physical health in the study should capture a wide range of effects resulting from the changes in the physical environment that the immigrants experience following their move from Vietnam to the U.S., e.g., changes in diet, medical care, sanitation, etc. (Hull 1979; Frisbie *et al.* 2001; Takeuchi *et al.* 2007b). Improvements in physical health among immigrants could potentially attenuate the negative mental health effects of migration, as individuals physically healthier could possess higher resilience in coping with stress and adverse events (Lambert and Lambert 1979; Herrman *et al.* 2005).

A second factor mediating the relationship between migration and mental health is social networks. The disruption (or strengthening) of social networks resulting from migration affects the health and well-being of immigrants by weakening (or strengthening) the exchanges of emotional and/or financial support. While the process of Vietnamese international migration probably disrupts key social ties, and may temporarily weaken social support and sources of social capital potentially available, we hypothesize that the larger effect will be a measurable buffering impact of helpful social relations within the ethnic enclave that will mitigate key

negative effects of an unfamiliar social and physical environment. In other words, it is anticipated that social networks of good quality will have measurably positive influences on the mental health of Vietnamese immigrants at their destination. Zhou and Bankston (1998) documented high levels of normative integration of Vietnamese immigrants families in this same immigrant community studied here, built upon a web of large and extended social and kinship relations.

Inset Figure 1 here.

Predisposing factors in the upper left box help determine who becomes a migrant in the first place. Several of these predisposing factors, e.g., age, socioeconomic status, etc., also have direct effects on social networks, physical health outcomes, and mental health outcomes, as modeled in the figure. Unmeasured propensities for risk-taking, suggested by the fact that cross-border migration was so arduous and dangerous in the post 1975 Vietnamese context, likely results in immigrants being on average more likely to take risks than never-leavers. Such measured and unmeasured propensities associated with decisions to migrate potentially confound or mask the (real) impacts of the migration experience upon the health of immigrants. This is why the inclusion of those who attempted to migrate but were repatriated (the returnees) is a central feature of the research design. The returnees should have the same underlying characteristics and propensities as the immigrants. But fate – the sudden and dramatic change in policy in 1989, detailed below – intervened, resulting in their repatriation.

Our central hypotheses are as follows. Migration will have long term measureable impacts on the mental health of Vietnamese immigrants which are independent from selection effects. Most of these long term impacts will be negative, resulting from the cumulative toll of functioning in an alien environment. We expect some of these negative impacts of migration to

be buffered by better physical health status among immigrants (relative to Vietnamese who live in Vietnam); and the tight-knit features of the Vietnamese immigrant community.

METHODS

A. Research design

Our major population of interest in this study is Vietnamese immigrants living in New Orleans. The employment of two groups of Vietnamese nationals - returnees and never-migrants – along with a major change in immigration policy occurring in June 1989 provide useful leverage for helping to ascertain what effects migration *per se* – as opposed to selection – has on mental health outcomes. Before June 1989 essentially all Vietnamese who made it to a country of first asylum were successfully settled in the West (mostly in the United States) – those who eventually settled in New Orleans constitutes the Vietnamese immigrant group. For those arriving in the transition countries after June 1989, only those able to prove a *bona fide* risk of persecution in Vietnam were accepted for resettlement; most (about ¾) were repatriated to Vietnam – those repatriated constitute the returnee group. Those who never attempted to emigrate constitute the never migrant group. The returnees (who were repatriated back to Vietnam after June 1989) and immigrants (who were settled in the U.S. before June 1989) should be selected for similar pre-migration characteristics, since both groups acted upon their desire to emigrate from Vietnam.

Most immigrants who settled in New Orleans lived in HCMC before leaving Vietnam. To make the three samples as similar as possible, HCMC was chosen as the comparison city. Specifically, the urban wards in HCMC known to have large numbers of returnees were chosen. The sample of never leavers (as well as the sample of returnees) was selected from these wards.

Comparing the never-migrants (in Vietnam) with the returnees on the health outcome measures, it becomes possible to estimate the effects of selection (the unobserved characteristics that place one at risk of migration) on health outcomes net of migration effects. By comparing the returnees to the immigrants, it is possible to estimate the effects of migration *per se* on health outcomes net of selection effects.

This approach, like all “natural experiment” designs, is far from perfect. The unachieved goal of emigration might have a negative effect on the mental health of the returnees. Extended stays in the transition camps in the third country before repatriation could have negative or positive impacts upon a wide range of health outcomes. But even with these shortcomings, the natural experiment design employed in this study is far superior to conventional approaches that simply ignore the potentially confounding effects of selection when comparing immigrants and never-leavers.

B. Data and sample

Data were collected between 2003 and 2005. These data consist of three population-based samples totaling 736 working age adults (23-53 years old). This consists of 127 Vietnamese immigrants currently residing in New Orleans; 142 migration returnees to Vietnam (and living in HCMC); and 467 never-migrants residing in the same urban wards in HCMC as do the returnees.¹ Returnees and never-migrants were selected using multi-stage cluster sampling. HCMC has 19 urban districts containing 259 urban wards. Three of these urban districts known to contain large numbers of returnees were selected for study. In each of the three selected districts, 1 ward was randomly selected. In the selected ward, 3 neighborhoods were randomly selected. For each neighborhood, four clusters (To Dan Pho) were randomly selected, and 12

¹ Two individuals not included in the figures here were excluded due to being out of the target age range; the total working sample is n=736.

households were randomly selected from each cluster. A complete listing of all adults in these households was compiled. Eligible respondents had lived in HCMC for at least 20 years and were between 25-49 years of age. If there was more than one eligible respondent within the household, a procedure to randomly select a respondent was implemented. There were two refusals among the never-leavers. A random sample of returnees living in these same urban wards constitutes the returnee sample. There were no refusals among the returnees.

For the immigrant sample, eligible individuals must have been between the ages of 25-49 during the time of the initial survey (summer of 2005); have been born in Vietnam; have arrived in the U.S. between 1980 and 1990; and have been between the ages of 15-30 when they arrived. These criteria ensured that the individuals were of working age (the ages at which the stresses of immigration and adaptation would be manifested); that the immigrant would have spent significant periods of his or her life in Vietnam and in America; and that they immigrated prior to the change in immigration policy in June 1989. A recently-updated population register of Vietnamese-American households in the greater New Orleans area was employed to draw the sample during the summer of 2005. This register is maintained by the main NGO and Catholic Church serving the area; it includes both Catholic and non-Catholic Vietnamese families, and lists household members by name. Upon arrival at the household thought to have an eligible respondent (the original registers had a list of residents, with their ages), the interviewer followed a procedure to first list and then randomly select an eligible respondent. The entire set of questions and measurements took about 45 - 90 minutes to complete. Data collection was completed in August 2005. Of the eligible households contacted by our NGO collaborators, 128 completed the interviews and 46 refused, yielding a response rate of 74%. Respondents in all three samples were given a token honorarium for their time.

C. Measurement

Standard subscales based upon the SF-36 health assessment instrument, developed by RAND Corporation and JE Ware, are employed to assess the mental health status of our respondents (Ware and Sherbourne 1992). SF -36 is a highly regarded general health assessment tool, which has been widely used among diverse population in various settings (McDowell and Newell 1996). With the assistance of the developers of the SF-36 instrument, a Vietnamese version was constructed, pretested, and implemented, as part of the larger project. We focus here on the instrument's four subscales related to mental health: vitality, energy and fatigue; general mental health; social functioning; and role limitations due to emotional problems. Any difference of ten points or higher on a SF-36 subscale is considered as clinically significant (Ware *et al.* 1993).

Our physical measure for assessing mental health is waist hip ratio (WHR). This measure is commonly used as an indicator for cardiovascular disease and coronary heart disease risk and morality risk (Lapidus *et al.* 1984; Filipovsky *et al.* 1993; Kortelainen *et al.* 1997; Welborn *et al.* 2003), but is also found to be correlated with work dissatisfaction, unemployment and negative life events such as divorce (Bjorntorp *et al.* 1998). Previous studies report an association between the development of abdominal obesity and heightened psychological stress, psychiatric symptoms and psychosocial adversity (Wing *et al.* 1991; Rosmond *et al.* 1996; Bjorntor 1998; Rosmond and Bjorntorp 1998; Steptoe *et al.* 1999).

The measure of social networks, a major intervening variable in this study, is the Social Relations Scale (SRS; McFarlane 1981). The SRS includes questions about whether a respondent discusses home and family with another person, the relationship with that person, the degree of helpfulness of the discussion, and reciprocal relations with that person in discussing home and

family. The SRS provides three social relations measurements: (1) size of social relation (how many people one talked to about home and family) (2) helpfulness of the relations (how helpful the talk was). (3) The rate of relations reciprocity (the proportion of people whom you talked to also talk to you about home and family). The second proposed mediating variable is physical health status. Physical health is measured with SF-36 general health (GH) subscale.

D. Data Analysis

Several sets of multivariate regression models (OLS regression with continuous outcomes and logistic regression with binary outcomes) are estimated to examine the association among migration, social networks, physical health, and mental health outcomes. Structural equation modeling is utilized to capture the potential mediating effect of social networks and physical health on observed associations between migration and mental health.

The first set of the multivariate regression analyses examines the association between migration status and mental health status. The goals of these analyses are, first, to determine whether there is an association between migration and the mental health outcomes; and second, by comparing returnees versus never-leavers, and then immigrants versus returnees, these models provide leverage on the “selection effects” versus “true migration effects” question.

The second set of multivariate models focuses on variation in social networks across migration status. It assesses whether Vietnamese immigrants differ from never-migrated Vietnamese nationals and migration returnees with respect to size, helpfulness and reciprocity of social networks. The third set of multivariate models examines associations between social networks and mental health outcomes. It predicts mental health outcomes of interest, with social

networks characteristics included as regressors, while controlling for the potentially confounding effects of social economic factors and migration.

Taken together, results from the above three separate sets of multivariate regression analyses can show whether mental health status differs across migration status; whether such effects are due to selection or migration *per se*; whether social networks change with migration; and whether social networks are associated with mental health status. The existence of the associations above is the prerequisite for proposing any mediating effect of social networks. Our test for such a mediating effect employs structural equation modeling to simultaneously control for potential three-way causal relationships, i.e., (1) Migration could have a direct effect on mental health of immigrants; (2) The effect of migration on mental health could be, at least partially, generated indirectly by an influence of migration on social networks and physical health in the first place; And (3) social networks or physical health, and mental health could be jointly determined by migration (see attached diagram in Figure 2). The model is expressed by the following equations.

Inset Figure 2 here.

$$\text{Equation 1: } Y (\text{Mental health}) = \beta_0 + \beta_1 X_{\text{age}} + \beta_2 X_{\text{sex}} + \beta_3 X_{\text{occupation}} + \beta_4 X_{\text{marital}} + \beta_5 X_{\text{migration}} + \beta_6 X_{\text{SF-36 GH}} + \beta_7 X_{\text{social network}} + \varepsilon_1$$

$$\text{Equation 2: } Y (\text{SF-36 GH}) = \beta_0 + \beta_1 X_{\text{age}} + \beta_2 X_{\text{sex}} + \beta_3 X_{\text{occupation}} + \beta_4 X_{\text{marital}} + \beta_5 X_{\text{migration}} + \varepsilon_i$$

$$\text{Equation 3: } Y (\text{Social networks}) = \beta_0 + \beta_1 X_{\text{age}} + \beta_2 X_{\text{sex}} + \beta_3 X_{\text{occupation}} + \beta_4 X_{\text{marital}} + \beta_5 X_{\text{migration}} + \varepsilon_i$$

The above simultaneous model allows us to distinguish between the direct effects of migration on mental health versus the indirect effects via the mediating effects of social networks and physical health. If there are significant mediation effects of social networks and physical health, it is expected that the relationships between migration status and mental health outcomes measured should disappear (for full mediation) or be significantly reduced (for partial mediation),

when the mediating factors are included in the model (Baron and Kenny 1986). If the relationships between migration status and mental health outcomes are dampened (the direct effect and indirect effect point to the opposite directions) when the mediating factors are included in the model, the phenomenon would be a form of suppression effect, which is also called inconsistent mediation (Mackinnon 2000). The significance of the indirect effects is examined by means of the following formula developed by Sobel (1982). Sobel's test provides a z-value, which allows us to estimate statistically whether the mediator carries significant influence of the independent variable to the dependent variable as shown in Figure 2.

$$\text{Equation: } Z\text{-value} = a*b/\text{Square Root } (b^2*s_a^2 + a^2*s_b^2)$$

Where:

a = raw (unstandardized) regression coefficient for the association between IV and mediator

s_a = standard error of a

b = raw coefficient for the association between the mediator and the DV (when the IV is also a predictor of the DV)

s_b = standard error of b

In addition, statistical analyses are performed to address any potential moderating mechanisms of social networks (or physical health) on the migration/mental health relationship (please see Figure 3 below). Rather than in a generative mechanism proposed in the above mediating model, the moderating effect model implies that social networks might actually work as an effect moderator by affecting the mental health outcomes among Vietnamese Americans and Vietnamese nationals differently in terms of either direction or magnitude (Baron and Kenny 1986).

Inset Figure 3 here.

The potential interactions between migration and social networks; and between migration and physical health are tested separately in two sets of multivariate linear regression models.

$$Y \text{ (Mental health)} = \beta_0 + \beta_1 X_{\text{age}} + \beta_2 X_{\text{sex}} + \beta_3 X_{\text{occupation}} + \beta_4 X_{\text{marital}} + \beta_5 X_{\text{migration}} + \beta_6 X_{\text{SF-36 GH}} + \beta_7 X_{\text{social networks}} + \beta_8 X_{\text{migration} * \text{Social networks}} + \varepsilon_i$$

$$Y \text{ (Mental Health)} = \beta_0 + \beta_1 X_{\text{age}} + \beta_2 X_{\text{sex}} + \beta_3 X_{\text{occupation}} + \beta_4 X_{\text{marital}} + \beta_5 X_{\text{migration}} + \beta_6 X_{\text{SF-36 GH}} + \beta_7 X_{\text{social networks}} + \beta_8 X_{\text{migration} * \text{SF-36 GH}} + \varepsilon_i$$

RESULTS

A. Demographic characteristics of respondents

The characteristics of the sub-samples, i.e. the three migration groups are presented in Table 1. Some differences across the groups are apparent. At the time of interview, the immigrant population was on average over 3 years older than the returnees and never-leavers. There are more females among never-leavers, but more males among returnees and immigrants². The educational attainment of the immigrant population is on average higher than never-leavers and returnees. Never-leavers are less likely to fall into the “unskilled, service and agricultural” occupational category, and more likely to fall into “entrepreneur” category compared to returnees and immigrants. The distribution of marital status is similar across three samples.

Members of our immigrant sample left Vietnam between 1975 and 1990 (results not shown). The vast majority of them (83.5%) reported that they first went to a third transition country/region before coming to the United States, including Guam, Hong Kong, Thailand, Indonesia, Malaysia, Philippine, Singapore etc. Over 86% of the immigrants reported refugee camps experience, with a length of stay ranging from 1 to 84 months (the average was just under 9 months). Over 85% of the immigrants have lived in the United States for over 20 years.

Regarding the returnee sample, the vast majority (93%) of returnees left Vietnam between 1989

² Many more men than women left Vietnam after the war; see Goodkind (1997) for a discussion of some of the implications.

and 1991 (results not shown), close to the cutoff date for the policy change. They all had experience in refugee camps in a third country/region including Hong Kong, Indonesia, Malaysia, Thailand, and the mainland of China etc. Their length of stay in camps ranging from 1 to 9 years (the average was just under 6 months). They were repatriated back to Vietnam between 1991 and 1997, with most (60%) returning during 1996 and 1997.

Inset Table 1 here.

B. Main results on migration and mental health associations

Bivariate differences on mental health outcomes across migration status, as measured with four SF-36 subscales -- SF, VT, RE and MH; and waist hip ratio -- are summarized in Table 2.³ The Cronbach's alphas, reported in the far right column of this table, show that all four mental health subscales have acceptable internal reliability with scores being higher or close to 0.70. SF-36 subscale *vitality, energy and fatigue* and *waist hip ratio* reveal apparent health disadvantages among immigrants, compared with both never-leavers and returnees. Immigrants also fare worse on SF-36 *mental health* and *social functioning*; relative to never-leavers (but not to returnees). However, opposite results are found on SF-36 *role limitation due to emotional problems* with immigrants showing better health outcomes than never-leavers and returnees.

Insert Table 2 here.

Multivariate regression results consistent with the above are presented in Table 3. These results show that the differences in mental health across the three subgroups of Vietnamese are independent of the compositional differences in the sub-samples with regard to age, sex and

³ We use *post-hoc* multiple comparisons analyses to compare the means across the three groups. The significance levels presented in Table 2 (as illustrated on columns for never-leavers and returnees) reflect the comparisons between immigrants and never-leavers; and between immigrants and returnees. The Turkey-Kramer test is used to account for unequal sample sizes.

socio-economic factors⁴. The results suggest both mental health advantages and disadvantages for our sample of Vietnamese immigrants relative to our two samples of Vietnamese nationals. The magnitudes and directions vary, depending on the particular mental health dimension examined with each of our five mental health measures.

Inset Table 3 here.

The pattern of results also suggests key roles for both migration processes *per se* and selection effects in mental health outcomes for immigrants versus nationals. Per our study design, the differences between immigrants and never-leavers would allow us to examine if there might be a gross migration effect, albeit one perhaps confounded by selection. The inclusion of returnees as a comparison group makes it possible to tease out the potential selection effect from the above. Mental health disadvantages for the immigrants (relative to the never-leavers) not found among the returnees should be due to the migration, resettlement, and acculturation experience, i.e., migration *per se*. If the cause was selection, then a similar outcome should also be found for the returnees, who were also “selected” for emigration. Thus, the differences between immigrants and never-leavers on SF-36 *vitality, energy and fatigue, role limitation due to emotional problems, and waist hip ratio, are attributable to migration per se*; selection can be ruled out as a principal mechanism. A significant disadvantage found for immigrants (but not for returnees) relative to never-leavers on *general mental health* indicates a role for migration *per se*; but a role for selection cannot be ruled out since the immigrants do not differ from the returnees on this outcome. Finally, it is possible that the disadvantage we find for immigrants relative to never-leavers on *social functioning* may well be primarily due to selection, since the returnees experience this disadvantage as well. Of course, it is also possible that poor *social functioning*

⁴ The control factors affected the mental health outcomes as expected, showing a positive correlation with SES and a negative correlation with age.

may also be due to different sets of challenges faced by the immigrants and returnees relative to the never-leavers.

The decomposition of these relative roles for migration and selection on mental health outcomes for immigrants will be discussed in more detail in the discussion section.

C. Main Results on migration and social networks associations

Having now established key differences in mental health outcomes among the three migration groups and the relative roles of migration processes per se and selection in these differences, our next step is to specify other key factors which may be responsible for some of these advantages and disadvantages in mental health outcomes for immigrants (*vis-à-vis* returnees and never-leavers). We next explore the potential role of social networks in explaining those observed differences in mental health among the groups, focusing on the four outcomes that migration appears to play a significant role in differences among the three sub-samples of Vietnamese: i.e. SF -36 *vitality, energy and fatigue, role limitation due to emotional problem, general mental health* and *waist hip ratio*.

Statistical analyses on the associations between migration status and social networks reveal significant differences among the three samples. Bivariate level results (Table 4) show that Vietnamese immigrants on average have smaller social networks, relative to never-leavers. But they are more likely than never-leavers and returnees to discuss with at least one person about home and family. The first person immigrants talk with is more likely to be their spouse - or girl/boy friend if not married - compared with never-leavers and returnees who are more likely to talk to friends and relatives. Immigrants on average have a higher level of relations helpfulness and higher likelihood of having (at least one) helpful relationship than both never-leavers and returnees. Results from multivariate regression analyses (not shown) show that

above differences on social networks across three samples hold when controlling for age, sex, marital status, education and occupation.

Insert Table 4 here

Our multivariate models (Table 5) exploring the impact of social relations on mental health outcomes demonstrates a positive role for higher relations helpfulness in explaining *vitality, energy and fatigue* and *general mental health*. The investigation of the potential mediating effects of social networks will thus focus on the two mental health outcomes for which migration effects *per se* are believed to play a significant role in differences among the three subsamples of Vietnamese; and for which social relations “helpfulness” appears to play a role in explaining these differences.

E. Results on the associations among migration, physical health and mental health outcomes

Our second candidate for a major mediating role between migration and mental health is physical health status. Regarding the associations between migration and physical health status, results from multivariate regression analyses (not shown) reveal significant differences among three samples of Vietnamese on physical health as measured with SF-36 *general health*.

Immigrants fare much better than never-leavers on SF-36 *general health* (Beta =13.65; P<0.001). And, returnees fare worse on it at a statistically significant level than never-leavers (Beta = -4.85; P<0.05).

Key associations between physical health and mental health are presented in Table 6. The results show that SF-36 *general health* is a significant predictor of mental health (except in the model predicting WHR) controlling for potentially confounding demographic and socioeconomic status factors. Furthermore, physical health is shown to be a significant mediator in

the migration and mental health relationship, as it is observed that the coefficients measuring the effect of migration status on mental health outcomes are dramatically changed (except in the model predicting *WHR*), after adding SF-36 *general health* in the models. For example: immigrants fare worse on the *vitality, energy and fatigue* (Beta = - 3.74, P<0.05) relative to never-leavers, controlling for age, sex and SES (Table 3). And there is no much difference between never-leavers and returnees (Beta = 0.40, not sig). However, this disadvantage among immigrants is elevated (Beta = -10.16; P<0.001) when the general (physical) health subscale is added as a predictor to the model (Table 6). And returnees start to show advantage relative to never-leavers (Beta = 2.68; P< 0.05). Meanwhile, the strong advantage among immigrants on *role limitation due to emotional problem* (relative to never-leavers) completely disappears, after controlling for the general (physical) health. Either of the two patterns of results is observed for the outcomes in table 6 (except in the model predicting *WHR*).

Inset Table 6 here.

F. Results on the hypothesized mediating effects of social networks and physical health on the migration/mental health association

The analyses to this point reveal significant associations among migration, social networks, physical health and mental health. The results also suggest a potential mediating role for physical health and social networks on the migration/mental health relationship. In order to rule out an alternative model that would have physical health and social networks serving a moderating role in the model, we tested a set of interaction terms between migration and social networks; and between migration and physical health. These interaction terms are largely insignificant (results not shown), showing very weak evidence of moderating effects of either social networks or physical health in migration and mental health dynamics. Thus, we turn next to a more formal test of the mediating roles for the two mental health outcomes for which we

have the best evidence of a true effect of migration and a potential mediating role for social networks and physical health: SF-36 *vitality, energy and fatigue* and *general mental health*.

Inter-correlations among the variables included in the models (results not shown) reveal that the dependent variables are only moderately correlated. This reduces the threat of multicollinearity, which might potentially threaten the stability of the analyses.

The major paths examined in the structural equation analyses are illustrated in Figure 4. Results from structural equation analyses are presented in Table 7. Path A is the direct effect of migration on mental health outcomes. The results indicate that being an immigrant is directly associated with worse health outcomes on SF-36 *vitality energy and fatigue* (Beta = -10.55; Z=-6.95) and *general mental health* (Beta = -9.02; Z = -6.39), as compared to never-leavers.

Returnees fare better on SF-36 *vitality, energy and fatigue* (Beta = 3.01; Z = 2.23) than never-leavers. Path B and C are the effects of migration on social networks and physical health. The results show that immigrants have higher social relations helpfulness (Beta = 0.37; Z=3.62) and better physical health than never-leavers as measured with SF-36 *general health* (Beta = 13.69; Z = 7.20). However, returnees have less helpful social relations (Beta = -0.28; Z = -2.93) and they fare worse on SF-36 *general health* (Beta = -4.83; Z = -2.75) than never-leavers. Path D is the effect of social networks on mental health outcomes. As expected, the results show that higher relations helpfulness is associated with better mental health outcomes as measured with SF-36 *vitality, energy and fatigue* (Beta = 1.24; Z = 2.37) and *general mental health* (Beta =1.16; Z = 2.38). Path E is the effect of physical health on mental health outcomes. The results show that higher score on SF-36 *general health* is related to better outcomes on SF-36 *vitality, energy and fatigue* (Beta = 0.47; Z=16.61) and on *general mental health* (Beta =0.38; Z = 14.57).

The above networks of relationships among migration status, social networks, physical health and mental health are decomposed into three components in Table 8: (1) total effect of migration on mental health outcomes; (2) the direct effect of migration on mental health outcomes; (3) the indirect effect of migration on mental health through the social networks; (4) the indirect effect of migration on mental health through physical health; (5) total indirect effects.

Results show that being an immigrant is related to worse outcomes on SF-36 *vitality, energy and fatigue* (Beta = -10.55; Z = -6.95) and *general mental health* (Beta = -9.02; Z = -6.39), as compared to never-leavers. However, higher social relations helpfulness (Beta = 0.46; Z = 1.98) and better outcome on SF-36 *general health* (Beta = 6.38; Z = 6.58) among immigrants are related to an increase on SF-36 *vitality, energy and fatigue* (Total indirect effects = 6.84). As a result, the observed health disadvantages among immigrants relative to never-leavers become much smaller on SF-36 *vitality, energy and fatigue* (Beta = -3.71; Z = -2.16) than they would be, were it not for the countervailing advantages immigrants have related to supportive social networks and better physical health. Similarly, higher social relations helpfulness (Beta = 0.43; Z = 1.99) and better outcome on SF-36 *general health* (Beta = 5.20; Z = 6.42) among immigrants are related to an increase on SF-36 *general mental health* (Total indirect effects = 5.63). Therefore, the health disadvantage among immigrants on *general mental health* relative to never-leavers is reduced (Beta = -3.39; Z = -2.18).

Similarly, being a returnee by itself is related to better outcomes on SF-36 *vitality, energy and fatigue* (Beta = 3.01; Z = 2.23) relative to never-leavers. However, the lower social relations helpfulness (Beta = -0.34, Z = -1.84) and lower score on SF-36 *general health* (Beta = -0.32, Z = -1.85) associated being returnees are related to worse outcomes on SF-36 *vitality, energy and*

fatigue (Total indirect effects = -2.60). Therefore, the health advantages among returnees on SF-36 *vitality, energy and fatigue* disappeared (Beta = 0.42, not sig).

To summarize, the results above reveal significant differences on mental health outcomes among Vietnamese immigrants, migration returnees and never-migrated Vietnamese nationals, the direction and extent of difference varies across mental health dimensions as measured by the four SF-36 standard mental health measures and waist hip ratio. Both social networks (operationalized as relationship helpfulness) and physical health (operationalized as the *SF-36 General Health* subscale) appear to play a significant role in this migration/mental health relationship. Results from SEM analyses provide strong evidence for a buffering role of social networks and physical health for several of these mental health outcomes. The scientific and policy significance of these major findings will be discussed in the following section.

DISCUSSION AND CONCLUSIONS

The results from this study reveal differences in mental health across the three subgroups of Vietnamese, independent of the differences in the sub-samples with regard to distributions of age, sex and socio-economic factors. The magnitude and direction of these migration effects on mental health vary, suggesting both mental health advantages and disadvantages for our sample of Vietnamese immigrants relative to our two samples of Vietnamese nationals. Furthermore, the pattern of results suggests roles for both selection and for migration processes *per se* in differences in mental health between immigrants and nationals. The inclusion of returnees as one of these comparison groups makes possible a decomposition exercise that helps separate the true effects of the migration experience upon mental health from selection effects.

Immigrants are disadvantaged (worse-off) relative to both never-leavers and returnees at statistically significant levels for *vitality, energy and fatigue* and *high waist hip ratio*. The fact that returnees are not similarly disadvantaged relative to never-leavers on this measure suggests that the disadvantage is due to the migration and adaptation experience *per se*, and not to selection factors. The logic for ruling out selection is that returnees and immigrants should both share the same set of “selection” factors that predispose one to leave. But since only the immigrants have the disadvantage (not the returnees), we conclude that the disadvantage is due to the factor that only the immigrants possess (the migration experience). By the logic of our research design, this migration effect should be free of the confounding effects of selection that plague studies comparing only immigrants and never-leavers.

From a substantive point of view, the disadvantage that immigrants face on the *vitality, energy, and fatigue* dimension may be a form of “John Henryism” (James *et al.* 1983), exhaustion resulting from the huge outlays of effort required to thrive in America, relative to Vietnam. Continuous, high-effort coping behaviors could compromise health, especially among those who are very goal-oriented (James *et al.* 1987; James 1994). This may be especially salient among Asian Americans (including Vietnamese immigrants) in the United States, a population that is intensely success-oriented and driven to resist and overcome barriers through persistence, hard work and determination (Zhou and Bankston 1998; Haritatos *et al.* 2007).

However, it should be emphasized here that the research approach is a *natural* experiment; it is not a randomized controlled trial, which would obviously be impossible for a study of migration and health in this context. One potential confounder in the design is a potential for problems such as stigma, harassment or difficulties in re-adjustment that returnees might face upon their return home. Such problems could of course potentially contaminate the

selection effects that we attempt to isolate with this research design. UNHCR has been carefully monitoring the returnees for several years, trying to minimize the re-integration problems through a number of re-entry benefits to help these individuals and families re-establish themselves in Vietnam (UNHCR 2002). While some evidence indicates that not all these returnees adapted well upon return (Duong and Morgan 2001), the same survey data analyzed here indicate that the vast majority of returnees report that they experience no problems with their neighbors upon their return.

Immigrants are also disadvantaged, relative to never-leavers, on *social functioning* and *general mental health*. However, we are not able to attribute these disadvantages purely to migration *per se*, since the immigrants are not significantly different from the returnees. It may be that both migration and selection play a role in explaining the health disadvantages on *general mental health* among immigrants, as immigrants are not significantly different from the returnees. Regarding *social functioning*, the disadvantage for immigrants relative to never-leavers may be primarily due to selection, as returnees also fare worse than never-leavers. Since returnees and immigrants share similar “selection” factors, it is possible that these two mental health disadvantages for immigrants and returnees may have some similar grounding in *a priori* pre-migration characteristics of those who attempt to leave their homeland. Stressful experiences related to migration, e.g., uprooting, readjustment, etc., are thought to have negative effects on Vietnamese immigrants (Kuo and Tsai 1986; Massey and Espana 1987; Vega *et al.* 1987; Rumbaut 1985). But returnees may face different – but equally stressful – challenges upon their return to Vietnam. In other words, international migration to the U.S. and return to Vietnam may well both be stressful, but in very different ways.

This same set of models suggests that immigrants are advantaged (better-off) relative to never-leavers (and returnees) on *role limitations due to emotional problems*. Per the logic of our research design, the fact that returnees are not similarly advantaged relative to never-leavers suggests that these disadvantages are due to migration and adaptation experience *per se*, and not to selection factors. It seems that in spite of living in a foreign and stressful environment, Vietnamese Americans meet (even exceed) social expectations regarding the fulfillment of social obligations. One explanation is related to the culture of success described above: non-fulfillment of role obligations is simply not an option in this community; however, successful fulfillment of these obligations may exact a significant toll as manifested in other (negative) outcomes described above. Another is that the immigrants' advantages on *role limitations* might be related to the strong social connections and systems of social support found among in Vietnamese enclaves in the U.S. (Zhou and Bankston 1998).

The results from this study also reveal significant differences on measures of social networks among Vietnamese immigrants, returnees and never-migrants. As expected, Vietnamese immigrants have smaller social networks size, which supports the hypothesis that migration and uprooting reduce the density of social ties among immigrants, as is frequently implied in the literature (Sluzki 1992; Portes and Zhou 1993; Portes 1998). Being away from one's extended family and home culture, Vietnamese immigrants generally have fewer people of the same ethnicity to be associated with, compared with Vietnamese nationals. Furthermore, linguistic isolation and racial segregation (U.S. Census 2002) may result in Vietnamese immigrants having fewer social contacts and less communication with mainstream society in the host country, which could consequently lead to smaller social networks among them.

However, Vietnamese immigrants seem to enjoy higher *quality* social networks, as reflected by the higher relations helpfulness among immigrants, relative to the two samples of Vietnamese nationals. This could indicate that Vietnamese immigrants pull together and take advantage of the resources they do have – each other – in order to cope with the difficulties in the new environment (Kuo and Tsai 1986). The hardships that Vietnamese immigrants experienced during the Southeast Asian war and emigration might have motivated their families and communities to link together tightly as an adaptive response and a collective coping strategy (Rambaut 1997); others have noted the tight-knit social networks and the supportive nature of families, kin or non-kin relationships within the Vietnamese ethnic communities (Bankston and Zhou 1995; 1997; Zhou and Bankston 1998). More recent manifestations of this are reflected in the generous support shown by Vietnamese-Americans across the country to the heavily affected Vietnamese community in New Orleans after the levee failures following Hurricane Katrina (The Houston Chronicle August 31, 2005; The Los Angeles Times May 15, 2006).⁵

Regarding the relationships between social networks and mental health among Vietnamese immigrants, the results reveal a positive relationship between higher quality social networks (as reflected by the higher relations helpfulness scores) and better mental health among Vietnamese immigrants on three of our mental health outcomes: *vitality, energy and fatigue, general mental health* and *positive affect*. These results are consistent with findings in literature on the supportive nature of social networks for maintaining good health and for reducing stress and depression in general (Cassel 1974; Cobb 1976; Wilcox 1981; Gallo 1982; Aneshensel 1992). Social networks have been considered by some to be especially important for the mental health of Vietnamese immigrants (Tran 1987; Rambaut 1997; Chung *et al.* 2000; Gellis 2003).

⁵ Our data for this study were collected before this community flooded when Katrina struck nearby in August 2005.

With regard to the relationships between migration and physical health, the analysis reveals better outcomes on SF-36 *general health* among immigrants, relative to both returnees and never-leavers. Although Vietnamese immigrants appear to benefit from long term effects of migration on physical well being compared to Vietnamese nationals, other work suggests that Vietnamese immigrants fare worse than native whites and other major Asian immigrants groups in the U.S. on physical well being (Frisbie *et al.* 2001). The physical health advantages for immigrants (compared to Vietnamese nationals) may be a consequence of better diets, a cleaner living environment and better health care services in the United States than in Vietnam (Hull 1979). As for the consistent positive associations revealed between physical health and mental health, this can be explained by the fact that individuals physically healthier should be able to better deal with stress and difficulties in adverse environment (Herrman *et al.* 2005).

Per our structural equation analytical approach, we expect to find an indirect effect of migration on Vietnamese immigrant mental health through the mediation of social networks and physical health. Our SEM models focusing on *vitality, energy and fatigue* and *general mental health* in fact do reveal significant buffering roles of physical health (as measured with SF-36 *general health*) and quality of social relations (as measured with relations helpfulness). We find significant suppression effects of social networks and physical health on the negative impact that migration has on mental health for the two SF-36 mental health outcomes for which we were able to discern a “true” migration effect. The direct effects of migration on these two outcomes are largely negative; however, the positive indirect effects of migration -- better social networks and better physical health --significantly dampen the negative direct effect of migration on mental health. The better-quality social networks and the better physical health status among

Vietnamese immigrants have protective effects which buffer the direct negative impact of migration upon the mental health of Vietnamese immigrants.

That such buffering effects may exist has long been asserted in the literature (Cassel 1974; Cobb 1976; House *et al.* 1988; Aneshensel 1992; Pernice and Brook 1996). Our results empirically confirm the importance of these key intervening variables in the relationships between migration and mental health among Vietnamese immigrants.

Theory and Policy Implications

While international migration provides physical health benefits for working-age first-generation Vietnamese immigrants, there are substantial negative consequences for mental health. Such negative consequences have long been anticipated by a wide range of authors who have documented the disinclination of many Vietnamese to adapt to American society (Butler 1993). Findings presented here provide strong evidence that such disaffection cannot be dismissed as simply due to disaffected individuals fleeing their homeland and remaining disaffected at their destination. Instead, it seems clear that the mental health strains documented here result from the stresses and strains of escape, dislocation, and adjustment to an extremely different, and for some, extremely stressful, American environment. Such findings should temper stereotypes about Asian immigrants in general and Vietnamese immigrants in particular being a model minority having few problems related to adjustment. The findings should also help to initiate further investigations regarding what kinds of consequences result from these mental health strains for the immigrants experiencing them, as well as for their families and communities.

The findings also point towards some potential mechanisms for minimizing such strains. Two sources of leverage may lie in social networks and physical health. The results support the

social support buffering hypothesis in migration research. It appears that there is a protective effect of good quality social networks on mental health outcomes. This implies that fostering community bonds within ethnic enclaves should pay dividends for improving mental health among Vietnamese Americans. The significant mediating role of physical health on the migration/mental health relationships can also be exploited in ways to benefit this community. The Vietnamese cultural penchants for exercise and for traditional diets that feature fish and vegetables have well-known benefits for physical health. Our results imply significant bonuses for mental health as well, key sources of cultural capital that serve to lessen the inherent stresses and strains of adapting to a new and unfamiliar environment far away from home.

REFERENCES

- Abe-Kim, Jennifer; David T. Takeuchi; Seunghye Hong, VIA; Nolan Zane; Stanley Sue; Viichael S. Spencer; Hoa Appel; Ethel Nicdao and Alegrfa, Margarita. 2007. "Use of Mental Health-Related Services among Immigrant and US-Born Asian Americans: Results from the National Latino and Asian American Study." *American Journal of Public Health* 97 (1): 91-98.
- Abraido-Lanza, A. F., Dohrenwend B. P., Ng-Mak D. S., Turner J. B. 1999. "The Latino Mortality Paradox: a Test of the "Salmon Bias" and Healthy Migrant Hypotheses". *American Journal of Public Health* 89: 1543-1548.
- Ali, J. 2002. "Mental Health of Canadian Immigrants." *Supplement to mental health report, Statistics Canada*.1-11.
- Aneshensel, Carol S. 1992. Social Stress: Theory and Research. *Annual Review of Sociology* 18: 15-38.
- Bjorntorp, P. 1998. "Etiology of the Metabolic Syndrome." Pp: 573 – 599 in Bray GA, Bouchard C, James WPT, (eds). *Handbook of obesity*. Marcel Dekker: New York.
- Banister, J. 1993. "*Vietnam Population Dynamics and Prospects*." University of California: Berkeley.
- Bankston, Carl L. and Min Zhou. 1995. "Religious Participation, Ethnic Identification, and Adaptation of Vietnamese Adolescents in an Immigrant Community." *Sociological Quarterly* 36(3): 523-534.
- Bankston, Carl L. and Min Zhou. 1997. "The Social Adjustment of Vietnamese American Adolescents: Evidence for a Segmented Assimilation Approach." *Social Science Quarterly* 78:508-523.
- Baron, R. M. and D.A. Kenny. 1986. "The Moderator–Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations." *Journal of Personality and Social Psychology* 51(6), 1173–1182.
- Beiser, M. 1988. "Influences of Time, Ethnicity, and Attachment on Depression in Southeast Asian Refugees." *American Journal of Psychiatry* 145 (1): 46-51.
- Beiser, M., Turner R. and Ganesan, S. 1989. "Catastrophic Stress and Factors Affecting its Consequences among Southeast Asian Refugee." *Social Science and Medicine* 28: 183-195.
- Beiser, M., Johnson P.J., Turner R. J. 1993. "Unemployment, Underemployment and Depressive Affect among Southeast Asian Refugees." *Psychological Medicine* 23: 731-743.

- Beiser, M. and Hou, F. 2001. "Language Acquisition, Unemployment and Depressive Disorder among Southeast Asian Refugees: A 10-year Study." *Social Science and Medicine* 53:1321-1334.
- Berry, J.W.; Uichol Kim; Thomas Minde and Doris Mok. 1987. Comparative studies of acculturative stress. *International Migration Review* 21(3): 491-511.
- Bronnee, S. 1992. "The History of the Comprehensive Plan of Action." *International Journal of Refugee Law* 4 (4): 534-559.
- Brown, Foster. 1987. "Counseling Vietnamese refugees: the new challenge." *International Journal for the Advancement of Counseling* 10 (4): 259 - 268.
- Brugha, T. 1995. *Social Support and Psychiatric Disorder: Research Findings and Guidelines for Clinical Practice*. London: Cambridge University Press.
- Buchwald, Dedra, Spero M Manson, et al.1993. "Prevalence of Depressive Symptoms among Established Vietnamese Refugees in the United States." *Journal of Internal Medicine* 8:76-81.
- Buchwald, Dedra; Spero M. Manson, Douglas L. Brennehan, Norman G. Dinges, Ellen M. Keane, Jan Beals and J. David Kinzie. 1995. "Screening for Depression Among Newly Arrived Vietnamese Refugees in Primary Care Settings." *The Western Journal of Medicine* 163(4): 341-346.
- Butler, Robert Olen. 1993. "A Good Scent from a Strange Mountain." Penguin: New York.
- Campi, Alicia. 2005. "From Refugees to Americans: Thirty Years of Vietnamese Immigration to the United States." *Immigration Policy Brief*, American Immigration Law Foundation. Available online: <http://www.aifl.org/ipc/refugeestoamericansprint.asp>.
- Carrey, J. W.; Oxtoby, M. J.; Nguyen, L P.; Huynh, V.; Morgan M.; Jeffrey, M. 1997. "Tuberculosis Belief among Recent Vietnamese Refugees in New York States." *Public Health Reports* 112(1): 66-72.
- Cassel, J. 1974. "Psychological Process and 'Stress': Theoretical Formulation", *International Journal of Health Services* 4(3): 471-482.
- CDC. 1992. "Behavioral Risk Factor Survey of Vietnamese -- California, 1991." *Morbidity and Mortality Weekly Report* 41(05):69-72.
- Chen, M. S. and Hawks, B. L. 1995. "A Debunking of the Myth of Healthy Asian Americans and Pacific Islanders." *American Journal of Health Promotion* 9:261-268.

- Chen, Hongtu Chen; Elizabeth Kramer; Teddy Chen; Henry. 2005. "Engaging Asian Americans for Mental Health Research: Challenges and Solutions." *Journal of Immigrant Health* 7(2): 109-118.
- Chung, R., Bemak, F., & Wong, S. 2000. "Vietnamese refugees' levels of distress, social support and acculturation: Implications for mental health counseling." *Journal of Mental Health Counseling* 22: 150-161.
- Chung, R. C. and Kagawa-Singer, M. 1993. "Predictors of Psychological Distress among Southeast Asian Refugees." *Social Science and Medicine* 36 (5): 631-639.
- Cobb, S. 1976. "Social Support as a Moderator of Life Stress." *Psychosomatic medicine* 38(5): 300-314.
- D'Avanzo, C. E. 1992. "Barriers to Health Care for Vietnamese Refugees." *Journal of Professional Nursing* 8(4): 245-253.
- Davis, E. Ruth. 2000. "Refugee Experiences and Southeast Asian Women's Mental Health." *Western Journal of Nursing Research* 22 (2): 144-168.
- Dong, Y'Lang T and Church, A. Timothy. 2003. "Cross-Cultural Equivalence and Validity of the Vietnamese MMPI-2: Assessing Psychological Adjustment of Vietnamese Refugees." *Psychological Assessment* 15(3): 370-377.
- Duong, L.B.; Morgan W.J. 2001. "The Contribution of Vocational Education and Training to the Integration of Refugee Returnees in Vietnam." *Compare* 31(1): 93-111.
- Duiker, W.J. 1983. *Vietnam: Nation in Revolution*. Westview: Boulder, Colorado.
- Filipovsky, J.; Ducimetiere, P.; Darne, B.; Richard, J. L. 1993. "Abdominal Body Mass Distribution and Elevated Blood Pressure are Associated with Increased Risk of Death from Cardiovascular Diseases and Cancer in Middle-aged Men: the Results of a 15- to 20-year Follow-up in the Paris Prospective Study." *International Journal of Obesity* 17: 197-203.
- Findley, Sally E. 1988. "The Directionality and Age Selectivity of Health-Migration Relation: Evidence from Sequences of Disability and Mobility in the United States." *International Migration Review* 22(3):4-29.
- Franzini, L; Ribble, J. C.; Keddie, A. M. 2001. "Understanding the Hispanic paradox." *Ethnicity and Disease* 11(3): 496-518.
- Frisbie, W. Parker, Youngtae Cho, Robert A. Hummer. 2001. "Immigration and the Health of Asian and Pacific Islander Adults in the United States." *American Journal of Epidemiology* 153(4): 372-380.

- Fox, G. Patricia; Julia Muenich Cowell; Margaret M. Johnson. 1995. "Effects of Family Disruption on Southeast Asian Refugee Women." *International Nursing Review* 42(1):27-30.
- Gallo, F. 1982. "The Effects of Social Support Network on the Health of the Elderly." *Social work in Health Care* 8(2):65-74.
- Gee, Gilbert C.; Michael S. Spencer, Juan Chen and David Takeuchi. 2007a. "A Nationwide Study of Discrimination and Chronic Health Conditions among Asian Americans." *American Journal of Public Health* 97 (7):1275-1282.
- Gee, Gilbert C.; Michael S. Spencer, Juan Chen and David Takeuchi. 2007b. "The Association between Self-reported Racial Discrimination and 12-month DSM-IV Mental Disorders among Asian Americans Nationwide." *Social Science and Medicine* 64: 1984–1996.
- Gellert, G. A.; Maxwell, R. M.; Higgins, K. V.; Mai, K. K.; Loweryb, R. 1995. "Barriers to Health Care Access and Utilization among Vietnamese Americans in Southern California." *Health-and-Place* 1(2): 91-99.
- Gellis, Zvi. D. 2003. "Kin and Nonkin Social Supports in a Community Sample of Vietnamese Immigrants." *Social work* 48(2):248-58.
- Gold, Steven J. and Nazli Kibria. 1989. "Vietnamese Refugees and Mobility: Model Minority or New Underclass?" Paper presented at the American Sociological Association Meetings, San Francisco, CA, August.
- Gold, S. Steven. 1992. "Mental Health and Illness in Vietnamese Refugees." *Western Journal of Medicine* 157(3):290-294.
- Goodkind, D. 1997. The Vietnamese double marriage squeeze. *International Migration Review* 31(1): 108-127.
- Green, Alexander R.; Quyen Ngo-Metzger, Anna TR Legedza, Michael P Massagli, Russell S Phillips, and Lisa I Iezzoni. 2005. "Interpreter Services, Language Concordance, and Health Care Quality Experiences of Asian Americans with Limited English Proficiency." *Journal of General Internal Medicine* 20(11): 1050–1056.
- Haritatos, Jana; Ramaswami Mahalingam; Sherman A. James. 2007. "John Henryism, Self-reported Physical Health Indicators, and the Mediating Role of Perceived Stress among High Socio-economic Status Asian Immigrants." *Social Science and Medicine* 64:1192–1203.
- Helton, A. 1993. "Refugee Determinations under the Comprehensive Plan of Action: Overview and Assessment." *International Journal of Refugee Law* 5(4): 129-139.

- Herrman, Helen; Shekhar Saxena; Rob Moodie. 2005. *Promoting Mental Health: concepts, emerging evidence, practice*. Report of the World Health Organization, Department of Mental Health and Substance Abuse in collaboration with the Victorian Health Promotion Foundation and The University of Melbourne, World Health Organization.
- Hinton, W. L.; Chen Y. C.; Du N.; Tran C. G., Lu F. G.; Miranda J.; Faust S. 1993. "DSM-III-R disorders in Vietnamese refugees: prevalence and correlates." *Journal of Nerves Mental Disease* 181:113-122.
- Hinton, W. L.; Du N.; Chen J. C.; Tran, C. G.; Newman, T.; Lu, F. 1994. Screening for Major Depression in Vietnamese Refugees: A Comparison of two Vietnamese Language Depression Scales. *Journal of General Internal Medicine* 9:202-207.
- Hinton W. L.; Tiet, Q.; Tran, C. G.; Chesney, M. 1997. "Predictors of Depression among Refugees from Vietnam: a Longitudinal Study of New Arrivals." *Journal of Nervous and Mental Disease* 185(1):39-45.
- Ho, E. 2004. "Mental health of Asian Immigrants in New Zealand: A Review of Key Issues." *Asian and Pacific Migration Journal* 13(1): 39- 60.
- Holzer C.; Swanson J.; Huynh M.; Ganju V.; Jono, R. Le. C. 1989. *Mental Health among the Texas Vietnamese. Psychiatric disorder among the Vietnamese-origin population in Texas: A diagnostic survey of 100 households in Harris and Galveston Counties*. Final report to the Texas Department of Mental Health and Mental Retardation. Texas: University of Texas Medical Research Branch.
- House, J.S.; D. Umberson, and K.R. Landis. 1988. "Structures and Processes of Social Support." *Annual Review of Sociology* 14:293-318.
- The Houston Chronicle. 2005. "Katrina: The Aftermath, Community Ties, Peace Provided in 'Real' Homes; Radio Saigon Houston Matches 500 Storm Victims with Volunteers." The Houston Chronicle, August 31, 2005.
- Hull, Diane. 1979. "Migration, Adaptation, and Illness: a Review." *Social Science and Medicine* 13: 25- 36.
- James S.A., Hartnett S.A., Kalsbeek W.D. 1983. "John Henryism and Blood Pressure Differences in Black Men." *Journal of Behavioral Medicine* 6:259-278.
- James, S. A. 1994. "John Henryism and the Health of African-Americans." *Culture, Medicine, and Psychiatry* 18, 163-182.
- James, S. A., Strogatz, D. S., Wing, S. B., & Ramsey, D. 1987. "Socioeconomic Status, John Henryism and Hypertension in Blacks and Whites." *American Journal of Epidemiology* 126: 664-673.

- Jenkins, Christopher NH, Thao Le, Stephen J. McPhee, Susan Stuart, and Ngoc The Ha. 1996. "Health Care Access and Preventive Care among Vietnamese Immigrants: Do Traditional Beliefs and Practices Pose Barriers." *Social Science and Medicine* 43: 1049- 1056.
- Jones, G.W. 1982. "Population Trends and Policies in Vietnam." *Population and Development Review* 8(4): 783-810.
- Jones, G.W. and Fraser, S.E. 1982. "Population Resettlement Policies in Vietnam." In Jones, G.W. and Richter, H.V. (eds.) *Population Resettlement Programmes in Southeast Asia*. Australian National University: Canberra pp. 113-133.
- Kantor, M. 1969. "Internal Migration and Mental Illness." In *Changing Perspective in Mental Illness*. Edited by Plog S. and Edgerton R. Holt, Rinehart and Winston, New York.
- Keefe, S. 1984. "Real and Ideal Extended Familism among Mexican Americans and Anglo Americans: On the Meaning of 'Close' Family Ties." *Human Organization* 43, 65-70.
- Kelly, Gail P. 1977. *From Vietnam to America: A Chronicle of the Vietnamese Immigrants to the United States*. Boulder, Co.: Westview Press.
- Kelly, Gail P. 1986. "Coping with America: Refugees from Vietnam, Cambodia, and Laos in the 1970s and 1980s." *Annals of the American Academy of Political and Social Science* 487(Immigration and American Public Policy): 138-149.
- Kessler, R., Kendler, K., Heath, A., Neale, M., & Eaves, L. 1994. "Perceived Support and Adjustment to Stress in a General Population Sample of Female Twins." *Psychological Medicine* 24: 317-334.
- Kibria, Nazli. 1993. *Family Tightrope: The Changing Lives of Vietnamese-Americans*. Princeton University Press.
- Kinzie J. D.; Tran, K. A.; Breckenridge, A.; Bloom, J. D. 1980. "An Indochinese Refugee Psychiatric Clinic: Culturally Accepted Treatment Approaches." *American Journal of Psychiatry* 137: 1429-1432.
- Kinzie, J.D.; JK Boehnlein; PK Lueng; LJ Moore; C Riley; and D Smith. 1990. "The Prevalence of Posttraumatic Stress Disorder and its Clinical Significance among Southeast Asian Refugees." *American Journal of Psychiatry* 147:913-917.
- Kortelainen, M. L.; Sarkioja T. 1997. "Coronary Atherosclerosis and Myocardial Hypertrophy in Relation to Body Fat Distribution in Healthy Women: an Autopsy Study on 33 Violent Deaths." *International Journal of Obesity* 21: 43 - 49.

- Kroll, Jerome; Marjorie Habenicht, Thomas Mackenzie, Mee Yang, Sokha Chan, Tong Vang, Tam Nguyen, Mayjoua Ly, Bounlieng Phommasouvanh, Hung Nguyen, Yer Vang, Langsanh Souvannasoth, Roberto Cabugao. 1989. "Depression and Posttraumatic Stress Disorder in Southeast Asian Refugees." *American Journal of Psychiatry* 146 (12): 1592-1598.
- Kuo, W. 1976. "Theories on Migration and Mental Health: An Empirical Testing on Chinese-Americans." *Social Science and Medicine* 10:297-306.
- Kuo, W. H. and Y. M. Tsai. 1986. "Social Networking, Hardiness and Immigrant's Mental Health." *Journal of Health and Social Behavior* 27:133-149.
- Lambert, Vickie A. and Clinton E. Lambert. 1979. *The Impact of Physical Illness and Related Mental Health Concepts*. Prentice-Hall.
- Landale, Nancy; Oropesa, R.S.; Lianes, Daniel; Gorman, Bridget K. 1999. "Does Americanization Have Adverse Effects on Health? Stress, Health Habits, and Infant Health Outcomes among Puerto Ricans." *Social Forces* 78:613-641.
- Landale, Nancy S. and R. S. Oropesa. 2001. "Migration, Social support and Perinatal Health: An Origin-Destination Analysis of Puerto Rican Women." *Journal of Health and Social Behavior* 42:166-183.
- Lapidus, L.; Bengtsson C, Larsson B, Pennert K, Rybo E, Sjostrom L. 1984. "Distribution of Adipose Tissue and Risk of Cardiovascular Disease and Death: a 12-year Follow up of Participants in the Population Study of Women in Gothenburg, Sweden." *British Medical Journal* 289: 1257 -1261.
- Le, Tuan D. 2004. "Barriers to Health Care Access among Vietnamese Refugees in Tarrant County, Texas." Master Thesis, University of North Texas Health Science Center at Fort Worth.
- Lee, Sharon. M. 1998. "Asian Americans: Diverse and Growing." *Population Bulletin* 53. June 1998.
- Leong, Frederick T. L. and Anna S. L. Lau. 2001. "Barriers to Providing Effective Mental Health Services to Asian Americans." *Mental Health Services Research* 3(4): 201-214.
- Lin, K, L Tazuma, and M Masuda. 1979. "Adaptational Problems of Vietnamese Refugees." *Archives of General Psychiatry* 36:955.
- Lin, E. H.; Ihle, L. J.; Tazuma, L. 1985. "Depression among Vietnamese Refugees in a Primary Care Clinic." *American Journal of Medicine* 78(1): 41-44.
- Lindstrom, David P. and Douglas S. Massey. 1994. "Selective Emigration, Cohort Quality, and Models of Immigrant Assimilation." *Social Science Research* 23:315-349.

- Los Angeles Times. 2006. "The Nation; Dispatch from New Orleans, A Community Wastes No Time Starting Over; A Predominantly Vietnamese American Neighborhood has Become a Model of Recovery due to its Residents' Initiative." *Los Angeles Times* May 15, 2006.
- MacKinnon, David P.; Jennifer L. Krull; Chondra M. Lockwood. 2000. "Equivalence of the Mediation, Confounding and Suppression Effect." *Prevention Science* 1(4): 173-181.
- Massey, Douglas S. 1995. "The New Immigration and Ethnicity in the United States." *Population and Development Review* 21 3:631- 652.
- Massey, Douglas S. and Felipe Garcia Espana. 1987. "The Social Process of International Migration." *Science* 237:733-737.
- McDowell, Ian and Claire Newell. 1996. *Measuring Health: A Guide to Rating Scales and Questionnaires*. New York: Oxford University Press.
- Mcfarlane, Allen.H.; K. A. Neale; G.R. Norman; et al.1981. "Methodological Issues in Developing a Scale to Measure Social Support." *Schizophr Bulletin* 7: 90-100.
- Mcfarlane, Allen.H.; Geoffrey R. Norman; David L. Streiner; and Ranjan G. Roy. 1983. "Characteristics and Correlates of Effective and Ineffective Social Support." *Journal of Psychosomatic Research* 28(6): 501 -510.
- Mcfarlane, Allen.H.; Geoffrey R. Norman; David L. Streiner; and Ranjan G. Roy. 1984. "The Process of Social Stress: Stable, Reciprocal and Mediating Relationships." *Journal of Health and Social Behaviors* 24(2): 160-173.
- Montero, Darrel. 1979. *Vietnamese Americans: Patterns of Resettlement and Socioeconomic Adaptation in the United States*. Boulder, Colo.: Westview Press.
- Nelson, Karen R.; Hoan Bui, Jeffrey H. Samet. 1997. "Screening in Special Populations: a "Case Study" of Recent Vietnamese Immigrants." *American Journal of Medicine* 102(5): 435-441.
- Newbold, K.B. and Danforth J. 2003. "Health Status and Canada's Immigrant Population." *Social Science and Medicine* 57: 1981-1995.
- Newbold, K. B. 2005. "Self-rated Health within the Canadian Immigrant Population: Risk and the Healthy Immigrant Effect." *Social Science and Medicine* 60: 1359-1370.
- Ngo-Metzger, Quyen; Michael P. Massagli, Brian R. Clarridge, Michael Manocchia, Roger B. Davis, Lisa I. Iezzoni, MSc, Russell S. Phillips. 2003. "Linguistic and Cultural Barriers to Care: Perspectives of Chinese and Vietnamese Immigrants." *Journal of General Internal Medicine* 18 (1): 44-52.

- Ngo-Metzger, Quyen; Anna T. R. Legedza; Russell S. Phillips. 2004. "Asian Americans' Reports of Their Health Care Experiences." *Journal of General Internal Medicine* 19(2): 111-119.
- Phan, Tuong. 2000. "Investigating the Use of Services for Vietnamese with Mental Illness." *Journal of Community Health* 25(5): 411-425.
- Portes, Alejandro. 1998. "Social Capital: its Origins and Applications in Modern Sociology." *Annual Review of Sociology* 24, 1-24.
- Portes, Alejandro and Min Zhou. 1993. "The New Second Generation: Segmented Assimilation and Its Variants." *Annals-of-the-American-Academy-of-Political-and-Social-Science* 530:74-96.
- Reeves, Terrance J. and Claudette E. Bennett. 2004. *We the People: Asians in the United States*, Census 2000 Special Reports, CENSR-17. Washington, DC: U.S. Census Bureau, December 2004, Figure 1, pg. 4.
- Robinson, C. Courtland. 1998. *Term of Refuge: The Indochinese Exodus and the International Response*. London: Zed Books.
- Rosmond, R. G. and Bjorntorp, P. 1998. "Psychiatric Ill-health of Women and its Relationship to Obesity and Body Fat Distribution." *Obesity Research* 6: 338 - 345.
- Rumbaut, R. G. 1985. "Mental Health and the Refugee Experience: A Comparative Study of Southeast Asian refugees." In *Southeast Asian Mental Health: Treatment, Prevention, Services, Training, and Research*. Edited by Tom Choken Owan and Bruce Bliatout. DHHS, NIMH, PHS, Alcohol, Drug Abuse, and Mental Health Administration in collaboration with Office of Refugee Resettlement, Social Security Administration.
- Rumbaut, Ruben G. and John R. Weeks. 1989. "Infant Mortality among Indochinese Refugees: Patterns of Infant Mortality, Birthweight and Prenatal Care in Comparative Perspective." *Research in the Sociology of Health Care* 8:137-96.
- Rumbaut, R. G., and J. R. Weeks. 1996. "Unraveling a Public Health Enigma: Why do Immigrants Experience Superior Perinatal Health Outcomes?" *Research in Sociology in Health Care* 13B:337-391.
- Rumbaut, Ruben G. 1997. "Ties That Bind: Immigration and Immigrant Families in the United States." Pp. 3-45 in *Immigration and the Family: Research and Policy on US Immigration*, edited by A. Booth, A. C. Crouter, and N. S. Landale. Mahwah, NJ: Lawrence Erlbaum Associates.
- Ryan, Dermot; Barbara Dooley and Ciarán Benson. 2008. Theoretical Perspectives on Post-Migration Adaptation and Psychological Well-Being among Refugees: Towards a Resource-Based Model. *Journal of Refugee Studies* 21(1):1-18.

- Salt, J. 1987. "Contemporary Trends in International Migration Study." *International Migration* 25(3): 241–50.
- Shuval, Judith T. 1993. "Migration and Stress." In *Handbook of Stress*. Shlomo Bienznite Leo Goldberg (eds). 641- 657: New York Free Press.
- Silove, Derrick.; Ingrid Sinnerbrink, Annette Field, Vijaya Manicavasagar and Zachary Steel. 1997. "Anxiety, Depression and PTSD in Asylum-Seekers: Associations with Pre-migration Trauma and Post-migration Stressors". *The British Journal of Psychiatry* 170(4): 351-357.
- Sluzki, C. E. 1992. "Disruption and Reconstruction of Networks Following migration/Relocation." *Family Systems Medicine* 10: 359-363.
- Starr, Paul D. and Alden E. Roberts. 1985. "Community Structure and Vietnamese Refugees Adaptation: the Significance of Context." *International Migration Review* 16: 595-613.
- Steel, Z.; Silove, D.; Phan, T. and Bauman, A. 2002. "Long-term Effect of Psychological Trauma on the Mental Health of Vietnamese Refugees Resettled in Australia: A Population-based Study. *Lancet* 360:1056-1062.
- Steel Z, Silove D, Chey T, Bauman A, Phan T, Phan T. 2005. "Mental Disorders, Disability and Health Service Use amongst Vietnamese Refugees and the Host Australian Population." *Acta Psychiatrica Scandinavica* 111:300–309.
- Stein, Barry. 1979. "The Geneva Conferences and the Indochinese Refugee Crisis." *International Migration Review* 13(4): 716-723.
- Steptoe A, Wardle J, Lipsey Z, Mills R, Oliver G, Jarvis M, Kirschbaum C. 1998. "A Longitudinal Study of Work Load and Variations in Psychological Well-being, Cortisol, Smoking and Alcohol Consumption." *Annals of Behavioral Medicine* 20: 84-91.
- Stillman, Steven; David McKenzie and John Gibson. 2006. "Migration and Mental Health: Evidence from a Natural Experiment." University of Waikato Department of Economics Working Paper in Economics 4/06 (March).
- Strand, Paul J. and Woodrow Jones, Jr. 1985. *Indochinese Refugees in America: Problems of Adaptation and Assimilation*. Durham: Duke University Press, 1985.
- Stein, Barry. 1979. "The Geneva Conferences and the Indochinese Refugee Crisis." *International Migration Review* 13(4):716-723.
- Stone, Scott C.S. and John E. McGowan. 1980. *Wrapped in the Wind's Shawl: Refugees in Southeast Asia and the Western World*. San Rafael, CA: Presidio Press.

- Shuval, Judith T. 1993. "Migration and Stress." In *Handbook of Stress*. Shlomo Bienznite Leo Goldberg (eds). 641- 657: New York Free Press.
- Strand, P. J. and W Jones Jr. 1983. Health Service Utilization by Indochinese Refugees. *Medical Care* 21:1089-1098.
- Sue, S.; Fujino, D.; Hu, L.; Takeuchi, D.; Zane, N. 1991. "Community Mental Health Services for Ethnic Minority Groups: A Test of the Cultural Responsiveness Hypothesis." *Consult Clinical Psychology* 59:533-540.
- Takeuchi, David T.; Margarita Alegria, James S.Jackson, David R. Williams. 2007a. "Immigration and Mental Health: Diverse Findings in Asian, Black, and Latino Populations." *American Journal of Public Health* 97(1): 10-12.
- Takeuchi, David T.; Nolan Zane, Seunghye Hong, David H, Chae, Fang Gong, Gilbert C, Gee, Emily Walton, Stanley Sue, and Margarita Alegria. 2007b. "Immigration-Related Factors and Mental Disorders among Asian Americans." *American Journal of Public Health* 97:84-90.
- Tran, Tranh Van. 1987. "Ethnic Community Supports and Psychological Well-being of Vietnamese Refugees." *International Migration Review* 21 (3): 833-844.
- Terry, D. J., Rawle, R., & Callan-Victor, J. 1995. "The Effects of Social Support on Adjustment to Stress: The Mediating Role of Coping." *Personal Relationships* 2: 97-124.
- Uba, L. 1992. "Cultural Barriers to Health Care for Southeast Asian Refugees in the United States." *American Journal of Public Health* 107: 544-548.
- UNHCR. 1989. *Note on the Work of the Coordinating Committee for the International Conference on Indochinese Refugees*, A/CONF. 148/4, 30 May, Annex V. P32.
- UNHCR. 1995. *Information Bulletin: the Comprehensive Plan of Action: A Regional Approach to Improving Refugee Protection*, Geneva, August 1995.
- UNHCR 2002. "Reintegration Programmes for Refugees in South-East Asia – Lessons Learned from UNHCR's Experience". (UNHCR Evaluation and Policy Analysis Unit, 2002). Available online at <http://www.unhcr.org/research/RESEARCH/3ccff9134.pdf>.
- U.S. Census Bureau. 2000. *Census of the United States of America*. Washington D.C.: U.S. Government.
- US Census Bureau. 2002. US Summary: 2000. Washington, DC: Department of Commerce, 2002, p. 9.

- U.S. Census Bureau. 2004. Table 1: Race and Hispanic or Latino Origin for the United States: 2000 to 2003. Available online at:
<http://www.census.gov/Press-Release/www/releases/img/cb04-98-table1.pdf>.
- Vega, William A.; Bohdan Kolody; Juan Ramon Valle. 1987. "Migration and Mental Health: An Empirical Test of Depression Risk Factors among Immigrant Mexican Women." *International Migration Review* 21(3) special issue on migration and health): 512-530.
- Walsh, A. and P. A. Walsh. 1987. "Social Support, Assimilation, and Biological Effective Blood Pressure Levels." *International Migration Review* (special issue on migration and health) 21:577-591.
- Ware, J. E and C. D. Sherbourne. 1992. "The MOS 36-item Short-Form Health Survey (SF-36). Conceptual Framework and Item Selection." *Medical Care* 30: 473-483.
- Ware, J. E.; Snow, K. K.; Kosinski, M.; Gandek, B. 1993. *SF-36 Manual and Interpretation Guide*. Boston: The Health Institute, New England Medical Center.
- Welborn, Timothy A; Satvinder, S. Dhaliwal and Stanley A Bennett. 2003. "Waist-hip ratio is the dominant risk factor predicting cardiovascular death in Australia." *The Medical Journal of Australia* 179 (11/12): 580-585.
- Wellman, B. 1981. *Applying Network Analysis to the Study of Support. Social Networks and Social Support*. B. Gottlieb. Beverly Hills, CA, Sage Publications: 154-169.
- Wilcox, B. 1981. "Social Support, Life Stress, and Psychological Adjustment: A Test of the Buffering Hypothesis." *American Journal of Community Psychology* 9(4): 371-386.
- Wing, R. R.; Matthews, K. A.; Kuller, L. H.; Meilahn, E. N.; Plantinga, P. 1991. "Waist to Hip Ratio in Middle-aged Women: Associations with Behavioral and Psychosocial Factors and with Changes in Cardiovascular Risk Factors. *Arteriosclerosis, Thrombosis, and Vascular Biology*." *Journal of the American Heart Association* 11: 1250- 1257.
- Woodall, Erica D.; Victoria M. Taylor; Yutaka Yasui; Quyen Ngo-Metzger; Nancy Burke; Hue Thai and J. Carey Jackson. 2006. "Sources of Health Information among Vietnamese American Men." *Journal of Immigrant and Minority Health* 8 (3): 263-271.
- Young, Rosalie F.; Allen Bukoff; John B. Waller, Jr.; Stephen B. Blount. 1987. "Health Status, Health Problems and Practices among Refugees from the Middle East, Eastern Europe and Southeast Asia." *International Migration Review* 21(3) special issue on migration and health): 760-782.
- Zane N, Takeuchi D, Young K, eds. 1994. *Confronting Critical Health Issues of Asian and Pacific Islander Americans*. Thousand Oaks, California: Sage Publications.

Zhang, Xiaoquan; P. Mick Kelly; Catherine Locke; Alexandra Winkels and W. Neil Adger. 2001. "Structure and Implications of Migration in a Transitional Economy: Beyond the Planned and Spontaneous Dichotomy in Vietnam." The Centre for Social and Economic Research on the Global Environment Working Paper GEC 01-01, University of East Anglia and University College London. ISSN 0967-8875.

Zhou, Min, and Carl L. Bankston III. 1994. "Social Capital and the Adaptation of Second Generation: The Case of Vietnamese Youth in New Orleans." *International Migration Review* 28(4):775-799.

Zhou, Min and Carl L Bankston III. 1998. *Growing up American: How Vietnamese Children Adapt to Life in the United States*. New York: Sage.

Table 1. Demographic characteristics of study participants (N=736).

Socio-demographic indicators	Immigrants (n=127)	Never leavers (n=467)	Returnees (n=142)
Age			
Mean age	42.01***	38.06	38.61
Median age	42.00***	39.00	38.50
Range (23-53)			
Sex			
Male	66.1%***	43.0%	59.9%
Female	33.9%	57.0%	40.1%
Marital Status			
Never married	14.2%	23.6%	21.8%
Currently Married and living with spouse	77.2%	65.3%	69.7%
Separated, divorced or widowed	8.7%	11.1%	8.5%
Education			
0-6 years	32.3%***	34.7%	62.7%
7-9 years	13.4%	26.3%	20.4%
10 years or above	54.3%	39.0%	16.9%
Occupation			
Unskilled, service and agricultural	19.0%***	7.9%	19.0%
Clerical, factory, skilled, sales	28.6%	12.2%	11.3%
Professional	14.3%	12.2%	4.9%
Entrepreneur	21.4%	45.4%	36.6%
Unemployed, other	16.7%	23.8%	28.2%

Note: ^Significant at $P < 0.1$; *Significant at $p < 0.05$; ** Significant at $p < 0.01$ *** significant at $p < 0.001$.

The combined data has a sample of 738 respondents. But 2 cases (1 with age=84 and 1 with age missing) were excluded from the analysis. The final analyses include a sample of 736 respondents.

Table 2: Mental health dimensions from the SF-36 and waist hip ratio (N=736).

Mental health measurement	Immigrants (n=127)	Never leavers (n=467)	Returnees (n=142)	Cronbach's alpha
SF-36 VT	61.34	64.98 [^]	65.88 [^]	0.66
SF-36 SF	82.09	89.16 ^{***}	83.98	0.69
SF-36 RE	91.60	80.51 ^{**}	77.00 ^{***}	0.84
SF-36 MH	69.20	72.61 [*]	70.59	0.70
#Waist hip ratio	0.92	0.83 ^{***}	0.84 ^{***}	N/A
#High waist hip ratio (yes)	77.0%	39.8% ^{***}	35.5% ^{***}	N/A

Notes: [^] significant at p < 0.1 level. ^{*} significant at p < 0.05 level. ^{**} significant at p < 0.01 level. ^{***} significant at p < 0.001 level.

SF-36 subscales: Larger score indicates better health outcome. VT = Vitality, energy, and fatigue, SF = Social functioning, RE = Role limitations due to emotional problems, MH = General mental health

#Waist hip ratio: N=730, with 6 missing cases (mean = 0.85; range 0.57-1.63).

#High waist hip ratio: waist hip ratio ≥ 0.90 for males and ≥ 0.80 for females.

Table 3: Multivariate linear regression analysis on migration and mental health outcomes (N=736).

Mental health outcomes	Never-leavers Beta	Returnees Beta	Immigrants Beta	R ²
VT: Vitality, energy, and fatigue				
Model 1: Never-migrants as reference group		0.40	-3.74*	0.07
Model 2: Returnees as reference group	-0.40		-4.14*	0.07
SF: Social functioning				
Model 1: Never-migrants as reference group		-4.93**	-6.56***	0.03
Model 2: Returnees as reference group	4.93**		-1.63	0.03
RE: Role limitations due to emotional problems				
Model 1: Never-migrants as reference group		-4.23	10.53**	0.03
Model 2: Returnees as reference group	4.23		14.77***	0.03
MH: General mental health				
Model 1: Never-migrants as reference group		-1.95	-3.40*	0.06
Model 2: Returnees as reference group	1.95		-1.45	0.06
#Having high waist hip ratio (yes/no)				
Model 1: Never-migrants as reference group		0.92	4.11***	0.25
Model 2: Returnees as reference group	1.09		4.47***	0.25

Notes: ^ Significant at P<0.1; *Significant at p <0.05; **Significant at p <0.01; *** Significant at p <0.001.

Control variables include age, sex, marital status and occupation.

In the model predicting waist hip ratio, logistic regression is used, and BMI is furthermore controlled, the reported point estimates are odds ratio.

Table 4: Differences on social relations across migration status (N=736).

Social relations measurement	Never leavers (n=467) %/n or mean	Returnees (n=142) %/n or mean	Immigrants (n=127) %/n or mean
Whether discussed home or family with someone (Yes)	85.45% / 399**	84.5% / 120	95.3%/121
#Type of first relations			
Friends	21.6%/86***	20%/24	11.6%/14
Spouse or g/b friend	41.4%/166	51.7%/62	63.6%/77
Other family members	29.1%/116	25.8%/31	19.0%/24
Other	8.0%/32	2.5%/3	5.8%/7
Size of relations	1.61***	1.27	1.36
Average helpfulness of relations	5.47***	5.19	5.88
Highest helpfulness of relations	5.73***	5.28	6.02
Helpfulness of first relations	5.57***	5.25	5.94
#Whether having helpful relations (Yes)	57.4%/268***	37.3%/53	70.1%/89
Reciprocity of relations	0.78	0.81	0.77

Notes: ^ significant at $p < 0.1$ level. * Significant at $p < 0.05$ level. ** Significant at $p < 0.01$ level.

*** Significant at $p < 0.001$ level.

N = 640. It only includes those who answered at least one relation. 96 respondents who answered no one were excluded.

#whether having helpful relations: with a cutoff point of 6 or higher on highest relations helpfulness scores.

Table 5: Multivariate linear regression on mental health outcomes, further adjusting for social relations helpfulness (N=736).

Predictors	Mental health outcomes			
	VT	RE	MH	Waist hip ratio
Age	-0.38***	-0.19	-0.14	0.002***
Sex				
Female (reference)				
Male	5.81***	4.54^	2.16^	0.06***
Occupation				
Unskilled, service, agricultural and unemployed (reference)				
Clerical, factory, skilled, sales	2.47	0.33	2.13	-0.01^
Professional , Entrepreneur	2.44^	0.06	3.74**	-0.008
Marital status				
Separated, formerly married (reference)				
Never married	1.63	-0.05	4.86*	0.009
Currently Married& living with spouse	3.12	1.19	6.38***	0.008
Migratory status				
Never leavers (reference)				
Returnees	0.93	-4.49	-1.45	-0.006
Immigrants	-4.50**	10.845**	-4.15**	0.05***
Social networks				
Relations helpfulness	1.89**	-0.96	1.72**	-0.006
#BMI				0.01***
Constant	62.43***	90.18***	59.82***	0.56***
R ²	0.08	0.03	0.06	0.45

Notes: ^ significant at p < 0.1 level. * significant at p < 0.05 level. ** significant at p < 0.01 level. *** significant at p < 0.001 level.

Outcomes: SF-36 Subscales: Larger score indicates better health outcome. VT = Vitality, energy, and fatigue, SF = Social functioning, RE = Role limitations due to emotional problems, MH = General mental health;

Waist hip ratio: N=730, with 6 missing cases (mean = 0.85; range 0.57-1.63). # BMI is controlled in the model predicting waist hip ratio.

Table 6: Multivariate linear regression on mental health outcomes, further adjusting for physical health (N=736).

Predictors	Mental health outcomes			
	VT	RE	MH	Waist hip ratio
Age	-0.18*	0.12	0.02	0.002***
Sex				
Female (reference)				
Male	1.63	-1.70	-1.28	0.06***
Occupation				
Unskilled, service, agricultural and unemployed (reference)				
Skilled, clerical, factory and sales	1.57	-1.92	1.41	0.02*
Professional and entrepreneur	1.47	-1.32	2.94**	-0.008
Marital status				
Separated, formerly married (reference)				
Never married	1.08	0.09	4.39*	0.009
Currently Married and living with spouse	3.29^	1.39	6.52***	0.008
Migratory status				
Never leavers (reference)				
Returnees	2.68*	-0.72	0.08	-0.005
Immigrants	-10.16***	0.49	-8.66***	0.05***
Physical Health				
SF-36 GH	0.47***	0.73***	0.38***	-0.0001
#BMI				0.01***
Constant	43.19***	38.48***	45.13***	0.53***
R ²	0.33	0.18	0.27	0.44

Notes: ^ significant at p < 0.1 level. * significant at p < 0.05 level. ** significant at p < 0.01 level. *** significant at p < 0.001 level.

Outcomes: SF-36 Subscales (VT, SF, RE, MH): Larger score indicates better health outcome.

#Waist hip ratio: N=730, with 6 missing cases; BMI is controlled in the model predicting waist hip ratio.

Table 7: Relationships between migration, social networks, physical health and mental health outcomes among Vietnamese (N=736).

Major path	Predicting models	
	SF-36 VT Beta (Z)	SF -36 MH Beta (Z)
A: Direct effect of migration to mental health (Never-leavers as reference)		
Returnees	3.01* (2.23)	0.21 (0.17)
Immigrants	-10.55*** (-6.95)	-9.02*** (-6.39)
B: Effect of migration to social networks (Never-leavers as reference)		
Returnees	-0.28**(-2.93)	-0.28 **(-2.93)
Immigrants	0.37 *** (3.62)	0.37 *** (3.62)
C: Effect of migration to physical health (Never-leavers as reference)		
Returnees	-4.83**(-2.75)	-4.83**(-2.75)
Immigrants	13.69*** (7.20)	13.69*** (7.16)
D: Effect of social networks to mental health		
Social relations helpfulness	1.24** (2.37)	1.16** (2.38)
E: Effect of physical health to mental health		
SF-36 General health	0.47*** (16.61)	0.38*** (14.57)

Notes: ^ Significant at P<0.1; *Significant at p <0.05; **Significant at p <0.01; ***Significant at p <0.001.

Dependent variables: SF-36 VT and MH; higher values indicate better health outcome.

Model fit statistics: GHI = 0.9990, AGFI = 0.9368, Chi square = 3.88 (DF = 1), P = 0.05

Critical value for Z score: 1.28 for P< 0.10; 1.65 for P<0.05; 2.33 for P < 0.01; 3.09 for P < 0.001.

Table 8: Decomposing the direct, indirect and total effect of migration on mental health outcomes among Vietnamese (N=736).

Migration effect (never-leavers as reference)	Predicting models	
	SF-36 VT Beta (Z)	SF -36 MH Beta (Z)
Total effect		
Returnees	0.42 (0.25)	-1.95 (-1.37)
Immigrants	-3.71* (-2.16)	-3.39*(-2.18)
Direct effect		
Returnees	3.01* (2.23)	0.21 (0.17)
Immigrants	-10.55*** (-6.95)	-9.02*** (-6.39)
Indirect effect of migration through social networks		
Returnees	-0.34*(-1.84)	-0.32*(-1.85)
Immigrants	0.46*(1.98)	0.43*(1.99)
Indirect effect of migration through physical health		
Returnees	-2.26**(-2.72)	-1.84**(-2.70)
Immigrants	6.38*** (6.58)	5.20*** (6.42)
#Total indirect effects		
Returnees	-2.60	-2.16
Immigrants	6.84	5.63

Notes: ^ Significant at P<0.1; *Significant at p <0.05; **Significant at p <0.01; ***Significant at p <0.001.

#the significant test of the total indirect effects is not provided.

Dependent variables -- SF-36 VT and MH: higher values indicate better health outcome.

Model fit statistics: GHI = 0.9990, AGFI = 0.9359, Chi square = 3.94 (DF = 1), P = 0.05.

Critical value for Z score: 1.28 for P< 0.10; 1.65 for P<0.05; 2.33 for P < 0.01; 3.09 for P < 0.001.

Figure 1: Conceptual framework on migratory experience, social networks and mental Health outcomes

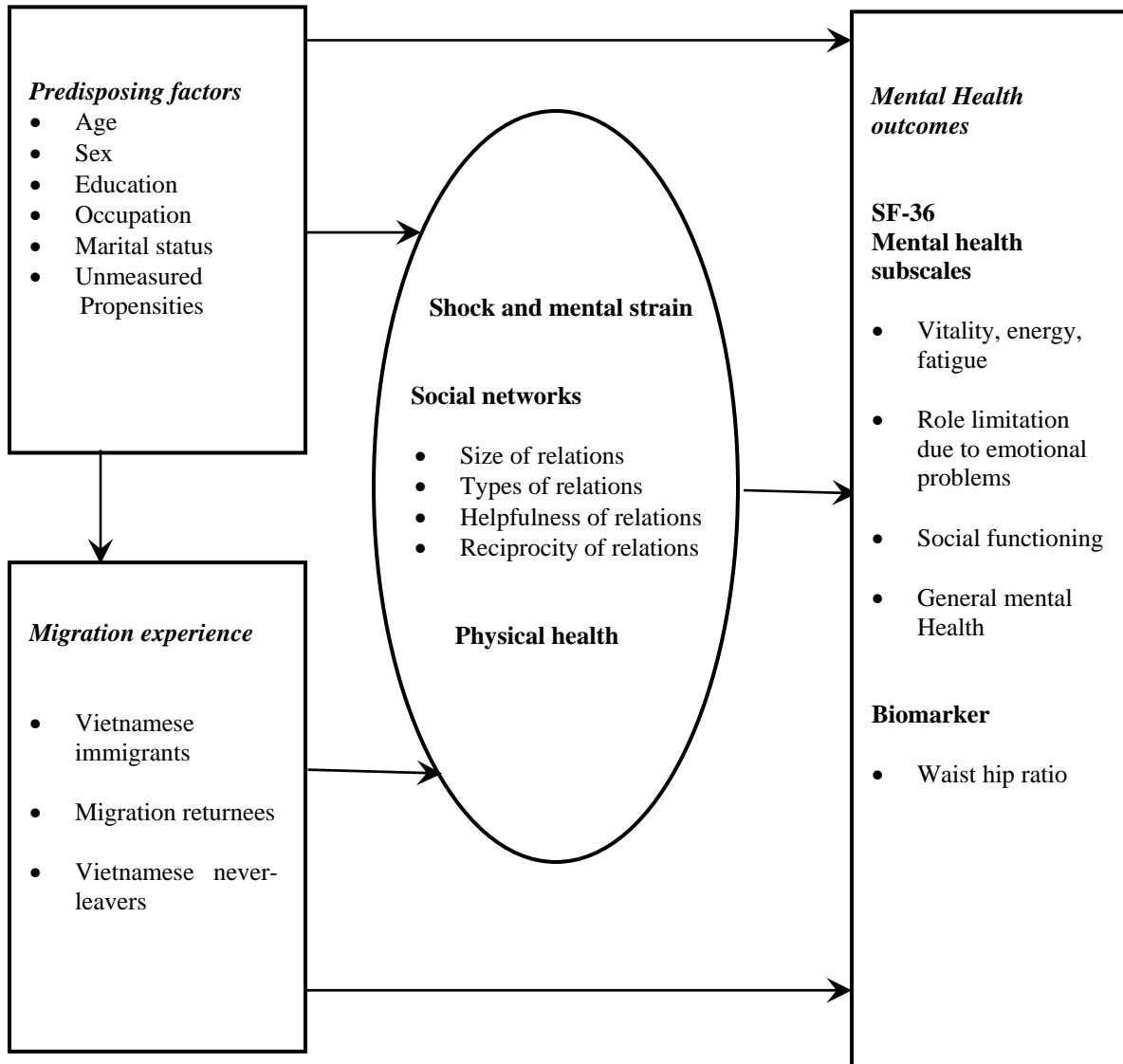


Figure 2: The mediating mechanism of social networks/physical health

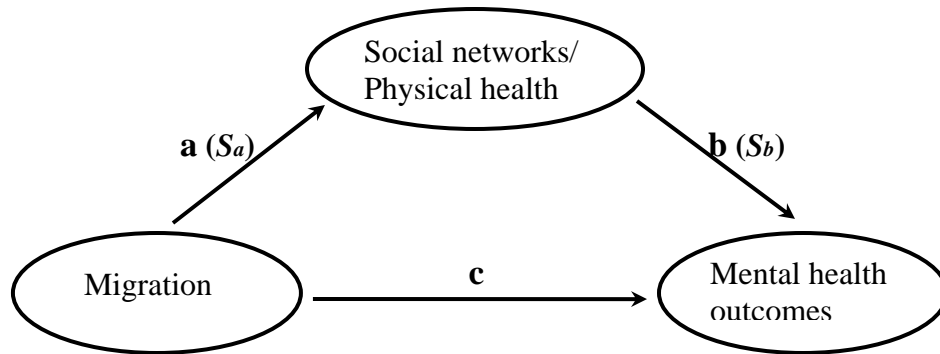


Figure 3: The moderating mechanism of social networks/physical health

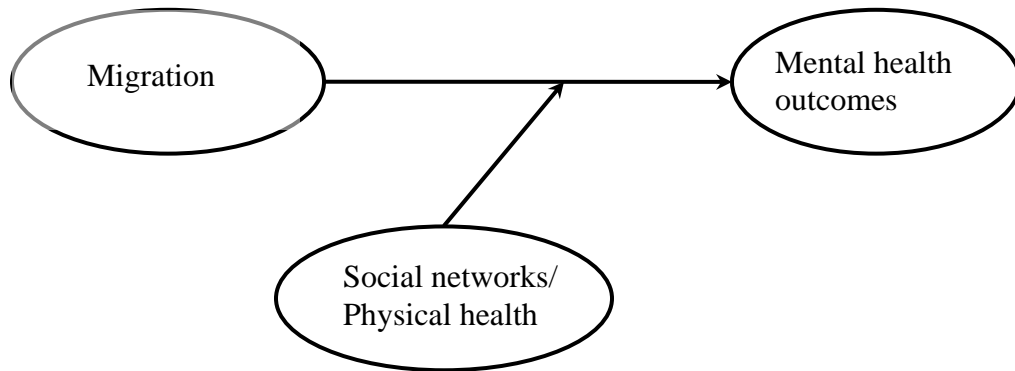


Figure 4: SEM paths diagram of migration, social networks, physical health and mental health associations

