

Abstract

Title: Psychological and physical health of Chinese immigrants in the Howard County, Maryland: A community survey

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Dissertation Abstract:

Background: Migration is a stressful event. Immigrants are vulnerable to psychological distress symptoms which increase their risk of heart disease, stroke and diabetes. Chinese are the third largest immigrant group in USA. Study of Chinese immigrants increases our understanding of their psychological health condition and the relationship to physical health and can inform the development of culturally sensitive community programs to improve psychological health in Chinese immigrants.

Purpose: The purpose of this study was to identify risk factors for psychological distress of Chinese immigrants using a biopsychosocial model. The intention was to identify modifiable factors for psychological distress in Chinese immigrants.

Methods: A cross-sectional design was used in this study. A total of 247 Chinese speaking immigrants in Howard County were recruited. All instruments used in the study were written in Chinese including the Chinese Cultural Orientation Scale, Chinese Bicultural Identity Integration Scale, Chinese Riverside Acculturation Stress Inventory and Chinese Kessler Psychological Distress Scale. Data were analyzed using descriptive statistics, Chi squares, t-tests, Pearson's correlations and linear multiple regressions.

Results: The psychological distress rate among Chinese immigrants in the study was 22.3%. Biological and social factors explained 17.8% of the variability in psychological distress scores. Other predictors in the model included age, self-reported health status and financial strain. The final model explained 26.1% of the variability in psychological distress scores.

Conclusion: Howard County is the third richest county by per capita income in the nation. Yet, financial uncertainty remains a strong predictor of psychological distress for Chinese immigrants. Interventions of social services could be developed to meet Chinese immigrants' needs. English proficiency is important for psychological health in Chinese immigrants, especially when facing acculturation stress. Self-reported health was a significant risk factor in the model. Further study is needed to examine what factors contribute to an individuals' perception of health and how that perception of health influences psychological health.

Psychological and physical health of Chinese immigrants in the Howard County,
Maryland: A community survey

by
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DEDICATION

To “I can do everything through Him who gives me strength.” Philippians 4:13

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CHAPTER 1: INTRODUCTION AND STATEMENT OF THE PROBLEM

1.1. Introduction

Immigrants were a large growing component of the population in the United States of American (USA). Since 1990, foreign born population had increased by 57%. One in every ten people in USA are foreign born (US Census Bureau, 2000). Chinese immigrants were one of the ethnic groups that had the fastest growth. There were 2.3 million of Chinese in USA, making up about 0.8% of the population. It was the third largest immigrant group in the USA.(Terrazas&Devani,2008).

Immigrants came to USA with their own cultural backgrounds, life styles and beliefs of health and medicine. Research had shown that ethnic differences influenced health care utilization, compliance with medical regimen and treatment outcomes (Brown, 2005).The increased immigrant population posed a challenge to the health system to provide culturally sensitive programs to meet their needs.

Migration and resettlement had negative health consequences both physically and psychologically (Shim and Schwartz, 2008; Wade, Chao &Kronenberg, 2007). Acculturation, acculturation stress and background characteristics such as gender, age, age at immigration, marital status, religious support, socioeconomic status, length of residency and social support are some of the major factors associated with the physical and mental health of immigrants. Understanding the relationship between these factors in health has important implications inimmigrants'health to modify risk factors and improve health.

The purpose of this study was to identify risk factors for psychological distress of Chinese immigrants using a biopsychosocial model. The intention was to identify

modifiable factors to facilitate interventions to decrease the development of psychological distress in Chinese immigrants. Findings would enrich the understanding of Chinese immigrants' psychological health condition. The findings will inform the development of community programs that are culturally sensitive to improve psychological health in Chinese immigrants.

This chapter will address, in sequence, background and significances of the problem, purpose of the study, research questions, definition of terms, conceptual framework, and summary of this chapter.

1.2 Background

1.2.1. Immigrants in the USA

Immigrants were a fast growing group in the US. There were 28 million foreign-born individuals which accounted for 11.1% of the total USA population (US Census Bureau, 2000). Within the foreign-born population, Asians accounted for 25% and was the second largest immigrant group (Larsen, 2004). There was little data to inform what is known about immigrant health (Hwang & Myers, 2007; Lee, 2007; Taylor, Yasui, Tu, Neuhausser, Woodall, &Acorda, et. al., 2007; Huh, Prause, & Dooley, 2008). Studies focused on immigrants' health were scant, and results were inconsistent. Some studies showed that immigrants were at higher risk of physical and mental health problems (Wu, Tran, &Amjad, 2004; Lee, 2007; Mui, et. al., 2007; Suinn, 2009), but others suggested that immigrants had better health than USA born citizens (Dey, 2006; Huh, Prause, & Dooley, 2008; Johnson &Hayes, 2004). The inconsistent findings were due to methodology, design, and the lack of cultural sensitive instruments. These limitations increased bias and decreased the validity and reliability of the results. One of the biggest

challenges of studying immigrants was to incorporate culturally sensitive factors into the study design.

1.2.2. Chinese immigrant history in the USA

Chinese was one of the Asian groups with a fast growth in population. From 1980 to 2006, the numbers of Chinese immigrants had increased five-fold and became the third largest immigrant group in the USA (Terrazas&Devani, 2008). Among Chinese Americans, about 70% were foreign born and 30 % were USA born (Taylor, Yasui, Tu, Neuhouser, Woodall, Acorda, et. al., 2007).

The history of Chinese immigrants was first documented in the 18th century. The Chinese were the first Asian immigrants to enter the USA. Chinese immigrants came to the USA in three waves. The first wave in between 1800 to 1880 was largely undocumented workers. In 1870, Congress passed the Naturalization Act that prohibited Chinese immigrants from applying for citizenship because they were not “White person and persons of African descent”. This law prohibited freedom of immigration and made Chinese the only culture that was legally discriminated against. The second wave from 1882 and 1965 was extremely restrictive and only Chinese who were diplomats, merchants, students and their dependents were allowed to travel to the USA. The Third wave of Chinese immigration started from around 1965, when Immigration and Naturalization Act was rescinded and Chinese could apply for citizenship. More highly selected well-educated Chinese entered the USA after the 1970’s; and at the same time, more Chinese immigrated to escape political instability or repression (Unknown, 2000).

1.2.3. Chinese immigrant in Howard County, Maryland

Maryland (MD) was one of the top ten states which had the largest population of

Chinese immigrants (Church of Nazarene, 2004). In 2006 US Census Bureau American Community Survey, there were 67,351 Chinese Americans in MD. It was the largest minority group in MD after Asian Indian (Colmers, & Hussein, 2008). Most of the Chinese Americans in Maryland live in Montgomery County, with a population of 28,590; followed by Baltimore County, with 4,886; and Howard County with 4,271 (US Census Bureau, 2000).

Chinese immigrants moved to Howard County in two phases. The first phase was in the 70's and 80's. They were generally from Hong Kong and Taiwan, by and large were professional and came to the USA mainly for education. The second phase was in the 90's. Chinese immigrants who came at that time were mainly from Mainland China; they entered the USA for better economic opportunity and engaged mostly in the service industries such as restaurants, laundries and beauty parlors. In Howard County, the primary organizations representing the Chinese community are three Chinese language schools and two Chinese churches (Association for the Study and Development of Community, 2005).

1.2.4. Chinese culture

Confucianism was a major influence in Chinese culture. In general, Chinese were more reserved. Being kind and considerate of others and avoiding conflict were emphasized in the Chinese culture. Ethnic identity, family integrity, high moral standard, and education were very important to Chinese. Asian culture value harmony and avoid confrontation. These characteristics may result in increased isolation in the USA, lower integration into society and increased in psychological stress (Greenfield and Cocking, 1994).

1.3. Significant of problem

Psychological distress was an unpleasant subjective state of depression and/or anxiety, which had both emotional and physiological manifestation (Mirowsky and Ross, 2003). Immigration was a major stressful event that predisposes immigrants for development of psychological distress (Shim, & Schwartz, 2008; Wade, Chao & Kronenberg, 2007).

1.3.1. Pathophysiological mechanism of stress

1.3.1.1. Autonomic nervous system

Autonomic nervous system (ANS) is a branch of the peripheral nervous system and it is the regulatory system to maintain homeostasis of the body. The normal function of the ANS depends on the equilibrium between its two components; the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS) in which the neurotransmitters and hormones play an essential part to support and balance the systems.

The SNS is a defensive system, reacts to threatening situations and triggers a “fight or flight” response. In contrast, the PNS provides a “rest and digest” response to restore and promote equilibrium. I

Stress triggers the release of the hormones and neurotransmitters which initiates biopsychological change, and may cause physical and psychological illness.

1.3.1.2. Norepinephrine and epinephrine

Norepinephrine and epinephrine are neurotransmitters and hormones released during the activation of the SNS. Any mental stress can activate the SNS to release these compounds. Stress increases the activities in SNS and increases circulating norepinephrine and epinephrine levels (Veith, Lewis, Linares, Barnes, Raskind,

& Villacreset. al., 1994).

Norepinephrine and epinephrine have substantial effects on the cardiovascular system specifically in increasing heart rate, blood pressure, narrowing blood vessels, and decreasing the heart rate variability (HRV).

1.3.1.3. Heart rate variability

Heart rate variability is a measure of beat to beat alterations in heart rate. Reductions in HRV increase risks of arrhythmia and accelerates the progress of heart disease (Podrid, Fuchs & Candinas, 1990).

1.3.1.4. Cytokines

The effect of norepinephrine and epinephrine also interact with cytokine levels in the body. The pro-inflammatory cytokines activate a cycle of reaction which includes mood alteration, stimulate SNS, increase release of norepinephrine and epinephrine and influence the course of acute and chronic disease negatively.

1.3.1.5. Serotonin

Serotonin is stored in the brain and in the platelets. It functions as a positive inotrope and increases blood pressure and heart rates, promotes platelet aggregation and thrombotic formation.

Serotonin and norepinephrine interact with each other to regulate feelings, thoughts and behaviors. Abnormality in the neurotransmitters function of norepinephrine and serotonin has been linked to depression symptoms.

When serotonin is activated in stressful situation, it upsets the balance of the neurotransmitter function. The release of serotonin changes mood and behaviors, promotes psychological symptoms. The positive inotrope effect of serotonin influences

the cardiovascular function and cause damage to the heart. Furthermore, the coagulation property in serotonin increases the platelet aggregation, increase blood viscosity and increase vasoconstriction (Ni & Watts, 2006).

1.3.1.6. Hypothalamic-Pituitary-Adrenal Axis (HPA axis)

The hypothalamus is the control center for most of the body's hormonal system in ANS. In response to stress, the hypothalamus activates the HPA axis by producing corticotrophin-releasing factor (CRF) hormone.

The CRF binds to specific receptors on pituitary cells and produce adrenocorticotrophic (ACTH) hormone. The ACTH is transported by blood to the adrenal cortex and stimulates the secretion of cortisol. Increase in cortisol levels contribute to the development of insulin resistance, abdominal obesity, hypertension, inflammation and the damage of endothelium (Goldberg, Becker, Bonsall, Cohen, Ketter, & Kaufman, et. al., 1996; Carney, Saunders, Freeland, Stein, Rich & Jaffe, 1995).

Acute stress triggers "fight and flight" response to release norepinephrine, epinephrine and cytokine that lead to harmful outcomes to physical and psychological health such as increasing blood pressure, narrowing blood vessels, altering mood, feelings and behaviors. Chronic stress alters the regulation of cortisol level to manage the constant stress stimulation. The adaptation causes a high cortisol level and resulted in the development of insulin resistance, abdominal obesity and hypertensive. Acute and chronic stress generates different health outcomes. Chronic stress has a longer duration and has been associated with greater impact on health than acute stress (McEwan, & Lasley, 2005).

1.3.2. Psychological distress and health

Stress associated with the development of psychological distress. Psychological distress is a risk of chronic disease such as heart disease, stroke and diabetes (Yakushko, Watson, & Thompson, 2008). Pratt (2009) analyzed the National Health Interview Survey and reported that severe psychological distress (SPD) was associated with higher mortality rate. The age and sex adjusted mortality hazard ratio associated with SPD was 2.2 (95% CI =1.9 to 2.5). Psychological distress was associated with diabetes. The crude prevalence of SPD among USA adults with diabetes was twice as high as among those without diabetes (Li, et. al., 2009). Psychological distress was also an independent risk factors for fetal stroke after adjusting for potential confounds (RR 3.36, 95% CI=1.29-8.7) (May et. al., 2002). Study in Japan reported that participants who were in the highest tertile of psychological distress had a 7-fold adjusted hazard ratio to develop cardiovascular disease compared to those who were in the lowest tertile. In the same study, people in the highest tertile of psychological distress had a 1.5-fold adjusted hazard ratio to develop hypertension compared to those who were in the lowest tertile (Ohira, 2010).

1.3.3. Psychological distress and immigrants

Research showed factors that associated with psychological distress in immigrants included biological, social and acculturation factors. Biological factors included gender (Ponizovsky, Radomislensky, & Grinshpoon, 2009; Nicklett, & Burgard, 2009; Wu, Tran, & Amjad, 2004; Masood, Okazaki, & Takeuchi, 2009; Lee, 2007; Chen, Benet-Martinez, & Bond, 2008; Tran, Manalo, & Nguyen, 2007), age (Sorkin, 2008; (Ponizovsky, Radomislensky, & Grinshpoon, 2009; Chen, Benet-Martinez, & Bond, 2008;

Tran, Manalo, & Nguyen, 2007; Cross and Fhagen-Smith, 2001). Social factors included: age at immigration (Leu, Yen, Gansky, Walton, Adler, & Takeuchi, 2008). marital status (Huang & Spurgeon, 2006; Wu, Tran, & Amjad, 2004; Tran, Manalo, & Nguyen, 2007); religious observation (Ponizovsky, Radomislensky, & Grinshpoon, 2009) ; employment (Barry and Garner, 2001; Mak, and Zane, 2004.; Ritsner, Ponikowski, Nechamkin, & Modai, 2001; Thapa and Hauff, 2005.; Pernice, and Brook, 1996.; Syed, Dalgard, & Dalen, et. al., 2006.; Jarvis, Kirmayer, & Lasry, 2005), socioeconomic status (Clark, Anderson, Clark, & Williams, 1999); length of residency (Shim and Schwartz, 2008); and social support (Hobfall, and Stokes, 1988; Huang and Spurgeon, 2006; Masood, Okazaki, & Takeuchi, 2009). Acculturation factors included bicultural competency; bicultural identity integration and acculturation stress (Suinn, 2009; Takeuchi, et. al., 2007; Padilla and Perez, 2003; Chen, Benet-Martinez, & Bond, 2008; Chiriboga, 2004; Jang & Chiriboga, 2009; Ponizovsky, Radomislensky, & Grinshpoon, 2009; Huang and Spurgeon, 2006; Mo, Mak and Kwan, 2006; Aroian, Norris, Asuncion, Fernandez, & Averasturi, 2008; Benet-Martinez & Haritatos, 2005).

Psychological health of immigrant is an important area to explore. Results not only benefiting the immigrants; they are also interrelated to the health care expense and the development of health care system in the society.

In research studies, Chinese Americans were clustered into the Asian Americans category. In the USA, there were more than 20 Asian American groups; failure to make distinctions among specific Asian American groups overlooked the significant differences between the groups. We indeed know very little about Chinese immigrants' physical and mental health (Public Health Informatics Research Laboratory, 2005; Hwang & Myers,

2007; Takeuchi, et. al., 2007; Taylor, et. al., 2007; Lee, 2007; Suinn, 2009).

1.4. Purpose

This study will explore Chinese immigrants' psychological health from the biological, social and acculturation aspects.

Research studies of immigrants and psychological health had identified non-modifiable risk factors such as gender, age at immigration and socioeconomic status (Ponizovsky, 2009; Nicklett ,2009; Wu, Tran &Amjad, 2004; Masood, Okazaki, & Takeuchi, 2009; Lee, 2007; Chen, Benet-Martinez, & Bond, 2008; Tran,Manalo, & Nguyen, 2007; Takeuchi et. al., 2007 ; Leu, Yen, Gansky, Walton, Adler, & Takeuchi , 2008; Clark, Anderson, Clark, & Williams,1999). The intention is to identify modifiable factors to facilitate interventions to decrease the development of psychological distress in Chinese immigrants.

1.5 Research Questions

The following research questions were formulated as the basis of this study:

1. What is the rate of psychological distress in Chinese immigrants?
2. Are biological factors related to psychological distress score in Chinese immigrants?
3. Is there a relationship between social factors and psychological distress symptoms in Chinese immigrants?
4. Is acculturation (bicultural competency and bicultural identity integration) related to psychological distress in Chinese immigrants?
5. Are acculturation stress scores related to psychological distress scores in Chinese immigrants?

6. Do acculturation factors (bicultural competency, bicultural identity integration and acculturation stress scores) add to the prediction of psychological distress scores beyond the contributions of biological and the rest of social factors in Chinese immigrants?

1.6 Definition of Terms

1.6.1. Chinese immigrant

A person with self-identified race of origin as Chinese who lives in the USA and was not born in the USA.

1.6.2. Psychological distress symptoms

It is an unpleasant subjective state of depression and/or anxiety, which has both emotional and physiological manifestation (Mirowsky and Ross, 2003). The operational definition of psychological distress in this study is the score of 20 or above measured by Kessler psychological distress scale (K-10).

1.6.3. Physical health

The overall condition of an organism at a given time that is related to the body as distinguished from the mind or spirit (Stedman's Medical Dictionary, n.d.). The operational definition of physical health in this study is the presence of hypertension, coronary artery disease, diabetes and stroke.

Physical health will be considered in two ways: present or absent of each individual disease, and number of chronic diseases present.

1.6.4 Acculturation

Acculturation is a process of behavioral and cultural change when two cultures come into contact (Williams & Berry, 1991). It is the process of adopting the cultural

traits or social patterns of a group other than one's own. For immigrant groups, acculturation is the process of incorporating values, beliefs and behaviors from the dominant culture into the immigrants' cultural worldview (Minnesota Department of Human Service Online). The operational definition of acculturation in this study is the score measured by Bicultural Identity Integration Scale (BIIs-1) and the strength of identity of their cultural orientation as Chinese and American (Bicultural competency).

1.6.5. Acculturation stress

The degree of perceived stressfulness associated with the experience of acculturation (Jang and Chiriboga, 2009). The operational definition of acculturation stress in this study is the score measured by Riverside Acculturation Stress Inventory (RASI).

1.7. Conceptual Framework

1.7.1 Biopsychosocial model of health

The relationship between acculturation and psychological health in Chinese immigrant was complex and multifaceted. This study explored this relationship from the biological, psychological and social factors. A descriptive correlational research design was constructed.

The biopsychosocial (BPS) theory was first introduced by an American psychiatrist George Engel in 1977. He suggested the psychological factors such as belief and interpersonal relationship were important in health and proposed the use of BPS model as a new medical model to treat diseases and illnesses. To apply the theory in cardiovascular health, Thomas et. al. (1997) proposed a biopsychosocial holistic model of cardiovascular health in which biological, psychological and social factors interacted

with each other and integrated into health (Figure 1). The diagram illustrated the interrelated relationship between biological, psychological and social factors in health.

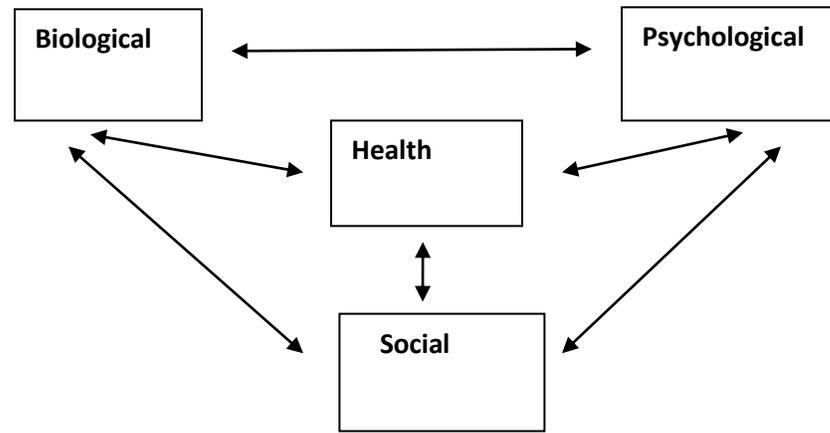


Figure 1. The biopsychosocial holistic model of cardiovascular health

Factors in the social realm such as education level and social support affected individuals' psychological status, biological status and health. Psychological factors such as anxiety and depression affected individual's social status, biological status and health. Biological factors such as age and gender affected individual's social, psychological status and health (Thomas, et. al., 2008). All three realms played significant role in human functioning in the context of disease and illness.

The biological realm of the model examined the cause of illness from the functioning state of individual such as age, gender and health condition. The psychological realm examined the potential psychological causes such as emotional instability for health problem. The social realm examined how social factors such as social support, cultural and religious influenced health (Santrock, 2007).

The BPS model implied that treatments for diseases should consider biological, psychological and social influences. The model supported the philosophical position of mind-body connection. The working of the body can affect the mind, and the working of

mind can affect the body (Halligan&Aylward, 2006). Growing evidences suggested that patient perceptions of health and disease, the barriers in social environment and cultural differences influenced disease process and health status (DiMatteo, Haskard, & Williams, 2007).

1.7.2. Biopsychosocial model of immigrant health

This study used the biopsychosocial holistic model to examine the interrelated relationship of the three major realms: (1) the biological realm, (2) social realm and (3) psychological realm (see Figure 2). Within the biological realm, the relationship of gender, age, physical health and self-reported health status to psychological will be examined. Within the social realm, the relationship of age at migration, marital status, religious support, financial strain, education level, length of stay in US, social support, health insurance status, English language proficiency, acculturation, and acculturation stress to psychological health will be examined. Within the psychological realm, the relationship of psychological distress to biological and social factors will be examined.

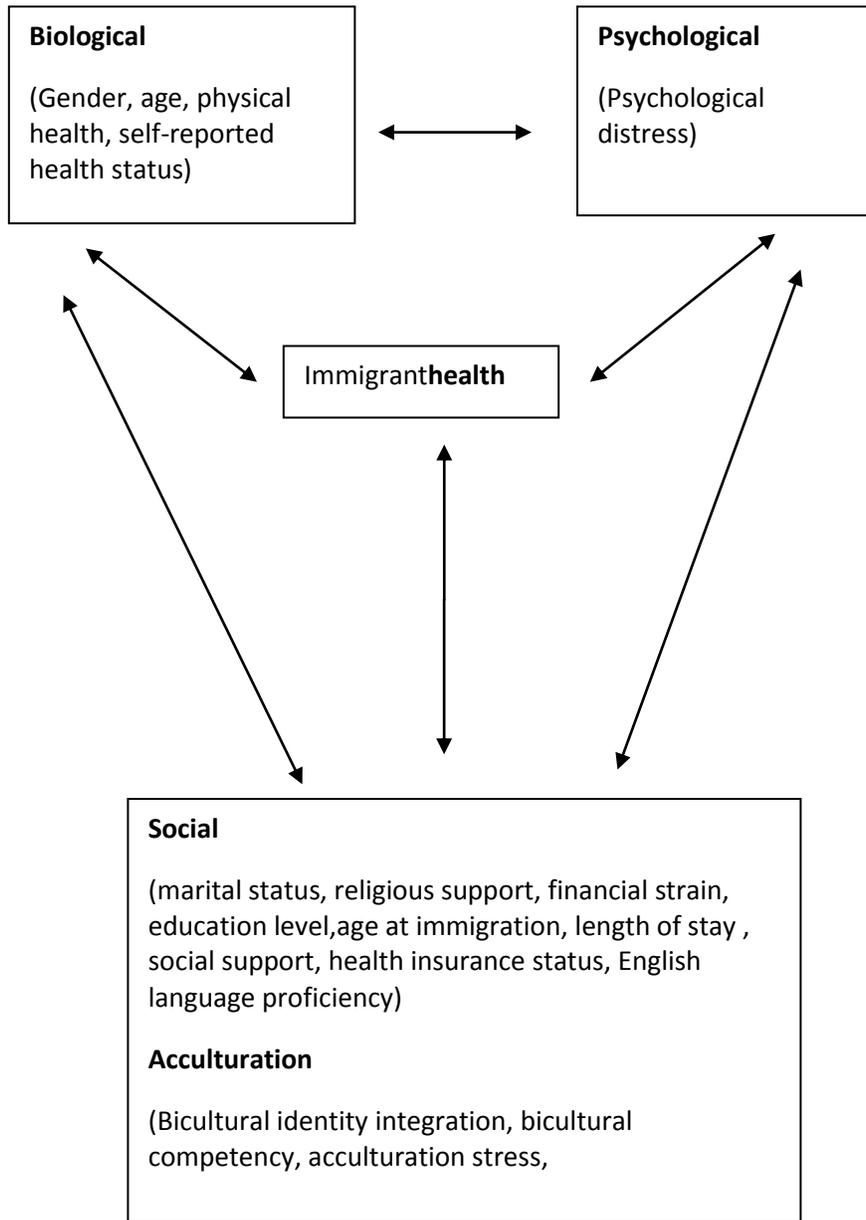


Figure 2. Biopsychosocial model of Chinese immigrant health

1.8. Significances

Psychological distress was a severe indicator that affected morbidity and mortality. This study explored the biological, social and acculturation factors that were

related to Chinese immigrants' psychological health. The intention is to identify modifiable factors to facilitate interventions to decrease the development of psychological distress in Chinese immigrants. If risks for psychological distress were modifiable, there was a potential to modify risks, decreased psychological distress and ultimately improved health and decreased need for health care in Chinese American population.

1.9. Significance for nursing

Nursing was a caring profession and nurses had a vital role in caring for people's physical and psychological wellbeing.

It was evident that the Chinese Americans population was growing in the USA. Nurses would encounter more Chinese American patients in the community settings, physician offices, emergency rooms or in the hospitals. Because ethnicity and cultural differences influenced treatment effects and affected health outcomes, understanding the cultural factors in health would improve treatment effects and health outcomes.

The results of this study added information to further understand Chinese immigrants' health. This information increased nurses' awareness of cultural factors in Chinese immigrants. The findings would assist nurses to provide effective and cultural competent care to Chinese immigrants. In addition, the findings could be translated to practice and modify risk factors of psychological distress. Ultimately would prevent diseases and improve health in Chinese immigrants' population.

1.10. Assumption

Self-administrated survey assumed that the participants understood clearly what was being asked of them if they were to respond and the participants understood the

questions unmistakably and responded truthfully to the questions (Dillman, 2007)

The study assumed the sample recruited by community leaders in Chinese community organizations, at various community services and Asian health fairs represented Chinese immigrant population in Howard County, Maryland.

1.11. Limitation

Limitations to this study include: selection bias, instrument bias and social desirability response bias.

A convenience sample was used in this study. Characteristics in sample studied may have systematic difference from individuals who were not studied. Convenience samples decreased the generalization of the results beyond this study population. To decrease the uncertainty and bias in the sample, more description was used to describe the contexts and characteristics of the sample so as to explain and compare the confounders (Henry, 1990). Data of sample characteristics, inclusive, exclusive criteria and sampling process were included in the design.

Reliable and valid instruments were important to the validity of the study. The instruments chosen in this study were written in Chinese to improve understanding. They were tested and validated. However, misinterpretation was possible in any survey. Sampling error and measurement error were potential limitation.

Social desirability bias was difficult to eliminate. This study was conducted by a Chinese immigrant who spoke their language to increase trust; each survey was attached with a Chinese cover letter to explain how confidentiality was reinforced and no personal information was collected in the survey. Despite these considerations, the possibility of social desirability response bias could not be eliminated.

1.12. Summary

Immigrants were the fastest growing fraction of the US population. Within the foreign-born population, Asians account for 25%. Among Asian groups, Chinese was the third largest immigrant group in the USA. From 1980 to 2006, the numbers of Chinese immigrants had increased by five-fold. Migration was a stressful event and the adaptation process was complex and multifaceted. The acculturation process caused negative physical and psychological health consequences. This study used a cross-sectional descriptive correlational survey design to explore the interrelationship between biological, psychological and social factors in Chinese immigrants' health. The results helped to tailor care and interventions that were culturally sensitive to decrease psychological distress symptoms.

CHAPTER 2: REVIEW OF THE LITERATURE

2.1. Introduction

This research study was designed to examine Chinese immigrant's psychological health using the biopsychosocial model. This chapter provided an overview of the current research related to biological, social and acculturation factors that influenced the psychological health in Chinese immigrants. The following review also illustrated the interaction between the three realms in immigrants' psychological health.

An introduction of the immigrant paradox was presented followed by the discussion of biological, social and acculturation factors that influenced psychological health in immigrants. Because of the limited data on Chinese immigrants' health, this review included literature of health of immigrants of other ethnic groups.

2.2. Immigrant paradox

Out of the epidemiological research in immigrants' health in the early 1980's emerged a new term "immigrant paradox", suggested that immigrants had both a better health and a lower risk for depression and anxiety compared to the USA born population of the same national origin. Research into the immigrant paradox showed inconsistent and contradicting results. Some studies showed that immigrants were at higher risk of developing physical and mental health problems (Wu, Tran, & Amjad, 2004; Lee, 2007; Mui, et. al., 2007; Suinn, 2009), but others suggested that immigrant's health was better than those who were USA born (Dey, 2006; Huh, Prause, & Dooley, 2008; Johnson & Hayes, 2004). Breslau and the colleagues (2009) examined 19 articles published from 1989 to 2008 and concluded that the immigrant paradox was indeed a complex

phenomenon. The phenomenon was ethnicity specific and influenced by many factors such as age and the experiences of immigration.

The conflicting results of immigrant health were attributed by the use of different sampling designs, measures of mental health and analysis methods. Behavioral studies in immigrants' health required the incorporation of culturally sensitive strategies to the design of the studies, so as to provide an accurate interpretation and allow greater generalization of the results. The researcher needed to be culturally competent and be a part of the community to understand the barriers of the research implementation and able to provide mechanisms to overcome them.

2.3. Psychological health of immigrants

This section provided an overview of immigration and psychological health. Level of psychological distress in different population were compared and discussed. Definition of terms in the study was discussed in chapter 1 (page 10).

2.3.1. Psychological distress and immigrant population

Immigrants were at higher risk to develop psychological distress. A cross sectional survey study examined 113 Chinese immigrants in England using the General Health Questionnaires (GHQ-10) and found that 61.4% of participants fell above the Caseness threshold (4/5) , indicated that they were experiencing mild or moderate symptoms of poor mental health and were vulnerable to develop depression or anxiety disorders (Huang & Spurgeon, 2006). Ponizovsky, Radomislensky, &Grinshpoon (2009) analyzed 4858 Former Soviet Union (FSU) immigrants from Israel National Mental Health Survey in Israel, using the same instrument to assess their psychological health. A score of >20 on GHQ-10 suggested the presence of psychological distress. The

psychological distress scores among FSU immigrants were significantly higher than other groups such as veteran Israeli and other immigrants (21.5, SE=0.25 vs. 18.8, SE =0.11 vs. 18.4, SE=0.53, respectively, $F(2, 4858) = 49.1, P < .0001$). In addition, only the FSU immigrant group scored exceeded the severe psychological distress level.

Immigrants were also had a greater need for psychological care. A California study used the California Health Interview Surveys to compare Vietnamese American (N=359) with non-Hispanic white adults (N=25177) who were 55 years old or above. Results showed that Vietnamese were more likely than white participants to report needing help for mental health problems (adjusted odds ratio = 2.1, 95% CI= 1.4-3.1), but less likely to have had their medical providers discuss their mental problems with them (OR =0.3, 95% CI = 0.1-0.5). The authors suggested that the lack of English proficiency in immigrant population may be one of the barriers to obtain professional health form physicians (Sorkin, Tan, Hays, Mangione, & Ngo-Metzger, 2008).

Prevalence rate of depression symptoms in immigrants has been studied extensively. Two studies showed that Chinese immigrants had a higher rate of depressive disorder compared to the USA population (Yeung, Howarth, Chan, Sonowalla, Nierenberg, & Fava, 2002; Takeuchi et. al., 2007). Yeung, Howarth, Chan, Sonowalla, Nierenberg, & Fava (2002) screened 503 Chinese American for depression in a primary care clinic of a community health center. The study used the Chinese version of the Beck Depression Inventory (CBDI) and the rate of positive screening for depression symptoms in the study was 15%. A total of 180 participants in the study agreed to be interviewed by a psychiatrist using the Structured Clinical Interview for DSM-III-R patient version. This is a diagnostic instrument and yielded a depressive disorder rate of 29.4%.

A Secondary data analysis used a sample of 2095 Asian Americans from the National Latino and Asian American Study (2002-2003). The survey used the World Health Organization Composite International Diagnostic Interview to assess their psychological health. Results showed that Chinese immigrants had the highest (weighted percentage =18%, SE = 2.34)lifetime prevalence of any mental disorder compared to other ethnic groups such as Filipinos, Vietnamese, Koreans, Japanese and Asian Indians in the sample.

Immigration itself was a stressful event. Immigrant was vulnerable population to develop psychological distress symptoms. Psychological distress altered the function of individual, family and the community, led to the disruption of family, friendship and other social networks. Psychological distress was not just the experience of negative mood of an individual; it was a significant threat to immigrants.

2.4. Biological factors of immigrants' health

This section reviewed the relationship of factors in biological realm to psychological health in Chinese immigrants. Within the biological realm, factors such as physical health, self-reported health status, gender and age will be examined.

2.4.1. Physical health and self-reported health status

In general, Immigrants had poorer physical health. Sorkin, Tan, Hays, Mangione, & Ngo-Metzger (2008) compared the health status of Vietnamese American (N=359) with non-Hispanic white adults (N=25177). Study reported that Vietnamese American had significantly worse physical health than white adults on five of eight domains of the Medical Outcomes Survey 12-items ($p < .006$).

Physical health status was one of the indicators of psychological distress

symptoms. A Community-based study was conducted in an East Coast metropolitan area. A total of 311 Vietnamese American were surveyed using the Center for Epidemiologic Studies Depression Scale (CED-S). The results showed that having good health was related to less depressive symptoms ($\beta = -.237, p < .001$) (Tran, Manalo, & Nguyen, 2007). In Montreal, Jarvis, Kirmayer, & Lasry (2005) surveyed 1485 Asian participants using GHQ to assess their psychological distress symptoms. The sample included 42.6% immigrants from Asia and 57.4% of non-immigrants. The study reported that the presence of chronic disease was significantly related to level of psychological distress ($B = .38, p < .001$). The positive correlation of health status to psychological health was consistent with another survey study. Wu, Tran, & Amjad (2004) used CED-S to assess depressive symptoms of 177 Chinese-speaking elderly immigrant in Boston. Self-reported health status was the strongest predictor of CES-D scores ($B = -0.26, p = .001$). Physical health status and self-reported health status were significant to individual's psychological health.

Because of the cultural differences, the conception and expression of depression or distress symptoms were different between Asian, European and Americans. Asian culture did not encourage verbal expression of emotion or feeling. Somatic symptoms may be an alternate way for Asians to communicate their psychological distress symptoms (Karasz, 2005; Burr & Champman, 2004). A cross-sectional survey study of 1747 Chinese Americans ages 18-65 years old was conducted in a community of Los Angeles. This survey study used the depression and anxiety subscales of Symptom Checklist-90-Revised (SCL-90-R) to measure the depressive and anxiety symptoms. The somatization scores were moderately correlated with anxiety symptoms ($r = 0.41$) and

depression symptoms($r = 0.42$). The common somatic items identified were headaches, muscle soreness and back pain (Mak, and Zane, 2004).

Poor physical health caused discomfort and pain. The restrictions of functional capacity decreased mobility, increased social isolation and caused consequences in psychological health.

2.4.2. Gender

Female immigrants were at higher risk of developing psychological distress symptoms than males. Nicklett ,&Burgard (2009) conducted a secondary analyze using data from National Latino and Asian American Study (2002-2003). The sample contained 3056 Latino and Asian immigrants in the USA. The World Health Organization Composite International Diagnostic Interview was used to assess the presence of psychiatric disorders such as depression, anxiety and substance use disorder. The study found that females were more likely to have major depression episode in the last 12 months (OR = 0.56, 95% CI = 0.41-0.78, $p < .01$) after controlling for mobility, origin subjective social status, ethnic group, age, educational attainment, duration of residence in USA, citizenship, English proficiency and employment status. Another study by Masood, Okazaki, & Takeuchi (2009) used the same data set and showed consistent results. In this study, authors selected a subgroup of 164 South Asian American to further analyze the risk factors of psychological distress in females and males. Kessler Psychological Distress Scale (K-10) was used to assess the frequency of behavioral, cognitive and somative expression of distress experiences. For females, the lack of extended family support was related to higher distress scores (B = -0.86, $p = .012$) whereas for males, financial strain (B = 0.73, $p = .0005$), greater conflict with family

culture ($B = 0.59, p = .020$), and a lower community social position ($B = -0.72, p = .005$) predicted a higher distress scores. Females were more likely to have an episode of depression disorders. Social factors such as family support, financial strain and socio-economic status affect males and females differently.

The gender specific results occurred not only in Asian American study. In Israel, a study using the Talbich Brief Distress Inventory (TBDI) to examine 1062 Russian born Jewish immigrants' depressive symptoms and anxiety in a cross-sectional community survey and concluded that females had a higher level of psychological distress than males (mean, 1.47 (SD = 0.7) vs. mean, 1.24 (SD = 0.7); $P < .001$) (Ritsner, Ponikowski, Nechamkin, and Modai, 2001). Another study of Latin American immigrants in Spain also had similar results. This cross sectional study surveyed 300 Latin American immigrants using SCL-90-R and found females had significantly higher distress scores than males ($p = .015$) after controlling age and years in Spain. Females also reported experiencing more immigrant related demand such as loss and issues with occupation ($p < .006$) (Aroian, Norris, Asuncion, Fernandez, & Averasturi, 2008).

However, another study of Asian population presented non-significant effect of gender differences in level of depression. Tran, Manalo, & Nguyen (2007) conducted a community-based survey in an East Coast metropolitan area with 311 Vietnamese American using CES-D to assess psychological distress symptoms. The analysis revealed that gender had no significant relationship to the depression symptom ($\beta = 0.145, p > .5$).

Overall, depression disorder and psychological distress symptoms were reported more commonly in females, but had not specifically been studied in Chinese immigrant populations. One survey study in Boston of 177 Chinese speaking immigrant who were

60 years old or older and found gender was not a predictor for depressive symptoms ($B = -0.02, p > .05$) (Wu, Tran, & Amjad, 2004). This study used CES-D to assess depressive symptoms, had an older mean age of 71.8 years old ($SD = 7.2$) and a longer average of length of stay of 18.4 years. Perhaps the effect of gender difference on depressive symptom scores did not affect Chinese elderly population or may be gender had an interaction effect with length of stay, therefore did not show significant to depressive symptom scores in this study.

In summary, the effects of / relationships between gender and psychological distress were reported with conflicting results. The effect on the gender difference may be sensitive to other social and environmental factors. More studies are warranted to further investigate the gender specific factors in the development of psychological distress symptoms in Chinese immigrants.

2.4.3. Age

Age has been reported as an important factor in physical and psychological health. Aged was associated with higher rate of chronic diseases, and chronic disease were related to depressive symptoms (Wu, Tran and Amjad, 2004). However, the relationship between age and level of psychological distress in the immigrant was not clear.

A sample of 4858 Former Soviet Union immigrants from the Israel National Mental Health Survey was examined to observe the association of age and psychological distress. GHQ-12 was used in this study and it concluded that the level of psychological distress in immigrants increased gradually across the lifespan. The presence of psychological distress rate for participants at age of 21-29 was 18.7% ($SE = 0.5$); rate

increased to 21.1% (SE= 0.6) for age of 40-49, and at age of 60-69, rate was at 23.1% (SE = 0.7) (Ponizovsky, Radomislensky, &Grinshpoon, 2009). In contrast, Tran, Manalo, & Nguyen (2007) found a different result. Tran and the colleagues conducted a community-based survey in an East Coast metropolitan area with a sample of 311 Vietnamese American using CES-D to assess the depressive symptoms. The sample age range from 18 to 73 years old (M=38.76, SD = 13.76). The study found age had no significant relationship to the depression symptoms ($\beta=0.001, p>.5$). While there was no information of the mean age in the Israel National study, it was noted that the mean age in the community sample was fairly young. The Israel National study had only 17.9% of participants who were between 30-39 years old with most participants were in their 50-59 years range.

Age had been reported as an important factor in psychological health. The conflicting results between the two studies were due to the distribution of age in the sample and the smaller sample size in the community study. Nevertheless, elderly immigrants appeared to experience more difficulties in adapting to new environment and had more distress symptoms due to low level of English proficiency and social isolation (Jang &Chiriboga, 2009).

2.5. Social factors of immigrants' health

This section reviewed the relationship of factors in social realm to psychological health. Within the social realm, the factors such as age at immigration, marital status, religious support, and financial strain, and education, length of stay in USA, social support, health insurance status, and English proficiency will be examined.

2.5.1. Age at immigration

Age at immigration seemed to be a risk factor for development of psychological distress symptoms because age represented the stage in life and affected the social activity, networking and learning ability. For example, individuals who came to USA in their teen years had the school environment to network with friends. Also, the teen years were believed to be more optimal to learn new language and culture. The younger Individual may have the advantage to adapt to new environment. Takeuchi, et. al. (1998) studied Asian American immigrants using the World Health Organization Composite Interventional Diagnostic Interview to diagnose depressive disorder. The results indicated that immigrants arrived in USA after age of 20 years old they were 1.5 to 3.0 times more likely to experience major depression disorder. On the other hand, Breslau, Borges, Hagsr, Tancredi, & Gilman (2009) noted a rather different result. The study included 33,601 individuals who were age 18 or above, 28,006 were USA born and 5595 were immigrants (no Asians included). The data was obtained from the National Epidemiological Study of Alcohol and Related Conditions. It compared lifetime prevalence and lifetime risk for depression and anxiety disorder by US-nativity and age at immigration across seven immigrant groups in the USA. DSM-IV version was used to diagnose depressive disorder in this study. Results showed that immigrants from Mexico, Eastern Europe and Non-Hispanic Black who arrived in the USA at age of 13 or older were less likely to experience depression or anxiety disorder compared to those who arrived in the USA at age of younger than 13 years old ($p < .05$).

The relationship between age at immigration and psychological health was ambiguous. In both studies mentioned above, neither of these two studies included

acculturation stress in their regression models. The variables incorporated in the regressions contributed to the difference in findings. Age at immigration had a direct impact on the perception of individual's cultural identity, and cultural identity was one of the key factors in the adaptation to the host country. When individual had difficulties integrating one's two cultural identities, it created conflict, affected social interaction and increased level of stress (Benet-Martinez & Haritatos, 2005). Acculturation and psychological distress was discussed in section 2.6 (page 33). The disagreement between these two studies may also be due to the difference in ethnicity and cultural background as one study was for Asian Americans and the other one was for non-Asian Americans.

2.5.2. Marital status

Being married was negatively associated with psychological distress symptoms in immigrants. In a Community-based survey of Vietnamese American using CES-D to assess depressive symptoms, results indicated that married individuals had lower CES-D scores than non-married ($\beta = -.162, p < .01$) (Tran, Manalo, & Nguyen, 2007). However, the protective effect of marriage in psychological distress may be gender specific. Another study used a different instrument of GHQ to assess psychological distress of 1485 Asian American immigrants and non-immigrants in Montreal showed that being married significantly predicted lower GHQ score only in females ($B = -.01, p < .01$) but not in males ($B = -.00, p > .05$). (Jarvis, Kirmayer, & Lasry, 2005). Similar findings were also noted in a sample of Latin American immigrants using SCL-90-R to assess psychological distress symptoms. The study concluded that being accompanied by a spouse or partner was associated with significantly lower level of psychological distress in females ($r = 0.19, p = .019$), but not males ($r = 0.03, p = .75$). The study also showed

that merely living with a partner or relative did not have the protective effect in females ($r < -0.07, p > .41$) or in males ($r < -0.06, p > .42$) (Aroian, Norris, Asuncion, Fernandez, & Averasturi, 2008).

Marriage was a relationship that brought encouragement and love. The relationship strengthened one's resilience to against the stress in life and acted as a buffer to psychological health. However, merely living together was not the same as married to share life with each other. The quality of the marriage differences the magnitude of the protective effect in psychological distress.

2.5.3. Religious

Religious practices fortified the sense of meaning to life. It defended stresses and promoted emotional well-being (Ponizovsky, Radomislensky, & Grinshpoon, 2009). Jarvis, Kirmayer, & Lasry (2005) conducted a secondary data analysis from health care utilization in Montreal using GHQ to assess level of distress. The sample of 1485 Asian Americans immigrants (42.6%) and non-immigrants (57.4%) were surveyed and stratified. Result showed that attendance at religious service was significantly negatively associated to GHQ scores ($B = -.15, p < .01$). The study concluded that religious practice augmented social support and coping skills, buffer against stressful life events.

2.5.4. Financial Strain

Financial stability played an important role in immigrant's psychological health. Financial difficulties in immigrants intensified the stressful situation for immigrants. Tran, Manalo, & Nguyen (2007) studied Vietnamese Americans and reported that being employed was a significant protective factor to depressive symptoms ($\beta = -.176, p < .01$). A secondary data analysis of the National Latino and Asian American Study (2002-2003)

examined 164 of South Asian American subgroup, using K-10 to assess their psychological distress and noted that financial strain significantly predicted higher distress scores ($B = 0.73, p = .005$) in males (Masood, Okazaki, & Takeuchi, 2009).

Financial strain was a risk factor for development of psychological distress in immigrants. However, the effect may be gender specific and affected males only.

2.5.5. Education

The relationship between education and psychological distress was contradictory in immigrants. Education was often used as a proxy measure of individual's social economic status (SES). Overall, people completed a higher level of education had more opportunities to have a higher income job, a more stable income and more likely to have a higher social status.

Tran, Manalo, & Nguyen (2007) conducted a community-based survey in an East Coast metropolitan area, the study surveyed 311 of Vietnamese American using CES-D. The results showed that higher education level significantly predicted lower depressive symptom scores ($\beta = -.162, p < .01$). Other studies showed opposite results. Shim and Schwartz (2008) studied 118 Korean immigrants in the USA. The cross sectional survey used Brief Symptom Inventory (BSI) to assess their psychological distress symptoms and found that education level did not predict psychological distress scores ($B = -.01, p = .29$). In Spain, Aroian, Norris, Asuncion, Fernandez, & Averasturi (2008) examined 300 Latin American immigrants (150 male and 150 female) psychological status using SCL-90-R. The study also concluded that higher education was not associated with lower level of psychological distress ($r = < -0.02, p > .85$). The relationship of education and level of distress could be gender specific. Jarvis, Kirmayer,

&Lasry (2005) analyzed a secondary data of health care utilization in Montreal using GHQ and found similar results. The study contained 1485 stratified community sample mixed with Asian Americans immigrants and non-immigrants, concluded that higher education was a significant predictor to lower level of psychological distress in females ($B = -.25, p < .01$) and not in males ($B = -.12, p > .05$).

Education revealed contradictory results in psychological distress and influenced males and females differently.

2.5.6. Length of stay in the USA

Length of stay was often used as a proxy measure of acculturation. Theoretically, immigrants who stay in the USA longer were better adjusted, more Americanized and fitted into the community better than newcomers. Ponizovsky, Radomislensky, & Grinshpoon (2009) used GHQ to assess the psychological distress in immigrants and proposed two possible risk periods in the length of stay to their psychological health. The study consisted of 4858 Former Soviet Union immigrants participated in the Israel National Mental Health Survey. The first at risk period was when immigrants just arrived and faced the drastic life changes. Second at risk period happened at the later stages of adjustment when emergencies and family difficulties occurred. The conclusion was conflict with the results of another study of Vietnamese immigrants. Tran, Manalo, & Nguyen (2007) in a community-based survey, surveyed 311 Vietnamese American and noted an inverted U-shape relationship between length of stay and level of depression. Depressive symptoms were high during the initial 12.5 years of settlement ($\beta = 0.558, p < .001$) and then began to decrease ($\beta = -0.461, p < .01$) after 12.5 years. The length of residency was the strongest factor to predict depressive symptoms ($\beta = -0.461, p < .01$) in

the study.

It was not surprising when Aroian, Norris, Asuncion, Fernandez, & Averasturi (2008) studied 300 Latin American immigrants in Spain and found the length of stay was not significantly related psychological distress ($r = 0.09, p = .29$) because the length of stay of participants in the study was from 18.1 to 72.8 years. According to Tran's study; the participants in the study had passed the peak of the inverted U-shape effect.

Length of stay was often used as a proxy measure for acculturation. The longer one stayed the less psychological distress they experienced. According to Tran, Manalo, & Nguyen (2007), the effect of length of stay on psychological distress was not linear. More studies were required to further understand the relationship between length of stay and psychological health.

2.5.7. Social support

Social support was associated with psychological distress. Social support divided into direct services, emotional support and social integration. Direct services included providing material aid and advice for problem solving. Emotional support was the personal interaction to provide security, intimacy and reassurance of worth. Social integration was the involvement in social and community activities. When social support was lacking, immigrants were more vulnerable to stress in life (Kim & Grant, 1997). Syed, Dalgard, & Dalen, et al., (2006) analyzed a secondary dataset from Oslo health study (2000-2001) using Hopkins Symptom Checklist (HSCL-10) to assess the psychological distress symptoms. The data contained 1351 Norwegian and 339 Pakistanis immigrants. The number of good friends was a significantly predictor of psychological distress scores in Pakistanis immigrants ($B = -.06, p < .001$). Similar results were reported

in a cross sectional survey with 113 Chinese immigrants in United Kingdom (UK) using GHQ to assess their psychological status. Having fewer Chinese friends was significantly related to mild or moderate symptoms of poor mental health. (χ^2 (df =1) =3.83; p=.05) (Huang and Spurgeon, 2006).

Knowing that someone who cares about you was available to help when you needed them was the key factor in social support. It promoted individual's physical and psychological health (Sarason, et.al., 1983). The single most reliable predictor of psychological health was to ask if individuals have anyone with whom they can share their innermost thoughts and feeling (Vega and Rumbant, 1991).

Social support was important and positively related to psychological health for immigrants.

2.5.8. English language proficiency

English proficiency was imperative to the adaptation for immigrants in the USA. Language was a skill for communication and living. Language barriers affected individuals' capacity to perform daily activities and impacted their dependency. Lack of English proficiency also limited immigrants' ability to acquire knowledge of the host country, prevented them from getting resources and decreased their opportunities in the society.

A study of 321 non-Western Muslim immigrants in a population-based survey, using K-10 to assess psychological distress symptoms and showed that language proficiency was a significant predictor of psychological distress scores ($\beta=0.20$, $p=.026$) (Fassaert et.al., 2009). Asian Americans generally had a lower level of English proficiency. This was particularly important in elderly immigrants. According to 2000

census, more than 83% of all immigrants spoke a language other than English at home and many were in “linguistic isolation” because of the language barriers (Grieco, 2003).

Language barrier could also be a form of acculturation stress. In Netherland, a study examined 321 Muslim immigrants from Turkey and Morocco, using K-10 to assess their psychological status and concluded that the lack of skills for living such as language proficiency was associated with higher distress level ($p = .026$). The lack of language skill caused individual to feel disadvantaged and to be in an outsider’s status (Fassaerk et. al., 2009)

Lacking of English proficiency in immigrants caused inconvenient in everyday life and increased stress in personal interaction. The feeling of inadequate in the society and could not function in full capacity affected their self-esteem and took a toll on their psychological health (Dion et. al., 1990).

2.6. Acculturation factors of immigrants’ health

This section reviews the relationship of acculturation factors in social realm to psychological health. Factors of acculturation and acculturation stress will be examined

2.6.1. Acculturation

Acculturation was the adaptation to the new environment. Immigrants went through process of acculturation and enculturation. Acculturation was a process to learn to adapt to new environment and negotiate between two different cultures. Enculturation was a process of becoming socialized into and maintaining the norms of the origin countries (Suinn, 2009). Acculturation would not just happen as two cultures come into contact; the strategy of adaptation was largely depended on the social and environment factors. The process of adaptation was also different among ethnic groups (Takeuchi, et.

al., 2007). Until now, there was no available model to fully explain the mechanism of how individual chooses one culture over the other (Padilla and Perez, 2003). However, immigrants with a high acculturation level were more likely to be successfully integrated to the new culture with their original cultures. When two cultures integrated, immigrants were able to identify themselves in both cultures without conflicts. Immigrants had high acculturation level acquired the bicultural identity integration and were truly adapted to the new environment physically and emotionally (Benet-Martinez & Haritatos, 2005).

When there was incompatibility in bi-cultural identities, immigrants' perceived conflict between the culture of host country and the country of origin. The incompatibility created mix feeling because situations may contradict or conflict with one and another culture. This confusion and emotion was associated with psychological discomfort. In a study of 67 mainland Chinese immigrants in Hong Kong, using the SCL-90-R to assess their psychological status and reported that the cultural identity integration played a key role in the adaptation and daily functioning of long-term migrant population. Psychological adjustment was positively predicted by the bicultural identity integration ($\beta = 0.24, p < .01$) (Chen, Benet-Martinez, & Bond, 2008). Bicultural identity integration was an indicator of the fit between an individual and the host culture (Chiriboga, 2004). It affected how people perceive conflicts and relationships. It also influenced the use of different strategies in dealing of stressors. As immigrants increased interaction with host culture, they may have an increase or decrease in acculturation stress depending on the circumstances, the perceived stress level and the social context (Jang & Chiriboga, 2009).

Acculturation was a complex concept. Studies of acculturation used different operational definitions. It was important to recognize the definition in interpreting the

result correctly. Hwang & Myers (2007) surveyed 1747 Chinese immigrant and the USA born in Los Angeles County. The study used the University of Michigan's version of Composite International Diagnostic Interview (UM-CIDI) to diagnose depressive disorder and showed that those who had higher acculturated level were significantly more likely to report negative life events such as being robbed, relationship breakup, in trouble with law and social conflicts than those who were less acculturated. ($F(1,1395) = 8.25, p = .01$; $F(1,1394) = 36.84, p = .01$ respectively). The study concluded that high level of acculturation moderated the effects of negative events in predicting depression disorder ($OR = 1.52, 95\% CI = 1.03-2.25, p = .04$). In this study, acculturation was measured by the time resided in the USA. Therefore, it would be more accurate to interpret the time in the USA was a moderator in predicting depression disorder.

Acculturation was a crucial factor in psychological health for immigrants. The concept of acculturation was complex and there was no standard definition to measure it. Therefore, it was difficult to conclude if higher level of acculturation was good or bad to immigrants. It depended on the definition and the interpretation.

2.6.2. Acculturation stress

Acculturation stress was the challenges that immigrants could not avoid. Acculturation stress divided into two categories: task oriented stress and emotional-oriented stress. Task oriented stress was the stress related to performing tasks such as performing daily activities and getting resources. Emotional-oriented stress was the stress associated with the psychological needs such as feeling homesick, isolated and experiencing discrimination (Ponizovsky, Radomislensky, & Grinshpoon, 2009; Jang & Chiriboga, 2009).

Studies found that acculturation stress was positively associated with level of psychological distress in immigrants. Mo, Mak and Kwan (2006) surveyed 131 women who immigrated to Hong Kong from mainland China, using SCL-90-R to assess their psychological distress and found acculturation stress significantly predict psychological distress scores ($\beta = .29, p < .001$). Chen, Benet-Martinez, & Bond (2008) used the same instrument (SCL-90-R) in her study also found similar results. This cross sectional study surveyed 67 mainland Chinese migrants of Hong Kong and noted psychological adjustment was negatively predicted by acculturation stress ($\beta = -0.30, p < .01$). In addition, Huang and Spurgeon (2006) used GHQ to examine 113 Chinese immigrants in UK and found that immigrants who perceived difficulty in coping had significant higher rate of poor mental health than those who had no difficulty ($\chi^2 (df = 1) = 4.45; p = .04$).

Jang and Chiriboga (2009) surveyed 472 Korean American elders in Florida using Geriatric Depression Scale (GDS-SF) to assess their depressive symptoms. The study concluded that acculturation stress mediated the relationship between acculturation and depression symptoms ($r = -.47, p < .05$). Another cross sectional study surveyed 300 Latin American who immigrated to Spain, using SCL-90-R to assess their psychological status, also reported higher level of acculturation stress was related to higher level of psychological distress ($p < .001$) (Aroian, Norris, Asuncion, Fernandez, & Averasturi, 2008).

One of the sources of acculturation stress was discrimination. Discrimination was recognized as a psychological stressor in ethnic minority groups. It was a risk factor for poorer physical and psychological health (Finch, Hummer, Kolody, & Vega, 2001; Schulz, Israel, Williams, Parkers, Becker, & James, 2000). In a study of 2047 Asian (USA

born and foreign born), foreign born Asian reported more discrimination than the USA born ($t = -5.07, p < .001$). Discrimination was significantly associated with psychological distress symptoms ($b = .05, SE = .02, p < .05$) (Yip, Gee and Takeuchi, 2008).

Acculturation stress was positively associated to psychological distress symptoms. Immigrants who perceived stresses in their daily life, whether tasks or emotional related, would have a higher level of psychological distress.

2.7. Summary

This chapter provided an overview of the current research related to biological, social and acculturation factors that influenced the psychological health in Chinese immigrants.

In psychological realm, Immigrants were at higher risk to develop psychological distress. Chinese immigrants had a higher lifetime prevalence of any mental disorder compared to other ethnic groups. The distress altered the function of individual, family and the community. It also led to the disruption of family, friendship and other social networks

In the biological realm, physical health was negatively associated to level of psychological distress in immigrants. Study showed that immigrants in general had a poorer physical health. Overall, female immigrants were at higher risk to develop psychological distress than males, but the evidence had not been found in Chinese immigrants. The association between age and psychological distress in immigrant was not clear.

In the social realm, age at migration showed ambiguous findings to psychological distress. Being married was negatively associated with psychological

distress in immigrants, especially in females. However, merely living with a partner or relative did not have any protective effect in females or in males. Religious practice was negatively related to psychological distress. It augmented social support and coping skills and served as a buffer against stressful life events. Financial difficulties in immigrants intensified the stress of adaptation and are positively related to psychological distress. Education was often used as a proxy measure of individual's social economic status (SES) and showed negative relationship to psychological distress. Studies of length of stay and psychological distress noted an inverted U-shape effect with the distress level peak at 12.5 years after migration and then gradually decreased after the 12.5 years period. Social support was positively associated with psychological distress. Lack of social support was related to higher psychological distress level. English proficiency was related to the adaptation. Language was a skill for communication and living. Poor English proficiency was associated with higher psychological distress.

Regarding acculturation factors in social realm, acculturation was an indicator of the fit between an individual and the dominant culture. It identified individuals who were at risk for development of psychological distress because acculturation level affected how people perceived conflicts and relationship; it also influenced the strategies in dealing of stressors. Studies of acculturation indicated conflicting results due to variation in definition and measuring instruments. Acculturation stress was the challenges that immigrants could not avoid. Most of the studies found that acculturation stress positively associated with psychological distress in immigrants.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This study was a cross sectional descriptive correlational survey of Chinese immigrants in Howard County. The purpose of this study was to identify risk factors for psychological distress of Chinese immigrants. The intention is to identify modifiable factors to facilitate interventions to decrease the development of psychological distress in Chinese immigrants. Findings would enrich the understanding of Chinese immigrants' psychological health condition. Further inform the development of community programs that were culturally sensitive to improve psychological health in Chinese immigrants. The research questions are: (1) what is the rate of psychological distress in Chinese immigrants? (2) Are biological factors related to psychological distress score in Chinese immigrants? (3) Is there a relationship between social factors and psychological distress symptoms in Chinese immigrants? (4) Is acculturation (bicultural competency and bicultural identity integration) related to psychological distress in Chinese immigrants? (5) Are acculturation stress scores related to psychological distress scores in Chinese immigrants? (6) Do acculturation factors and acculturation stress scores add to the prediction of psychological distress scores beyond the contributions of biological and the rest of social factors in Chinese immigrants? This chapter discussed the setting, the sample, human right protection, instrumentation, feasibility, research procedure, and data analysis.

3.2 The Setting

This study was conducted in Howard County, Maryland (MD). In Howard County, the primary organizations representing the Chinese community were three

Chinese language schools and two Chinese churches (Association for the Study and Development of Community, 2005).

3.3 Study Participants

The target population was Chinese immigrants. The sample was recruited from Howard County. To obtain a more representative sample, multiple recruitment strategies was used including contacting community leaders, recruitment at community service events and Asian health fair.

3.3.1. Community Leaders

According to the publication by FIRN, Inc. and the Howard County Department of Citizens Service, there were five community organizations representing Chinese immigrants population in Howard county; Chinese schools (n=3) and Chinese churches (n=2). Each group had a designated leader. All the leaders of these Chinese immigrants' groups were contacted and invited to participate in this study. Leaders informed members of this study, all members in the groups were invited to participate in the study.

3.3.2 Community Service

Chinese Americans Doctors Association (CADA) and Asian American Health Center (AAHC) in Howard County provided community services such as blood pressure screening event and free administration of influenza vaccine to promote Chinese immigrants' health. Chinese immigrants attending these events were informed of this study by poster, flyers and invited to participate.

3.3.3 Asian Health Fair

Howard County Asian health fair was hosted in the fall of each year. Each year, hundreds of Asian Americans participated in the fair to receive free health screening,

health information and resources. Chinese immigrants came to the health fair, 2010 were informed of this study by poster, flyers and invited to participate.

These recruitment methods were used to be able to identify Chinese immigrants in Howard County.

The study assumed the sample recruited by community leaders in Chinese community organizations, at various community service events and Asian health fairs represented Chinese immigrants' population in Howard County, Maryland.

Inclusion criteria were men and women, who were Chinese immigrants, able to read and understand Chinese, equal or greater than 18 years old.

3.4 Sample size

To obtain a reliable regression model, ten cases of data for each predictor was required in the model (Field, 2005). This study includes a total of 19 independent variables: twelve in demographic, two in bicultural identity and competency, one in perceived acculturation stress and four in physical health. A total of 190 completed surveys were required for the study. Taking incomplete survey into consideration, a sample size of 240 was estimated to produce 190 completed surveys and to examine a maximum of 19 predictors in regression model.

3.5 Instruments

All tools selected for this study were written in Chinese. The questionnaires were divided into three sections. Section one was about biological information. Section two was the social information and section three was to examine the psychological distress symptoms.

3.5.1. Section one: Biological information

Eight questions were for biological information. The questions included: where were you born? (Description), gender (Male/Female), age (Years), self-reported health status (Bad/Fair/Good/Excellent), and physical health. For physical health, four questions were used to assess the participants' physical health. The questions included presence of hypertension (Yes/No/don't know), heart disease (Yes/No/don't know), diabetes (Yes/No/don't know) and stroke (Yes/No/don't know). The results were examined by two approaches: (1) the presence of individual chronic health condition. (2) The presence of chronic health conditions was added together to give a chronic health condition score. The total score ranged from zero to four. Higher scores corresponded to the presence of more chronic diseases.

3.5.2 Section two: Social information

3.5.2.1. Part I: Social factors

Questions for social information were: age at migration (Years old), Marital status (Married/widowed/divorced/others), religious practice such as prayer or attend service regularly (Yes/No), do you struggle to pay your monthly bills? (Yes/No), education level (Less than high school/ high school/ More than high school), do you have anyone who you can share your innermost thoughts and feeling? (Yes/No), do you have health insurance (Yes/No), English language proficiency (Not at all/Not too well/Well/Very well).

3.5.2.2 Part II: Acculturation factors

Two items were used to examine how participants identify themselves with the culture of origin (Chinese) and with the receiving culture (USA). "How much do you

identify with USA culture?” and “How much do you identify with Chinese culture?” Responses were measured on a 6-point scale and ranged from 1 (very weakly identified) to 6 (highly identified). Higher scores corresponded to higher strength of identity of their cultural orientation (Chinese vs. USA). After identified mean and median of each item, a median splits was performed on each item. Scores fell at or above median split score was categorized as high and scores below the median split was categorized as low. Individuals whom scored both two items on high category were classified as high bicultural competency and the rest was classified as low bicultural competency (Benet-Martinez & Haritatos, 2005). Individual with high bicultural competency was equally involved in both the USA and Chinese cultures. They acquired the skills and knowledge to comfortably identify themselves in both cultures. Individual with low bicultural competency involved more with one of the two cultures or only involved moderate-low level with both cultures (LaFromboise, Coleman, & Gerton, 1993).

Bicultural Identity integration scale (BIIs-1) was a nine item questionnaire developed by Benet-Martinez et. al. (2002). The instrument used a 5-point scale of 1 (strongly disagree) to 5 (strongly agree) to assess the extent of integration between both cultures. Two major components in this scale were identified: cultural distance and cultural conflict. Higher bicultural identity integration was negatively associated with cultural distance ($r = -.48, p < .05$) and cultural conflict ($r = -.35, p < .05$). Cultural distance, the perceiving of the two culture identity as separated instead of fused, was largely associated with the traditional acculturation factors such as years lived in the USA ($r = -.29, p < .05$) and language proficiency ($r = -.55, p < .05$). Cultural conflict was the feeling of being torn between two cultures instead of seeing the compatibility. It was

related to intercultural relation such as the feeling of rejection ($r = .31, p < .05$) and cultural isolation ($r = .28, p < .05$). BIIs-1 scores were the summed of these two components. Some items needed to be reversed so that high scores reflected high level of bicultural identity integration. The alpha reliability coefficient for the scale in the Chinese population was 0.70 (Chen, Benet-Martinez, & Bond, 2008).

Riverside Acculturation Stress Inventory (RASI) consisted of 15 items which assessed acculturation stress in five life domains: work, language skills, intercultural relations, discrimination/prejudices, and cultural/ethnic makeup of the community. Response was measured on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). The total score ranged from minimum of 15 to maximum of 75. Higher scores corresponded to higher acculturation stress. The alpha reliability coefficient for the scale in Chinese population was 0.87. (Chen, Benet-Martinez, & Bond, 2008, Benet-Martinez & Haritatos, 2005)

3.5.3 Section three: Psychological distress symptoms

Kessler psychological distress scale (K10) consisted of 10 items. It was used to measure non-specific psychological distress symptoms in the previous 30 days. The scale was largely used to identify likely cases of anxiety and depression in the community and to monitor treatment progress. Responses to each item were measured on a 5-point scale ranging from 1 (all of the time) to 5 (none of the time). The total score ranged from 10-50. The instrument assessed the frequency of behavioral, emotional, cognitive, and somatic expression of psychological distress experienced. A total score of >20 indicated individual was likely to have psychological distress, and a score >30 indicated that an individual was likely to have severe psychological distress (Kessler, Barker, Colpe,

Epstein, Gfroever, & Hiripi, et. al., 2003). A higher score on the K10 was correlated with anxiety and affective disorder, area under the receiver operating characteristic curve of serious mental illness was 0.854 (Kessler, et. al., 2003). The alpha reliability coefficient for general population was 0.93 (Kessler et. al., 2003). The scale was also valid for Asian American, the alpha reliability coefficient was 0.79 (Masood, Okazaki, & Takeuchi, 2009).

Extra two questions were included in the survey to better understand what kind of programs would be beneficial to immigrants: what kind of program will help you most to adapt the life in the USA (language/ knowledge of USA culture/ job information/ Chinese support group), comments about sources of stress as an immigrant, and describe “bad emotional state” in your own words. The last question was asked to further understand what constitute the “bad emotional state” in the context of Chinese culture and language.

3.6 Feasibility

Previous experience in working with the Chinese Americans Doctors Association (CADA) demonstrated the adequacy of the response to questionnaires distributed through community leaders.

In 2009, a non-profit physician group (CADA) collaborated with other community organizations to conduct a health survey of Chinese Americans in Howard County. The results were used in a grant application for funding to promote Chinese American health in Howard County.

The self-administered survey consisted of thirty questions divided into two sections. Section one was for demographic information and section two was health

information. Sample questions in section one included age, gender, nationality, status of health insurance, English proficiency, size of household and marital status. Questions about health information were yes and no questions to determine the presence of hypertension, diabetes, osteoporosis, hepatitis, vaccination and more.

The survey packets were distributed to a number of Chinese community organizations such as Chinese schools and Chinese churches by community leaders. A total of 110 completed surveys from Chinese Americans who reside in Howard County were collected in two weeks.

The preliminary results showed that 28% of Chinese immigrants did not speak English, 26% had poor English proficiency, 36% had no health insurance, 13% had diabetics, 36% had hypertension and 32% had high cholesterol (CADA, unpublished observation, 2009). The results suggested the feasibility of using community leaders to recruit sample in Howard County, Maryland.

3.7 Research procedure

3.7.1 IRB approval

The study was approved by the Institutional Review Board (IRB). The invitation for participation, the purpose and procedure of the study, the right to withdraw from the or participate in the study, the risks and benefits for participation, the anonymity of the questionnaires, the protection of privacy and confidentiality, and the contact information for concerns and questions was described.

Participation to the study required time to complete the survey. The questions in the survey may remind participants of their unpleasant experiences. There was no more

than minimal risk for participation. Participation in the study had no direct benefit to individual. The results from the survey would benefit the Chinese immigrant community.

3.7.2 The recruitment method

A modified drop-off and pick-up method was used to conduct the survey. The drop-off and pick-up method delivered the survey packets to participants by hand, allowed time to complete the survey and picked up by researcher. It retained the advantages of self-administration approach. It was relatively fast to collect data and maintaining high response rates. In a community survey using the drop-off and pick-up method, the estimated response rate was 72% and the completion rate among those responded was 79%. It was relatively low cost and most appropriate to use in small community study. In addition, this method provided opportunity for researcher to gain insight of the study by working directly in the community, observing the layout of the community and increased understanding of the characteristics of the sample. This additional information was not available in either mail nor telephone survey method and it was helpful in interpreting survey results. (Melby, Bourke, Luloff, Liao, Theodorri and Krannich, 2000).

3.7.3 The recruitment procedure:

3.7.3.1 By community leaders.

1. The leader of the community organization informed members of this survey study. Purpose, procedure and inclusive criteria of the study were explained to the members. All members were invited to participate. Voluntary participation and the protection of confidentiality were emphasized.
2. The researcher was available in the facility for questions or concerns.

3. Participants picked up survey packets from the researcher in the facility.
4. Survey packets included following: cover letter, IRB approved consent document, questionnaires of cultural orientation, Bicultural Identity Integration Scale, Riverside Acculturation Stress Inventory, chronic diseases checklist, Kessler Psychological Distress Scale, and the demographic information.
5. Participants filled out the survey on site.
6. A sealed and non-see-through drop off box was used to collect completed survey in the facility.
7. The drop off box was kept by the researcher.

3.7.3.2 By community service events and Asian health fair:

1. Chinese immigrants who participate in the community service events and Asian health fair were informed of this study by posters and flyers in the facility.
2. Same survey packet as above was used.
3. Participants picked up survey packets from the researcher in the facility.
4. Participants filled out the survey on site.
5. A sealed and non-see-through drop off box was used to collect completed survey in the facility.
6. The drop off box was kept by the researcher.

3.8 Data Analysis

The statistical software program SPSS was used for statistical analysis. Results were considered statistically significant when $p < .05$. Prior to data analysis, frequencies of each variable was checked to identify any missing values, outliers and ensure the accuracy of data input, variables was assessed for multicollinearity to meet the

assumptions of statistical test. Descriptive statistics was used to describe all dependent and independent variables.

Research question 1: What is the rate of presence of psychological distress symptoms in Chinese immigrants? The rate was estimated based on answers to the Kessler psychological distress scale. A cut off score of 20 was used to determine the presence of psychological distress symptoms. Descriptive analysis was used; frequency and percentage of participants with psychological distress symptoms were calculated.

Research question 2: Are biological factors related to psychological distress score in Chinese immigrants? Pearson correlation, Chi square tests, t-tests and Analysis of Variance (ANOVA) were used to examine the relationship between psychological distress scores and biological variables.

For variables of age (years), Pearson correlations was used to examine their relationship with psychological distress score. For physical health, number of chronic health condition was summed; Pearson correlation was used to examine the relationship of physical health with psychological distress score. Chi square test was used to examine the difference in presence of psychological distress symptoms (Yes/No) in each chronic condition (Yes/No). Independent t-tests were used to examine the gender differences in psychological distress score. For self-reported health status (bad/ fair/good/excellent), ANOVA was used to examine the differences in psychological distress score and the four self-reported health statuses.

Research question 3: Is there a relationship between social factors and psychological distress symptoms in Chinese immigrants? Pearson correlation, Chi square tests, t-tests and ANOVA were used to examine the relationship between psychological

distress symptoms and social variables.

Age at migration (year old) and length of stay in the USA (year): Separate Pearson correlations were used to examine their relationship with psychological distress score.

For variables of religious practice such as prayer or attend service regularly (Yes/No), do you struggle to pay your bills? (Yes/No), do you have anyone who you can share your innermost thoughts and feeling? (Yes/No), health insurance status (Yes/No): Independent t-tests were used to examine the group differences in the mean of psychological distress score. Chi square test was used to examine the difference in presence of psychological distress symptoms (Yes/No).

For marital status (Married/widowed/divorced/others), education (less than high school/ high school/ more than high school), English language proficiency (not at all/ not too well/ well/ very well) : Analysis of variance was used to examine the differences in psychological distress score in four marital status, three education levels and four English language level.

Research question 4: Is acculturation (bicultural competency and bicultural identity integration) related to psychological distress in Chinese immigrants? Pearson correlation was used to examine the relationship of bicultural identity integration (BIIs-1score) with psychological distress score. Chi square tests were used to examine the difference in presence of psychological distress symptoms (Yes/No) in bicultural competency (high/Low).

Research question 5: Are acculturation stress scores related to psychological distress scores in Chinese immigrants? Pearson correlation was used to examine the

relationship of acculturation stress (RASI score) with psychological distress score (K-10 score).

Research question 6: Do acculturation factors (bicultural competency, bicultural identity integration and acculturation stress scores) add to the prediction of psychological distress scores beyond the contributions of biological and the rest of social factors in Chinese immigrants? Multiple regressions were used to test the best predictors for positive of psychological distress symptoms. Step 1: a simultaneous multiple regression analysis with all of the predictors of psychological distress symptoms in biological factors and all social factors except for the acculturation stress (RASI score), bicultural competency and bicultural identity integration (BIIs-1 score) were entered as a block. Variables that did not predict psychosocial distress score at $p < .20$ were eliminated from the model and the model was rerun. Step 2: variables identified as predictors in step 1 was entered as first block. Second block of predictors including acculturation stress (RASI score), bicultural competency and bicultural identity integration (BIIs-1 score) were added to examine the independent contributions of these variables to psychological distress scores after controlling for the other variables and each other. Interaction effect was examined.

3.9 Summary

This study was a cross sectional descriptive correlational study. A community survey among Chinese immigrants in the Howard County, MD was conducted. A convenient sample was used to recruit a total of 247 participants. The study was approved by IRB to protect the human subjects. This study examined the relationship between biological factors, social factors and psychological distress symptoms in selected

population. The instrumentation, feasibility and research procedure were discussed in this chapter. Data was analyzed using descriptive statistics, Pearson's correlation, Chi's square, t-tests, Analysis of variance and multiple regressions.

CHAPTER 4: Results

4.1. Introduction

The purpose of this study is to identify risk factors for psychological distress of Chinese immigrants using a biopsychosocial model. The intention is to identify modifiable factors to facilitate interventions to decrease the development of psychological distress in Chinese immigrants. The research questions are: (1) what is the rate of psychological distress in Chinese immigrants? (2) Are biological factors related to psychological distress score in Chinese immigrants? (3) Is there a relationship between social factors and psychological distress symptoms in Chinese immigrants? (4) Is acculturation (bicultural competency and bicultural identity integration) related to psychological distress in Chinese immigrants? (5) Are acculturation stress scores related to psychological distress scores in Chinese immigrants? (6) Do acculturation factors and acculturation stress scores add to the prediction of psychological distress scores beyond the contributions of biological and the rest of social factors in Chinese immigrants? Results reported in this chapter include description of the sample, biological and social variables, statistical analyses of relationship between biological, social, acculturation factors and psychological distress symptoms of Chinese immigrants in this sample.

4.2. Description of sample

The participants were recruited from three types of sites: Chinese schools, a health fair and community service activities (see Table 1). The Chinese school sites were the two largest Chinese schools in Howard County. The health fair site was the Asian American Health Fair that takes place once a year in Howard County; it is sponsored by community organizations, hospitals and churches to provide free health screening,

seminars and resources to Asian Americans. The community service activity was a series of events providing flu shots in the community. The activity was located at churches, schools, and a clinic.

The majority of participants were born in China (61.5%). Participants born in Taiwan and Hong Kong each comprised 17% of the total sample. Place of birth was missing for 4.5% of the participants.

Table 1

Description of participants (N= 247) according to the recruitment site

Survey site	frequency	percentage
Chinese school	122	49.4
Health fair	31	12.6
Community service activity	94	38.1

4.3. Biological variables

The sample as a whole was relatively young. Age ranged from 21 to 78 years (M = 46.37 years old, SD = 11.6 years). A majority of the participants were female (66.4%). Age of immigration to the USA had a wide range from 5 to 72 years old. The average age of migration to the USA was at 30.89 years old (SD =12.8 years). Most of the participants self-reported having good (39.7%) or fair (43.7%) health. About 10% of the sample has a history of hypertension or diabetes, less than 5% had a history of heart disease or stroke (see Table 2).

Table 2

Description of participants (N=247) according to the frequency and percentage of the biological variables

Variables	Frequency	Percentage	Mean	SD	Range Min. - Max.	Missing percentage
Age			46.37	11.6	21-78	6.5
21-39	71	28.7				
40-69	147	59.5				
70-79	13	5.3				
Age at migration			30.89	12.89	5-72	9.3
< = 25	73	29.6				
26-31	77	31.2				
> =32	74	30				
Sex						0.4
Female	164	66.4				
Male	82	33.2				
Self-reported health						0.8
Bad	5	2				
Fair	108	43.7				
Good	98	39.7				
Excellent	34	13.8				
Hypertensive						1.2
Yes	31	12.6				
No	202	81.8				
Diabetes						2.8
Yes	18	7.3				
No	207	83.8				
Heart disease						2.8
Yes	7	2.8				
No	216	87.4				
Stroke						3.6
Yes	3	1.2				
No	226	91.5				

4.4. Social variables

A majority of the participants were married (87.4%). About half (48.2%) of the sample had been in the USA for more than 12 years. They were mostly well educated with 75.7% having more than a high school level education. Almost 80% of the sample had health insurance and more than 80% stated that they had someone who they can share their most innermost thoughts and feelings. Approximately one third (32.4%) of the participants struggled to pay their monthly bills. More than half (69.2%) of the participants reported that they had no regular religious practice. Only 6.9% of the participants disclosed that they do not speak English at all and a majority (72.9%) of the participants reported well or very well in English proficiency (see Table 3).

Table 3
Description of the participants (N=247) according to the frequency and percentage of the social variables

Variables	Frequency	%	Mean	SD	Missing	
					Min.- Max.	%
Years in USA			15.35	10.82	0-70	11.3
< = 12	100	40.5				
> = 13	119	48.2				
Marital status						1.6
Married	216	87.4				
Divorced	9	3.6				
Widowed	4	1.6				
Others	14	5.7				
Education						0.8
Less than high school	23	9.3				
Completed high school	34	13.8				
More than high school	187	75.7				
Have medical insurance						0
Yes	195	78.9				
No	52	21.1				
Have someone to share your feelings						2.8
Yes	202	81.8				
No	38	15.4				
Struggle to pay monthly bills						2.4
Yes	80	32.4				
No	161	65.2				
Have regular religious practice						2
Yes	71	28.7				
No	171	69.2				
English proficiency						0.4
Not at all	17	6.9				
Know some	49	19.8				
Well	83	33.6				
Very well	97	39.3				

4.5. Acculturation variables

The bicultural competency scale includes two items. The median of each item was identified. Participants who scored above the median on both items were classified as having high bicultural competence. All other participants were categorized as having low bicultural competence.

Many participants 131(53%), reported having very strong or strong cultural orientation to China. Regarding cultural orientation to the USA, 57 (23.1%) reported feeling strongly related to the USA culture and 9 (3.6%) said they agreed that their orientation to USA culture was “very strongly”. About one third (29.1%) of the participants stated that their orientation was “somewhat strong” and about one quarter (25.1%) said their orientation was “somewhat weak” to the USA culture. The results indicated that participants in the study had a slightly stronger orientation to Chinese culture than to the USA culture. In this sample, 96 (38.9%) had a high level of bicultural competency and 151 (61.1%) had low bicultural competence (see Table 4)

Bicultural identity

While level of bicultural competency assesses how individuals identify themselves and their involvement in both cultures, BII evaluates participants’ opinions of how much the USA and Chinese cultures were integrated. Level of BII is measured with BII-1 scale. The scores of negative items are reversed. The BII score ranged from 16 to 40, mean score was 28.59 (SD = 4.43). About 43% of the participants scored higher than the mean score and about 47% of the participants scored lower than the mean score. The higher the BII-1 score indicated a higher integration of Chinese and USA identities (see

Table 4). The Cronbach's Alpha of BIIS-I in this sample was 0.689, an acceptable internal reliability.

The Riverside Acculturation Stress Inventory (RASI) was used to assess the acculturation stress in five life domains: work, language skills, intercultural relations, discrimination, and cultural/ethnic makeup of the community. RASI scores ranged from 22 to 69. The mean score was 44.65 (SD =8.38). The mean and median were almost the same in all the subscales of RASI with a small standard deviation. The subscale scores range from a minimum of three to a maximum of 15. The mean score on the work related subscale was 10.3 (SD = 2.0); the mean score on the subscale related to language skill was 9.2 (SD = 2.7); the mean score on the subscale related to intercultural relationship was 7.5 (SD = 2.1); the mean score on the subscale related to discrimination/prejudice was 8.8 (SD = 2.3); and the mean score on the subscale related to cultural isolation was 8.8 (SD = 2.3) (Table 4). About 51% of participants scored below the mean score of RASI and about 44% of participants scored above the mean score (see Table 4). The Cronbach's Alpha of RASI in this sample was 0.870, indicating good internal reliability.

Table 4

Description of participants (N=247) according to the frequency and percentage of the acculturation variables

Variables	f	%	Min.- Max.	Mean	SD	Missing percentage
Cultural orientation to China						3.2
Very weak	9	3.6				
Weak	12	4.9				
Somewhat weak	11	4.5				
Somewhat strong	75	30.4				
Strong	101	40.9				
Very strong	30	12.1				
Cultural orientation to USA						2.8
Very weak	13	5.3				
Weak	25	10.1				
Somewhat weak	62	25.1				
Somewhat strong	72	29.1				
Strong	57	23.1				
Very strong	9	3.6				
Bicultural competency						
High	92	37.3				
Low	147	59.5				
BII			16-40	28.59	4.43	10.1
RASI			22-69	44.65	8.38	4.9
RASI-1 (work)			6-15	10.3	2.00	2.4
RASI-2 (Language skill)			3-15	9.2	2.70	2.8
RASI-3 (Intercultural relationship)			3-13	7.5	2.10	3.2
RASI-4 (discrimination/prejudice)			3-14	8.8	2.30	3.2
RASI-5 (cultural isolation)			3-15	8.8	2.30	2.8

RASI=Riverside Acculturation Stress Inventory

4.6. Dependent variable

Psychological distress scores were measured with the Kessler psychological distress scale (K10) in total scores and categories. The mean score on the K10 was 16.29 (SD = 6.4). A cut off of 20 was used to identify the presence of psychological distress according to the scoring instructions (Kessler, et. al., 2003). A total of 55 (22.3%) participants showed the presence of psychological distress symptoms. Among these 55 participants, 32 (13.0%) were likely to have a mild disorder, 15 (6.1%) were likely to have a moderate disorder and 8 (3.2%) were likely to have a severe disorder (see Table 5). The Cronbach's Alpha of K10 in this sample is 0.932, indicating high internal reliability.

Table 5

Description of participants (N=247) according to the frequency and percentage of the Kessler psychological distress scale (K10)

Variables	Frequency	%	Mean	SD	Range	Missing
					Min.- Max.	%
Psychological Distress Score			16.29	6.4	10-50	3.2
Psychological distress symptoms (cut off at 20)						
Yes	55	22.3				
No	184	74.5				
Likely to be well	184	74.5				
Likely to have mild disorder	32	13				
Likely to have moderate disorder	15	6.1				
Likely to have severe disorder	8	3.2				

4.7. Statistical Analyses of Research Questions

4.7.1. Research Question #1

The first research question examines the rate of psychological distress in Chinese immigrants. A cut off score of 20 of K10 was used to determine the present of psychological distress symptoms. A total of 55 (22.3%) of the 247 participants reported the presence of psychological distress.

4.7.2. Research Question #2

The second question was to test the relationship between biological factors (age, gender, self-reported health status, presence of hypertension; diabetes; heart disease and stroke, total physical health score) and psychological distress scores in Chinese immigrants. Age and self-reported health status were related significantly to psychological distress scores. Gender, presence of hypertension; diabetes; heart disease and stroke, total physical health score did not have significant relationship with psychological distress scores. Age was significantly negatively related to psychological distress scores ($r = -.158$, $p = .018$). The older the participants, the less psychological distress they reported. Analysis of variance for self-reported health status and psychological distress score revealed significant differences in mean of psychological distress score between the participants who reported bad, fair, good and excellent health ($F(3,233) = 4.764$; $p = .003$). Post hoc tests were conducted to examine differences between groups of participants reported of bad, fair, good and excellent health. Participants who reported fair health status had a significantly higher mean psychological distress scores compared to individuals who reported good or excellent health ($p = .032$ and $p = .039$ respectively) after adjusted for multiple comparisons. However, the mean

score of psychological distress of participants who reported fair health status did not differ from those who reported poor health status ($p > .05$). Psychological distress scores differed along with the self-reported health status levels. There was no significant difference in psychological distress scores according to gender ($t = -1.143, P = .255$). The mean scores for females and males were almost the same (see Table 6). Psychological distress scores did not differ between females and males. Total health scores was not significantly correlated with psychological distress score ($r = .054, p = .403$). Chi square tests were used to examine the difference in the presence of psychological distress (Yes/No) with the presence of hypertension; diabetes; heart disease and stroke. The presence of psychological distress symptoms did not differ according to the presence of hypertension; diabetes; heart disease or stroke ($p > .05$) (see Table 7).

Table 6

Relationship of biological factors (gender, self-reported health status) to psychological distress scores of Chinese immigrants (N=274)

Variables	Mean	SD	Range	Test statistic	p
Self-reported health status				F (3,233) =	
Bad	19.40	9.00	10-34	4.764	0.003
Fair	17.86	7.40	10-50		
Good	15.22	5.24	10-43		
Excellent	14.19	3.77	10-26		
Gender				t(161.5)=	
Males	15.63	6.11		-0.043	0.255
Females	16.61	6.49			

Table 7

Relationship of biological factors of presence of hypertensive, diabetes, heart disease and stroke to the presence of psychological distress symptom (Yes/No) in Chinese immigrants (N=247)

Variables	Frequency	%	χ^2	p
Physical health- Hypertensive			0.100	0.750
Yes	31	12.6		
No	202	81.8		
Physical health-Diabetes			0.250	0.617
Yes	18	7.3		
No	207	83.8		
Physical health-Heart disease			2.530	0.112
Yes	7	2.8		
No	216	87.4		
Physical health-Stroke			3.270	0.071
Yes	3	1.2		
No	226	91.5		

4.7.3. Research Question # 3

The third question was to examine the relationship of social factors (age at migration, years in USA, regular religious practice, financial strain, having someone to share innermost thoughts and feeling, having health insurance coverage, marital status, education level, and English proficiency) to psychological distress scores. In bivariate analysis, participants with financial strain reported significantly higher psychological distress scores. All other variables: age at migration, years in USA, regular religious practice, having someone to share the innermost thoughts and feeling, having health insurance coverage, marital status, education level, and English proficiency were not related to psychological distress scores ($p > .05$).

Student t-tests were used to examine the differences in mean of psychological distress scores between groups with regular religious practice (Yes/No), with having someone to share the innermost thoughts and feeling (Yes/No), with struggling to pay their bills (Yes/No), and with having health insurance (Yes/No). Participants who struggled to pay their bills had a significantly higher psychological distress scores than individuals who did not struggle to pay their bills ($t = 4.742, p = .000$). Mean psychological distress scores differed according to participants' financial situation (see Table 8). There were no significant differences in psychological distress scores according to regular religion practice, having someone to share the innermost thoughts and feeling or having health insurance coverage (see Table 7). Analysis of variance was used to examine the differences in psychological distress score according to four marital status categories, three education level categories and four English proficiency level categories. None of them showed a significant differences in psychological distress score ($p > .05$) (see Table 8). Psychological distress scores did not differ according to four marital status categories, three education level categories, or four English proficiency level categories. Chi square tests were used to examine the difference in the frequency of presence of psychological distress (Yes/No) according to social factors (regular religious practice(Yes/No), struggling to pay their bills (Yes/No), having someone to share innermost thoughts and feeling(Yes/No), having health insurance coverage(Yes/No), marital status (Married/ Not married) , education level (Less than high school/ High school or higher), and English proficiency(Bad/Good). The presence of psychological distress was significantly different according to the presence of financial strain (χ^2 (df, 1) = 20.90, $p = .000$). Participants who struggle financially were significantly associated

with the presence of psychological distress. There were no significant differences in the presence of psychological distress in relation to regular religious practice, having someone to share innermost thoughts and feeling, having health insurance coverage; marital status, education level, and English proficiency (see Table 9).

Table 8

Relationship of social factors (financial strain, health insurance status, have someone to share the innermost thoughts and feelings, regular religion practice, educational level, marital status and level of English proficiency) to psychological distress scores in Chinese immigrants (N=247)

Variables	Mean	SD	Range	Test statistic	p
Struggle to pay bills				t(104.18)=4.742	0.000
Yes	19.45	7.87	10-50		
No	14.78	4.92	10-42		
Have health insurance				t(61.07)=-0.810	0.421
Yes	16.01	5.93	10-43		
No	17.08	7.87	10-50		
Have someone to share the innermost thoughts and feeling				t(231)=-1.795	0.074
Yes	16.07	6.23	10-50		
No	18.14	7.11	10-43		
Have regular religion practice				t(232)=-0.175	0.861
Yes	16.21	5.04	10-29		
No	16.37	6.88	10-50		
Marital status				F(3,231)=2.523	0.059
Married	16.09	6.18	10-43		
Divorced	18.44	3.64	14-25		
Widowed	24.25	17.40	12-50		
Other	16.36	4.94	10-28		
Education				F(2,234)=2.301	0.102
Less than high school	16.64	4.82	10-29		
Completed high school	18.38	10.08	10-50		
More than high school	15.85	5.57	10-43		
English proficiency				F(3,234)=2.179	0.091
Not at all	17.36	8.10	10-34		
Know some	16.96	7.44	10-50		
Well	17.20	7.07	10-43		
Very well	15.00	4.44	15-15		

Table 9

Relationship of social factors of presence of regular religion practice, financial strain, someone to share the innermost thoughts and feeling, health insurance; marital status, education level and English proficiency to the presence of psychological distress symptom (Yes/No) in Chinese immigrants (N=247)

Variables	Frequency	%	χ^2	p
Have regular religious practice			0.760	0.384
Yes	71	28.7		
No	171	69.2		
Struggle to pay monthly bill			20.900	0.000
Yes	80	32.4		
No	161	65.2		
Have someone to share your innermost thoughts and feeling			2.240	0.135
Yes	202	81.9		
No	38	15.4		
Have health insurance			0.560	0.454
Yes	195	78.9		
No	52	21.1		
Marital status			0.150	0.699
Married	216	87.4		
Not married	27	10.9		
Education			1.009	0.315
Less than high school	23	9.3		
More than high school	221	89.5		
English proficiency			0.343	0.558
High	180	72.9		
Low	66	26.7		

4.7.4. Research Question #4

The fourth question was to examine the relationship of acculturation factors (bicultural competency and BII) to psychological distress scores. There was a significant negative relationship between BII and psychological distress scores ($r = -.277, p = .000$). The higher level of BII, the less psychological distress they reported. A Chi square test was used to examine the difference in the presence of psychological distress (Yes/No) with the bicultural competency levels (high/Low). The presence of psychological distress did not differ according to the levels of cultural competency ($\chi^2 (df, 1) = 3.799, p = .051$).

4.7.5. Research Question #5

The fifth question was to examine the relationship between acculturation stress (RASI) and psychological distress score. There was a significant positive correlation between acculturation stress score and psychological distress score ($r = .421, p = .000$). Participants who reported a higher acculturation stress scores had a significant higher psychological distress scores.

4.7.6. Research Question #6

The last question was to examine whether acculturation factors (bicultural competency, bicultural identity integration and acculturation stress score) predicted psychological distress score beyond the contributions of the biological and the social factors. Hierarchical linear multiple regressions analysis was used to address this question. Step 1: all of the biological and social predictors of psychological distress were entered into the regression as a block with psychological distress scores as the dependent variable (model 1) (Table 10). Age at migration was not entered because the combination

of age at migration and years in USA explained 100% of the variability in age. Entering all of these three variables (age, age at migration and years in the USA) violate the assumption of multicollinearity. Age and years in the USA were selected for inclusion because age and years in the USA had significant interaction effect with other variables and age at migration to the USA did not have any interaction effect with other variables. The model (model 1) explained 15.4% of the variability of psychological distress scores. Age and struggled to pay bills were significant independent predictors of psychological distress scores. Participants who were younger or struggling to pay bills predicted higher psychological distress scores (see Table 10).

Table 10

Simultaneous multiple regressions (model 1) with biological and social factors as predictors of psychological distress score, N=247: Block 1

Variable	Unstandardized coefficients B	Standardized coefficients Beta	Sig.
Total health score	1.060	0.100	0.196
Age	-0.125	-0.220	0.010
Gender	1.716	0.128	0.060
Self-reported health	1.226	0.095	0.203
Years in USA	0.039	0.065	0.399
Marital status	0.634	0.031	0.659
Regular religious practice	1.367	0.097	0.164
Struggle to pay all bills	4.375	0.327	0.000
Education level	1.806	0.081	0.274
Have someone to share your feelings	1.175	0.069	0.303
Have medical insurance	0.323	0.020	0.802
English proficiency	0.023	0.002	0.987
R ²	0.203		
adjusted R ²	0.154		
F change	4.101		0.000
df	12,193		

Variables that did not predict psychological distress score at $p < .20$ (years in USA, marital status, education levels, have someone to share their innermost thoughts and feelings, have medical insurance coverage and English proficiency) in model 1 were eliminated from the model and the model was rerun. The rerun model (model 2) explained 15.5% of the variability of psychological distress scores. The adjusted R square was almost identical to model 1 and the identified significant predictors of psychological distress scores were the same as model 1. Participants who were younger or struggling to pay bills predicted higher psychological distress scores. For every increase of one year in

age, psychological distress score decrease by 0.122. The average psychological distress score of immigrants who had difficulty paying their bills was 4.272 higher than for those who did not have difficulty paying their bills (see Table 11).

Table 11

Simultaneous multiple regressions (model 2) with biological and social factors with $p < .20$ as predictors of psychological distress score, N=247: Block 1

Variable	Unstandardized coefficients B	Standardized coefficients Beta	Sig
Total health score	0.698	0.064	0.379
Age	-0.122	-0.208	0.003
Gender	1.467	0.106	0.098
Self-reported health	1.544	0.118	0.091
Regular religious practice	1.099	1.160	0.247
Struggle to pay all bills	4.272	0.310	0.000
R ²	0.178		
adjusted R ²	0.155		
F change	7.601		0.000
df	6,210		

Variables that did not predict psychological distress score at $p < .20$ in model 2 (total health scores and regular religious practice) were eliminated from the model and the model was rerun once more. The reduced model (model 3) explained 17.2% of the variability of psychological distress scores. Model 3 explained 0.6 % of variability of psychological distress scores less than model 2. The change in R square was not significant ($p = .393$). Gender became a significant independent predictor in this model. Age and struggled to pay bills were also the significant independent predictors of psychological distress scores. Participants who were younger, female and struggling to

pay bills predicted higher psychological distress scores after controlling for the effects of all other variables in the model. For every increase of one year in age, psychological distress score decrease by 0.109. Female immigrants had an average psychological distress score 1.213 higher than males. The average psychological distress score of immigrants who had difficulty paying their bills was 4.180 higher than for those who did not have difficulty paying their bills (see Table 12).

Table 12

Simultaneous multiple regressions (model 3) with biological and social factors with $p < .20$ as predictors of psychological distress score, $N=247$: Block 1

Variable	Unstandardized coefficients B	Standardized coefficients Beta	Sig.
Age	-0.109	-0.186	0.000
Gender	1.213	0.088	0.003
Self-reported health	1.860	0.142	0.161
Struggle to pay all bills	4.180	0.303	0.035
R ²	0.172		0.000
adjusted R ²	0.156		
F change	11.103		0.000
df	4,214		

Step 2: variables identified as predictors ($p < .20$) in model 3 (age, gender, self-reported health status, struggle to pay bills) were entered as the first block. A second block of predictors included all acculturation factors (RASI, level of bicultural competency and BIIs-1) were then added to the model. The model explained 23% of the variability of psychological distress scores. Acculturation factors contributed to the

adjusted R^2 significantly after controlling for the other variables and each other (change in $R^2 = .104$, $p = 0.000$). Age, struggling to pay bills and RASI were significant independent predictors of psychological distress scores. Participants who were younger, struggling to pay bills, and reported higher acculturation stress predicted higher psychological distress scores. For every increase of one year in age, psychological distress score decrease by 0.101. The average psychological distress score of immigrants who had difficulty paying their bills was 2.388 higher than for those who did not have difficulty paying their bills. For every one point increased in RASI, psychological distress score increase by 0.238 (see Table 13).

Table 13

Hierarchical linear multiple regressions with significant biological and social factors as the first block and acculturation factors as a second block to predict psychological distress score (N=247)

Variable	Block 1			Block 2		
	coefficients B	Beta	Sig.	coefficients B	Beta	Sig.
Age	-0.105	-0.177	0.008	-0.101	-0.169	0.008
Gender	1.063	0.079	0.236	-0.750	0.056	0.380
Self-reported health	2.123	0.166	0.021	1.368	0.107	0.120
Struggle to pay all bills	3.634	0.270	0.000	2.388	0.178	0.011
BII				-0.050	-0.035	0.639
RASI				0.238	0.314	0.000
Bicultural competency				-0.672	-0.052	0.436
R ²	0.153			0.257		
adjusted R ²	0.135			0.230		
Change R ²	0.153			0.104		
F change	8.780		0.000	8.983		0.000
df	4,195			7,192		

Variables that did not predict psychological distress score at $p < .20$ in this regression (gender, BII and bicultural competency) were eliminated from the model and the model was rerun once more. The model explained 24.1% of the variability of psychological distress scores. Younger age, struggling to pay bills and acculturation stress were significant predictors of psychological distress scores. This model explained the variability of psychological distress score slightly better than the last model. The R^2 was increased by 1.1% . The change was not significant ($p = .556$). The identified

significant predictors of psychological distress scores were the same. Participants who were younger, struggling to pay bills or reported higher acculturation stress predicted higher psychological distress scores. For every increase of one year in age, psychological distress score decrease by 0.108. The average psychological distress score of immigrants who had difficulty paying their bills was 3.007 higher than for those who did not have difficulty paying their bills. For every one point increased in RASI, psychological distress score increased by 0.251 (see Table 14).

Table 14.

Rerun of hierarchical linear multiple regressions with significant biological and social factors and acculturation factors to predict psychological distress score, N=247

(model 4)

Variable	Unstandardized coefficients B	Standardized coefficients Beta	Sig
Age	-0.108	-0.179	0.003
Self-reported health status	1.339	0.102	0.116
Struggle to pay all bills	3.007	0.217	0.001
RASI	0.251	0.326	0.000
R ²	0.256		
Adjusted R ²	0.241		
F	17.938		0.000
df	4, 209		

4.7.6.1. Interaction effect

Interactive effects between variables were examined. There were 3 pairs of significant interactive variables to psychological distress score (see Table 15).

Table 15

Significant interactive variables to psychological distress score

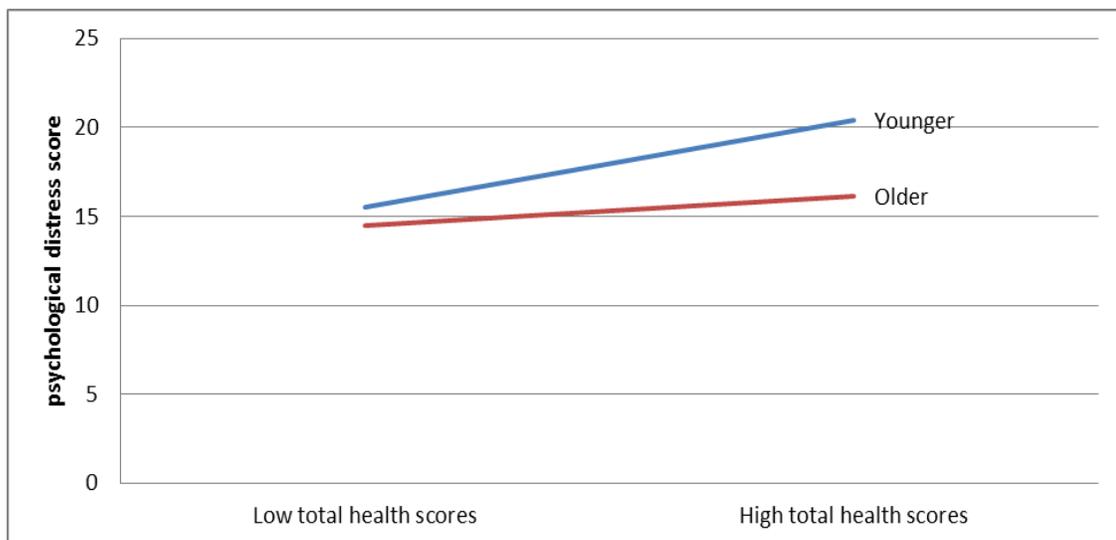
Interactive variable	Unstandardized coefficients B	Standardized coefficients Beta	F	df	Sig
Age	-0.085	-0.150			0.055
Total health scores	8.568	0.782			0.018
Age*total health scores	-0.123	-0.687	4.010	1,220	0.044
RASI	0.449	0.598			0.000
Yrs. in USA	0.310	0.501			0.065
RASI*Yrs in USA	-0.008	-0.587	4.486	1,196	0.035
RASI	0.272	0.355			0.000
Eng. Proficiency	-13.587	-0.915			0.013
RASI*Eng. proficiency	0.267	0.895	5.689	1,225	0.018

There was a significant interaction effect of age and total health scores on psychological distress scores. Higher total health scores represented more chronic diseases. The higher the total health score, the higher psychological distress scores. The prediction of psychological distress score by total health score depended on age. Younger participants with more chronic diseases had much higher psychological distress scores than younger participants with fewer chronic diseases. Figure 3 shows estimated prediction of psychological distress scores for participants with total health scores one standard deviation above (high: 0.81) and one standard deviation below (low: -0.33) the mean and age one standard deviation above (high: 57.9 years old) and one standard

deviation below (low: 34.77 years old) the mean. The increase in psychological distress scores for older participants from fewer chronic diseases to more chronic diseases was smaller than the increase for younger people. Having more chronic diseases affected younger participants' psychological distress scores more than those of older participants. The lowest psychological distress was experienced by older participants with fewer chronic diseases. The highest psychological distress was experienced by younger participants with more chronic diseases (see Figure 3).

Figure 3

Interactive effect of age and total health scores as predictors of psychological distress scores



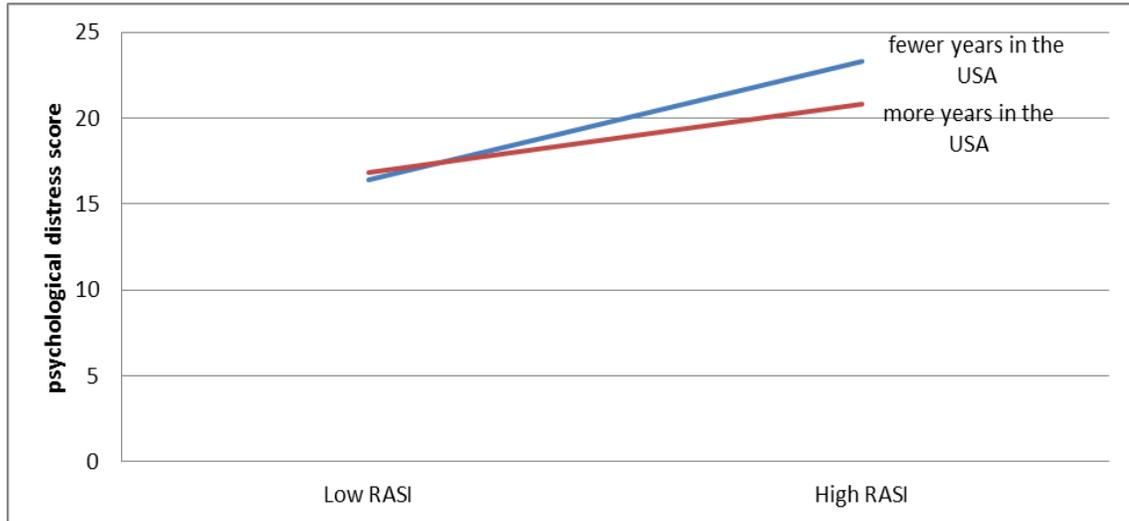
Low total health scores = one standard Deviation below the mean of total health scores
 High total health scores = one standard Deviation above the mean of total health scores
 Younger = one standard Deviation below the mean of age
 Older = one standard Deviation above the mean of age

Acculturation stress scores (RASI) were positively related to the psychological distress scores. Participants who reported higher RASI scores had higher psychological distress scores. There was a significant interaction effect of RASI and years in the USA

on psychological distress scores. Figure 4 shows estimated prediction of psychological distress scores for participants with RASI scores one standard deviation above (high: 53.03) and one standard deviation below (low: 36.27) the mean and years in the USA one standard deviation above (high: 26.17years) and one standard deviation below (low: 4.53 years) the mean. The prediction of psychological distress score by RASI depended on years stayed in the USA. Participants who stayed fewer years in the USA and experienced higher acculturation stress had much higher psychological distress scores than participants who stayed fewer years in the USA and experienced lower acculturation stress. The increase in psychological distress scores for participants who stayed longer in the USA from lower RASI to higher RASI was smaller than the increase for participants who stayed fewer years in the USA. Higher RASI affected psychological distress scores of participants who stayed fewer years in the USA more than of participants who have been in the USA longer. The highest psychological distress was experienced by participants who stayed fewer years in the USA and had high RASI (see Figure 4).

Figure 4

Interactive effect of RASI score and years in the USA as predictor of psychological distress scores



Low RASI = one standard Deviation below the mean of RASI

High RASI= one standard Deviation above the mean of RASI

Fewer years in the USA = one standard Deviation below the mean of years in the USA

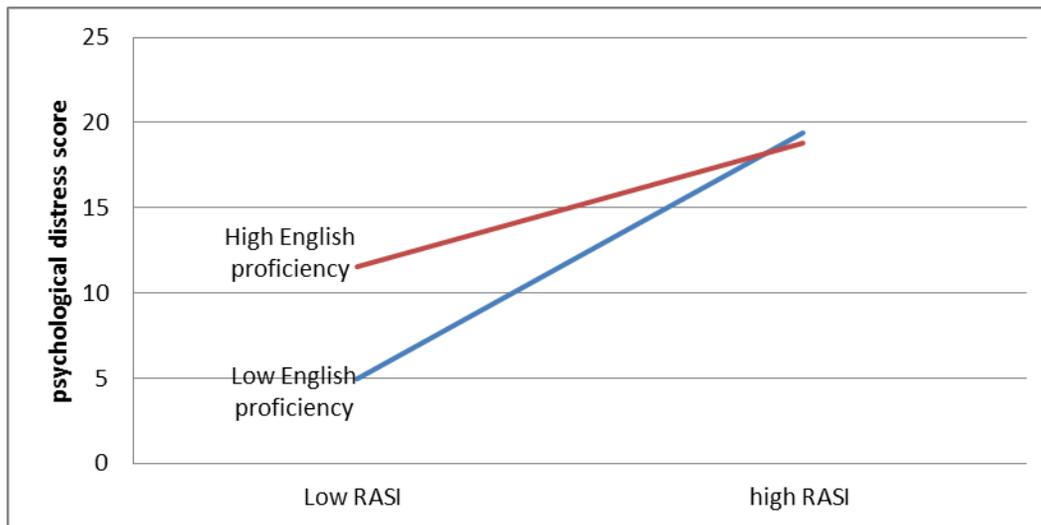
More years in the USA = one standard Deviation above the mean of years in the USA

There was a significant interaction effect of English proficiency and acculturation stress on psychological distress scores. The prediction of psychological distress score by RASI depended on English proficiency. Participants with lower English proficiency and high RASI had much higher psychological distress scores than participants with lower English proficiency and low RASI. Figure 5 shows estimated prediction of psychological distress scores for participants with RASI one standard deviation above (high: 53.03) and one standard deviation below (low: 26.27) the mean and high English proficiency (0) and low English proficiency (1). The increase in psychological distress scores for participants with higher English proficiency from low RASI to high RASI was smaller than the increase for participants with lower English

proficiency. Higher RASI affected psychological distress score of participants with lower English proficiency more than of participants with higher English proficiency. The lowest psychological distress was experienced by participants with lower English proficiency and lower RASI. The highest psychological distress was experienced by participants with lower English proficiency and higher RASI (see Figure 5).

Figure 5

Interactive effect of RASI and English proficiency as predictor of psychological distress scores



Low RASI = one standard Deviation below the mean of RASI
 High RASI= one standard Deviation above the mean of RASI
 Low English proficiency =1
 High English proficiency =0

To summarize the interaction effects on psychological distress scores. There were three significant moderator relationships. 1) Total health scores predicted psychological distress scores differently according to age. The worst psychological distress occurred in younger participants who had more chronic diseases. 2) Acculturation stress scores (RASI) predicted psychological distress scores differently

according to the length of stay. The worst psychological distress occurred in participants who had fewer years in the USA and experienced higher RASI. 3) Acculturation stress (RASI) scores also predicted psychological distress scores differently according to English proficiency level. Participants with lower English proficiency level and high RASI reported the highest psychological distress scores.

Simultaneous multiple regression was used to examine the relationship of significant biological factors (age, self-reported health status, total health scores), social factors (struggle to pay bills, years in the USA, English proficiency), acculturation factor (RASI score) and interaction factors (RASI*years in the USA, RASI* English proficiency, age*total health scores) to psychological distress scores (see Table 14). The model explained 27.1% of the variability of psychological distress scores. The interactive factors explained an addition of 3% of the variance in the dependent variable and the change in R^2 was significant ($p = 0.04$). Struggling to pay bill; higher RASI scores and lower English proficiency level were significant predictors of higher psychological distress scores after controlling for all other variables (see Table 16).

Table 16

Multiple regression to examine the contributions of biological, social, acculturation and interactive factors to psychological distress score, N=247 (Model 5)

Variable	block1			block 2		
	B	Beta	Sig.	B	Beta	Sig.
Age	-0.100	-0.165	0.036	-0.044	-0.073	0.393
Self-reported health status	1.251	0.096	0.177	1.361	0.105	0.138
RASI	0.270	0.358	0.000	0.227	0.302	0.017
Years in the USA	0.008	0.014	0.852	0.004	0.007	0.982
English proficiency	-1.341	-0.091	0.232	-12.277	-0.830	0.039
Struggle to pay bills	3.264	0.241	0.001	3.093	0.229	0.001
Total health scores	0.599	0.055	0.442	7.089	0.646	0.055
RASI * Years in the USA				-0.001	-0.049	0.874
RASI* English proficiency				0.231	0.779	0.057
Age*total health score				-0.120	-0.655	0.066
R ²	0.277			0.308		
adjusted R ²	0.250			0.271		
Change R ²				0.031		
F change	10.395		0.000	2.820	0.040	
df	7,190			3,187		

All Variables that did not predict psychological distress scores at $p < .20$ (years in the USA and RASI*years in the USA) were eliminated from the model and the model was rerun (see Table 17).

Table 17

Multiple regression to examine the contributions of biological, social, acculturation and interactive factors to psychological distress score, N=247 (Model 6)

Variable	block1			block 2		
	B	Beta	Sig.	B	Beta	Sig.
Age	-0.108	-0.178	0.008	-0.073	-0.120	0.091
Self-reported health status	1.632	0.124	0.070	1.799	0.137	0.043
RASI	0.264	0.342	0.000	0.204	0.265	0.000
English proficiency	-1.567	-0.104	0.130	-12.995	-0.863	0.016
Struggle to pay bills	3.089	0.223	0.001	2.916	0.211	0.001
Total health scores	0.549	0.049	0.471	6.496	0.582	0.055
RASI* English proficiency				0.245	0.808	0.028
Age*total health score				-0.109	-0.588	0.062
R ²	0.265			0.295		
adjusted R ²	0.244			0.267		
Change R ²				0.030		
F change	12.433		0.000	4.339	0.014	
df	6,207			2,205		

Variables that did not predict psychological distress scores at $p < .20$ in model 6 (Total health scores and age*total health scores) were eliminated from the model and the model was rerun (see Table 18).

Table 18

Multiple regression to examine the contributions of biological, social, acculturation and interactive factors to psychological distress score, N=247 (Model 7)

Variable	block1			block 2		
	B	Beta	Sig.	B	Beta	Sig.
Age	-0.097	-0.160	0.010	-0.096	-0.159	0.010
Self-reported health status	1.719	0.131	0.054	1.182	0.138	0.040
Struggle to pay all bills	3.145	0.227	0.001	2.986	0.216	0.001
RASI	0.264	0.343	0.000	0.203	0.263	0.000
English proficiency	-1.490	-0.099	0.148	-13.732	-0.912	0.011
English proficiency *RASI				0.257	0.850	0.021
R ²	0.263			0.282		
Adjusted R ²	0.245			0.261		
R ² change				0.019		
F change	14.849		0.000	5.45		0.021
df	5, 208			1, 207		

The final regression model identified four significant predictors of psychological distress score: age, self-reported health status, struggle to pay bills and RASI*English proficiency. Younger age, self-reported of poorer health status and struggling to pay bills predicted higher psychological distress scores. Also, English proficiency level significantly interacted with RASI to predict psychological distress. Participants reported that high RASI and low English proficiency levels predicted a higher psychological distress scores compared to participants who reported high RASI and high English proficiency levels. For every increase of one year in age, psychological distress score decrease by 0.096. The average psychological distress score of immigrants who had difficulty paying their bills was 2.986 higher than for those who did not have difficulty

paying their bills. Also, the average psychological distress score of participants who reported poorer self-reported health status was 1.182 higher than for those who reported better health status.

4.8. Summary

Statistical procedures were conducted to examine the six research questions. For the first question, psychological distress rate in Chinese immigrants was examined. A total of 55 (22.3%) participants reported presence of psychological distress. Among these 55 participants, 32 (13.0%) were likely to have a mild psychological distress, 15(6.1%) were likely to have a moderate psychological distress, and 8 (3.2%) were likely to have a severe psychological distress. The second question examined only biological predictors of psychological distress scores. Only age and self-reported health status had a significant relationship with psychological distress scores. The rest of the biological factors: gender, presence of hypertension; diabetes; heart disease and stroke, total physical health scores were not significantly related to psychological distress. The third question tested only social predictors of psychological distress scores. Participants with financial strain reported significantly higher psychological distress scores. All other variables: age at migration, years in USA, regular religious practice, having someone to share the innermost thoughts and feelings, having health insurance coverage, marital status, education level, and English proficiency were not significantly related to psychological distress scores. The fourth question examined the association of acculturation factors to psychological distress score. Bicultural identity integration showed significant negative correlation with psychological distress score. The presence of psychological distress did not differ according to level of cultural competency. The fifth question tested the

relationship between acculturation stress scores and psychological distress score.

Acculturation stress scores were positively correlated with psychological distress scores.

In the last question, a series of hierarchical linear multiple were conducted to examine whether acculturation factors and acculturation stress scores add to the prediction of psychological distress scores beyond the contributions of biological and the rest of social factors. In addition, interaction effects were examined. Three significant interactive variables were identified. The final regression model resulted in four significant predictors of psychological distress score in Chinese immigrant: age (younger), self-reported health status (poorer in health status), struggling to pay bills and the interaction factor of higher RASI scores and the lower levels of English proficiency predict higher psychological distress scores. Younger age, self-reported of poorer health status and struggling to pay bills predicted higher psychological distress scores. Also, English proficiency level significantly interacted with RASI to predict psychological distress. Participants reported that high RASI and low English proficiency levels predicted a higher psychological distress scores compared to participants who reported high RASI and high English proficiency levels. Discussion and implications are addressed in chapter 5.

Chapter 5: Discussion and implications

This chapter includes an overview of the study, discussions and implications of the findings, recommendations for nursing practice and limitations of the study.

5.1 Overview of the study

The purpose of this study was to identify risk factors of psychological distress in Chinese immigrants using a biopsychosocial model. The intention was to identify modifiable factors for development of interventions to prevent psychological distress in Chinese immigrants. The research questions were: (1) what is the rate of psychological distress in Chinese immigrants? (2) Are biological factors related to psychological distress score in Chinese immigrants? (3) Is there a relationship between social factors and psychological distress symptoms in Chinese immigrants? (4) Is acculturation (bicultural competency and bicultural identity integration) related to psychological distress in Chinese immigrants? (5) Are acculturation stress scores related to psychological distress scores? (6) Do acculturation factors (bicultural competency, bicultural identity integration and acculturation stress scores) add to the prediction of psychological distress scores beyond the contributions of biological and the rest of social factors?

Survey questionnaire included biological, social and psychological questions. All instruments were written in Chinese. The seven questions for biological information included gender (Male/Female), age (Years), self-reported health status (Bad/Fair/Good/Excellent), and physical health. Four questions were used to assess the participants' physical health including: presence of hypertension (Yes/No/don't know), heart disease (Yes/No/don't know), diabetes (Yes/No/don't know) and stroke

(Yes/No/don't know). Eight questions assessed general social information: age at migration (Years old), Marital status (Married/widowed/divorced/others), religious practice such as prayer or attend service regularly (Yes/No), do you struggle to pay your monthly bills? (Yes/No), education level (Less than high school/ high school/ More than high school), do you have anyone who you can share your innermost thoughts and feeling? (Yes/No), do you have health insurance (Yes/No), English language proficiency (Not at all/Not too well/Well/Very well). Two scales were used (bicultural competency scale and BIIs-1) to measure acculturation status. Kessler psychological distress scale (K 10) was used to measure psychological status. Chinese immigrants were recruited in three community sites and 247 participants completed the surveys.

A total of 22.3% of participants in the sample scored 20 or above on the Kessler Psychological distress scale indicating the presence of psychological distress . In the examination of the relationship of biological factors to psychological distress scores, only age (younger) and self-reported health status (poorer health status) had a significant relationship to psychological distress. In regards to social factors, participants who indicated they struggled to pay their bills had significantly higher psychological distress scores; no other social factors were significant to psychological distress score. For acculturation factors, bicultural identity integration (BIIs-1) and acculturation stress (RASI) were positively related to psychological distress. Hierarchical linear multiple regressions identified four significant predictors of psychological distress scores: age (younger), self-reported health status (poorer health status) and interactive effect of RASI and English proficiency (poorer English proficiency)

5.2. Discussion

5.2.1. Research question #1

Psychological distress is an unpleasant subjective state with symptoms of depression and/or anxiety and has both emotional and physiological manifestation (Mirowsky and Ross, 2003). The psychological distress rate among Chinese immigrants in the study was 22.3%, much higher than the 13% in the general population (GP Care, 2011). The finding was consistent with the suggestion of previous literature that immigrants have a higher rate of psychological distress than the general population (Wu, Tran, & Amjad, 2004; Lee, 2007; Mui, et. al., 2007; Suinn, 2009). Immigration is a stressful event because immigrants face challenges from unfamiliar environment, at work, discrimination, conflicts of cultural values, loss sense of security and/or feeling isolated or home sickness (Benet-Martinez & Haritatos, 2005). Among those who were experiencing psychological distress, almost 10% reported moderate or severe psychological distress. These participants need self-help programs or professional mental health assistance to decrease their distress level. It is challenging to improve mental health in Chinese because of the stigmatism Chinese attached to poor mental health. Also, the lack of Chinese speaking mental health providers makes it harder to intervene. The result of current study indicated need for culturally sensitive interventions and programs to reduce the psychological distress rate in Chinese immigrants.

5.2.2. Research question #2

The second question was to test the relationship between biological factors and psychological distress scores. Participants in the sample were mostly healthy with very low rate of chronic diseases. This was in agreement with their self-reported health status

in the survey. Most of them reported fair or good health. Total physical health score was a sum of the number of chronic diseases and it did not show significant relationship to psychological distress. This was different from most of the immigrant studies suggested immigrants were generally had a poorer physical health. Although the total physical health score was not significantly related to psychological distress, self-reported health status was significantly associated with psychological distress scores. Total physical health score in the study was measured by the number of the most common four chronic diseases (hypertensive, diabetes, heart disease and stroke) and did not include physical health assessment. Self-reported health status may be a more inclusive assessment of physical health. Health status was an important predictor of psychological distress in Chinese immigrants. The findings in the current study were consistent with findings from a previous study of immigrant health that better self-reported health status was associated with better psychological health (Tran, Manalo, & Nguyen, 2007). The relationship between self-reported health and psychological distress also confirmed the linking of the biological realm and the psychological realm of biopsychosocial model. Effective health promotion interventions are important to decrease psychological distress in Chinese immigrants.

The relationship of age and psychological distress was not clear in the existing literature and presented mixed results (Ponizovsky, Radomislensky, & Grinshpoon, 2009; Tran, Manalo, & Nguyen, 2007). Age was negatively related to psychological distress scores in this study which was different from the previous reports of Ponizovsky et. al. (2009), a study of Israel immigrants from former Soviet Union and Tran et. al. (2007), a study of Vietnamese Americans who reported a positive correlation and no relationship

of age to psychological distress respectively. However, neither of these two studies included acculturation stress in their regression models. The variables incorporated in the regressions contribute to the difference in findings. For most of the Chinese, living with parents and assuring that elders are being taken care of are the priority. The family oriented culture in Chinese culture may ease some stress from Chinese elderly in this population.

Age has been studied as an important factor related to psychological distress but not much previous discussion was devoted to the interaction effect of age and other predictors. Age represents different stage of life. Different stages of life come with different priorities and challenges. Age was negatively related to psychological distress in the study and had an interactive effect with total health scores. Younger participants in the sample (37 years old or younger) experienced more distress when they had more chronic diseases compared to older participants. It is understandable that people in this age range (37 years old or younger) may have greater responsibilities and obligation for their families. Diseases mean more expenses in health care, less working time, and possibly less life expectancy. It will be particularly stressful for immigrants when there are hurdles in health management such as language and cultural barriers, limited health care access and limited financial resources. More attention should be dedicated to younger Chinese immigrants who struggle with health problems, especially in the four most chronic diseases. Health care for Chinese immigrants should aim to prevent the development of chronic diseases and ultimately minimize their risk of developing psychological distress.

Female immigrants were thought to be more susceptible to psychological distress but the evidence was not found in Chinese immigrants (Wu, Tran, &Amjad, 2004). In this study, gender was not related to depressive symptoms and females did not have significantly different depressive scores from males. Gender had no significant interactive effect with social support, RASI, English proficiency, education or length of stay in the USA as predictors of psychological distress scores. This result supported the conclusion of earlier studies showing no gender difference in psychological distress in Chinese immigrants (Wu, Tran, &Amjad, 2004; Tran, Manalo, & Nguyen, 2007).

5.2.3. Research question #3

The third question examined the relationship of social factors to psychological distress. Financial status was the only factor had significant association with psychological distress. This sample was obtained in Howard County, Maryland. Howard County is third richest county by per capita income in the nation. Yet, financial uncertainty remains a strong predictor of psychological distress for Chinese immigrants. Interventions of social services need to meet the finance challenges in Chinese immigrants and help them to decrease their psychological distress.

Age at immigration seems to be a risk factor for psychological distress. Studies suggested that teen's age was a turning point in regard to age of immigration and the development of psychological distress (Takeuchi, et. al., 1998; Breslau, Borges, Hagsr, Tancredi, & Gilman, 2009). Age at immigration did not have significant relationship with psychological distress scores in this study. In the study, age at immigration had a wide range and less than 15% of participants came to the USA when they were at teen age. The distribution of age at immigration may contribute to the non-significant finding.

Length of stay in the USA was often used as a proxy measure of acculturation. The longer length of stay in the USA may help individuals fit into the community better and experience less distress than the new comers. An inverted U-shape relationship between length of stay and psychological distress with peak at 12.5 years was identified (Tran, Manalo, &Nguyen, 2007). No significant relationship between years in the USA and psychological distress was identified in this study. There was no different in psychological distress between groups of different length of stay in the USA. It was worth noting that Participants in this study had a longer length of stay in the USA ($M = 15.38$, $SD = 10.82$) and a wide range from less than one year to 70 years. In addition, a bigger proportion of participants in the current study stayed in the USA more than 13 years. Thus most of the participants were passed the peak (12.5 years) of the inverted U-shape effect and may contribute to the lack of significant relationship between length of stay and psychological distress. This non-significant result was consistent with the report of Aroian, Norris, Asuncion, Fernandez, &Averasturi (2008) which also had a longer length of stay in the study sample.

Regular religious practice had shown negative association with psychological distress in Asian American immigrants including Caribbean, Vietnamese and Filipino (Jarvis, Kirmayer, &Lasry, 2005). In this study, regular religious practice did not have significant relationship to level of psychological distress. Only 29% of the participants in the study had regular religious practice, the lack of variation may have contributed to the non-significant finding. Perhaps the buffer effect of religious practice was not homogenous across the Asian American subgroups.

Having someone to share their innermost thoughts and feelings was a predictor of psychological distress (Vega and Rumbant, 1991). No significant relationship was found between this kind of support to psychological distress in this study. It was impressive to note that participants in the sample had a highly supportive environment. About 82 % of the participants reported they had someone with whom they can share their feeling and thoughts. The result showed that Chinese Americans had a very close community and having a good friend was common. This lack of variation may contribute to the non-significant result.

Being married was negatively associated with less psychological distress . Aroian, Norris, Asuncion, Fernandez, &Averasturi (2008) concluded that the quality of marriage added a buffer to psychological distress in Vietnamese American and Latin Americans immigrants. We found no differences of psychological distress between married and non-married participants. The non-significant result was consistent among male and female participants. In this study, about 87% of the participants were married. This lack of variation may contribute to the non-significant result. Further research with non-married immigrants is needed to understand the relationship of marriage status to psychological distress in Chinese immigrants.

Education had revealed contradictory results to psychological distress. Jarvis, Kirmayer, &Lasry (2005) reported the effect of education to psychological distress was gender specific. In the current study, about 76 % of participants had more than high school education. There was no significant relationship of education level to psychological distress. There were also no gender differences in the relationship of education level to psychological distress. The lack of variation in education in the current

study may contribute to the non-significant result. A more comprehensive sample with less educated population including those who do not participate in community activities or Chinese school is need to articulate the effect of education to psychological distress in Chinese immigrants.

English proficiency is imperative for the adaptation of immigrants. Lack of English proficiency was associated with psychological distress. Most of participants (73 %) in the study reported overly high in English proficiency. In this study, the effect of English proficiency on psychological distress scores depended on level of acculturation stress. English proficiency interacted with acculturation stress was the strongest predictor of psychological distress. Participants reported with lower English proficiency and high acculturation stress had much higher psychological distress scores than participants with lower English proficiency and low acculturation stress. The increase in psychological distress scores for participants with higher English proficiency from low acculturation stress to high acculturation stress was smaller than the increase for participants with lower English proficiency. Higher acculturation stress affected psychological distress score of participants with lower English proficiency more than of participants with higher English proficiency

One of the considerations of the non-significant result was context of English proficiency. In general, English proficiency included four aspects: reading, writing, understanding and speaking. Most of the Chinese immigrants had discrepancy between the ability to read, write, understand and speak. Particularly for those who had higher education, they may be able to read and write English well but may have limited ability to understand and speak English. When asking them to self-report their English

proficiency, participants may be assessing themselves based on their reading and writing or weight differently among the four aspects in English proficiency. Perhaps the relationship of English proficiency to psychological distress was more sensitive to speaking and understanding in English proficiency. A more clear definition of English proficiency was needed to further understand how the perception of English proficiency affects psychological distress.

Poor in English proficiency affects everyday life, increases stress in personal interaction and the perception of discrimination (Kim, Wang, Deng, Alvarez, & Li, 2011; Dion, Dion, & Pak, 1990). However, this suggestion may vary depending on the environment. First, it was not uncommon for Chinese immigrants to work in Chinese restaurants, laundry shops or beauty parlors which did not require a high level of English proficiency. Therefore, the level of English proficiency to them would not be as important as to those who were working in an environment that expected them to speak and understand English like USA born Americans. We did not ask if the participants spoke mainly Chinese or English at home and at work. Another example of environmental influence was many elderly Chinese immigrants are taking care of by their families. They are self-sufficient without even needing to interact with the outside world. Their families would perform any English related tasks for them such as calling, talking, shopping, interpreting and writing. Therefore, English proficiency levels would have very little impact to their lives and would not affect their psychological status. The study result reminds us that while English proficiency was imperative to immigrants in adaptation, measurement and environment could influence its consequence.

5.2.4. Research question #4

The fourth question was to examine the relationship of acculturation factors (bicultural competency and bicultural identity integration) to psychological distress scores. Bicultural competency assesses how individuals identify themselves and their involvement in both cultures. About only one third of participants were classified as high bicultural competency, indicating most of the participants view themselves as belong to only one culture rather than both cultures. The concept of ethnic loyalty described Bicultural competency was very close ($p = 0.051$) to become a significant factor related to psychological distress in the study.

Bicultural identity integration (BIIs-1) was associated with the development of psychological distress because it evaluated participants' opinions of the fit between an individual and the host culture (Chiriboga, 2004). The study showed higher BII was associated with lower psychological distress; this result was consistent with the existing literature.

5.2.5. Research question #5

The fifth question examined the relationship between acculturation stress and psychological distress score. Many studies have found acculturation stress was positively associated with psychological distress in immigrants (Mo, Mak and Kwan, 2006; Chen, Benet-Martinez, & Bond, 2008; Huang and Spurgeon, 2006). This study also found a positive association between acculturation stress and psychological distress which confirmed earlier literature. In the current study, the prediction of psychological distress score by acculturation stress score depended on years stayed in the USA. Participants who stayed fewer years in the USA and experienced higher acculturation stress had much

higher psychological distress scores than participants who stayed fewer years in the USA and experienced lower acculturation stress. The increase in psychological distress scores for participants who stayed longer in the USA from lower acculturation stress to higher acculturation stress was smaller than the increase for participants who stayed fewer years in the USA. Higher acculturation stress affected psychological distress scores of participants who stayed fewer years in the USA more than of participants who have been in the USA longer.

5.2.6. Research question # 6

The last question examined whether acculturation factors (bicultural competency, bicultural identity integration and acculturation stress score) predicted psychological distress score beyond the contributions of biological and the social factors. All biological and social factors together explained 15.4% of the variability in psychological distress scores; adding acculturation factors to the model explained an extra 10.4% of the variability of psychological distress scores which was a significant change in the model. The result indicated the importance of acculturation factors in psychological distress among Chinese immigrants.

To further understand the complexity of biological and social factors to psychological distress in Chinese immigrants. Interactive effects were examined and three interactive effects were identified.

The first interaction was between age and total health scores which were discussed in research question #2(section 5.2.2. Page 87). The second interaction was between years in the USA and acculturation stress. Although acculturation stress increased psychological distress scores as a whole, participants who had spent fewer

years in the USA were more susceptible to acculturation stress and increase in psychological distress score than participants who had been in the USA for a longer period of time. Acculturation stress is the challenges that immigrants cannot avoid. It is the stresses they experienced at work, during intercultural relations, discrimination/prejudices, and cultural/ethnic makeup of the community (Chen, Benet-Martinez, & Bond, 2008, Benet-Martinez & Haritatos, 2005). Newcomers were not familiar with the host culture and language would encounter more problems which intensified the stress they experienced in their everyday life, putting them at a higher risk to develop psychological distress. Participants who had been in the USA a longer period of time were not exempted from acculturation stress. It still affected them, the higher the acculturation stress they experienced, the higher the psychological distress score. However, the increase in psychological distress scores was less than for the newcomers. Participants staying longer in the USA may understand the host culture better and able to acquire more resources to manage their challenges in life. When they face the acculturation stress, they are able to cope with it a bit better than the newly arrived. The result suggested two options for decreasing psychological distress in Chinese immigrants. The best way was to decrease the acculturation stress which will benefit both groups of participants: the ones who had been in the USA for a while and for those who were just been in the USA for few years. Interventions such as improve language skills to increase capability in managing everyday life; improve intercultural relationship which will improve communication, acceptance and the sense of belongings. Also, decrease misunderstanding and the feeling of isolation. The other way was to pay special attention to the newcomer group and tailor intervention to decrease their acculturation stress

because they were in a group more subjected to the increase of psychological distress when dealing with acculturation challenges.

The last interactive effect was between acculturation stress and self-reported English proficiency. Again, acculturation stress increased psychological distress scores across both English proficiency groups but the increase was more substantial in low English proficiency group than the high English proficiency group. It was clear that English proficiency was essential to immigrants in the USA because language is a skill for communication and living. Communication is crucial in getting resources and opportunities (Benet-Martinez & Haritatos, 2005). Without needed resources and assistance, it was very hard for participants in the lower English proficiency group to handle the high acculturation stress. This leads to a greater increase in psychological distress scores.

It was interesting to note those participants who had higher English proficiency had a higher psychological distress score than the lower English proficiency group when they were all facing low acculturation stress. This phenomenon indicated that the self-perception of high English proficiency only put participants into a higher level of psychological distress. Perhaps speaking English in itself was a source of stress to Chinese immigrants. The English language is very different from Chinese language. They have completely different rules of grammar, sentence structure and pronunciation systems. It was possible that the perception of high English proficiency meant they were expected to help their friends and families deal with the USA system and USA born Americans. These expectations increased their encounters with problems and situations which could induce stress to individuals.

To decrease the psychological distress in Chinese immigrants, it would be useful to decrease acculturation stress. Acculturation stress came from five main sources: work, language skills, intercultural relations, discrimination/prejudices, and cultural/ethnic makeup of the community (Chen, Benet-Martinez, & Bond, 2008, Benet-Martinez & Haritatos, 2005). Interventions and programs should be developed to focus on the modifiable factors such as increase self-assurance, improve language skills, increase knowledge of USA culture, provide opportunities to establish relationship with Americans, improve intercultural relationships, and increase the diversity of the community to decrease the sense of isolation.

Another approach to decrease distress is to increase their English proficiency level, to better equip them to manage the unavoidable acculturation stress. In Howard County, many free English classes are offered in community colleges, churches and different community organizations. However, participants still suffered from psychological distress from lack of English skills. It may be necessary to assess the effectiveness of current English programs that were offered to Chinese immigrants. Possibly improvement is required according to the results of the assessment. The development of an effective English class for Chinese immigrants should involve the stakeholders: the immigrants, to understand their unique needs and challenges. Also, cultural differences should be considered to increase the productivity of learning.

The reduced parsimonious model explained 26.1% in variability of the psychological distress. The model identified four significant predictors of psychological distress: age, self-reported health status, financial strain and the interaction variable of acculturation stress and English proficiency. The interaction effect of acculturation stress

and English proficiency was the strongest predictor of psychological distress scores. Even though that not all risk factors were modifiable, interventions and programs could be developed using the identified modifiable risk factors in the study: improve self-reported health status, resources to manage financial strain, decrease acculturation stress and improve English proficiency.

5.3. Implications

Psychological distress associated with the development of chronic physical diseases such as heart disease, stroke and diabetes (Yakushko, Watson, & Thompson, 2008). Severe psychological distress was associated with higher mortality rates (Pratt, 2009). In this study, Chinese immigrants had a higher rate of psychological distress than the general population. Interventions and programs are needed to decrease the psychological distress in Chinese immigrants; programs to increase public awareness of mental health and to decrease the stigmatism of mental illness are urgently needed. Through education, people will have more knowledge about mental health problems and psychological distress and be more receptive to treatment and counseling. Second, interventions including cultural considerations are needed to reduce psychological distress in Chinese immigrants, specifically immigrants are more likely to have mental health problems but are less likely to have had their medical providers discuss their mental problems with them (Sorkin, Tan, Hays, Mangione, & Ngo-Metzger, 2008). Health providers need to be more sensitive to the psychological health of Chinese immigrants. Furthermore, more bilingual Chinese mental health providers who understand Chinese culture are needed to decrease language barriers, enhance communication, and promote mental health.

Self-perceived health status was an important predictor of psychological health for Chinese immigrants. To modify this risk factor, health promotion includes preventive care and medical care are needed. For preventive care, education is imperative. Educational information such as pamphlets or health related websites are very useful to distribute health information. Material in Chinese will further benefit Chinese Americans with lower English literacy. For medical care, clinics with bilingual staff will be more accessible to Chinese Americans. Local non-profit clinics can provide for low income immigrants' health concerns. Health status was important to immigrants, especially younger immigrants; more attention should be focused on them because they were more imperiled by psychological distress.

Financial uncertainty was one of the major predictors of psychological distress. For immigrants who come to a new environment, it will be very difficult for them to handle financial strain. Minimizing financial strain will decrease psychological distress among Chinese immigrants. Social services and counseling sessions that coach immigrants how to manage budgets and debts; help them to understand the legal system of the USA and provide them with resources and information about finances when needed will be helpful to alleviate the stress from financial issues.

Although cultural identity and integration are not easy to modify, the community could design programs and events to facilitate the process. Programs to help Chinese immigrants to understand the USA culture will be very helpful in making sense of the customs and to interact appropriately in the society. Also, social events that provide opportunities for Chinese immigrants to socialize with Americans in a friendly and secure

environment will help establish intercultural relationship, promote communication, and increase acceptance.

English proficiency was essential to immigrants in adaption and related to the development of psychological distress. Improving English proficiency strengthens Chinese immigrants' ability to resist stressors and reduce the risk of developing psychologically distress. English education for immigrants should be accessible and effective. Involving stakeholders will improve the design of classes and make it more productive.

Decreasing acculturation stress minimizes risk of psychological distress in Chinese immigrants. Not all of the items in acculturation stress are modifiable, but some of them are, such as language skills and intercultural relationship that have been discussed earlier in this chapter. Health care providers can reduce Chinese immigrants' acculturation stress by not discriminating them as a foreigner and not to stereotype them because of their non-standard American accent. Migration is a stressful event, biological and social factors are vital to decrease psychological distress in Chinese immigrants. To reduce psychological distress in Chinese immigrants, health care providers need to understand the linking of biological, social and psychological realms to health.

5.4 Limitations

There were some limitations to the study. A convenient sample was used. People who chose to participate may be differed from those who chose not to participate. The characteristics in the sample may have systematic difference from individuals who were not in the study. To offset this limitation, the study purposely recruited sample from a number of sites to increase the variation in the sample. Since almost half of the

participants were recruited from Chinese Schools, it was possible that immigrants who enrolled their children in Chinese Schools were overrepresented in the study. On the other hand, Chinese immigrants who were depressed or anxious may be more reluctant to participate in the survey when invited; therefore, the study may underestimate the psychological distress rate in Chinese immigrants. Like many community survey, the sample may represent a particular type of participants located in the area. Participants in the sample were mostly young, healthy, had social support and were highly educated. The results may not be able to generalize to Chinese immigrants in general. However, while these prosperous population had a higher psychological distress rate than overall population, it was very likely that Chinese immigrant in general would have an even higher psychological distress rate than what was reported in the study. Social desirability response bias may occur in the study. People tended to present themselves in a favorable status; immigrants may be reluctant to confess their unsavory experiences such as having problems adapting lives in the USA psychological distress symptoms. Acknowledging their unfavorable status was associated with psychological cost and admitted they were being controlled over by others (Padilla, Perez, 2003). To eliminate the bias, trust and reinforcement of confidentiality were important. The study was conducted by a Chinese immigrant who spoke their language. Each survey was attached to a Chinese cover letter to explain how confidentiality was reinforced and that no personal information was collected in the survey. Despite these considerations, the possibility of social desirability response bias could not be eliminated. The survey did not measure past mental health problems because it could be too sensitive for Chinese immigrants and the intention to

decrease survey burden for participants. Past mental health problems may confound the psychological distress rate.

5.5. Future study

Despite the limitations, the study identified modifiable risk factors that could decrease psychological distress among Chinese immigrants. Much more is needed in this area of research to replicate these findings and further understand psychological distress in Chinese immigrants. For example, perceiving English proficiency had significant interaction with acculturation stress as predictor of psychological distress scores but was not a significant predictor by itself. Further study could investigate how Chinese immigrant measure their English proficiency and how does it interact with their acculturation stress to increase psychological distress. Also, a qualitative study might help to gain insight into the relationship of English proficiency and financial strain to psychological distress in Chinese immigrants. Finally, future research might also investigate what determines how people perceive their health status, what are the factors that contributed to the perception of health that influences the psychological health the most. Answers to these questions will provide further information about psychological health in Chinese immigrants, decrease psychological distress and improve health.

Appendix A. Approval Letter of IRB

University of Maryland, Baltimore
Institutional Review Board (IRB)
Phone: (410) 706-5037
Fax: (410) 706-4189
Email: hrpo@som.umaryland.edu

Exempt Confirmed Notification

Date: September 21, 2010

To: Sue Thomas
From: IRB Chair/Vice Chair: Stephen Seliger
RE: HP-00045477
Risk designation: Minimal Risk
Exempt Confirmed Date: September 21, 2010

This is to certify that University of Maryland, Baltimore (UMB) Institutional Review Board (IRB) has received and reviewed correspondence regarding the above referenced protocol entitled, "Psychological and physical health of Chinese immigrants in the Howard County, Maryland: A community survey."

Your protocol has been determined to be exempt under 45 CFR 46.101(b), from IRB review based on the following category (ies):

45 CFR 46.101(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Investigators are reminded that the IRB must be notified of any changes in the study. In addition, the PI is responsible for ensuring prompt reporting to the IRB of proposed changes in a research activity, and for ensuring that such changes in approved research, during the period for which IRB approval has already been given, may not be initiated without IRB review and approval except when necessary to eliminate apparent immediate hazards to the subject (45 CFR 46.103(4)(iii)).

Research activity involving veterans or the Baltimore VA Maryland Healthcare System (BVAMHCS) as a site, must also be approved by the BVAMHCS Research and Development Committee prior to initiation. Contact the VA Research Office at 410-605-7131 for assistance.

The UMB IRB is organized and operated according to guidelines of the International Council on Harmonization, the United States Office for Human Research Protections and the United States Code of Federal Regulations and operates under Federal Wide Assurance No. FWA00007145.

Appendix B. Cover Letter

Hello,

My name is Mei Ching Lee. I am a registered nurse and a doctoral student at University of Maryland School of Nursing. I am conducting a research study to better understand the impact of acculturation to Chinese immigrants' health. As a Chinese immigrant who understands Chinese, your participation in this 20 minute survey is important to the success of this study.

If you are 18 years old or above, were not born in USA and can read Chinese, you are invited to give an opinion about your experiences as an immigrant in the United States. This survey will be conducted at community organizations including Chinese schools, churches, clinics and Asian grocery stores. I would like to have about 300 participants in this survey study.

The survey will cover information about your perception of Chinese and American culture and how those perceptions affect your everyday life and health. This survey study will also examine the sources of stress for Chinese immigrants and their health care needs. Results of this survey will help us understand what kinds of programs are needed to improve the health of Chinese immigrants.

The survey takes about 20 minutes to complete. Participation is entirely voluntary and your activity in community organizations and health care will not be impacted by your decision to participate or not. The survey results will remain completely anonymous; do not put your name, date of birth, or other identifying information on the survey material. You have the right to skip any questions or stop at any time after you begin the survey.

You can pick up the survey packet at the desk of the research team, located in the facility. Completed surveys can be deposited in the sealed non see-through collection box near the research desk. Please pick up an extra copy of this letter when you drop off the completed survey so that you will have our contact information if needed later on.

If you have any questions or concerns there will be an opportunity to address them with a research team member in the facility. You may also contact me at any time. If you are concerned about my conduct during any part of this research study, you may contact Dr. Sue Thomas, my advisor for this project. Her contact information is also below.

Sincerely,

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Appendix C. Instruments

Bicultural Identity Integration (BIIs-1 Scale)

As a Chinese living in the US, you have been exposed to two cultures (**Chinese** and **American** cultures) therefore; you could be described as a bicultural or multicultural individual. The experience of being bicultural differs across individuals and we are interested in YOUR particular experience.

Now please think for few minutes how much you tend to SEPARATE (vs. COMBINE) these two cultural orientations or identities, and how much CONFLICT (vs. HARMONY) you experience about the norms and values implicit in each culture. Next, read the statements below and rate (by circling a number) the extent to which each statement describes your experience in GENERAL. Please rate ALL statements, even if they seem redundant to you; try to avoid 'Not sure' if possible.

	Strongly disagree	Somewhat disagree	Not sure	Somewhat agree	Strongly agree
1. I feel Chinese-American.	1	2	3	4	5
2. I am simply a Chinese who lives in North America.	1	2	3	4	5
3. I keep Chinese and American cultures separate.	1	2	3	4	5
4. I feel part of a combined culture.	1	2	3	4	5
5. I am conflicted between the American and Chinese ways of doing things	1	2	3	4	5
6. I don't feel trapped between Chinese and American cultures.	1	2	3	4	5
7. I feel that my Chinese and American identities are quite compatible.	1	2	3	4	5
8. I feel like someone moving between two cultures.	1	2	3	4	5
9. I feel caught between the Chinese and American cultures	1	2	3	4	5

Cultural Orientation

We would like to ask you about your **cultural/ethnic identity** (the culture you feel most sense of belonging to). Please rate the strength of your cultural identification with Mexican and American cultures by circling the appropriate number from scales 1 and 2 below.

	Very Weak	Weak	Somewhat weak	Somewhat strong	Strong	Very Strong
1. US American (North-American)	1	2	3	4	5	6
2. Chinese	1	2	3	4	5	6

Riverside Acculturation Stress Inventory (RASI)

Sometimes negotiating more than one cultural orientation or identity can be difficult. How is it for you? Below are some statements that may or may not describe your own experience. Please, for each statement circle the appropriate number.

	Strongly disagree	Somewhat disagree	Not sure	Somewhat agree	Strongly agree
1. Because of my Chinese background, I have to work harder than most Americans.	1	2	3	4	5
2. I feel the pressure that what "I" do will be seen as representative of Chinese people's abilities.	1	2	3	4	5
3. In looking for a job, I sometimes feel that my Chinese background is a limitation.	1	2	3	4	5
4. It's hard for me to perform well at work because of my English skills.	1	2	3	4	5
5. I often feel misunderstood or limited in daily situations because of my English skills.	1	2	3	4	5
6. It bothers me that I have an accent (in English or Chinese).	1	2	3	4	5
7. I have had disagreements with other Chinese (e.g., friends or family) for liking American customs or ways of doing things.	1	2	3	4	5

8.	I have had disagreements with Americans for liking Chinese customs or ways of doing things.	1	2	3	4	5
9.	I feel that my particular cultural practices (Chinese or American) have caused conflict in my relationships.	1	2	3	4	5
10.	I have been treated rudely or unfairly because of my Chinese background.	1	2	3	4	5
11.	I have felt discriminated against by Americans because of my Chinese background.	1	2	3	4	5
12.	I feel that people very often interpret my behavior based on their stereotypes of what Chinese are like.	1	2	3	4	5
13.	I feel that there are not enough Chinese people in my living environment.	1	2	3	4	5
14.	When I am in a place or room where I am the only Chinese person, I often feel different or isolated.	1	2	3	4	5
15.	I feel that the environment where I live is not multicultural enough, it doesn't have enough cultural richness.	1	2	3	4	5

Kessler Psychological Distress Scale (K10)

Please tick the answer that is correct for you:	All of the time (score 5)	Most of the time (score 4)	Some of the time (score 3)	A little of the time (score 2)	None of the time (score 1)
1. In the past 4 weeks, about how often did you feel tired out for no good reason?					
2. In the past 4 weeks, about how often did you feel nervous?					
3. In the past 4 weeks, about how often did you feel so nervous that nothing could calm you down?					
4. In the past 4 weeks, about how often did you feel hopeless?					
5. In the past 4 weeks, about how often did you feel restless or fidgety?					
6. In the past 4 weeks, about how often did you feel so restless you could not sit still?					
7. In the past 4 weeks, about how often did you feel depressed?					
8. In the past 4 weeks, about how often did you feel that everything was an effort?					
9. In the past 4 weeks, about how often did you feel so sad that nothing could cheer you up?					
10. In the past 4 weeks, about how often did you feel worthless?					

Appendix D Instruments used in the reviewed articles to assess psychological health

Instrument	Assess	Domains
Alcohol use disorder and associated disability interview schedule-Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (AUDADIS-IV)	Assess alcohol, drug, and mental disorders according to DSM-IV diagnostic criteria in both clinical and general populations	Anxiety disorder (social phobia, specific phobia, agoraphobia, panic disorder or generalizes anxiety disorder) and mood disorders (major depression, dysthymia or bipolar).
Brief Symptom Inventory (BSI)	Psychological distress symptoms (short form of SCL-90-R)	9 symptom domains: somatization, obsessive-compulsory, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism.
Chinese Beck Depression Inventory	Depressive symptoms	Depression
Structured Clinical Interview for DSM-III-R Patient version	semi structured interview for diagnostic major psychological disorders	major Axis I DSM-III-R diagnoses : schizophrenia, major depressive disorder, dysthymia, generalized anxiety disorder, panic disorder, alcohol use disorder and other psychoactive substance use disorder and other anxiety disorders.
Center for Epidemiologic Studies Depression Scale (CED-D)	Depressive symptoms	Depression
Geriatric Depression Scale (GDS-SF)	Depressive symptoms	Depression
General Health Questionnaires (GHQ-12)	Psychological distress symptoms	Psychological distress (anxiety and Depression), social and emotional dysfunction.
Hopkins Symptom checklist (HSCL-10)	Psychological distress symptoms	5 domains: somatization, obsessive-compulsive, interpersonal sensitivity, anxiety and depression.
Kessler Psychological Distress Scale (K-10)	Non-specific psychological distress symptoms	frequency of behavioral, cognitive and somative expression of distress experience

(SCL-90-R)Symptom Checklist-90-Revised	Psychological distress symptoms	9 symptom domains: somatization, obsessive-compulsory, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism.
Talbieh Brief Distress Inventory (TBDI)	Psychological distress symptoms	6 domains: obsessiveness, hostility, sensitiveness, depression, anxiety, and paranoid ideation
University of Michigan's version of composite international diagnostic interview (UM-CIDI)	Major depressive disorder	Depression
World Health Organization Composite International Diagnostic interview	Assess of any lifetime and 12 months presence of psychiatric disorders based on DSM-IV	Depression, anxiety and substance use disorder

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