UCSF
UC San Francisco Electronic Theses and Dissertations

Title

Cultural factors related to medication compliance in Chinese immigrants with hypertension

Permalink

https://escholarship.org/uc/item/2pc0z2j5

Author

Li, Wen-Wen

Publication Date

2004

Peer reviewed|Thesis/dissertation

Cultural Factors Related to Medication Compliance
in Chinese Immigrants with Hypertension

by

Wen-Wen Li

DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of
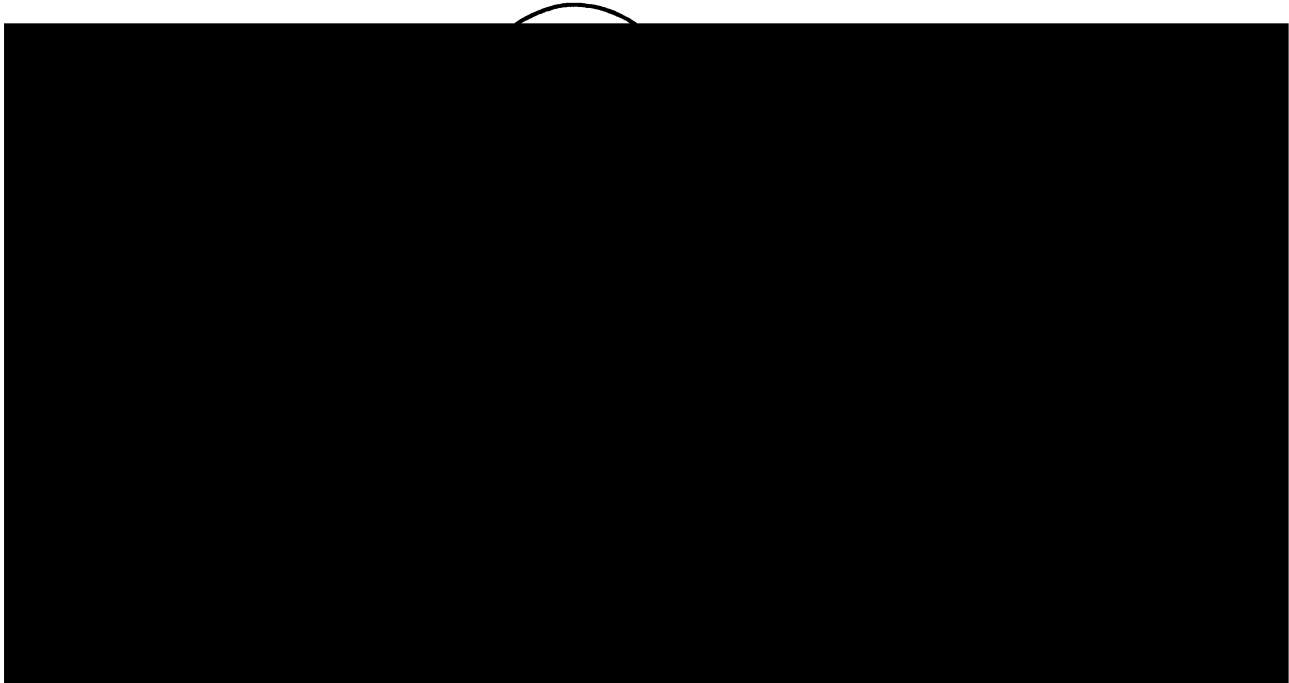
DOCTOR OF PHILOSOPHY

in

Nursing

in the

GRADUATE DIVISION

of the

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

CULTURAL FACTORS RELATED TO MEDICATION COMPLIANCE IN CHINESE IMMIGRANTS WITH HYPERTENSION

Wen-Wen Li, R.N., M.S., Ph.D.

University of California, San Francisco, 2004

ABSTRACT

Purpose: To characterize Chinese immigrants with hypertension (HPT), develop cultural measures of health perceptions/behaviors and social support and examine the extent to which cultural factors are correlated with medication compliance (MC).

Significance: In the general US population, only 58% of patients taking antihypertensive medications have their blood pressure (BP) controlled. Little is known about MC and HPT control among Chinese immigrants.

Design: cross-sectional.

Methods: A convenience sample (n=200) was recruited in an Asian outpatient clinic in the San Francisco Bay area. The inclusion criteria were: A Chinese immigrant $\geq$ 18 years old, taking HPT medications, and able to speak Mandarin. Data collection included medical record abstraction, self-report questionnaires, and BP measurements.
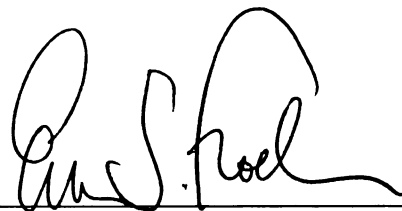
Findings: The mean age was 70.6 ($\pm$10.3). Half were men (50.0%) and had less than a high school diploma (50.0%). The majority (70.5%) reported an annual family income of $\leq$ \$19,999. Their average length of stay in the US was 13.0 years ($\pm$7.2). Only 2.0% preferred using English to communicate with their health care provider. Half (51.0%) had their HPT controlled. Measures with item-total correlation $\geq$ 0.30 and Cronbach's α $\geq$ 0.60 were retained in this study. Eight factors were evaluated for their association with non-MC: 1) Perceived Benefits of Chinese Herbs, 2) Perceived Benefits of Western Medications for HPT, 3) Perceived Susceptibility in General, 4) Perceived Susceptibility

to Specific Diseases, 5) Health-Related Social Support, 6) Social Support in General, 7) Age and 8) Length of Stay in the US. Four variables were statistically significant: Lower Perceived Susceptibility in General [OR=3.77 (95%CI 1.19, 12.01)]; Higher Perceived Benefit of Chinese Herbs [OR=2.21 (95%CI 1.02, 4.81)]; Lower Perceived Benefits of Western Medications for HPT [OR=2.78 (95%CI 1.13, 6.84)]; and Longer Length of Stay in the US [OR=2.48 (95%CI 1.12, 5.50)].

Conclusions: The instruments for cultural factors and MC have an acceptable internal consistency. Four out of eight cultural factors were predictors for non-MC.

Implications: The study results provide important information about Chinese immigrants with HPT and cultural factors associated with non-MC. This exploratory prediction model can help in the formulation of nursing intervention for improving MC and HPT control in this population.

Approved by Dissertation Chair: _____.

Erika S. Froelicher, RN, MA, MPH, Ph.D.

Dedication

This dissertation is dedicated to my dear mother, Chin-Feng Li, and supportive husband, Wei-Chung Huang.

Table of Contents

List of Figures

Chapter 1.
Introduction

Hypertension (HPT) is defined as a systolic blood pressure (BP) ≥140 mmHg and diastolic BP ≥90 mmHg [1]. In the United States (US), HPT contributes to more than 500,000 strokes and 150,000 stroke deaths as well as 1 million heart attacks and 500,000 heart attack deaths per year [2]. Many people who have had a stroke or a heart attack die prematurely. However, since it is a preventable risk factor for both stroke and heart disease [1], treatments to better control BP are of paramount concern to enhance patients' long-term health and prevent the complications of uncontrolled HPT.

Despite effective treatments for controlling HPT, it remains inadequately controlled in most patients [1,3]. HPT management includes lifestyle modification and medication [1,4-6]. When it comes to medication, compliance is important to ensure effectiveness. Some literature was found investigating the medication compliance (MC) issue in the general US population; however, very few have focused on Chinese immigrants with HPT.

<u>Significance of Study</u>

This study is targeted to characterize Chinese immigrants with HPT taking prescribed Western HPT medication and to explore cultural factors related to MC. Estimating the proportion of compliance and BP control as well as describing perceptions of HPT and its treatment and health behaviors (i.e. use of Western and Chinese Medicine and self-care) in Chinese immigrants will be essential to identify the types and magnitude of problems for HPT management (e.g., what are Chinese immigrants' major concerns about taking HPT medication). Moreover, exploring cultural factors associated with MC will be important for clinicians to identify those who are at risk of non-compliance and to help adjust intervention when managing HPT for this population. These are especially

important in California because this state has the largest Chinese population in the U.S. (980,000, 40% of all Chinese in the U.S.) [7].

A cross-sectional study design is suitable for the above purposes. However, due to the fact that there is little in the literature about what Chinese cultural factors are related to HPT medication compliance and the lack of culturally appropriate measurements, preliminary work is essential to gain insights into the factors that are culturally meaningful. A pilot study was designed with in-depth individual interviews and a focus group to explore Chinese immigrants' perceptions of HPT, health behaviors and social support related to MC. The results from this pilot study provided invaluable resources to develop the domain and areas of content for measuring cultural factors.

The innovations of this study are twofold: to address a minority population of both men and women previously not studied sufficiently and to develop a logistic regression model of cultural factors for MC in Chinese immigrants with HPT.

<u>Purposes of Chapters</u>

Chapter 2 is to evaluate the theories for fit with Chinese immigrants with HPT. Chapter 3 will present a conceptual framework to define the cultural factors and antihypertensive MC in Chinese immigrants with HPT and to present first-generation measures of these concepts in a sample of Chinese immigrants. Chapter 4 is to characterize Chinese immigrants with HPT and to explore cultural factors related to MC.

3

References

1. Joint National Committee. *The sixth report of the Joint National Committee on prevention , detection, evaluation, and treatment of high blood pressure (NIH Publication No. 98-4080)*. Bethesda, MC: National Institutes of Health 1997.

2. Department of Health and Human Services. *Health promotion and disease prevention United States, 1990 (PHS publication No. 93-1513)*: Hyattsville, MC: Author; 1993.

3. Kaplan NM. *Management of Hypertension*. 5th ed. Durant, OK: Essential Medical Information Systems, Inc.; 1993.

4. Moser M. *Clinical management of hypertension*. Caddo, OK: Professional Communication, Inc.; 1998.

5. Moser M. Antihypertensive medications: relative effectiveness and adverse reactions. *Journal of Hypertension. Supplement.* 1990;8(2):S9-16.

6. Joint National Committee. *The seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure (NIH Publication No. 03-5233)*. Bethesda, MC: National Institutes of Health 2003.

7. U.S. Bureau of the Census. *Profiles of General Demographic Characteristics: 2000 census of Population and Housing, United States (p. 1)*. Washington, DC: U.S. Department of Commerce; 2000.

Chapter 2.
Compliance with Antihypertensive Medication in Chinese Immigrants: Cultural Specific Issues and Theoretical Application

Authors: Wen-Wen Li, Nancy Stotts, Erika Sivarajan Froelicher

Compliance with Antihypertensive Medication in Chinese Immigrants: Cultural Specific Issues and Theoretical Application

Abstract

Background and Significance: In the general US population, only 58% of patients receiving treatment for hypertension (HPT) have their blood pressure (BP) controlled. Little is known about medication compliance (MC) associated with BP control among Chinese immigrants. Due to the scarcity of literature about Chinese immigrants with HPT and the uniqueness of the Chinese culture, it is important to have a culturally sensitive model for studying MC in Chinese immigrants with HPT.

Purpose: To review and evaluate the theories for fit with Chinese immigrants with HPT.

Review and Evaluation of Theory: The Sick Role Behavior (SRB) Model is used to evaluate its suitability in studying MC behavior in Chinese immigrants with HPT. This model explained and predicted health-seeking behaviors when developed in 1950s. Five concepts are essential for studying Chinese immigrants, including susceptibility, severity, benefits/barriers of treatment regimen, and motivation. Most concepts are clearly defined and suitable for this population. However, susceptibility and severity are not culturally sensitive for studying MC in Chinese immigrants because the meaning of these two concepts when translated from English to Chinese is reversed. The modification of these two translated concepts (e.g., re-defining concepts within Chinese context) need further clarification. The SRB model is also compared with other models to add other important concepts for studying MC behavior. Four models are compared, Behavior Model of Health Services, Social Interactionism Model, Health Decision and Social Learning Theory. The following concepts are added, including immigrant status, language barriers, patient-provider relationship, provider continuity, beneficial self-care activities,

social support, frequency of medications and types of medications, cultural healer (traditional herbs).

Conclusions: This modified model needs to be tested in Chinese immigrants with HPT for its appropriateness in Chinese culture.

Keywords: Sick Role Behavior Model, susceptibility, severity, benefits of treatments, barriers of treatment, motivation, Behavior Model of Health Services, Social Interactionism Model, Health Decision and Social Learning Theory, patient-provider relationship, provider continuity, beneficial self-care activities, social support, frequency of medications, types of medications.

Introduction

Hypertension (HPT) is defined as a systolic blood pressure (BP) ≥140 mmHg and diastolic BP ≥90 mmHg [1]. It is a preventable risk factor for both stroke and heart disease [1]. One of the major problems with this diagnosis is that patients are mostly free of any symptoms unless the BP reaches very high levels, which makes HTP management a tremendous challenge. The consequences of uncontrolled HPT are strokes and heart attacks, which are a major public health concern. In the United States (US), HPT contributes to more than 500,000 strokes and 150,000 stroke deaths as well as 1 million heart attacks and 500,000 heart attack deaths per year [2]. Many people who have a stroke or a heart attack die prematurely. If they survive, they experience a loss in quality of life and productivity. Problems associated with cardiovascular disease or stroke are increasing throughout the US and in other developed countries and have other significant implications (e.g., financial and social burden) for the individual, family, and society [1]. For instance, in the US, annual medical costs for controlled HPT are $124 per patient, but the annual cost for uncontrolled HPT, such as the patient with organ damage is $691 [3], more than five times higher . Given the above, treatments to better control BP are of paramount concern in order to enhance patients' long-term health, prevent complications from uncontrolled HPT, and decrease medical costs. Despite the existence of effective treatments for controlling HPT [1,4], only 54% of hypertensive patients received treatment, and only 27% had their HPT under control [1].

HPT management includes both lifestyle modification and medication [1,5-7]. For medication to be effective, compliance is paramount. However, literature on medication compliance (MC) in Chinese immigrants with HPT is scarce. In recognition of the

disparity of health studies and services in minority groups, Institute of Medicine recommended immediate actions (e.g., more research) should be taken to enhance health care in minority populations [8]. This paper is directly responsive to this recommendation in that it specifically targets Chinese immigrants. The purposes of this paper are: 1) to explore factors related to MC; 2) to review theories suitable for guiding studies of MC behaviors in Chinese immigrants with HPT, and 3) to evaluate these theories for fit with Chinese immigrants with HPT.

Cultural Factors of Chinese Immigrants and Antihypertensive Medication Compliance

Chinese immigrants constitute the largest proportion (25%) of Asian Americans and Pacific Islanders (AAPIs) (10.2 million in 2000) in the US [9]. Stroke is a major cause of mortality for Chinese in China [10]. A meta-analysis study of 2379 stroke cases shows that management of HPT can reduce stroke deaths by about 50%.

The most recent data show that age- and gender- adjusted prevalence rates of HPT among Chinese in the US are 11.8% for men aged 18-49, 6.4% for women aged 18-49, 45.0% for men over 50 and 34.3% for women over 50 [11]. Of Chinese immigrants with HPT, only 42% know that they have HPT, compared to 56% in the overall population [11]. About half do not know the serious consequences of uncontrolled HPT and only 15% of Chinese immigrants know that HPT is not associated with any symptoms (31 % in the overall population) [11]. Chinese immigrants have their own health beliefs and medical system (Chinese Medicine) that are rooted in Chinese culture for over 5,000 years [12]. For Chinese immigrants who are taking antihypertensive medications, medication compliance (defined as taking at least 80% of their prescribed medications [13]) is critically important

for the control of HPT. However, no study was found investigating antihypertensive MC behaviors in Chinese immigrants.

<u>Cultural Factors Associated With MC</u>

<u>Chinese Health Perceptions and Behaviors Associated With Compliance</u>. Chinese Medicine is the best-known cultural heritage that influences Chinese people's health perceptions. Chinese Medicine differs from Western Medicine in that Chinese Medicine emphasizes the balance between Yin (cold or feminine aspect of nature) and Yang (hot or masculine aspect of nature). It is believed that health is harmed if there is an imbalance between Yin and Yang. Chinese physicians prescribe treatments, such as Chinese herbs to correct these imbalances.

HPT is believed to be caused by the imbalance of Yin and Yang, and the best treatment for it is Chinese herbs [14]. Some immigrants also do Chinese exercises to help manage their HPT. These exercises are designed to correct the imbalance of the body [14]. Chinese immigrants believe also that Chinese herbs produce fewer side effects than Western medications [14]. Due to these beliefs in Chinese Medicine, patients who use it may defer or compromise their compliance to Western medical therapy in the belief that Chinese Medicine is the best way to correct the imbalance in their body [14].

<u>Social Support Associated With Compliance.</u> Another important Chinese cultural value is social support [15]. In Chinese society, the focus is on the family or social unit rather than the individual [15]. Family or friends have an important role in supporting, communicating and interacting with the whole society. Social support (such as reminding patients to take HPT medication and accompanying patients to visit the physician) is an essential social factor in helping the patients manage their HPT [14].

<u>Age and Immigrant Status Associated With Compliance</u>. Older age is positively related to MC [16, 17]. The potential explanation for this is that a majority of the elderly are retired and therefore have more time to attend to their treatment. Immigrant status would also appear to be an important predictor. The longer the immigrants stay in the US, the more they are likely to adapt to and comply with Western Medicine[14].

Origin of Health Belief Model (HBM) & Sick Role Behavior (SRB) Model

The HBM was originally designed in early 1950 to describe health behaviors in disease prevention [18]. This preventive health behavior model was first defined by Kasl and Cobb [19], as the behaviors of a healthy individual used to prevent disease or detect it in an early (asymptomatic) stage. However, this model was modified, renamed and used in a variety of contexts. For example, the SRB model, a modification of the HBM, was introduced to predict compliance behavior in an individual with chronic disease, such as HPT [20]. According to Kasl and Cobb [19, 21], the SRB refers to health activities undertaken by sick people and explains the restoration of an individual's health or a halting of disease progression.

Evaluation of Suitability of the SRB for Antihypertensive MC in Chinese Immigrants

A number of theoretical models have been proposed to investigate compliance behavior in hypertensive patients. Among these models, the Sick Role Behavior (SRB) model, derived from the Health Belief Model (HBM), is the earliest model proposed. Although the developers did not label this as the SRB model, they described the behaviors they were trying to explain as "sick role behaviors". In order to distinguish it from the original HBM, this paper uses the SRB to refer to the modified HBM that

predicts and explains sick role behaviors. The SRB model was first developed in 1974 [20] and the developer was also a member of the cohort who developed the HBM [20]. The application of the SRB model in research was investigated by Janz and Becker [22]. Nineteen studies explored the SRB between 1974 and 1984. Among these 19 studies, four included hypertensive patients, but very few of them included Chinese immigrants with HPT [23-26]. The HBM and SRB models will be evaluated to determine predictors for antihypertensive MC in Chinese immigrants on two perspectives: 1) clarification between the HBM and SRB models in terms of their target populations; and 2) the comparisons of the SRB model and other cognitive/behavioral models on their fit for explaining compliance in Chinese immigrants with HPT.

The HBM

Concepts of the Original HBM

The approach to a human being's health seeking/maintenance behavior in the HBM is based on the individual's ' attitude, belief and motivation [27]. This approach emphasizes the individual's 's perceptions of health and illness. Three major concepts play pivotal roles: 1) individual perceptions (perceived susceptibility to disease and perceived seriousness of disease), 2) modifying factors (e.g. demographic variables and sociopsychological variables) and the individual's evaluation of the effects of the medical regimen (perceived benefits and perceived barriers to preventive action), and 3) cues to action (a trigger to stimulate health seeking/maintenance behavior). All three concepts are important to a patient's likelihood of taking preventive health action (compliance behavior).

Perceived susceptibility and severity are major components in an individual's picture of health and illness. Perceived susceptibility refers to an individual's feeling of danger to contract a disease or experience complication(s). Perceived severity varies and depends upon the individual's concern of the effects of a particular disease on physical activity, family life, and social relations. Both susceptibility and severity could be viewed as the threat of a disease [23] that is supposed to motivate patients to take preventive action. A patient's self-evaluation of efficacy of medical regimen contains two important components, benefits of regimens (e.g., maintenance of health) and barriers to taking action (e.g., language barrier). Both of these concepts are based on an assumption that it is an individual's subjective belief rather than objective facts (medical diagnosis and assessment) about effectiveness of action that determine health-seeking behavior [28]. Moreover, an individual's perceptions of benefits and barriers are usually embedded in her/his social norms and living environment [29]; therefore, it is essential to explore an individual's concerns regarding the effects of treatment regimen from their own perspectives.

The SRB Model-Modified from the HBM

Concepts of the SRB Model (Figure 2.1)

The original HBM explains the behavior of preventing an illness threat [30]. Similar to the original HBM, the purpose of the SRB model is to explain and predict health-seeking behaviors. The targeted population for the SRB model is a sick population (people with an existing diagnosis of disease), which is different from the healthy people that the HBM targets. For sick people, not only susceptibility and severity of illness, but motivation is an important predictor for compliance behaviors. Motivation refers to an

individual's emotional incentive driven by certain types of stimulation. Motivation contains 'concern about health matters in general' and 'positive health activity'. The first concept (health concern) is literally suitable for motivation. However, since 'positive health activity' contains the behavioral component of managing disease, this concept is likely to belong to a new category rather than the previously conceptualized emotional incentive as motivation. The possible category for this concept could be self-care activities.

Evaluation of the SRB Model

Keller[31] reviewed 243 cardiovascular nursing research articles and found that various health-related behaviors have been examined using the HBM. Although the HBM has been applied in clinical settings and research work for several decades, no study was found using the SRB model as their theoretical framework. This might be due to the fact that the developers of the SRB model (e.g. Becker) did not differentiate the titles for the two models although they predict two distinct health behaviors (one is preventive behavior while the other is for sick role behavior)[20].

Prevention behaviors focus on preventing disease, while compliance behaviors focus on the concept of controlling an existing disease (usually chronic) and preventing their potential complications. Compliance requires more intensive intervention and higher motivation for optimum adherence to therapeutic regimens (e.g. Western medication and self-care behaviors); therefore, emphasis should focus on improving adherence to complex treatments, which in turn strengthens the outcome (e.g. HPT control). Since the SRB model is the theory that focuses on compliance with therapy for existing disease, it is the preferred model for explaining compliance behavior.

Next, the SRB model will be evaluated by using criteria as modified by Meleis [32] and Dudley-Brown [33]. The criteria proposed by Meleis were comprehensive and practical (pp. 245-276) [32]. Dudley-Brown's aimed to examine the theory within and among cultural contexts to advance the application of theory in different cultures [33]. By reviewing the above two sets of criteria, the authors selected several criteria which aim to examine the suitability of the SRB model in explaining compliance behavior within the Chinese culture. More specifically, the evaluation of the SRB model will answer the following two inquiries about compliance behavior in Chinese immigrants with HPT. First, are the internal components and external dimensions of the SRB model appropriate for describing compliance behavior? Second, are the concepts clearly defined, relevant and measurable in Chinese immigrants with HPT?

Operational Definitions. Concept is a term used to categorize or summarize a phenomenon or a group of thoughts that are related to a phenomenon (Meleis, 1998). All concepts need to be operationalized for replication and measurement either for research projects or clinical practice (Leininger, 1991). The SRB model provides operational concepts in explaining compliance behaviors. The essential concepts, such as motivation, perceived susceptibility, severity of illness, perceived benefits and barriers of treatments, relationship between patients and providers and provider continuity are defined and operationalized.

Description, Identification and Clarification. Most concepts in the SRB model have been clearly defined and identified. However, the boundary between two concepts, susceptibility and severity is not sensitive enough to pick up Chinese cultural perceptions for HPT. Susceptibility refers to the effects of HPT (e.g. stroke) and severity was defined

15

as consequences of HPT (e.g. negative influences on family life). The similarity between the effects and consequences of HPT made the definitions of susceptibility and severity unclear to Chinese immigrants. In Chinese, the two words, "effects" and "consequence", have opposite meanings. "Effects of HPT" in Chinese refer to the influence of HPT on their lives, but "consequences of HPT" refer to complications caused by HPT. To some extent, "effect" could also refer to a broad array of influences of an event that contains the concept "consequence". Therefore, using the definitions by Becker[23], effects for susceptibility and consequences for severity, will easily lead to confusion within the Chinese population being studied. In order to make these concepts meaningful, it is essential to explore what these concepts mean within this Chinese context.

Scope. The SRB model predicts sick people's health seeking behavior and the approach is broad, general and complex. Ellis[34] states, "The broader the scope, in terms of the number and variety of facts or related concepts, the greater is the significance of the theory" (p. 135). Since the SRB model covers very broad dimensions of concepts including an individual's beliefs, environmental factors (e.g. health care system), and sociodemographic factors, its application in predicting compliance behavior tends to be flexible and broad. For example, it has been applied in patients with various chronic diseases, such as HPT[23], renal disease[35], and diabetes[36]. Although the SRB model is broad, an important component about cultural differences in health beliefs is missing. This is essential when describing compliance issues with Chinese immigrants because many tend to treat their diseases (e.g. HPT, cold and cough) with their own traditional therapies. For Chinese immigrants using traditional therapies, one must ask how do they

perceive disease and Western medications, and will these perceptions influence their compliance to Western medications? All of these are unknown for this population.

Social congruence and significance. Meleis [32] and Dudley-Brown [33] proposed that a theory should encompass social congruence and significance. Social congruence contains the beliefs and values from different cultures, which shapes a theory; while social significance asks if the goal of a theory is to make itself more practical in humanity and society. Moreover, a theory should be transferable across cultures. The SRB model seems to miss this component, which needs attention when it is used to explain MC behaviors in Chinese immigrants with HPT.

Usefulness of the SRB model in education, research and practice. According to Haynes [37], a "theory provides an organizational framework through which research can be conducted in an orderly fashion to understand and modify compliance behavior" (p. 416). The SRB model has been developed based on this notion. Identifying those factors that will be important for health care providers to detect patients with high risk of non-compliance and then to further develop appropriate interventions to improve compliance. Therefore, studies with good methodological design, appropriate application of the SRB model, and in diverse populations will be necessary to improve the sick patient's compliance, which in turn promotes efficacy of disease management.

Methodological difficulties include inconsistent measurement of health beliefs and insufficient reporting of reliability and validity. This is a greater concern in Chinese immigrants with HPT due to the scarcity of studies in this population. Thus, in order to improve the usefulness of the SRB model in this group, efforts need to be made to

generate reliable and valid measurements of the essential concepts in the SRB model, which in turn enhance the credibility of these studies.

Comparisons with Other Models

Besides the HBM/SRB model, some other theoretical models are also proposed to explore their utility in further predicting MC. These include the Behavioral Model of Health Services Use [38, 39], Symbolic Interactionism [40], Health Decision Model [41-43], and Social Learning Theory [44, 45]. Comparisons between the SRB model and these other models will focus on the purposes and primary concepts of each theoretical model. The strength and weakness of each will be discussed in terms of applicability in studying MC in hypertensive Chinese immigrants and exploration of the supplemental concepts in light of enhancing the ability of the SRB model to predict or explain MC behaviors in this population.

Behavioral Model of Health Services

The Behavioral Model of Health Services (BMHS) was developed by Anderson (1968) to understand why an individual or family utilizes health services and to help develop health care policies. Three important components of this model included predisposing characteristics (demographic variables, social support and health beliefs), enabling resources (personal/family, community and health care resources), and need (patients' perceived needs and providers' evaluated needs of patients). The strength of the model is that it is culturally sensitive in describing compliance behaviors for Chinese immigrant populations. For example, its focus of health care resources could include good patient-provider relationship and provider continuity, which will be needed for Chinese immigrants who have language and cultural barriers. Without health care

provider continuity, Chinese immigrants may have difficulty finding a doctor who can speak their own language and who can understand their needs. For those patients, follow-up of their compliance to treatment regimens will be problematic.

Although this model provides some important concepts to study compliance behaviors in Chinese immigrants, the scope of this model is too limited to describe other crucial factors, such as the characteristics of various treatment regimens (effectiveness and side effects), that might influence a patient's perception and acceptance of treatment. For example, patients who experience side effects from antihypertensive medications promptly tend to discontinue taking them.

<div align="center">Symbolic Interactionism Model (SIM)</div>

The purpose of SIM is to "provide a framework for defining the phenomenon of compliance, delineating the antecedents of compliance behavior, and determining effective nursing interventions" (p.33) [40]. Four central concepts of this model are (1) compliance role enactment, (2) self-concept, (3) counter-roles, and (4) evaluation. Very similar to the concept of perceived susceptibility in the SRB model, compliance role enactment refers to the concept that an individual undertakes health recommendations due to his/her recognition of vulnerability for developing adverse consequences from illness.

Self-concept "reflects one's life priorities, family and social roles, and sociocultural responses to wellness/illness (p. 34) [40]. This concept is important for the Chinese immigrant population, since many put family or social role as their first priority. For example, if a Chinese immigrant thinks a complication (e.g., stroke) from his HPT will increase the care burden for his family, he may be more compliant in taking his

medication. This concept, to some extent, is very similar to 'Susceptibility' in the SRB model. However, this concept has an important aspect that the SRB lacks, sociocultural responses to illness. Since Chinese medicine is profoundly rooted in Chinese culture, how this population views HPT and its treatment from this perspective is an important factor that should not be left out.

Counter-role is defined as support from health professionals and significant others. Through interaction with others, an individual modifies his behavior to reduce the threat of illness. Evaluation of role enactment is when behavior will be evaluated by an individual himself or by counter-roles. This concept is similar to social support in the SRB model, both of which are potentially important factors related to MC, since family/social support is central to Chinese culture.

The value of this model is its applicability to various ethnic groups since an individual's self-concept of illness (influenced by his/her own culture), sociocultural responses to disease and his interaction with significant others are considered. Those concepts are what the SRB model misses when one investigates MC behaviors in Chinese immigrants. One major limitation is that the scope of the model is too limited to explore the complexities of compliance behavior. For example, benefits and side effects of Western medications have been consistently reported to be associated with MC (Table 4), but this model is not able to detect these predictors.

<u>Health Decision Model (HDM)</u>

This model is proposed as "a third generation model of patient behaviors that focuses more specifically on health decisions" (p.260) [41]. The purpose of the HDM is to explore the factors associated with health decisions and behavior. The HDM is a

combination of three components, health beliefs, disease analysis, and behavioral decision theory. Components of health beliefs are derived from the HBM, including perceived susceptibility and severity. Disease analysis focuses on patients' preferences about trade-off between benefits and risks of the treatment regimen for a disease [46, 47]. This concept has the same focus as the SRB on the benefits and barriers of particular treatment regimens, which might be associated with MC behavior.

Behavioral decision theory emphasizes the identification of the probablility that patients will try to simplify their complicated treatment. As an example, if patients have more than one disease (comorbidity), which needs more than one medication, they might try to reduce the frequency or number of medications to make things easier [41, 42, 48]. Potentially, this could be a serious problem for insuring MC.

The HDM provides broad and complex concepts to predict a patient's compliance behavior. When compared to most other models, the HDM is relatively comprehensive; however, several crucial drawbacks were found. First, some relationships between concepts are not flexible enough to allow other relationships to be tested. For example, low financial support (sociodemographic factor) might directly affect the patient's decision about taking medication (compliance); however, it is only related to the concept of one's knowledge. Second, behavioral decision theory is a possible component for exploring predictors for compliance. However, due to the lack of clear operational definitions, measurement of behavioral decision theory is problematic. Therefore, application of this model for investigating compliance behavior is questionable.

Social Learning Theory (SLT)

The SLT intends to predict behavior by using three concepts: motivation, outcome expectation, and efficacy expectation (Bandura, 1986). Outcome expectation is very different from that of efficacy expectation. Outcome expectation refers to the expectation that a given outcome is caused by a particular behavior, but efficacy expectation is defined as an individual's belief of his/her ability to perform the behavior that will lead to the given outcome. Similar to the Self Regulation Model, the SLT also emphasizes one's self-evaluation of his own behavior and expectancy of the given outcome. The outcomes that will be influenced by self-efficacy consist of the likelihood of starting a new behavior, discontinuing existing behavior (e.g. stopping non-compliance behavior), and resuming behavior (e.g. resuming exercising after a surgery).

The advantage of the SLT model is that it explores and promotes one's self-regulation, determination and management of his/her disease. Self-management of illness might be more effective than conventional interventions, which are led by health professionals. However, emphasis on self-regulation or self-management might not be applicable to Chinese immigrants, since in their culture, the patient usually is a passive receiver of health care information. They tend to depend on what the health care providers have told them to do rather than organize and manage their own treatment.

Summary of Theory Comparisons and Modified SRB Model in Predicting Antihypertensive MC in Chinese Immigrants

Tables 2.1 and 2.2 list the purposes, primary concepts and evaluation of the above four models and the SRB model. The criteria for evaluations are explained at the bottom of Table 2, and are based on reviewing and comparing the five theories for their

operationalized definitions, clarification of concepts, scope, and emphasis on social congruence and significance. Before expanding the very limited knowledge that exists for Chinese immigrants, a very fundamental understanding of the phenomenon of compliance is necessary; specifically, studies that explicate the predictors for MC are needed. To conduct these studies, a theoretical model that is broad, flexible and adjustable, such as the SRB model, is an appropriate choice since it provides extensive scope for studying a complex behavior, such as MC. Although the SRB model seems to be the most suitable model for explaining MC in Chinese immigrants with HPT, concepts that are missing from the SRB model but important for explaining MC in this group should be added to enhance the predictive ability of the SRB model. These include the enabling factor from the BMHS, self-concepts from the SIM, counter-roles from the SIM, and behavioral decision theory from the HDM (Figure 2.1).

The modified model for explaining antihypertensive MC behaviors in Chinese immigrants is shown in Figure 2.1. There are four constructs, including motivation, cultural health perceptions, modifying factors, and cultural health care activities. Each construct contains one or more concepts that are also listed in Figure 2.1. The underlined parts in Figure 2.1 are the additional concepts. This model needs to be tested for its applicability and its accuracy of describing MC in Chinese immigrants with HPT.

Conclusion and Recommendations

Despite the fact that Chinese immigrants constitute the largest immigrant population among AAPIs and that antihypertensive MC behavior in Chinese immigrants is a complex issue in health care practice, very few studies were found that had investigated this issue. This calls attention to the need for research agencies to advocate

for studies on such issues. Responding to this advocacy, health care providers should consider investigating the MC issue in Chinese immigrants, using an appropriate model to guide HPT management in both research and clinical practice.

Compared to other theoretical models, the SRB model is broad, flexible, and adjustable. Therefore, it is preferable when investigating antihypertensive MC in Chinese immigrants. However, since the previous applications of this model have been primarily in Western populations, it should be modified to better explain or predict antihypertensive MC in the Chinese immigrant population. In this group, with their own cultural health beliefs and immigrant experience, a model that considers both of these aspects deserves more attention. Figure 2.1 shows a modification of the SRB model, based on an evaluation of the SRB model, comparison with other theoretical models, and an understanding of Chinese culture and practice relevant to HPT management. This modified model requires further study to test its acceptability, sensitivity, and applicability in Chinese immigrants with HPT.

References

1. Joint National Committee. *The sixth report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure (NIH Publication No. 98-4080)*. Bethesda, MC: National Institutes of Health 1997.

2. Department of Health and Human Services. *Health promotion and disease prevention United States, 1990 (PHS publication No. 93-1513)*: Hyattsville, MC: Author; 1993.

3. Campbell NR. The enigma of hypertension patient management. *Pharmacare Economics*. 1996;11:16-23.

4. Kaplan NM. *Management of Hypertension*. 5th ed. Durant, OK: Essential Medical Information Systems, Inc.; 1993.

5. Moser M. *Clinical management of hypertension*. Caddo, OK: Professional Communication, Inc.; 1998.

6. Moser M. Antihypertensive medications: relative effectiveness and adverse reactions. *Journal of Hypertension. Supplement*. 1990;8(2):S9-16.

7. Joint National Committee. *The seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure (NIH Publication No. 03-5233)*. Bethesda, MC: National Institutes of Health 2003.

8. Institute of Medicine. *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care*. Washington, D.C.: The National Academies Press; 2003.

9. U.S. Bureau of the Census. *Profiles of General Demographic Characteristics: 2000 census of Population and Housing, United States (p. 1)*. Washington, DC: U.S. Department of Commerce; 2000.

10. World Health Organization. *World Health Statistics Annual, 1993*. Geneva, Switzerland: World Health Organization; 1994.

11. Stavig GR, Igra A, Leonard AR. Hypertension and related health issues among Asians and Pacific Islanders in California. *Public Health Reports*. 1988;103(1):28-37.

12. Ogden S. *Global studies: China*. 9th ed. Columbus, OH: McGraw-Hill Dushkin; 2001.

13. Sackett DL, Haynes, R. B., & Tugwell, P. Compliance. In: Sackett DL, (Ed.), ed. *Clinical epidemiology: A basic science for clinical medicine*. Boston, MA: Little Brown; 1985.

14. Li WW. *Pretest of instruments for measuring health belief and medication compliance in Chinese immigrants* [Pilot Project]. San Francisco, CA: Department of Physiological Nursing, University of California, San Francisco; 2001.

15. Lassiter SM. *Multicultural clients: A professional handbook for health care providers and social workers*. Westport, CT: Greenwood Press; 1995.

16. Sharkness CM, Snow DA. The patient's view of hypertension and compliance. *American Journal of Preventive Medicine*. 1992;8(3):141-146.

17. Nelson EC, Stason WB, Neutra RR, Solomon HS. Identification of the noncompliant hypertensive patient. *Preventive Medicine*. 1980;9(4):504-517.

18. Rosenstock TM. Historical origins of the Health Belief Model. *Health Education Monographs*. 1974;2(4):328-335.

19. Kasl SV, Cobb S. Health behavior, illness behavior, and sick role behavior. I. Health and illness behavior. *Archives of Environmental Health*. 1966;12(2):246-266.

20. Becker MH. The Health Belief Model and sick role behavior. *Health Education Monographs*. 1974;2(4):409-432.

21. Kasl SV, Cobb S. Health behavior, illness behavior, and sick-role behavior. II. Sick-role behavior. *Archives of Environmental Health*. 1966;12(4):531-541.

22. Janz NK, Becker MH. The Health Belief Model: A decade later. *Health Education Quarterly*. 1984;11(1):1-47.

23. Becker MH, Haefner DP, Kasl SV, Kirscht JP, Maiman LA, Rosenstock IM. Selected psychosocial models and correlates of individual health-related behaviors. *Medical Care*. 1977;15(5 SUPPL):27-46.

24. Nelson EC, Stason WB, Neutra RR, Solomon HS, McArdle PJ. Impact of patient perceptions on compliance with treatment for hypertension. *Medical Care*. 1978;16(11):893-906.

25. Inui TS, Yourtee EL, Williamson JW. Improved outcomes in hypertension after physician tutorials. A controlled trial. *Annals of Internal Medicine*. 1976;84(6):646-651.

26. Taylor DW. A test of the Health Belief Model in hypertension. In: Haynes RB, Taylor, D. W.& Sackett, D. L., ed. *Compliance in health care*. Baltimore, Maryland: The Johns Hopkins University Press; 1979:103-109.

27.   Janz NK. The Health Belief Model in understanding cardiovascular risk factor reduction behaviors. *Cardiovascular Nursing.* 1988;24(6):39-41.

28.   McNeil BJ, Pauker, S. G., & Sox, H. C. On the elicitation of preferences for alternative therapies. *The New England Journal of Medicine.* 1984;306(1259-1262).

29.   Fabrega H, Jr. (1974). *Disease and social behavior: An interdisciplinary perspective.* Cambridge, MA: Massachusetts Institute of Technology Press.

30.   Becker MH. Patient perceptions and compliance: Recent studies of the Health Belief Model. In: Haynes RB, Taylor, D. W., & Sackett, D. L., ed. *Compliance in health care.* Baltimore, MA: The John Hopkins University Press; 1979:78-109.

31.   Keller C. Cardiovascular nursing research review. 1969 to 1988. *Progress in Cardiovascular Nursing.* 1990;5(1):26-33.

32.   Meleis A. *Theoretical nursing: Development and progress.* 3rd ed. New York, NY: JB Lippincott; 1997.

33.   Dudley-Brown SL. The evaluation of nursing theory: a method for our madness. *International Journal of Nursing Study.* Feb 1997;34(1):76-83.

34.   Ellis R. Characteristics of significant theories. *Nursing Research.* 1968;17(3):217-222.

35.   Cummings KM, Becker MH, Kirscht JP, Levin NW. Psychosocial factors affecting adherence to medical regiments in a group of hemodialysis patients. *Medical Care.* 1982;20(6):567-580.

36.   Cerkoney KA, Hart LK. The relationship between the health belief model and compliance of persons with diabetes mellitus. *Diabetes Care.* 1980;3(5):594-598.

37.   Haynes RB, Taylor, D. W., & Sackett, D. L. *Compliance in Health Care.*

Baltimore: MD: The John Hopkins University Press; 1979.

38.   Anderson RM. Revisiting the Behavioral Model and access to medical care: Does

it matter? *Journal of Health and Social Behavior.* 1995;36:1-10.

39.   Anderson R. *A behavioral model of families' use of health services.* Chicago, IL:

University of Chicago, Center for Health Administration Studies.; 1968.

40.   Dracup KA, Meleis AI. Compliance: an interactionist approach. *Nursing*

Research. 1982;31(1):31-36.

41.   Eraker SA, Kirscht JP, Becker MH. Understanding and improving patient

compliance. *Annals of Internal Medicine.* 1984;100(2):258-268.

42.   Eraker SA, Politser P. How decisions are reached: physician and patient. *Annals*

of Internal Medicine. 1982;97(2):262-268.

43.   Eraker SA, Becker, M. H., Strecher, V. J., & Kirscht, J. P. Smoking behavior,

cessation techniques, and the health decision model. *American Journal of*

Medicine. 1985;78(817-825).

44.   Bandura A. *Social learning theory.* Englewood Cliffs, NJ: Prentice-Hall; 1986.

45.   Bandura A. Self-efficacy: toward a unifying theory of behavioral change.

Psychological Review. 1977;84(2):191-215.

46.   Weinstein MC, & Fineberg, H. V. *Clinical Decision Analysis.* Philadelphia, PA:

W. B. Saunders; 1980.

47.   McNeil BJ, Keller E, Adelstein SJ. Primer on certain elements of medical

decision making. *The New England Journal of Medicine.* 1975;293(5):211-215.

48.   Eraker SA, Sox HC, Jr. Assessment of patients' preferences for therapeutic

outcomes. *Medical Decision Making*. 1981;1(1):29-39.

Table 1.1 Comparison of Theoretical Models

Theoretical Models	SRB Model	Behavior Model of Health Services	Social Interactionism Model	Health Decision Model	Social Learning Theory
Purpose(s)	1) To predict/ explain for health seeking behavior	1) To understand why individual or family does not utilize health services 2) To help develop health care policies	1) To define compliance behavior 2) To explore antecedents 3) To guide effective nursing interventions	1) To explore the factors associated with health decision and behavior	1) To explain health seeking behaviors
Primary concepts	1) Susceptibility 2) Severity 3) Cues to action 4) Benefits 5) Side effects	1) Predisposing characteristics 2) Enabling resources 3) Need	1) Compliance role enactment 2) Self-concept 3) Counter-roles 4) Evaluation	1) Social interaction 2) Sociodemographic 3) Experience 4) Knowledge 5) Health beliefs 6) Patient preference 7) Health decision 8) Compliance behavior 9) Health outcome	1) Motivation 2) Outcome expectation 3) Efficacy expectation

31

Table 1.2 Evaluations of Theoretical Models

	SRB*1	BMHS*2	SIM*3	HDM*4	SLT*5
Operational definition	+	-	+	-	+
Concept clarification	+	+/-	-	+	+
Scope	+	+/-	-	+	-
Social congruence and significance	-	+/-	+	+/-	-

*1: SRB: Sick Role Behavior Model
*2: BMHS: Behavioral Model of Health Services
*3: SIM: Symbolic Interactionism Model
*4: HDM: Health Decision Model
*5: SLT: Social Learning Theory

+ stands for the following:
  1) Definitions of concepts were clearly operationalized;
  2) Distinguish and similarity among concepts were clarified;
  3) Scope were broad;
  4) Social congruence and significance were emphasized.
-: stands for the theory not meeting the above criteria
+/-: stands for the criteria were achieved by the theory to some extent but not completely.

32

Figure 1.1 The Modified SRB Model to Predict Antihypertensive Medication Compliance in Chinese Immigrants

Motivation

<u>Cultural Health Perceptions</u>

Health concern in general

Perceptions of Hypertension
Severity & Susceptibility
Perceptions of Medications
Side Effect & Benefit

Medication Compliance

<u>Cultural Health Care Activities</u>

Positive health activity
   1) <u>Beneficial self-care activities</u>
Cultural practice
   <u>1) Cultural/Traditional healer (traditional herb)</u>

Modifying Factors

Sociodemographics
   1) Demographic variables
   2) SES
   3) <u>Immigrant status (e.g. duration of stay in the</u>
      <u>US)</u>
   4) <u>Language</u>
Clinical factor
   1) Comorbidity
   2) Frequency of Medications
   3) Types of Medications
Relationship between patients and providers
   1) Patient-provider relationship
   2) Provider continuity
<u>Social support (perceived from cultural norm)</u>

*1 Source: Modified from Becker, 1974.
*2 <u>Underline</u>: modified part

33

Chapter 3.
Cultural Factors and Medication Compliance in Chinese Immigrants Who Are Taking Antihypertensive Medications: Instrument Development

Authors: Wen-Wen Li, Anita L. Stewart, Nancy Stotts, Erika Sivarajan Froelicher

Cultural factors and medication compliance in Chinese immigrants with hypertension: Instrument development

Abstract

Purpose: To present a conceptual framework for measuring cultural factors [e.g., health perceptions of hypertension (HPT)/its treatments and social support] and medication compliance (MC) in Chinese immigrants with HPT.

Significance: This study will provide information about measurements for cultural factors and MC in Chinese immigrants with HPT, an underserved population.

Design: Cross-sectional.

Methods: The framework was developed based on qualitative interviews. We examined the psychometric properties of measures in 200 Chinese immigrants with HPT, recruited in the San Francisco Bay area. The inclusion criteria were: A Chinese immigrant ≥ 18 years old, taking HPT medications, and able to speak Mandarin. The instruments were retained if they had Cronbach's $\alpha \geq 0.60$ and item-total correlations (ITC) ≥ 0.30.

Findings: Table 1 shows the measures that were retained in the final model. Cronbach's α all are above 0.60. ITCs are all above 0.30.

Conclusions: The instruments appear useful and have an acceptable internal consistency (Cronbach's α). This framework will aid in the development of culturally sensitive interventions for improving MC and HPT control in Chinese immigrants.

Keywords: Conceptual framework, cultural factors, health perception, medication compliance, Chinese immigrants, hypertension, measurement, Cronbach's α, item total correlation, Perceived Susceptibility to Specific Diseases, Perceived Susceptibility in General, Benefits of Chinese Herbs, Health Related Social Support, Social Support in General.

Table 1. Psychometric Properties of Instruments (n = 200)

Instruments	Perceived Susceptibility to Specific Diseases	Perceived Susceptibility in General	Benefits of Chinese Herbs	Health Related Social Support	Social Support in General	MC-3 items	MC-4 items
# of items	5	2	4	7	6	3	4
Mean	10.25	7.99	14.01	26.85	19.18	12.96	3.30
SD	4.04	1.21	2.22	3.77	6.60	2.31	1.00
Score range	5-25	2-10	4-20	7-35	6-30	3-15	0-4
Cronbach's α	0.79	0.66	0.75	0.83	0.91	0.65	0.62
ITC range	.45-.68	.50	.42-.68	.37-.74	.70-.84	.36-.56	.31-.59

A higher score means a greater result for all instruments (e.g. greater susceptibility).

Introduction

Hypertension (HPT) is a major contributor to many serious diseases, including stroke and heart disease [1]. Compliance with antihypertensive medication is critical to ensure the effectiveness of interventions in long-term HPT control. Medication compliance (MC) is defined as taking at least 80% of prescribed medications [2]. Low MC (36-79%) remains a major concern in the control of HPT [3-10]. MC rates may be lower in minority populations, such as Chinese immigrants, than in the general US population [11] possibly due to different health perceptions, practices, languages and limited health care resources [12-14].

Despite the high likelihood of low MC and poor blood pressure control in Chinese immigrants, there are few studies of this population. Chinese immigrants have their own health practices, Chinese Medicine, which have been rooted in Chinese culture for over 5,000 years [15]. Consequently, their health perceptions and practices have been profoundly influenced by this long history. Results from studies in the existing literature on non-Chinese immigrant populations may not be applicable to Chinese immigrants. Therefore, describing MC and exploring factors associated with MC specific to Chinese immigrants is an important research priority. This is especially important in California because of its large Chinese population (980,000, about 40% of all Chinese immigrants in the US) [16]. Due to insufficient literature addressing factors related to MC and lack of measures for describing cultural factors relevant to MC in Chinese immigrants with HPT, preliminary work is needed to identify those factors that are culturally meaningful.

The primary purpose of this paper is to present a measurement framework for defining cultural factors and antihypertensive MC in Chinese immigrants with HPT and

to present some first-generation measures of these concepts in a sample of this population.

Our long-term goal is to see how these cultural factors are related to MC in Chinese

immigrants with HPT. In this paper, we will use 'cultural factors' to refer to perceptions

of HPT/its treatments, health behaviors and social support. The measurements for

defining concepts were based on the following theoretical framework (Figure 3.1), which

has been modified from the Sick Role Behavior Model [17, 18]. This modified theoretical

framework was derived from literature review, our pilot study and one of the

investigator's (WWL) years of clinic practice with Chinese immigrants with HPT. In

brief, cultural health perceptions (e.g., perception of HPT and its treatments), cultural

health behaviors (e.g., beneficial self-care behaviors) and social support are cultural

factors that might be relevant to MC, which in turn is associated with HPT control.

Figure 3.1 Theoretical Framework

◄─► : Prediction (or relationship between concepts)
◄─ : The constructs **contain** several concepts
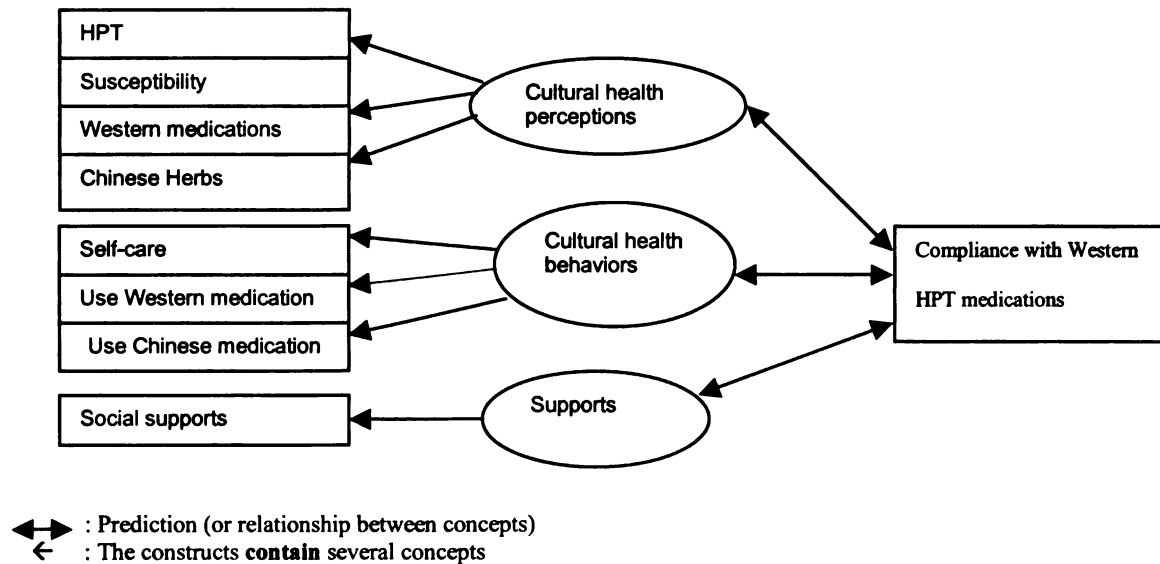
INSERT TABLE 3.2

To operationalize the constructs in this framework, we developed a battery of

measures. In Table 3.2, we present how each construct was defined and measured in the

scales. These include: 1) Beliefs About Causes of HPT, 2) Perceived Susceptibility in General, 3) Perceived Susceptibility to Specific Diseases, 4) Benefits of Chinese Herbs in General, 5) Barriers of Chinese Herbs in General, 6) Barriers of Western Medications for HPT, 7) Barriers to Using Western Medications for HPT, 8) Barriers of Western Medications in General, 9) Beneficial Self-Care Behaviors, 10) Health-Related Social Support, and 11) Social Support in General. Definitions and items for several of these measures were developed from qualitative interviews (Table 3.2). Others measures were modified from existing instruments (Table 3.2).

Procedure

A pilot study, using 5 in-depth individual interviews and a focus group, consisting of 5 participants, was conducted. The sample was from an Asian outpatient clinic in the San Francisco Bay area. The mean age for this small sample was 72.4 (±11.9) ranging from 50-87. Half were men, and six were married. The average length of stay in the US was 12.5 years (±7.7), ranging from 1-23 years. All interviews were tape recorded and transcribed in English. The content was reviewed by the authors to identify the domains and concepts of cultural factors and MC. Once the domains and concepts were determined, items for each concept were written based on the findings from the interviews. The guideline for determining themes, concepts and items was from Strauss and Corbin's Basics of Qualitative Research [19]. The pilot study demonstrated that Chinese immigrants have their own health perceptions about treatment or maintenance of health that is rooted in Chinese medicine. This was the initial stage for developing our questionnaires.

All questionnaires were translated by bicultural and bilingual experts. Recommended methods [20] for translation were used. A translator took the English versions of the questionnaires and translated them into Mandarin Chinese. Once the Mandarin Chinese version was ready, the second translator worked independently to translate the Mandarin Chinese version back to English. The two English versions were then compared for inconsistencies by the authors. If there were inconsistencies, the investigators worked together to compare the themes and items and rewrote the items for a new edition. This procedure was repeated until the authors agreed on the revised items.

After written consent was obtained from participants, the instruments were pilot-tested for appropriateness of content, wording, and response choices. The pilot-test was performed with five Chinese immigrants with HPT who were taking antihypertensive medications and items were revised accordingly. After the interview, the questions were revised as indicated.

Next, the survey was administered to 200 Chinese immigrants, and the set of derived variables for each instrument was finalized. Total scores of instruments were calculated for each participant.

<u>Measurement of Cultural Health Perceptions of HPT: Item Selection.</u>

<u>Beliefs About Causes of HPT</u>. This scale contains 6 items, developed from qualitative interviews. A Likert scale with five response choices from "strongly disagree" to "strongly agree" is applied. The items for 'Beliefs About Causes of HPT' reflect what an individual thinks causes their HPT. For example, one item asked if eating too much hot-nature food is a cause of HPT. If the participant agrees, this does not mean that having too much hot-nature was a definite factor attributing to HPT. Rather, the

purpose of this scale was to help us understand how these Chinese immigrants perceived HPT from their point of view, given their specific backgrounds. We are interested in knowing what proportion of Chinese immigrants perceived a certain cause for their HPT, especially for the culture-specific item such as whether too much hot-nature food is a cause for HPT. This concept is associated with a central component for Chinese Medicine, which explains that many diseases are caused by imbalance of hot and cold natures [21]. The other 5 of the 6 items are not culture -specific.

Perceived Susceptibility to Specific Diseases is defined as possible diseases and complications that are attributable to uncontrolled HPT. The 5-item scale was derived from Weissfeld's Health Belief Index [22]. The complications identified by Weissfeld include uncontrolled HPT, heart attack, stroke, kidney disease and cancer. The original instruments contained items with a Likert scale providing 4 response choices (strongly agreed, agreed, disagree, strongly disagreed). Since many Chinese immigrants feel more comfortable with having a wide range of answers to choose from, the Likert scale was changed from 4 to 5 response choices including 'strongly disagree', 'disagree', 'neutral', 'agree' and 'strongly agree' for all items. This modified instrument was pre-tested in Chinese immigrants with HPT. The results showed that the wording of all questions was understandable and the five-choice Likert scale was acceptable to this group.

Perceived Susceptibility in General is the perceived influence of HPT on one's personal life and social activities. General susceptibility emphasizes the respondent's understanding of the overall threat and inconvenience that is attributable to uncontrolled HPT. This can influence one's personal life if a complication develops and general health deteriorates. This 3-item scale was derived from the qualitative interviews. A

41

Likert scale with five response choices from "strongly disagree" to "strongly agree" is applied to all questions.

Measurement of Cultural Health Perceptions HPT Treatment

Perceived Benefits of Chinese Herbs in General is defined as the perceived beneficial nature and effect attributable to Chinese herbs in general. This new scale contains 4 items developed from individual interviews and focus group. A Likert scale provides five response choices ranging from "strongly disagree" to "strongly agree". Unlike other concepts (e.g., cause of HPT) that were explained by Chinese immigrants using both Western and Chinese perspectives; all items for this concept are unique to Chinese herbs and reflect very traditional Chinese culture. Even in everyday life, Chinese people tend to use these terms (e.g., balancing health) to communicate how they maintain their health and why they use Chinese herbs to maintain their health.

Perceived Barriers to Using Chinese Herbs in General is defined as perceived negative aspects of using Chinese herbs. Barriers to using Chinese herbs are rarely defined by Chinese immigrants in terms of side effects because many Chinese people think herbs are natural so they have no side effects (obtained from the qualitative study). Rather, barriers refer to the negative nature of herbs compared to Western medications (e.g. no scientific basis and slower effectiveness than Western medications). These 5 new separate items are designed with a 5-choice Likert scale ranging from 'strongly disagree' to 'strongly agree'.

Perceived Benefits of Western Medications for HPT was developed from the qualitative interviews. It is defined as perceived benefit of Western antihypertensive

medications. A Likert scale provides five response choices ranging from "strongly disagree" to "strongly agree". Two new items were developed.

Perceived Barriers to Using Western Medications for HPT is defined as any perceived side effect that is attributable to Western antihypertensive medications. This single item was derived from the qualitative interviews. A Likert scale with five response choices from "strongly disagree" to "strongly agree" is applied.

Perceived Barriers to Using Western Medications in General is defined as perceived side effects or any barriers attributed to any Western medications, not particularly to antihypertensive medication. Chinese immigrants who preferred using Chinese herbs to treat disease thought that Chinese herbs can 'cure' health problems but Western medicine can only 'treat' the symptoms. If the problem is not cured, the disease or discomfort will resume. From the pilot study, Chinese immigrants, who used Western and Chinese herbs simultaneously, tend to compare the benefits and barriers between these two types of treatments. This observation is important for clinicians or researchers who investigate the issues for HPT management and MC since use of Chinese herbs might offset Chinese immigrants' compliance to Western medications.

Measurements of Cultural Health Behaviors

Beneficial Self-Care Behaviors are defined in terms of 6 self-care activities and lifestyle changes that are adopted for managing HPT. A Likert scale with five response choices, ranging from 'never' to 'very often', is used for all items with the time frame of 4 weeks. Two items, 'reading books' and 'exercising' refer to both Western and Chinese style activities. For example, 'book' refers to any Western and Chinese reading material on how to treat HPT and 'exercise' includes Western and Chinese exercise (e.g., Tai-Chi).

We hypothesized that each activity under this concept is exclusively independent from each other. For example, people who sleep well at night might not take their blood pressure at home. Given the independent nature of these six items, a summary score for all items is not meaningful. Therefore, each item was considered as a single statement for describing self-care behavior.

Measurements of Social Support.

Health-Related Social Support. This is defined as perceived support that relates to health care services from family or friends. These new items were obtained from individual interviews and a focus group. A Likert scale provides five response choices ranging from 'strongly disagree' to 'strongly agree'.

Social Support in General is defined as perceived mental and physical support from family or friends. The social support scale was used by the Enhancing Recovery in Coronary Heart Disease Patients (ENRICHD) Trial Investigators and is a short and easily administered instrument which contains seven items and has been tested in 2481 patients hospitalized with heart disease. The Cronbach's α in that study was 0.86 [23]. Evidence of its validity and reliability in women and men and in minority populations has been obtained [23,24]. Evidence of validity is provided by its correlations [25]. It is also correlated with other social support scales. However, the pilot study showed that one item (the emotional support item) in this instrument is not culturally suitable for Chinese immigrants, because Chinese culture does not encourage the expression or discussion of one's emotions with non-family members. Therefore, this item was revised to read 'support' (a more general term rather than 'emotional support'). Examples for 'support' include talking over problems and helping make a difficult decision [26]. Six items (Table

44

3.2) have a Likert scale providing 5 response choices ranging from "None of the time" to "All of the time" and one single item (Table 3.2) has a dichotomous response choice (yes or no).

<u>Measurements of MC</u>

<u>Medication Compliance Scale Modified from Morisky's Original Instrument</u> [27] is the extent to which an individual's medication-taking behavior follows the prescription [28]. This 4-item instrument was designed by Morisky et al. [27] to measure MC in hypertensive patients [27]. These four items ask if patients ever forgot, missed, or stopped taking antihypertensive medications and if the patients were careful about taking medications. The original instrument used 'yes' or 'no' response choices [27]. We modified this scale to convert dichotomous responses of yes/no to 1-5 ordinal scales for 3 items, to add an item about physician's recommendation to stop taking the medication and to change the time frame from 'ever' to the past 4 weeks for all items. Since our pilot study showed that Chinese immigrants prefer choosing an answer from the middle (e.g., Likert scale) rather than extreme answers, the 'yes' and 'no' response choices for the first 3 items were changed to a 5-response Likert scale. For example, an original item designed by Morisky et al. asks 'do you ever miss taking your high blood pressure pill' (dichotomous answer: Yes and No). We changed this item to 'How much of the time did you miss taking your high blood pressure pill in the past four weeks?' and provided a Likert scale with 5 response choices ranging from 'none of the time' to 'all of the time'[26]. For the last question, we kept the original question and answer but added one more question 'Did you consult with your health care provider before you stopped the pills?' The reason we kept the original 'yes' and 'no' format is that once the patient stopped

taking pills, the action is 'stopped'; there is no continuous action afterwards. Therefore, the dichotomous answer makes more sense for this item.

Because of the different format of item question and response choices, we split the scale into two components, the first 3 items as a group and the last two items as the other group. We felt that the domain of the first three item questions (forget to take pills, missed taking pills, and careful to take pills) provides a good definition of MC with good continuous-like answers; but the last two (stopped taking pills and whether they consulted with provider before they stopped) are a new domain of MC. We are interested in combining these last two questions as a classification for patients who are taking antihypertensive medications: 1) 'never stop' or 'stopped but consulted the provider' is considered as MC , and 2)'stopped without consulting the provider' considered as non-MC.

More Recent Medication Compliance Measures (modified from Morisky's new MC scale)[29, 30] contains 9 items with a yes/no option for the first 8 items and a 5-choice Likert scale for the last item. The first 8 items ask specific questions about MC behavior. The time frame was mixed in the items (e.g., ever, yesterday, and past 2 weeks) and response choices were yes/no, such as whether high blood pressure pills were taken yesterday, forgot to take pills for the past two weeks and whether a reminder system was used. The last question is a global compliance item, ' How often do you have difficulty taking all your blood pressure medications?'' using a 1-5 ordinal response scale.

Due to the different approaches by these two aspects of the questions, one more specific than the other, this scale was hypothesized to split into two components, the first 8 questions as a group and the last one as a single item.

The reason that the investigators tested both versions of Morisky's questionnaire is because when the study was launched, only the original questionnaire was available. Later, after the study was underway, we became aware of the revised version with better reliability and face validity. It was considered valuable to test both questionnaires in Chinese immigrants with HPT to compare the psychometric properties to see which one will be more suitable for this population.

Design and Sample

A cross-sectional study design was used. A convenience sample of 200 Chinese immigrants with HPT was recruited from an Asian outpatient clinic in the San Francisco Bay area. Eligibility was identified by medical record reviews. The inclusion criteria were: A Chinese immigrant $\geq$ 18 years old, taking Western HPT medications, and able to speak Mandarin. The exclusion criteria included being medically unstable (e.g., acute renal failure) and having concurrent psychiatric problems (e.g., schizophrenia).

Methods of Testing Psychometric Properties

We assessed the frequency of missing data and score distributions (mean, standard deviation, observed and possible score ranges, % at floor and ceiling) for each instrument. A skewness value of more than twice its standard error is taken to indicate a departure from symmetry [31]. Reliability was assessed by Cronbach's α. Two criteria were used for considering whether more than one item could be combined into a multi-item scale: (1) Cronbach's α reliability $\geq$ 0.70, and (2) item-total correlation (ITC) $\geq$ 0.30.

Results

Sample Characteristics

Subjects ranged in age from 39 to 91 years (Mean 70.6, SD 10.3). Half were men (50.0%) and half had less than a high school education (50.0%). The majority (70.0%) were married and 74.5% were retired. The median annual family income category was $10,000-$19,999 range, with 70.5% reporting an annual income of less than $19,999. The majority of subjects were born in China (83.0%); their average length of stay in the US was 13.0 (±7.2) years with a range of 1-37 years. About half of them could neither speak (40.5%), understand (44.0%), nor read English (50.0%). Only 2.0% preferred using English to communicate with their health care provider (HCP). Some (9.5%) used Chinese herbs to treat their HPT, and 43.0% used herbs to treat other diseases or for health promotion.

Psychometric Properties of Instruments

A summary of the percent missing, descriptive statistics, floor/ceiling effects, range of corrected ITC, and Cronbach's α reliability for all final scales is shown in Tables 3.3 and 3.4. Frequency distributions are shown in Figures 3.2 and 3.3. Results are based on the total sample of 200 Chinese immigrants with HPT.

INSERT TABLES 3.3 & 3.4

INSERT FIGURES 3.2 (Fig3.21-3.26) & 3.3 (Fig3.31-3.32)

Beliefs About Causes of Hypertension. Since the items of this scale were constructed to be independent, we present the frequency for each item (Table 3.5). For all items, most of the respondents (67.5%) answered agree or strongly agree.

Perceived Susceptibility to Specific Diseases. The mean was 10.25 (±4.04) with an observed range of 5-22. The distribution of total scores for this scale indicated that most respondents tended to have low scores (Figure 3.21), suggesting that most respondents tended to believe that they are not susceptible to specific diseases. The ITC ranges from 0.45-0.68, all above the standard (0.30). The reliability was 0.79. Other variability information is listed in Table 3.3.

Perceived Susceptibility in General. We presented this scale beginning with ITCs and Cronbach's α. For the original 3-item scale (not shown in Table 3.3), the ITC ranged from 0.22-0.46, with one below the standard (0.30). After dropping the item with ITC below 0.30, the correlation increased to 0.50 and Cronbach's α improved (0.66). This reliability is tolerable for a scale that is in a developmental stage. For this 2-item scale, scores were approximately normally distributed (Figure 3.22). The mean score (7.99 ± 1.21) was a quarter above the middle (6) of the observed scale (2-10) indicating that respondents tended to believe they are susceptible in general. A medium ceiling effect (12.0%) and a low floor effect (0.5%) were found.

Perceived Benefits of Chinese Herbs in General. The average score was about at the midpoint, suggesting that the respondents vary in their perceptions about the concepts. A nearly normal distribution was found (Figure 3.23). All ITCs were above the standard (0.30). The Cronbach's α reliability of this 4-item scale was 0.75.

Perceived Barriers to Using Chinese Herbs in General. Table 3.6 shows percentages for all five-response choices ranging from 'strongly disagree' to 'strongly agree'. For the item asking if the respondents think that Chinese herbs are not science-based medicine, most participants (58.5%) strongly disagreed or disagreed. About one

third (29.5%) were neutral in their answer. For the item asking if the respondents think that Chinese herbs decrease the effectiveness of Western medication, half (50%) respondents were neutral in their answer; 35.5% strongly disagreed or disagreed; only 14.5% strongly agreed or agreed. For the other three items, most respondents strongly agreed or agreed that it is time-consuming to prepare Chinese herbs (67.5%); there are some fake Chinese herbs on the market (58.0%), and the time to feel the benefits from Chinese herbs is slower than Western medications (77.5%). These items were not combined as noted in the methods.

Perceived Benefits of Western Medications for HPT. The mean score (7.95 ± 1.01) was a quarter above the middle (6) of the observed scale (2-10) indicating that respondents tended to believe that Western medication is beneficial for treating HPT. A nearly normal distribution was found (Figure 3.24). The ITC was 0.41 (only one value for this 2-item scale). The Cronbach's alpha was 0.57, below the standard.

Perceived Barriers to Using Western Medications for HPT. The mean for this single item was at the midpoint of 3.00 (±0.99), suggesting that the respondents vary in their perceptions about their belief about Western medication for treating HPT. The scores were about normally distributed. Very low percent at ceiling (2.5%) or floor (3.0%) was found. Table 3.7 shows frequency for this single item. The percent (41.0%) of respondents who strongly disagreed or disagreed is almost equal to that (40.5%) of respondents who strongly agreed or agreed. The other 18.5% had neutral as an answer.

Perceived Barriers to Using Western Medication in General. Table 3.8 shows frequency for the two items of this scale, which did not meet minimal scale criteria. About half (48.5%) of respondents strongly disagreed or disagreed that they experienced

side effects from Western medications; 18% answered in the neutral; and one third (33.5%) strongly agreed or agreed that they had side effects. Likewise, approximately half (46.0%) strongly disagreed or agreed that Western medicine treats their symptoms, not their overall health; about a quarter were neutral in their answer; and the other 30% strongly agreed or agreed.

Beneficial Self-Care Behaviors. Since this scale contains independent items, we present the frequency for each item. Table 3.9 shows the percent for all five-response choices ranging from 'strongly disagree' to 'strongly agree'. For 4 items, including relaxed, exercised, ate healthy food, and got enough sleep, most of the respondents (53.0-74.0%) agreed or strongly agreed that they did those activities. For the other two items, checked blood pressure at home and read books on how Chinese medicine or Western medicine is used to treat HPT, most of the respondents (75.5-86.5%) disagreed or strongly disagreed that they did those activities.

Health-Related Social Support. The mean (26.85±3.77) was about a quarter above the midpoint of the observed scale (7-35) suggesting that the respondents tended to have good health-related support from family or friends. A nearly normal distribution was found (Figure 3.25). All the ITCs were above 0.30 (range 0.37-0.74). The reliability was 0.83, higher than the standard, thus the scale is performing well in the developmental stage.

Social Support in General. This scale was split into two components, 'social support' (6-item Likert subscale) and 'living with a partner or spouse' (single item dichotomous subscale). The 6-item subscale had a high Cronbach's α (0.91) and ITCs were all above 0.70 (ranged 0.70-0.84). The mean (19.18±6.60) was above the midpoint

of the observed scale (6-30) indicating that the respondents tended to have good social support in general. A nearly normal distribution was found for this 6-item scale (Figure 3.26). For the single item subscale, data shows that most (70%) lived with a spouse or a partner.

INSERT FIGURE 3.3 (Fig3.31-3.32)

Medication Compliance

Medication Compliance Scale Modified from Morisky's Original Instrument. The 5-choice Likert scale was acceptable for our sample with no missing data found for MC Scale I asking if the respondent forgot, missed or was careful taking HPT medications in the past 4 weeks. We began with reversing two negatively stated questions, which made the higher total score refer to better MC. The mean (12.96±2.31) was near the high side of the observed scale (3-15) suggesting that the respondents tended to report a high level of medication compliance. The distribution was negatively skewed (Figure 3.31); 38% of respondents had the highest score (ceiling effect). The floor effect was low (2.5%). The ITCs ranged from 0.36-0.56, all above 0.30. The Cronbach's α was 0.65, marginal for a scale in this developmental phase.

For MC Scale II asking if the respondent ever stopped taking HPT medications and whether she/he consulted the physician before stopping, 27% of respondents reported that they stopped medications without first discussing it with their physician.

More Recent Medication Compliance Measures. The remaining 4 items (MC Scale III asking if the respondent sometimes forgot HPT pills, missed pills for the past 2 weeks, took pills yesterday and stopped taking pills when blood pressure was under control) all had ITCs above 0.30 (0.31-0.59) and the Cronbach's α of 0.62. We present

its variability in Table 3.4. The mean (3.30±1.00) was on the high side of the observed

range (0-4) suggesting that the respondents tended to report high level of medication

compliance. The distribution was negatively skewed (Figure 3.32). A low floor effect

was found (3.5%); however, an extremely high ceiling effect was noted (55.3%),

indicating that this scale might not capture improvement in MC.

The frequency for the 'MC Single Item' asking 'how often do you have difficulty

remembering to take all your blood pressure medication?' is shown in Table 3.10. A

high percent of respondents (83.2%) answered that they never had difficulty

remembering to take their blood pressure medication.

Discussion and Recommendations

Our framework for cultural factors and MC has been operationalized containing

multi-item scales for measuring cultural factors and multi-item scales for measuring MC.

Scales measuring cultural factors, 'Health-Related Social Support' and 'Social Support in

General' performed very well with good ITCs and Cronbach's α. These two scales

should be considered as good and reliable scales for use with Chinese immigrants with

HPT. Their stability and performance in other populations need further investigation.

Three scales (Perceived Susceptibility to Specific Disease, Perceived

Susceptibility in General, and Perceived Benefits of Chinese Herbs in General) had good

ITCs and acceptable Cronbach's α. For instruments in a developmental phase (1st

generation instruments), these are considered acceptable. They can be modified and

improved by conducting more quantitative open-ended questions or qualitative interviews

which could add more items for the instruments.

Although two constructs, "Perceived Susceptibility to Specific Diseases" and "Perceived Susceptibility in General", measured different domains of the respondents' perceived susceptibility to illness, they both were constructed to measure the consequences of HPT. The former focused on more specific complications that HPT might lead to, while the latter addressed the more general consequences in life that might be attributable to HPT.

'Perceived Benefit of Western Medication for HPT' had a good ITC but reliability was not promising (0.57). Given there are only two items, we would expect it to perform better if more relevant items are added to this scale to improve reliability in future studies.

'Perceived Barriers to Using Chinese Herbs in General' and 'Perceived Barriers to Using Western Medication for HPT' did not perform well. Although the psychometric properties did not show the promising potential for retaining these scales in our final framework, the items for these scales might be considered as possible components for the future since these items were discovered from our qualitative interviews and they had good face validity.

For 'Beliefs About Causes of HPT' and 'Beneficial Self-Care Behaviors', each item should be considered as an independent item. These items are important to help us understand more about how Chinese immigrants' perceive HPT and what they do to manage their HPT, which are culturally meaningful for this population. These phenomena are also important for us to design health education and interventions to help manage Chinese immigrants' HPT.

We also present frequency for all items that either did not have sufficient ITCs and Cronbach's α or only had a single item. The former include 'Perceived Barriers to

Using Chinese Herbs in General' and 'Perceived Barriers to Using Western Medication in General'. The latter was referred to 'Barriers to Using Western Medication for HPT'. Frequency of these three scales provided important information about how the respondents perceived every single item from the scales. This information also helps clinicians understand how and why Chinese immigrants are not compliant to antihypertensive medication from the perspectives of both Chinese and Western medicine.

In terms of measurements for MC, MC Scale I with three 5-choice Likert scale items had nice ITCs and acceptable Cronbach's α so we would recommend this simple scale be further tested to enhance its reliability. For MC Scale II (2 dichotomous items), it might serve as a tool to screen Chinese immigrants as to which group they belong in terms of how well they communicate with providers when they decide to stop taking their antihypertensive medications.

Although all eight questions of the 'More Recent Medication Compliance Measure' literally seem to be associated with each other, the ITC and Cronbach's α did not perform well for this scale. After dropping 4 items from this scale, MC Scale III (the remaining 4 items) had improved ITCs and Cronbach's α. However, its high ceiling effect (55.3%) makes the future application of capturing improvement in MC difficult. Therefore, this instrument needs further work to improve its variability by adding more relevant items and re-testing in this particular population. One possibility is to ask all questions in the same time frame (e.g. in the past 4 weeks) to make the questions and answers more consistent and less confusing to the respondents.

Because MC Scales I and III had the best ITCs and reliability (compared to other MC scales) and shared some similar questions, it will be important to distinguish these

two scales in terms of their face validity and psychometric properties to provide information about their usability in the future with this group. Although both scales tend to measure the same concept (MC) and had some similar questions (e.g., forgot taking medications), they have different face validity. MC Scale I tended to measure a more general concept about MC behavior with a consistent time frame (e.g., in the past 4 weeks). MC Scale III asked more specific questions about MC behaviors with different time frames (ranging from yesterday to the past two weeks). Because the two scales tended to measure different perspectives of MC, it is essential to further test their applicability and usability in future studies.

Which MC measure is better will depend on which aspect is of interest. For example, if a researcher is more interested in exploring the overall MC, MC Scale I will be a better choice. If an investigator focuses more on understanding specific aspects of improving MC, such as using a reminder system, then MC scale III will be a better choice.

For 'MC Single Item' asking the respondents 'Difficulty Remembering to Take All Blood Pressure Medication', we also presented the frequency distribution to understand how the respondents evaluate their overall medication taking behaviors from the aspect of forgetting/difficulty remembering to take HPT medication, which was identified by Morisky et al.[27, 29, 30] as a common reason for causing people to be non-compliant to prescribed antihypertensive medication. This single item might serve as a quick screening tool to identify patients who need a reminder aid or support to help them remember to take their medication. However, the results of this item need cautious interpretation because in our sample, a high percent (83.2%) reported that they never/rarely had difficulty remembering to take blood pressure medications. Whether or

not Chinese immigrants tend to overlook their difficulty in remembering medications was not ascertained. Given this difficulty, this screener might not pick up those reporting no difficulty, but who actually have difficulty. In order to solve this problem, another question to confirm difficulty in remembering to take medications might be needed. Therefore, the application of this screener should be validated with future studies to test its applicability, conceptual meaningfulness and adequacy.

By further developing and refining our final framework, we hope to establish a reliable and valid framework for measuring cultural factors and MC in Chinese immigrants. Our long-term goal is to use this framework to support the following: 1) to continue the development of culturally sensitive instruments for cultural health perceptions and behaviors, social supports and MC; 2) to assess the populations' characteristics in terms of their perceptions of Western medication and Chinese herbs, social support and MC in clinical settings; 3) to identify those who are at risk of non-compliance and to help adjust the interventions (e.g., develop culturally-sensitive and language-appropriate health education materials) to manage HPT for Chinese immigrants; and 4) to examine associations between cultural factors and MC in Chinese immigrants with HPT.

References

1. Joint National Committee. *The sixth report of the Joint National Committee on prevention , detection, evaluation, and treatment of high blood pressure (NIH Publication No. 98-4080).* Bethesda, MC: National Institutes of Health 1997.

2. Sackett DL, & Haynes, R. B. *Compliance with therapeutic regimens.* Baltimore, MD: The John Hopkins University Press; 1976.

3. Cummings KM, Becker MH, Kirscht JP, Levin NW. Psychosocial factors affecting adherence to medical regiments in a group of hemodialysis patients. *Medical Care.* 1982;20(6):567-580.

4. Daniels DE, Rene AA, Daniels VR. Race: an explanation of patient compliance--fact or fiction? *Journal of the National Medical Association.* 1994;86(1):20-25.

5. Lim TO, Ngah BA, Rahman RA, et al. The Mentakab hypertension study project. Part V--Drug compliance in hypertensive patients. *Singapore Medical Journal.* 1992;33(1):63-66.

6. Khalil SA, Elzubier AG. Drug compliance among hypertensive patients in Tabuk, Saudi Arabia. *Journal of Hypertension.* 1997;15(5):561-565.

7. Kirscht JP, Rosenstock IM. Patient adherence to antihypertensive medical regimens. *Journal of Community Health.* 1977;3(2):115-124.

8. Nelson EC, Stason WB, Neutra RR, Solomon HS. Identification of the noncompliant hypertensive patient. *Preventive Medicine.* 1980;9(4):504-517.

9. Shea S, Misra D, Ehrlich MH, Field L, Francis CK. Correlates of nonadherence to hypertension treatment in an inner-city minority population. *American Journal of Public Health.* 1992;82(12):1607-1612.

10. Shulman N, Cutter G, Daugherty R, et al. Correlates of attendance and compliance in the hypertension detection and follow-up program. *Controlled Clinical Trials*. 1982;3(1):13-27.

11. Stavig GR, Igra A, Leonard AR. Hypertension and related health issues among Asians and Pacific Islanders in California. *Public Health Reports*. 1988;103(1):28-37.

12. Hong B, Bayat N. National Asian American & Pacific Islander cardiovascular health action plan eliminating racial and ethnic in cardiovascular health [On-line]. Available at: http://www.apiahf.org/cvd1.html.

13. Lipson JG, & Meleis, A. I. Research with immigrants and refugees. In: Hinshaw AS, Feetham, S. L., Shaver, J. L. F. (Eds.), ed. *Handbook of clinical nursing research*. Thousand Oaks, CA: Sage Publication; 1999.

14. U.S. Department of Health and Human Services. *Addressing cardiovascular health in Asian Americans and Pacific Islanders: A background report. (NIH Publication N0. 00-3647)*. Bethesda, MD: National Institute of Health; 2000.

15. Ogden S. *Global studies: China*. 9th ed. Columbus, OH: McGraw-Hill Dushkin; 2001.

16. U.S. Bureau of the Census. *Profiles of General Demographic Characteristics: 2000 census of Population and Housing, United States (p. 1)*. Washington, DC: U.S. Department of Commerce; 2000.

17. Li WW, Stotts N, Froelicher ES. Compliance with antihypertensive medication in Chinese immigrants: Cultural specific issues and theoretical application: a Dissertation (in progress). 2004, San Francisco, CA.

18.   Becker MH. The Health Belief Model and sick role behavior. *Health Education Monographs.* 1974;2(4):409-432.

19.   Strauss AC, J. *Basics of Qualitative Research.* 2nd ed. Thousand Oaks, California: SAGE Publications, Inc.; 1998.

20.   Marin G, & Marin, B. V. Translation of data collection instruments. In: Marin G, & Marin, B. V., ed. *Research with Hispanic populations.* Vol 23. Nebury Park.: Sage Publications; 1991:82-100.

21.   Li WW. *Exploration of cultural factors in Chinese immigrants with hypertension* [Pilot study]. San Francisco, CA: Department of Physiological Nursing, University of California, San Francisco; 2001.

22.   Weissfeld JL, Brock BM, Kirscht JP, Hawthorne VM. Reliability of health belief indexes: confirmatory factor analysis in sex, race, and age subgroups. *Health Services Research.* 1987;21(6):777-793.

23.   The ENRICHD Investigators. Enhancing recovery in coronary heart disease patients (ENRICHD): Study design and methods. *American Heart Journal.* 2000;139:1-9.

24.   Berkman LF, Blumenthal J, Burg M, et al. Effects of treating depression and low perceived social support on clinical events after myocardial infarction: the Enhancing Recovery in Coronary Heart Disease Patients (ENRICHD) Randomized Trial. *Jama.* Jun 18 2003;289(23):3106-3116.

25.   Mitchell PH, Powell L, Blumenthal J, et al. A short social support measure for patients recovering from myocardial infarction: the ENRICHD Social Support

Inventory. *Journal of Cardiopulmonary Rehabilitation.* Nov-Dec 2003;23(6):398-403.

26. Li WW. *Pretest of instruments for measuring health belief and medication compliance in Chinese immigrants* [Pilot Project]. San Francisco, CA: Department of Physiological Nursing, University of California, San Francisco; 2001.

27. Morisky DE, Green, L. W., & Levine, D. M. Concurrent and predictive validity of a self-reported measure of medication compliance. *Medical Care.* 1986;24(1):67-74.

28. Burke LE, Ockene IS. *Compliance in healthcare and research.* Armonk, NY: Futura Publishing Company, Inc.; 2000.

29. Morisky DE, Ward HJ, Ang A. The psychometric properties and predictive validity of a self-reported measure on adherence behavior. Paper presented at: The Annual Meeting of the APHA, 2002; Philadelphia.

30. Morisky DE, Ward HJ, Liu KY. Self-reported medication taking behavior: A valid indicator for assessing compliance. Paper presented at: 129th APHA meeting, 2001; Atlanta.

31. Norusis MJSI. *SPSS for Windows. Base System User's Guide Release 6.0.* 6th ed. Chicago, IL: SPSS, Inc; 1993.

Table 3.2 Definitions and Item Content of Measures of Cultural Factors and Medication Compliance

Concepts: Definitions	Item Content	Source of measure	# of items
Cultural Health Perceptions of HPT			
Beliefs About Causes of HPT: Perceptions of possible causes of HPT that are embedded in a cultural context.	Possible causes of HPT include 1) stress, 2) anxiety; 3) hurry, 4) unhealthy eating style, 5) too much hot-nature food, & 6) blocked blood vessels	New	6 separate items
Perceived Susceptibility to Specific Diseases: Perceptions of potential complications.	Risk of acquiring a specific disease or condition in the future due to HPT, including 1) elevated blood pressure level one year from now when blood pressure is not in good control, 2) heart attack, 3) stroke, 4) kidney disease, & 5) cancer	Modified Weissfeld	5-item scale
Perceived Susceptibility in General: Perceptions of potential influences of HPT in a personal life and social activities.	Risk of acquiring disease or of suffering the ill-effects of disease, including 1) cause serious health problems, such as stoke or heart disease if blood pressure not well controlled, & 2) needing others to help for the rest of life if getting a stroke or heart disease	New	2-item scale (tested 3 items ended up with 2 items)
Health Perceptions of Chinese Herbs			
Benefits of Chinese Herbs in General: Perceptions of beneficial nature and effects attributable to Chinese herbs in general	Perceived value of herbs in general, including 1) no side effects due to natural property of Chinese herbs, 2) maintenance of health, 3) balance of health, & 4) treatment of basic/radical health problems, not just symptoms	New	4-item scale
Perceived Barriers to Using Chinese Herbs in General: Perceptions of negative aspects and natures relevant to Chinese herbs	Perceived difficulties of taking herbs, including 1) time-consuming to prepare herbs, 2) not science-based medicine, 3) herbs decrease effectiveness of Western medications, 4) fake herbs in market, & 5) slower effectiveness than Western medications	New	5 separate items

62

Health Perceptions of Western Medications			
Perceived Benefits of Western Medications for HPT: Perceptions of beneficial nature and effects attributable to Western antihypertensive medications	Benefits of medications for HPT, including 1) effectiveness in decreasing blood pressure & 2) quick action of Western blood pressure medications	Modified Weissfeld	2-item scale
Perceived Barriers to Using Western Medications for HPT: Perceptions of discomforts attributable to Western antihypertensive medications	Disadvantage of medications for HPT—1) lowering blood pressure too much which makes one uncomfortable (e.g. weak or sleepy)	New	1 separate item
Perceived Barriers of Western Medications in General: Perceptions of side effects and barriers attributable to Western medications in general	Disadvantages of medications in general, including 1) experiencing side effects (e.g., allergy) from Western medications & 2) Western medications not treating radical (basic) health problems	New	2 separate items
Beneficial Self-Care Behaviors			
Beneficial Self-Care Behaviors: Self-care activities and lifestyle	An individual's own health care behaviors in the past four weeks, including 1) relaxed, 2) exercised, 3) ate healthy food, 4) checked blood pressure at home, 5) read books on how Chinese medicine or Western medicine to treat high blood pressure & 6) got enough sleep	New	6 separate items
Social Support			
Health-Related Social Support: Perceived supports which are related to health care services from family or friends	Social contacts to help an individual's seeking medical care, including someone available 1) to discuss health issues before seeing a doctor, 2) help with translation, 3) transportation to clinic, 4) taking care of the patient when s/he got sick, 5) find a doctor for the patient, 6) help maintain healthy lifestyle, & 7) remind the patient to take medications	New	7-item scale

63

Social Support in General: Perceived support from family or friends	**Six items with a 5-Likert scale:** Social contacts to help an individual's daily life, including someone available 1) whom one can count on to listen to him/her when h/her needs to talk, 2) to give good advice about a problem, 3) to show love and affection, 4) help with daily chores, & 5) to provide support (e.g., talking over problems or helping make a difficult decision. The last item, 'do you have as much contact as you would like with families/friends you feel close to, those in whom you can trust and confide	Modified ENRICHD	6-item scale
	Single item with a dichotomous scale: Living with a spouse or a partner	ENRICHD	1 separate item
Medication Compliance			
MC Scale I: The extent to which an individual follows providers' prescriptions of medication regimens at right dose, right time and right method [3]	**Three items with a 5-Likert scale:** Frequency in past 4 weeks of taking HPT medications in an appropriate way, including 1) forgot to take medications, 2) careful to take medications, and 3) missed taking medications	Modified Morisky's original MC scale	3-item scale
MC Scale II: The extent to which an individual follows providers' prescriptions of medication regimens at right dose, right time and right method [3]	**Single item with a sub-question (dichotomous answers):** Did you stop taking high blood pressure medication? (If yes, answer the following question) 1) Did you consult your physician before you stop high blood pressure medication?	Modified Morisky's original MC scale	2-item scale

64

MC Scale III: The extent to which an individual follows providers' prescriptions of medication regimens at right dose, right time and right method	Takes HPT medications in an appropriate way, including 1) sometimes forgot to take pills, 2) sometimes miss taking pills for reasons other than forgetting for the past 2 weeks, 3) took medications yesterday, & 4) stopped taking medication because blood pressure is under control	Modified Morisky's new MC scale	4-item scale (tested 8 items ended up with 4 items)
MC Single Item: The extent of difficulty remembering to take HPT medications	Extent of difficulty remembering to take all high blood pressure medication	Morisky's new MC scale	1 separate item

Table 3.3 Psychometric Properties for Scales for Cultural Factors

Scales	Perceived Susceptibility to Specific Diseases	Perceived Susceptibility in General- 2 items	Perceived Benefits of Chinese Herbs in General	Perceived Benefits of Western Medication for Treating HPT	Health-Related Social Support	Social Support in General
# of items	5	2	4	2	7	6
n (% of missing cases)	13	0	0	0	0	0
Mean (SD)	10.25 (4.04)	7.99 (1.21)	14.01 (2.22)	7.95 (1.01)	26.85 (3.77)	19.18 (6.60)
Observed range	5-22	2-10	8-20	2-10	7-35	6-30
Possible range	5-25	2-10	4-20	2-10	7-35	6-30
% at floor	16.7	0.5	0	0.5	0.5	3
% at ceiling	0	12.0	3	9	4	8.5
Skewness						
Statistics	0.47	-0.95	0.40	-0.90	-1.12	-0.07
Standard Errors	0.18	0.17	0.17	0.17	0.17	0.17
Range of ITC	0.45-0.68	0.50-0.50	0.42-0.68	0.41-0.41	0.37-0.74	0.70-0.84
Reliability						
Cronbach's α	0.79	0.66	0.75	0.57	0.83	0.91

NOTE: Higher score is higher level of scale label for all scales (e.g., greater susceptibility); N/A = not applicable

Table 3.4 Psychometric Properties for Measuring Medication Compliance

Scale	MC Scale I	MC Scale III
# of items	3	4
n (% of missing cases)	0	N/A
Mean (SD)	12.96 (2.31)	3.30 (1.00)
Observed range	3-15	0-4
Possible range	3-15	0-4
% at floor	0.5	3.9
% at ceiling	38.0	55.3
Skewness		
Statistics	-1.43	-1.75
Standard Errors	0.17	0.18
Range of ITC	0.36-0.56	0.31-0.59
Reliability		
Cronbach's α	0.65	0.62

Higher score means better MC; N/A: not applicable; MC Scales II & V are <u>not</u> presented here because they did not meet the criteria: ITC ≥ 0.30

Table 3.5 Frequency of 'Beliefs About Causes of HPT' Items (n=200)

Cause of Hypertension	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Stressful events	0.5	16.0	16.0	60.5	7.0
Being anxious consistently	0.5	20.5	15.0	57.5	6.5
Being in a hurry	0	15.5	19.0	58.5	7.0
Unhealthy eating style	0	14.0	11.0	66.5	8.5
Eating too much hot-nature food	1.0	31.0	16.0	47.5	4.5
Blocked blood vessel	0.5	16.0	27.5	47.0	9.0

Table 3.6 Frequency of 'Perceived Barriers of Using Chinese Herbs in General' Items (n=200)

Barriers to Using Chinese Herbs in General	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Time-consuming to prepare	0.5	8.5	23.5	65.0	2.5
Not science-based medicine	9.5	49.0	29.5	11.5	0.5
Decrease effectiveness of Western medication	4.5	31.0	50.0	14.0	0.5
Fake Chinese herbs in the market	0.5	3.5	38.0	52.0	6.0
The effectiveness slower than Western medications	0	2.0	20.5	70.5	7.0

Table 3.7 Frequency of 'Perceived Barriers to Using Western Medication for Treating HPT' Items v (n=200)

	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Western HPT medication lowers my blood pressure too much which makes me uncomfortable	2.5	38.5	18.5	37.5	3.0

Table 3.8 Frequency of 'Perceived Barriers to Using Western Medication in General' Items (n=200)

	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Experience side effects from Western medications	5.0	43.5	18.0	28.0	5.5
Western medications do not treat my radical health problem	5.0	41.0	24.0	28.0	2.0

Table 3.9 Frequency of 'Beneficial Self-Care Behaviors' Items (n=200)

Beneficial Self-Care Behaviors	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Relaxed	19.0	9.5	16.0	18.0	37.5
Exercised	18.0	9.5	19.5	23.5	29.5
Ate healthy food	6.0	5.5	14.5	34.5	39.5
Checked blood pressure at home	53.5	22.0	7.0	9.5	8.0
Read books on how to treat HPT	70.5	16.0	4.5	5.0	4.0
Got enough amount of sleep	20.5	9.0	15.0	16.5	39.0

Table 3.10 Frequency of 'Medication Compliance Scale II' Items (n=200)

	%
Never stopped taking HPT pills or stopped after consulting their physician	73.0
Stopped without consulting their physician	27.0

Table 3.11 Frequency of 'Medication Compliance Single Item', 'Difficulty Remembering to Take All Blood Pressure Medication' (n=200)

	Never/rarely (%)	Once in a week (%)	Sometimes (%)	Usually (%)	All the time (%)
Difficulty remembering to take blood pressure medication	83.2	11.2	3.4	0.6	1.7

Figure 3.2 Distributions of Perceptions of HPT and Its Treatments, Behaviors, and Social Support

Figure 3.2-1 Perceived Susceptibility to Specific Diseases
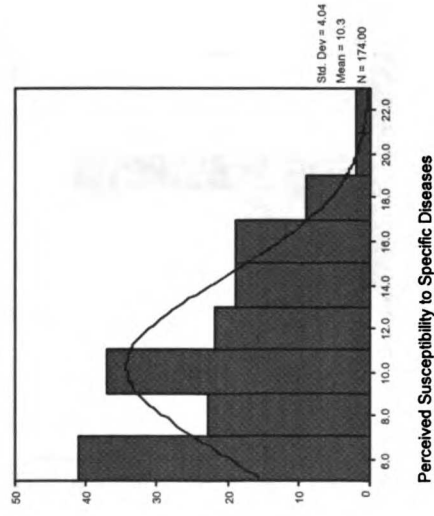
Figure 3.2-2 Perceived Susceptibility in General
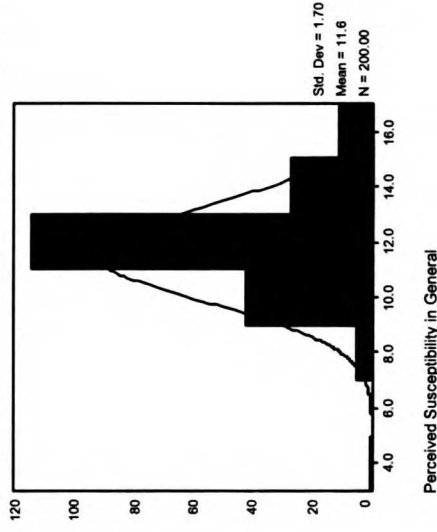
Figure 3.2-3 Perceived Benefits of Chinese Herbs in General
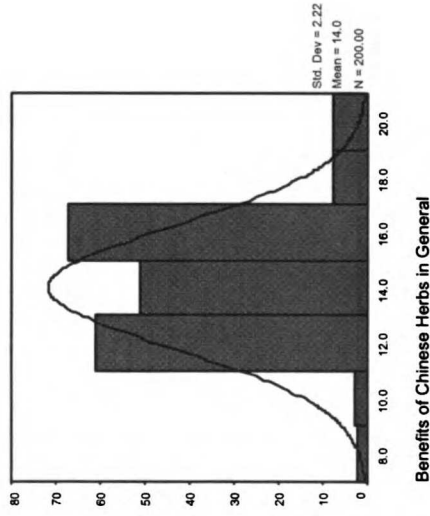
Figure 3.2-4 Perceived Benefits of Western Medication for HPT

70
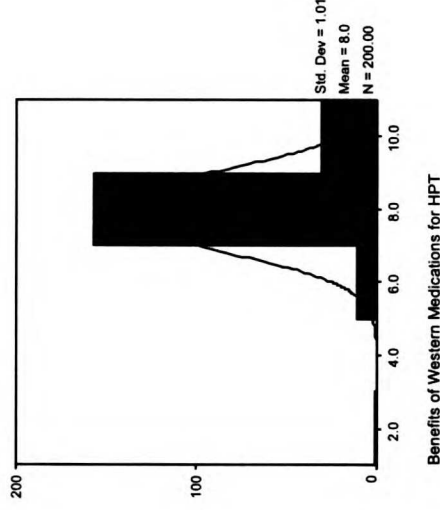
Figure 3.2-5 Health-Related Social Support
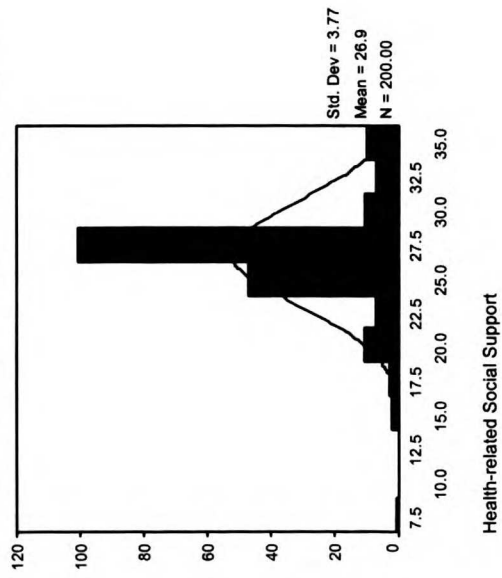
Figure 3.2-6 Social Support in General

Std. Dev = 3.77
Mean = 26.9
N = 200.00

Health-related Social Support

Std. Dev = 6.60
Mean = 19.2
N = 200.00

Social Support in General

71
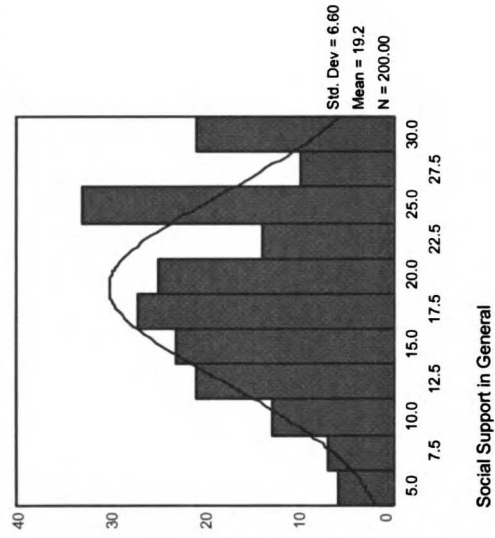
Figure 3.3 Distributions of Medication Compliance

Figure 3.3-1 MC Scale I

MC Scale I

Std. Dev = 2.31
Mean = 13.0
N = 200.00

Figure 3.3-2 MC Scale III

MC Scale III

Std. Dev = 1.00
Mean = 3.3
N = 179.00

72
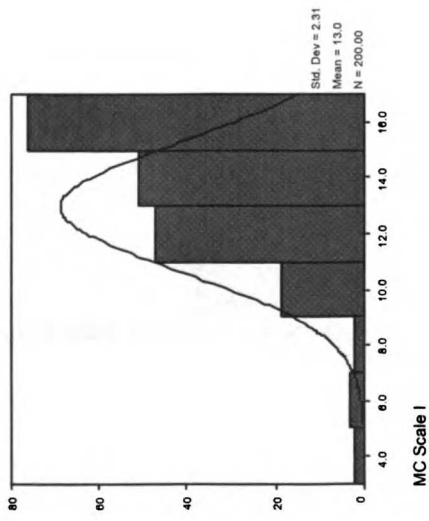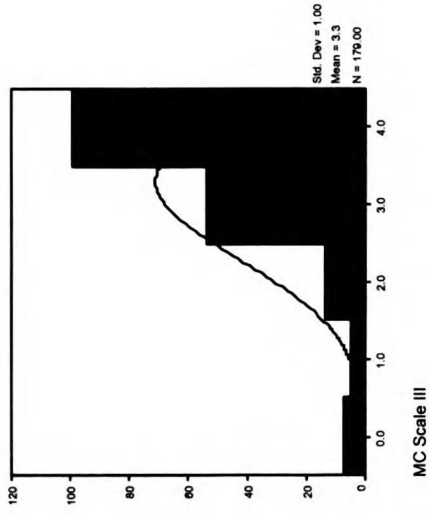
Chapter 4.
Cultural Factors of Chinese Immigrants as Predictors of Medication Compliance to Hypertension

Authors: Wen-Wen Li, Anita L. Stewart, Nancy Stotts, Erika Sivarajan Froelicher

Cultural Factors of Chinese Immigrants as Predictors of Medication Compliance to Hypertension

Abstract

Purpose: To characterize Chinese immigrants with hypertension (HPT) and to examine

the extent to which cultural factors are correlated with medication compliance (MC).

Significance: In the general US population, only 58% of patients receiving HPT

medications have their blood pressure (BP) controlled. Little is known about cultural

factors related to MC in Chinese immigrants with HPT.

Design: cross-sectional.

Sample: A convenience sample of 200 subjects was recruited in an Asian outpatient

clinic in San Francisco Bay area. The inclusion criteria: A Chinese immigrant ≥ 18 years

old, taking HPT medications, and able to speak Mandarin.

Methods: Self-report questionnaires and BP measurements were used.

Findings: The mean age was 70.6 (±10.3) years old. Half were men (50.0%) and had less

than a high school diploma (50.0%). The majority (70.0%) were married and 70.5%

reported an annual family income of less than $19,999. Their average length of stay in

the US was 13.0 (±7.2) years. Only 2.0% preferred using English to communicate with

their care provider. Half (51.0%) had their HPT controlled. Proportion of MC was 74.5%.

Eight factors were evaluated for their association with non-MC: 1) Perceived Benefits of

Chinese Herbs, 2) Perceived Benefits of Western Medications, 3) Perceived

Susceptibility in General, 4) Perceived Susceptibility to Specific Diseases, 5) Health-

Related Social Support, 6) Social Support in General, 7) Age, and 8) Length of Stay in

the US. The following four variables were statistically significant: Lower Perceived

Susceptibility in General [OR=3.77 (95%CI 1.19, 12.01)]; Higher Perceived Benefit of

Chinese Herbs [OR=2.21 (95%CI 1.02, 4.81)]; Lower Perceived Benefits of Western Medications for HPT [OR=2.78 (95%CI 1.13, 6.84)]; and Longer Length of Stay in the US [OR=2.48 (95%CI 1.12, 5.50)].

Conclusions: Most participants were old, poor and had a low level of education. Very few preferred to communicate with their health care provider in English. Four out of eight cultural factors were predictors for non-MC.

Implications: Health care providers need to have linguistic competency to manage Chinese immigrants' HPT. The exploratory prediction model for non-MC from this study can help in the formulation of nursing intervention for HPT management in this old and poor population.

Keywords: Chinese immigrants, hypertension, cultural factors, medication compliance, blood pressure control, Perceived Benefits of Chinese Herbs, Perceived Benefits of Western Medications, Perceived Susceptibility in General, Perceived Susceptibility to Specific Diseases, Health-Related Social Support, Social Support in General, Years of Stay in the US, predictors

Introduction

Hypertension (HPT) is a well-recognized risk factor for both stroke and heart disease and is defined as a systolic blood pressure (BP) ≥140 mmHg and diastolic BP ≥90 mmHg [1]. In the United States (US), more than 500,000 strokes and 150,000 stroke deaths as well as 1 million heart attacks and 500,000 heart attack deaths are caused by HPT each year [2]. Many persons who have a stroke or a heart attack die prematurely or have a poor quality of life.

Effective treatments for HPT exist and the benefits of preventing complications are well established [3]. In spite of the availability of numerous treatment options for controlling HPT, HPT remains inadequately controlled in a majority of patients.

Because of different cultural health perceptions and practices [4-6], the problems of HPT treatment and control are likely to be greater in Chinese immigrants. Many immigrants retain their traditional health belief system, and those with HPT often depend upon a belief that combines Chinese Medicine and Western Medicine, with its emphasis upon the biomedical model and pharmacological intervention [7]. As a result, the management of HPT in a population of Chinese immigrants is potentially quite complicated.

Some studies have explored health perceptions and behaviors related to medication compliance (MC) in hypertensive patients [8-11]. However, the majority of participants in the studies were Caucasian Americans, thus these findings may not adequately represent the uniqueness of Chinese immigrants. Institute of Medicine recognized the disparity of health studies and services in minority groups and suggested immediate actions (e.g., more research) should be taken to enhance health care in these

minority populations [12]. This study is directly responsive to this suggestion in that it specifically targets Chinese immigrants with HPT.

Background of Chinese Immigrants With HPT

Chinese immigrants are persons of Chinese heritage who have immigrated to the US. They constitute the largest proportion (25%) of Asian Americans and Pacific Islanders (10.2 million in 2000) in the US [13]. In China, stroke is the second most common cause of death in urban areas and the third most common in the rural areas [14]. Therefore, preventing strokes is important for this population. A meta-analysis involving 2379 stroke cases in China showed that the relative risk of stroke related to HPT was 5.43 (95% confidence interval (CI): 4.62, 6.39) [15]. The population attributable risk of stroke deaths associated with HPT was 49.5% [15]. Thus, by eliminating stroke related to HPT, the proportion of stroke deaths could potentially be reduced by about 50%. As can be seen, HPT is a major preventable risk factor for stroke in Chinese.

A study from China confirms a high prevalence of HPT (13.6%) in the overall Chinese population in their native settings [16]. However, precise data about prevalence of HPT in Chinese immigrants in the US is lacking. Since Chinese immigrants have had their own medical system (Chinese Medicine) for over 5,000 years, their perception of HPT and its treatment might be very different from those in the general US population [7]. Nevertheless, very limited information exists describing how Chinese culture influences Chinese immigrants' perceptions, MC and management of HPT.

Significance and Purpose

The purposes of this study are to characterize Chinese immigrants with HPT and to explore cultural factors related to MC. Characterizing this population is important for

the identification of the urgent health needs of this population. To identify the cultural factors associated with non-compliance is important in aiding clinicians adjust their intervention to manage HPT for Chinese immigrants. This is especially important in California because this state has the largest Chinese population in the US (980,000, 40% of all Chinese in the US) [13]. A cross-sectional study design is suitable for these purposes.

Cultural factors include health perceptions of HPT and its treatment, social support and demographic factors. MC is defined in the literature as taking at least 80% of the prescribed Western medications for treating HPT [17].

Research Design and methods

This study uses a cross-sectional design. Three approaches were used to obtain the necessary data. Medical record abstraction was used to obtain clinical variables for the participants. Self-report questionnaires were administered to collect cultural health perceptions and behaviors, social support, and demographic factors. BP measurements were obtained to verify HPT status [1].

Setting

A non-profit Asian health clinic in the San Francisco Bay area is chosen as a study site because it provides services for a large number of Chinese immigrants for more than 25 years. Approximately 200 patients visit this clinic daily for health problems, of whom 65% are hypertensive. Most of the health care providers in this setting are bilingual and bicultural Chinese Americans, thus providing more linguistic choices for minority patients who cannot communicate in English.

Sample

Chinese immigrants with HPT who are registered at an Asian health clinic were the target population for this study. This population is chosen because they are the largest group among Asian Americans and Pacific Islanders who have a high stroke death rate related to HPT. Only Chinese immigrants were recruited because it was hypothesized that they have health perceptions and behaviors about HPT that are unique due to their cultural heritage.

A convenience sample of 200 Chinese immigrants with HPT was recruited. The criteria for inclusion included: (1) being a Chinese immigrant 18 years and older (ethnic Chinese born outside the US, but immigrated to the US); (2) having a diagnosis of HPT; (3) having taken HPT medications for ≥ one month before study enrollment; (4) having had at least one visit to an Asian health clinic in the prior year; and (5) being able to speak and read Mandarin Chinese. The exclusion criteria are: being medically unstable (e.g., acute renal failure) and having concurrent psychiatric problems (e.g., schizophrenia).

Measurements

Since little has been published in the literature about Chinese cultural factors related to MC and the lack of culturally appropriate measurements, preliminary work was performed to explore the factors that are culturally meaningful. A pilot study was designed with 5 in-depth individual interviews and a focus group with 5 participants to explore Chinese immigrants' perceptions of HPT, health behaviors and social support related to MC (n = 10). In this small study, half the participants were men. The mean age was 72.4 (±11.9) ranging from 50-87. The average stay in the US was 12.5 (±7.7)

ranging from 1-23. Four were married. The results from the pilot study have informed the domain and areas of content for measuring cultural factors. The domains and measures for cultural factors have been reported in another article by the authors [18]. Most of the measures we used in this study are first generation instruments [18]. All measures were pre-tested in 5 Chinese immigrants with HPT for appropriateness of content, wording and response choices. The pre-test results were analyzed and measures were revised accordingly [6].

Measurements of Cultural Factors

Psychometric properties of six scales for cultural factors are described in Table 4.1. The median for the six scales was used as a cut-point for defining dichotomous independent variables for a logistic regression analysis for non-MC.

Perceived Susceptibility to Specific Diseases is defined as the perception of one's experiencing complications caused by uncontrolled HPT. These are heart attack, stroke, kidney disease and cancer. This 5-item scale was derived from Weissfeld's Health Belief Index [19]. A Likert scale with 5 response choices including 'strongly disagree', 'disagree', 'neutral', 'agree' and 'strongly agree' was provided for all items. The Cronbach's α was 0.79 in Chinese immigrants with HPT. The summed score ranged from 5-22. The cut-point > 10 (median value) is defined as a high perceived susceptibility to specific diseases.

Perceived Susceptibility in General is the perceived impact of HPT on one's personal life. General susceptibility focuses on the respondent's understanding of the overall threat that is caused by uncontrolled HPT. This can influence one's personal life if general health deteriorates. This 3-item scale was derived from the qualitative

80

interviews. A Likert scale with five response choices from "strongly disagree" to "strongly agree" is applied to all questions. The Cronbach's alpha (α) was 0.66. The summed scores ranged from 2-10. The cut-point > 8 (median value) is defined as a high perceived susceptibility in general.

Perceived Benefits of Chinese Herbs in General is defined as the perceived beneficial properties of Chinese herbs in general. This new scale containing 4 items was obtained from the qualitative interviews. A Likert scale provides five response choices ranging from "strongly disagree" to "strongly agree". A higher score indicates more perceived benefits of Chinese herbs in general. The Cronbach's α of this 4-item scale was 0.75 and the summed score ranged from 4-20. The cut-point of > 14 (median value) is defined as a high perceived benefits of Chinese herbs in general.

Perceived Benefits of Western Medications for HPT is defined as perceived benefit of Western antihypertensive medications. This 2–item scale was developed from the qualitative interviews. A Likert scale provides five response choices ranging from "strongly disagree" to "strongly agree". A higher score indicates more perceived benefits of Western medications for HPT. The Cronbach's alpha was 0.57. The summed score ranged from 2-10. The cut-point > 7 (median value) is defined as a high perceived benefits of Western medications for HPT.

Health-Related Social Support is defined as perceived support of health care services obtained from family or friends. The 7 items developed by the investigator were driven from qualitative interviews. A Likert scale provides five response choices ranging from 'strongly disagree' to 'strongly agree'. A higher score indicates better health-

related social support. The Cronbach's α was 0.83. The summed score ranged from 7-35. The cut-point > 28 (median value) is defined as better health-related social support.

Social Support in General is defined as perceived general support from family or friends. This scale was tested in 2481 patients hospitalized with heart disease in the Enhancing Recovery in Coronary Heart Disease Patients (ENRICHD) Trial [20, 21]. The instrument is easy to administer and contains seven items [20]. It is also correlated with other social support scales [22]. Since the pilot-test of instruments showed that one item of this scale containing "emotional support" was not culturally appropriate in Chinese immigrants (they tend to hold their emotional express instead of speaking out), it was revised as "support" with some specific examples for support given. All six items have a Likert scale providing 5 response choices ranging from "None of the time" to "All of the time" and one single item has a dichotomous response choice (yes or no). This 6-item scale had a high Cronbach's α (0.91). The summed score ranged from 6-30. The cut-point > 19 (median value) is defined as better social support in general.

Measurements of Demographics and Length of Stay in the US

Gender and socioeconomic status (e.g. income, education and employment status) were not included in our logistic regression model due to two reasons: 1) they were not predictors for MC in most literature [23-27]; and 2) in our preliminary logistic regression model for MC, gender and SES were not significantly associated with MC. Since literature reported that age was a predictor for MC [26, 28], it was included in our model. Length of stay in the US is an important cultural factor for immigrant populations; therefore it was also included.

Age was calculated based on the date when the participant was enrolled in the study. Only 25% are younger than 65 years; therefore, we used the median value (72 years) as a cut-point instead of a traditional one (65 years old) because our sample tended to be older with the mean (± SD) of 70.6 (10.3).

Length of Stay in the US was calculated based on the year when the participant was enrolled in the study. We used the median value (12 years) as a cut-point.

Measurements of MC and BP

The MC Scale by Morisky et al. [29] has been modified to measure how often the participants forgot/missed taking medication, how often they were careful to take HPT medication (3 items). The original dichotomous response choices were changed to a Likert scale with five response choices ("None of the time" to "All of the time") [6]. Psychometric properties for this scale are described in Table 4.2. A total score ≥ 80% of the highest score was classified as compliant.

BP was measured by using a mercury sphygmomanometer and applying the standard procedures suggested by the Joint National Committee VI [1]. BPs were taken twice and the values for systolic and diastolic BPs were averaged to reduce variability and to increase accuracy of BP readings. If the averaged BP is < 140/90 mmHg, it is classified as BP control [1].

Recruitments Plans & Procedures

A letter of endorsement for the project was obtained from an Asian health clinic and approval for the study was obtained from the UCSF Committee on Human Research. A computerized database of patients with HPT was reviewed by a clinician in the Asian health clinic to identify eligible participants.

An invitation letter in Mandarin Chinese that described the study purpose and voluntary nature of study was sent to the eligible participants. This invitation letter included the consent information sent by the health care providers to the eligible participants. A postcard for those wishing to decline participation was attached with the invitation letter. In the invitation letter, it was stated that if the patients did not send back the refusal postcard within two weeks, the investigator would phone them to discuss their potential for participating in the study.

This telephone call was made following the specific telephone script written by the investigator two weeks after an invitation letter was sent to potential participants. The script was to inform the respondent about the purpose and nature of the study, how they could participate in the study, and their right to terminate their participation at any time.

Those who agreed to participate were asked to bring in all their medications on their next clinic visit. The study was explained to participants and written consent was obtained by the investigator after their scheduled clinic visit with their care provider. Participant were asked to rest for at least 5 minutes and then their BP was checked twice by the investigator. They were asked to fill out the questionnaires. The questionnaires were translated (English to Mandarin Chinese) and back-translated (Mandarin Chinese to English) by bicultural and bilingual experts. Recommended methods [30] for translation were used.

Data Management and Analysis

The SPSS 11.0 software was used for data entry, management and analysis. Descriptive statistics were used to screen data for missing values and outliers.

Inconsistent data was checked and discrepancies were verified. A univariate logistic

regression analysis was used to screen for the association between each individual

cultural factor and non-MC. A multivariate logistic regression was used to examine the

independent associations of eight cultural factors with non-MC with results presented as

Odds Ratio (OR) and 95% Confidence Interval (CI). Variables that are statistically

significant predictors (95% CI does not include 1) can then be used to build a final

parsimonious explanatory model.

<u>Assumptions and Limitations</u>

Since the primary author (WWL) is a new Chinese immigrant to the US, the

match between her cultural and linguistic background is ideal for conducting this study.

The pilot work provides invaluable culture-specific information for investigating health

perceptions/behaviors and social support associated with MC problems in Chinese

immigrants. The assumption was made that information given by the participants in the

questionnaires is accurate; therefore, measurement errors from self-reports may not be

detected. Survival bias is a potential problem in this study since persons who have either

suffered a stroke or died from a stroke related death are less likely to be sampled.

Results

<u>Sample Characteristics</u>

Table 4.3 shows demographics for 200 Chinese immigrants with a diagnosis of

HPT. Subjects ranged in age from 39 to 91 years (Mean 70.6, SD 10.3). Half were men

(50.0%) and half had less than a high school education (50.0%). The majority were

married (70.0%), lived with their family or close friends (86.5%), and 74.5% were

retired. The median annual family income was in the $10,000-$19,999 range. The

majority of subjects were born in China (83.0%). The mean age they came to the US was 57.5 (±12.1) years old with a range of 22-85 years. The average length of stay in the US was 13.0 (±7.2) years with a range of 1-37 years. Many could neither speak (40.5%), understand (44.0%), nor read English (50.0%). Only 2.0% were able to communicate in English with their health care provider. A higher percentage of women, compared to men, tended to be poor (less than 10,000: 59% vs. 36%), not speak (50% vs. 31%), understand (52.0% vs. 36%), or read English (60.0% vs. 40.0%) at all; and a lower percentage were married (56.0% vs. 84.0%); a greater percentage had less than a high school education (53.0% vs. 47.0%).

About half (51.0%) of total sample (n = 200) had their HPT controlled; 74.5% were compliant (by self-report) with their antihypertensive medications. About two thirds (67.5%) had lipid abnormalities. Table 4.3 shows that the percentages with a family history of CVD, physical inactivity, type II diabetes, obesity and smokers were 17.5%, 19.0%, 24.0%, 6.0% and 22.5%, respectively (Table 4.3). The percentage with target organ diseases, including heart disease, stroke, nephropathy, and retinopathy, ranged from 1.5% to 14.0% (Table 4.3).

About a third (34%) were currently using or had ever used other types of treatments (e.g., lifestyle modification) to treat their HPT (Table 4.4); 60.5% "were currently using" or "had ever used" medications to treat diseases other than HPT (Table 4.4). Over a third (38.5%) "were currently" or "had ever used" treatments other than medications to treat diseases other than HPT (Table 4.4).

About one tenth (9.5%) were currently using or had ever used Chinese herbs to treat HPT (Table 4.4). Forty-three percent "were currently using" or "had ever used"

Chinese herbs for any reason other than HPT (e.g, cough and promoting health) (Table 4.4). Thirty-two percent were currently visiting or had ever visited Chinese medicine professionals (Table 4.4).

<div align="center">Cultural Factors and non-MC</div>

A univariate logistic regression analysis evaluated to assess each of eight cultural factors and non-MC, and none were statistically significantly associated with non-MC. A multiple logistic regression analysis was used to simultaneously evaluate the independent effects of eight variables for their association with non-MC, and the following four variables were statistically significant: Lower Perceived Susceptibility in General [OR=3.77 (95%CI 1.19, 12.01)]; Higher Perceived Benefit of Chinese Herbs [OR=2.21 (95% CI 1.02, 4.81)]; Lower Perceived Benefit of Western Medications for HPT [OR=2.78 (95%CI 1.13, 6.84)]; and Longer Length of Stay in the US [OR=2.48 (95%CI 1.12, 5.50)] (Table 4.5).

<div align="center">**Discussion and Recommendations**</div>

The results from the logistic regression analysis showed that Chinese immigrants who believed that HPT had an influence on their personal life (perceived susceptibility in general) might be more compliant with their medications because they wished to avoid the adverse effects of uncontrolled HPT on their personal and family life. However, no association was found between Perceived Susceptibility to Specific Diseases and non-MC. This finding is consistent with other studies conducted in the US [23, 31] and in Singapore [32]. A possible explanation may be that most participants had not yet experienced symptoms or complications from uncontrolled HPT that would have made

them feel vulnerable. For those patients, the value of additional health education about the importance of being compliant should be tested.

Chinese immigrants with higher Perceived Benefits of Chinese Herbs in General tended to be less compliant with Western antihypertensive medications. It appears that Chinese immigrants might either reduce the dose of Western medications or only use Chinese herbs to treat their disease if they think Chinese herbs have fewer side effects.

Those who reported that they believed in the benefits of Western medications for HPT tended to be more compliant to antihypertensive medications. Although the "Perceived Benefits of Western Medication for HPT" had only a moderate internal consistency (Cronbach's $\alpha = 0.57$), its significant association with MC was considered as important. In our pilot qualitative study, our participants consistently reported benefit of Western medication was an important factor for them to take medication and our logistic regression analysis confirmed this statement. Furthermore, in the literature, benefit of Western medication was consistently reported to be associated with MC [9,28,33,34].

Given the association between benefit of Western medication and MC, Chinese immigrants' perception that effectiveness of Western medication on lowering BP is faster than Chinese herb plays an important role on Chinese immigrants' MC behaviors. Therefore, frequent and careful monitoring of side effects of HPT medications and adjusting medications to increase their effectiveness on lowering BP will be an important task for health care providers. In addition, delivering effective health education about HPT medications and reinforcing the importance of clinical follow-up will be essential for increasing medication compliance in Chinese immigrants.

Chinese immigrants, who have been in the US longer, tended to be more non-compliant to Western antihypertensive medications than those with a shorter stay. One explanation may be that most of these Chinese immigrants came to the US at an older age, and as their length of stay in the US increases, their adaptation was not increasing correspondingly. A longer stay may be accompanied with less mobile and experiencing more complex health problems. These factors will compound their non-MC behaviors. Another explanation is that for people who have stayed for a long time in the US (i.e. more than 20 years), they might live in an isolated environment because of the language barrier. In this situation, they may not have many chances to be exposed to health information posted on TV, newspapers or in health education campaigns. However, for those who have just arrived in the US, because there were no cultural and language barriers in their home country, they might have already received more health information from their native media. For example, they may already know how important it is to control HPT and to be compliant to antihypertensive medications.

Contrary to some earlier reports [26, 28], age was not associated with non-MC in this study. The lack of sufficient age distribution in our sample (three quarters of our sample were $\geq$ 65 years old), may not have allowed us to fully address this issue.

Proportion of MC (74.5%) in our sample was higher than we expected. However, proportion of HPT control (51.0%) was lower (proportion of HPT control was about 7% lower than that of the general US population). The discrepancy between the relatively higher MC rate and low HPT control rate might be due to several reasons. First, there might be discrepancy between objective measure of BP and subjective measure of MC (self-report questionnaire). Second, the 3-item MC scale had only a moderate internal

consistency (Cronbach's $\alpha = 0.65$). Whether the 3-item MC scale was sensitive in capturing most non-compliance behaviors needs further testing. Furthermore, future refinement of this scale is suggested due to its moderate internal consistency. Third, it is possible that Chinese immigrants over-estimated their MC because they were afraid of being stigmatized as a "bad" patient due to non-compliance. Fourth, other factors besides MC may influence HPT control (e.g., is HPT treatment optimized by the provider). Given the complexity of the concept, further research is needed on this issue in this population.

Almost all Chinese immigrants preferred using Chinese to communicate with their health care providers. Chinese immigrants live in the Chinese community where they do not use English to communicate with people and do not reach out to the world beyond this community. They only go to the clinic where the health care providers can speak their language. This situation might be even more prominent in Chinese immigrant women since they tended to be less educated and have more language barriers than men. These findings indicate that more bilingual and bicultural health care providers are needed for this population, especially Chinese immigrant women. Moreover, it will be crucial to find out how Chinese immigrants handle the situation if they cannot see their own providers. Do they seek care in other places? Do they simply give up on their treatments or delay the treatment until later when their Mandarin-speaking care provider is available? For those who do not get continuity in follow-up of their disease management or obtain reinforcement from their provider about the importance of being compliant with their therapeutic regimen, will their compliance in continuing with their Western medication deteriorate? These questions necessitate further investigations.

The high percentage of married subjects (70%) suggests marriage is an important social status for Chinese immigrants, especially for men. This finding is similar to that of the US population. Women tend to outlive men; thus a larger percent of Chinese women might be widowed in their old age. For women who are widowed and live alone, they may receive less adequate health care than those who are married or live with significant others because of a lack of resources and social contact.

Most Chinese immigrants live with their family or friends (86.5%). Therefore, social support from family members and close friends is highly valued in Chinese society. However, in our logistic regression model, social support was not associated with non-MC. This finding is different from previous research [28, 35], which found a significant association between social support and MC in the general US population. The association between social support and non-MC in Chinese immigrants needs further testing.

Our exploratory model for MC demonstrates that four cultural factors were associated with non-MC, including Perceived Susceptibility in General, Perceived Benefits of Chinese Herbs in General, Perceived Benefits of Western Medications for HPT and Length of Stay in the US. This model will need further testing in other Chinese communities in the US. Confirming and establishing a model for non-MC will help clinicians to determine who will be at high risk for non-compliance to antihypertensive medications and, subsequently, who should receive individualized intervention to improve their MC.

More specifically, the following areas require further study to advance MC and BP control for Chinese immigrants with HPT: 1) our 3-item MC scale will need further

testing and modification for its applicability in other Chinese immigrant communities; 2) continuity of health care providers for Chinese immigrants might be associated with MC; 3) Chinese immigrant women who are widowed or single might need more individualized health care to ensure the adequacy of MC and BP control; 4) for those who perceive more benefits from Chinese herbs (e.g., fewer side effects than Western medications), close monitoring of side effects from Western medications will be important; 5) for those who have not yet experienced symptoms of uncontrolled BP may have poor MC, reinforcement of the importance of MC and understanding their difficulty in following treatment regimens will be important to help them manage their BP.

These findings can guide culturally appropriate nursing interventions to help manage non-MC and HPT in Chinese immigrants. Furthermore, this vulnerable population needs health care providers with cultural and linguistic competency to manage their HPT.

References

1. Joint National Committee. *The sixth report of the Joint National Committee on prevention , detection, evaluation, and treatment of high blood pressure (NIH Publication No. 98-4080)*. Bethesda, MC: National Institutes of Health 1997.

2. Department of Health and Human Services. *Health promotion and disease prevention United States, 1990 (PHS publication No. 93-1513)*: Hyattsville, MC: Author; 1993.

3. Psaty BM, Smith NL, Siscovick DS, et al. Health outcomes associated with antihypertensive therapies used as first-line agents. A systematic review and meta-analysis. *Jama*. Mar 5 1997;277(9):739-745.

4. Lipson JG, & Meleis, A. I. Research with immigrants and refugees. In: Hinshaw AS, Feetham, S. L., Shaver, J. L. F. (Eds.), ed. *Handbook of clinical nursing research*. Thousand Oaks, CA: Sage Publication; 1999.

5. Hong B, Bayat N. National Asian American & Pacific Islander cardiovascular health action plan eliminating racial and ethnic in cardiovascular health [On-line]. Available at: http://www.apiahf.org/cvd1.html.

6. Li WW. *Pretest of instruments for measuring health belief and medication compliance in Chinese immigrants* [Pilot Project]. San Francisco, CA: Department of Physiological Nursing, University of California, San Francisco; 2001.

7. Ogden S. *Global studies: China*. 9th ed. Columbus, OH: McGraw-Hill Dushkin; 2001.

8.   Daniels DE, Rene AA, Daniels VR. Race: an explanation of patient compliance--fact or fiction? *Journal of the National Medical Association.* 1994;86(1):20-25.

9.   Khalil SA, Elzubier AG. Drug compliance among hypertensive patients in Tabuk, Saudi Arabia. *Journal of Hypertension.* 1997;15(5):561-565.

10.   Lim TO. The Mentakab Hypertension Study Project Part VI--Blood pressure measurement and hypertension: a questionnaire survey of medical staff. *Singapore Medical Journal.* 1992;33(2):160-163.

11.   Shea S, Misra D, Ehrlich MH, Field L, Francis CK. Correlates of nonadherence to hypertension treatment in an inner-city minority population. *American Journal of Public Health.* 1992;82(12):1607-1612.

12.   Institute of Medicine. *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care.* Washington, D.C.: The National Academies Press; 2003.

13.   U.S. Bureau of the Census. *Profiles of General Demographic Characteristics: 2000 census of Population and Housing, United States (p. 1).* Washington, DC: U.S. Department of Commerce; 2000.

14.   World Health Organization. *World Health Statistics Annual, 1993.* Geneva, Switzerland: World Health Organization; 1994.

15.   He J, Klag MJ, Wu Z, Whelton PK. Stroke in the People's Republic of China. II. Meta-analysis of hypertension and risk of stroke. *Stroke.* 1995;26(12):2228-2232.

16.   Tao S, Wu, X., Duan, X., Fang, W., Hao, J., Fan, D., Wang, W., & Li, Y. Hypertension prevalence and status of awareness, treatment and control in China. *Chinese Medical Journal.* 1995;108(7):483-489.

17. Sackett DL, Haynes, R. B., & Tugwell, P. Compliance. In: Sackett DL, (Ed.), ed. *Clinical epidemiology: A basic science for clinical medicine.* Boston, MA: Little Brown; 1985.

18. Li WW, Stewart A, Stotts N, Froelicher ES. Cultural factors and medication compliance in Chinese immigrants who are taking antihypertensive medications: Instrument development: a Dissertation. 2004, San Francisco, CA.

19. Weissfeld JL, Brock BM, Kirscht JP, Hawthorne VM. Reliability of health belief indexes: confirmatory factor analysis in sex, race, and age subgroups. *Health Services Research.* 1987;21(6):777-793.

20. The ENRICHD Investigators. Enhancing recovery in coronary heart disease patients (ENRICHD): Study design and methods. *American Heart Journal.* 2000;139:1-9.

21. Berkman LF, Blumenthal J, Burg M, et al. Effects of treating depression and low perceived social support on clinical events after myocardial infarction: the Enhancing Recovery in Coronary Heart Disease Patients (ENRICHD) Randomized Trial. *Journal of American Medical Association.* Jun 18 2003;289(23):3106-3116.

22. Mitchell PH, Powell L, Blumenthal J, et al. A short social support measure for patients recovering from myocardial infarction: the ENRICHD Social Support Inventory. *Journal of Cardiopulmonary Rehabilitation.* Nov-Dec 2003;23(6):398-403.

23. Andreoli KG. Self-concept and health beliefs in compliant and noncompliant hypertensive patients. *Nursing Research.* 1981;30(6):323-328.

24. Kyngas H, Lahdenpera T. Compliance of patients with hypertension and associated factors. *Journal of Advanced Nursing*. 1999;29(4):832-839.

25. Cummings KM, Becker MH, Kirscht JP, Levin NW. Psychosocial factors affecting adherence to medical regiments in a group of hemodialysis patients. *Medical Care*. 1982;20(6):567-580.

26. Sharkness CM, Snow DA. The patient's view of hypertension and compliance. *American Journal of Preventive Medicine*. 1992;8(3):141-146.

27. Shaw E, Anderson JG, Maloney M, Jay SJ, Fagan D. Factors associated with noncompliance of patients taking antihypertensive medications. *Hospital Pharmacy*. 1995;30(3):201-203, 206-207.

28. Nelson EC, Stason WB, Neutra RR, Solomon HS. Identification of the noncompliant hypertensive patient. *Preventive Medicine*. 1980;9(4):504-517.

29. Morisky DE, Green, L. W., & Levine, D. M. Concurrent and predictive validity of a self-reported measure of medication compliance. *Medical Care*. 1986;24(1):67-74.

30. Marin G, & Marin, B. V. Translation of data collection instruments. In: Marin G, & Marin, B. V., ed. *Research with Hispanic populations*. Vol 23. Nebury Park.: Sage Publications; 1991:82-100.

31. Cummings KM, Kirscht JP, Binder LR, Godley AJ. Determinants of drug treatment maintenance among hypertensive persons in inner city Detroit. *Public Health Reports*. 1982;97(2):99-106.

32. Lim TO, Ngah BA, Rahman RA, et al. The Mentakab hypertension study project. Part V--Drug compliance in hypertensive patients. *Singapore Medical Journal.* 1992;33(1):63-66.

33. Kirscht JP, Rosenstock IM. Patient adherence to antihypertensive medical regimens. *Journal of Community Health.* 1977;3(2):115-124.

34. Given CW, Given BA, Simoni LE. The association of knowledge and perception of medications with compliance and health states among hypertension patients: a prospective study. *Research in Nursing and Health.* 1978;1(2):76-84.

35. Stanton AL. Determinants of adherence to medical regimens by hypertensive patients. *Journal of Behavioral Medicine.* 1987;10(4):377-394.

Table 4.1 Psychometric Properties for Scales for Cultural Factors

Scales	Perceived Susceptibility to Specific Diseases	Perceived Susceptibility in General-2 items	Perceived Benefits of Chinese Herbs in General	Perceived Benefits of Western Medication for Treating HPT	Health-Related Social Support	Social Support in General
# of items	5	2	4	2	7	6
Mean	10.25	7.99	14.01	7.95	26.85	19.18
(SD)	(4.04)	(1.21)	(2.22)	(1.01)	(3.77)	(6.60)
Possible range	5-25	2-10	4-20	2-10	7-35	6-30
% at floor	16.7	0.5	0	0.5	0.5	3
% at ceiling	0	12.0	3	9	4	8.5
Cronbach's α	0.79	0.66	0.75	0.57	0.83	0.91

NOTE: Higher score is higher level of scale label for all scales (e.g., greater susceptibility)

Table 4.2 Psychometric Properties for MC

Scale	MC Scale
# of items	3
Mean	12.96
(SD)	(2.31)
Possible range	3-15
% at floor	0.5
% at ceiling	38.0
Cronbach's α	0.65

Higher score means better MC

Table 4.3 Demographic and Clinical Variables of Chinese Immigrants with HPT

Demographics	Men (n=100)	Women (n=100)	Total (n=200)
HPT control (%)	52.0	50.0	51.0
Medication compliance (%)	71.0	78.0	74.5
Length of stay in the US: Mean ± SD	13.2 ± 6.8	12.9 ± 7.6	13.0 ± 7.2
Elderly	%	%	%
≥65 years old (y/o)	75.0	69.0	72.0
Education			
Less than high school	47.0	53.0	50.0
Martial status (%)			
Married	84.0	56.0	70.0
Live with family or friends	89.0	78.0	86.5
Work status			
Retired	74.0	75.0	74.5
Annual household income ($)			
Less than $10,000	36.0	59.0	47.5
$10,000-19,999	32.0	14.0	23.0
More than $20,000-29,999	18.0	13.0	15.5
Unknown or refused to answer	14.0	14.0	14.0
In which country were you born?			
China	80.0	86.0	83.0

	Others	20.0	14.0	17.0
Religion				
	Buddhism or folk religion	23.0	27.0	25.0
	Others	26.0	40.0	33.0
	None	51.0	33.0	42.0
How well do you speak English?				
	Not at all	31.0	50.0	40.5
	Poorly	60.0	46.0	53.0
	Fairly or extremely well	9.0	4.0	6.5
How well do you understand English?				
	Not at all	36.0	52.0	44.0
	Poor	55.0	45.0	50.0
	Fairly or extremely well	9.0	3.0	6.0
How well do you read English?				
	Not at all	40.0	60.0	50.0
	Poorly	47.0	35.0	41.0
	Fairly well or extremely well	13.0	5.0	9.0
Prefer using English to communicate with health care provider				
	No	96.0	100.0	98.0
Positive CV risk factors				
	Family history (being aware of)	18.0	17.0	17.5
	Physical inactivity	18.0	20.0	19.0
	Lipid abnormality	71.0	64.0	67.5
	Type II Diabetes	24.0	24.0	24.0
	Obesity	7.0	5.0	6.0
	Smoker	41.0	4.0	22.5
Target organ disease				
	Heart disease	15.0	13.0	14.0
	Stroke or transient ischemic attack	10.0	5.0	7.5
	Nephropathy	3.0	0	1.5
	Retinopathy	2.0	2.0	2.0

Table 4.4 Percent of Sample that Used Various Treatments for HPT and Other Diseases (n=200)

		Currently using % (n)	Ever used % (n)	Never used % (n)
HPT				
	Use other types of treatments	30.5 (61)	3.5 (7)	66.0 (132)
	Use Chinese herbs	4.5 (9)	5.0 (10)	90.5 (181)
Other diseases (e.g., diabetes)				
	Use medications	55.0 (110)	5.5 (11)	39.5 (79)
	Use other types of treatments	35.5 (71)	3.0 (6)	61.5 (123)
Any other reasons (e.g., cough)				
	Use Chinese herbs	14.5 (29)	28.5 (57)	57.0 (114)
	Visit Chinese medicine professionals	12.5 (29)	19.0 (57)	68.5 (114)

Table 4.5 Multivariate Logistic Regression of Cultural Factors for Non-Medication Compliance

Variables		OR	95% CI	
			Lower	Upper
Perceived Susceptibility to Specific Diseases	≤ 10	0.483	0.22	1.08
Perceived Susceptibility in General	≤ 8	**3.77**	**1.19**	**12.01**
Perceived Benefits of Chinese Herbs in General	> 14	**2.21**	**1.02**	**4.81**
Perceived Benefits of Western Medications for HPT	≤ 7	**2.78**	**1.13**	**6.84**
Health-Related Social Support	≤ 28	1.53	0.43	5.41
Social Support in General	≤ 19	0.65	0.30	1.40
Age (years)	> 72	1.63	0.76	3.53
Length of Stay in the US	> 12	**2.48**	**1.12**	**5.50**

Comparison are made with: Perceived Susceptibility in General >8; Perceived Susceptibility to Specific Diseases >10; Perceived Benefits of Chinese Herbs ≤ 14; Perceived Benefits of Western Medications for HPT >7; Health-Related Social Support > 28; Social Support in General > 19; Age (years) ≤ 72; Length of Stay in the US ≤ 12; MC =0; non-MC=1

Chapter 5.
Discussion and Recommendations

The sample in this study tended to be old, poor, not employed, born in China, spoke Mandarin Chinese almost exclusively, and had a low education level. The average length of stay in the US was 13.0 (±7.2) years. Given the old age of this sample, geriatric nursing skills to take care of this old population are recommended.

The proportion of MC (74.5%) in our sample was higher than we expected, however, the proportion of HPT control (51.0%) was low. The discrepancy between the relatively higher MC rate and low HPT control rate may be due to several reasons. First, since our 3-item MC scale is a first generation instrument, it might need further modification to detect non-MC behaviors in this population. Whether the current MC scale overestimated the MC behaviors needs further testing. Second, it is not clear if there are other factors besides MC influencing HPT control (e.g., is HPT treatment optimized by the provider?). Since this is a very complex situation, future studies will be needed to investigate this issue in this population. Almost all Chinese immigrants preferred using Chinese to communicate with their health care providers. Therefore, increasing the number of Chinese-speaking care providers will be important to better serve this underrepresented population.

The framework for measuring cultural factors and MC has been operationalized containing multi-item scales for measuring cultural factors and MC. The instruments appear useful and have an acceptable internal consistency (Cronbach's α). This framework will help the development of culturally sensitive intervention for improving MC and HPT control in Chinese immigrants. By further developing and refining the final framework, reliable and valid measures for cultural factors and MC in Chinese immigrants will be established.

This exploratory prediction model demonstrates that four important cultural factors are associated with non-MC: Higher Perceived Benefits of Chinese Herbs in General; Lower Perceived Benefits of Western Medications for HPT; Lower Perceived Susceptibility in General; and Longer Length of Stay in the US. This model will need further testing for its appropriateness in other Chinese communities in the US. Confirming and establishing a model for non-MC will help clinicians to determine who is at high risk for non-compliance to antihypertensive medications. Subsequently, those identified as being at high-risk for non-compliance can then receive individualized intervention to improve their MC.

Since the sample was from one clinic, the application of findings to other Chinese immigrant communities may be limited. However, the findings gleaned from this study will provide important information about the characteristics of Chinese immigrant populations and cultural factors associated with non-MC for antihypertensive medications. This will also help in the formulation of effective nursing intervention on HPT management in this population.

Wen-Wen Li
Department of Physiology Nursing
University of California

wenwenli@yahoo.com
Fax: 510-687-1337

Dear Ms Li

AMERICAN JOURNAL OF CARDIOLOGY, Vol 88, 2001, pp 316-322, The ENRICHD Investigators, "Enhancing recovery in ..." 1 Questionnaire only

As per your recent letter, we hereby grant you permission to reprint the aforementioned material at no charge in your thesis subject to the following conditions:

1. If any part of the material to be used (for example, figures) has appeared in our publication with credit or acknowledgement to another source, permission must also be sought from that source. If such permission is not obtained then that material may not be included in your publication/copies.

2. Suitable acknowledgment to the source must be made, either as a footnote or in a reference list at the end of your publication, as follows:

    "Reprinted from Journal title, Volume number, Author(s), Title of article, Page Nos, Copyright (Year), with permission from Excerpta Medica Inc."

3. Reproduction of this material is confined to the purpose for which permission is hereby given.

4. This permission is granted for non-exclusive world <u>English</u> rights only. For other languages please reapply separately for each one required. Permission excludes use in an electronic form. Should you have a specific electronic project in mind please reapply for permission.

5. This includes permission for UMI to supply single copies, on demand, of the complete thesis. Should your thesis be published commercially, please reapply for permission.

Yours sincerely

C. Tanker.

pp. Helen Wilson
Rights Manager

Your future requests will be handled more quickly if you complete the online form at www.elsevier.com/homepage/guestbook/?form=permis

TOTAL P.82

15 January 2003   Our Ref: HW/ct/jan 03.224

Wen-Wen Li
School of Nursing, University of California
42701 Everglades Park Dr.
Fremont, CA 94538
USA

Dear Ms Li

*AMERICAN JOURNAL OF CARDIOLOGY, Vol 88, 2001, pp 316-322, The ENRICHD Investigators,
"Enhancing Recovery in Coronary ..." 1 Figure only*

As per your letter dated 24 December 2002, we hereby grant you permission to reproduce the
aforementioned material in **print and electronic format** at no charge subject to the following conditions:

1. If any part of the material to be used (for example, figures) has appeared in our publication with
    credit or acknowledgement to another source, permission must also be sought from that source. If
    such permission is not obtained then that material may not be included in your publication/copies.

2. Suitable acknowledgement to the source must be made, either as a footnote or in a reference list at
    the end of your publication, as follows:

    "Reprinted from Journal title, Volume number, Author(s), Title of article, Page Nos, Copyright
    (Year), with permission from Excerpta Medica Inc."

3. Reproduction of this material is confined to the purpose for which permission is hereby given.

4. This permission is granted for non-exclusive world **Chinese Mandarin** rights only. For other
    languages please reapply separately for each one required.

Yours sincerely

Helen Wilson
Rights Manager

**Your future requests will be handled more quickly if you complete the online form at
www.elsevier.com/homepage/guestbook/?form=permis**

April 22, 2002

James A. Blumenthal, PhD
Department of Psychiatry and Behavioral Sciences
Box 3119
Duke University Medical Center
Durham, NC 27710

Dear Dr. Blumenthal:

I am writing to request your permission to use the ENRICHD Social Support Instrument (ESSI). Currently, I am a third-year doctoral student in UCSF School of Nursing. Dr. Erika S. Froelicher is my dissertation chair. I would like to use your questionnaire in my dissertation study entitled "Exploration of Cultural Factors Related to Hypertension and Its Treatment in Chinese Immigrants." I will modify your questionnaire to measure health belief concepts in Chinese immigrants with hypertension and translate it into Chinese Mandarin. I greatly enjoy reading your work and would be most pleased if you were to grant me the permission. Please indicate your agreement by signing and dating this letter in the space provided below and kindly return it to me in the self-addressed envelope.

Sincerely,

Wen-Wen Li, RN, MS, PhDc
Doctoral Student,
Department of Physiological Nursing,
Schools of Nursing,
University of California, San Francisco

The ESSI is now in the public domain. Please credit ENRICHD investigators in any publications. Thanks — and good luck. Dr. B.

Permission to reproduce signatures:

James A. Blumenthal, PhD   5/10/02
James A. Blumenthal, PhD   Date

106

University of California
San Francisco

UCSF

Department of Physiological Nursing
School of Nursing

2 Koret Way
Room N631, Box 0610
San Francisco, CA 94143-0610
tel: 415/476-2191
fax: 415/476-8899

April 22, 2002

Health Services Research
Official Journal of the Academy
Health Research and Educational Trust
One North Franklin
Chicago, IL 60606

To Whom It May Concern:

I am writing to request your permission to use the Health Belief Indexes
(Weissfeld, Brock, Kirscht, & Hawthorne, 1987). Currently, I am a third-year
doctoral student in UCSF School of Nursing. Dr. Erika S. Froelicher is my
dissertation chair. I would like to use this questionnaire in my dissertation study
entitled "Exploration of Cultural Factors Related to Hypertension and Its
Treatment in Chinese Immigrants." I will modify this questionnaire to measure
health belief concepts in Chinese immigrants with hypertension and translate it
into Chinese Mandarin. I greatly enjoy reading the work and would be most
pleased if you were to grant me the permission. Please indicate your agreement
by signing and dating this letter in the space provided below and kindly return it
to me in the self-addressed envelope.

**Weissfeld, J. L., Brock, B. M., Kirscht, J. P., & Hawthorne, V. M. (1987).
Reliability of health belief indexes: confirmatory factor analysis in sex,
race, and age subgroups. Health Services Research, 21(6), 777-793.**

Sincerely,

Wen-Wen Li, RN, MS, PhDc
Doctoral Student,
Department of Physiological Nursing,
Schools of Nursing,
University of California, San Francisco

Permission to reproduce signatures:

_____   5/30/2002
Health Services Research   Date

Please indicate in footnote "Reprinted w/ permission granted by
the Health Research & Educational Trust (1987).

107

University of California
San Francisco

UCSF

Department of Physiological Nursing
School of Nursing

2 Koret Way
Room N631, Box 0610
San Francisco, CA 94143-0610
tel: 415/476-2191
fax: 415/476-8899

April 22, 2002

Joel L. Weissfeld, M.D., M.P.H.
Department of Epidemiology
Suite 510, Keystone Building
University of Pittsburgh
Pittsburgh, PA 15261

Dear Dr. Weissfeld:

I am writing to request your permission to use the Health Belief Indexes (in your publication "Reliability of Health Belief Indexes: Confirmatory Factor Analysis in Sex, Race, and Age Subgroups" in 1987). Currently, I am a third-year doctoral student in UCSF School of Nursing. Dr. Erika S. Froelicher is my dissertation chair. I would like to use your questionnaire in my dissertation study entitled "Exploration of Cultural Factors Related to Hypertension and Its Treatment in Chinese Immigrants." I will modify your questionnaire to measure health belief concepts in Chinese immigrants with hypertension and translate it into Chinese Mandarin. I greatly enjoy reading your work and would be most pleased if you were to grant me the permission. Please indicate your agreement by signing and dating this letter in the space provided below and kindly return it to me in the self-addressed envelope.

Sincerely,

Wen-Wen Li, RN, MS, PhDc
Doctoral Student,
Department of Physiological Nursing,
Schools of Nursing,
University of California, San Francisco

Permission to reproduce signatures:

_____   _5/14/02_
Joel L. Weissfeld, M.D., M.P.H.   Date

University of California
San Francisco

UCSF

Department of Physiological Nursing
School of Nursing

2 Koret Way
Room N631, Box 0610
San Francisco, CA 94143-0610
tel: 415/476-2191
fax: 415/476-0089

April 22, 2002

Medical Care
Lippincott Williams & Wilkins,
530 Walnut Street,
Philadelphia, PA 19106-3621

To Whom It May Concern:

I am writing to request your permission to use the Medication Adherence
Instrument (Morisky, 1986). Currently, I am a third-year doctoral student in
UCSF School of Nursing. Dr. Erika S. Froelicher is my dissertation chair. I
would like to use this questionnaire in my dissertation study entitled "Exploration
of Cultural Factors Related to Hypertension and its Treatment in Chinese
immigrants." I will modify this questionnaire to measure the concept of
medication compliance in Chinese immigrants with hypertension and translate it
into Chinese Mandarin. I greatly enjoy reading the work and would be most
pleased if you were to grant me the permission. Please indicate your agreement
by signing and dating this letter in the space provided below and kindly return it
to me in the self-addressed envelope.

Morisky, D. E., Green, L. W., & Levine, D. M. (1986). Concurrent and
predictive validity of a self-reported measure of medication compliance.
Medical Care, 24(1), 67-74.

Sincerely,

Wen-Wen Li, RN, MS, PhDc
Doctoral Student,
Department of Physiological Nursing,
Schools of Nursing,
University of California, San Francisco

Permission is granted to reproduce the
requested material for use in your academic
thesis/dissertation. Permission is granted
provided a prominent credit line is placed
stating the original source and copyright owner,
© Lippincott Williams & Wilkins.

_____ date: 10-22-02

Permission to reproduce signatures:

_____
Lippincott Williams & Wilkins   Date
                                         10-22-02

University of California
San Francisco

UC_SF

Department of Physiological Nursing
School of Nursing

2 Koret Way
Room N631, Box 0610
San Francisco, CA 94143-0610
tel: 415/476-2191
fax: 415/476-8899

April 22, 2002

Donald E. Morisky, ScD
UCLA School of Public Health
Department of Community Health Sciences
10833 Le Conte Ave., CHS 26-070
Los Angeles, California 90095-1772

Dear Dr. Morisky:

I am writing to request your permission to use the Medication Adherence
Instrument (in your publication "Concurrent and Predictive Validity of a Self-
Reported Measure of Medication Adherence" in 1986). Currently, I am a third-
year doctoral student in UCSF School of Nursing. Dr. Erika S. Froelicher is my
dissertation chair. I would like to use your questionnaire in my dissertation study
entitled "Exploration of Cultural Factors Related to Hypertension and Its
Treatment in Chinese Immigrants." I will modify your questionnaire to measure
the concept of medication compliance in Chinese immigrants with hypertension
and translate it into Chinese Mandarin. I greatly enjoy reading your work and
would be most pleased if you were to grant me the permission. Please indicate
your agreement by signing and dating this letter in the space provided below and
kindly return it to me in the self-addressed envelope.

Sincerely,

Wen-Wen Li, RN, MS, PhDc
Doctoral Student,
Department of Physiological Nursing,
Schools of Nursing,
University of California, San Francisco

Permission to reproduce signatures:

_____   5/6/02
Donald E. Morisky, ScD   Date

110

UNIVERSITY OF CALIFORNIA, LOS ANGELES

UCLA

BERKELEY · DAVIS · IRVINE · LOS ANGELES · RIVERSIDE · SAN DIEGO · SAN FRANCISCO | SANTA BARBARA · SANTA CRUZ

SCHOOL OF PUBLIC HEALTH
P.O. BOX 951772
LOS ANGELES, CALIFORNIA 90095-1772

October 6, 2003

Wen-Wen Li, RN, MS, PhDc
Department of Physiological Nursing, Room N611P
School of Nursing
University of California San Francisco
San Francisco, CA 94143-0610

Dear Dr. Li:

Thank you for your letter requesting permission to use our updated, 9-item, self-reported medication-taking behavior measure which is currently under review. The original version of the scale appeared in a 1986 article titled " "Concurrent and Predictive Validity of a Self-reported Measure of Medication Adherence" Medical Care 1986: 24:67-74. I have used self-reported medication taking measures for all my adherence-related research involving chronic diseases (hypertension and diabetes) and infectious diseases (tuberculosis and HIV). The scale was validated with a urine test of a biochemical marker and indicated greater than a 95% concordance with self-reported high compliance and presence of the marker. This information has been published in: Morisky DE, Malotte CK, Choi P, et al. A Patient Education Program to Improve Adherence Rate with Antituberculosis Drug Regimens. Health Education Quarterly 1990: 17:253-268. Self-reported measures have been found to be reliable as well as demonstrating both concurrent and predictive validity. Our most recent 24 month longitudinal study with hypertensive patients using an expanded, 9-item measure, has demonstrated higher levels of internal consistency and significant concurrent validity. We have an article under review regarding the results of our updated compliance assessmen.

I give you permission to use the updated scale, provide that you provide appropriate citation of the instrument as well as update me as to the results of our scale, both as an independent variable on BP control and as a DV with hypothesized psychosocial and environmental predictors of adherence. I look forward to hearing from you regarding your results with this scale.
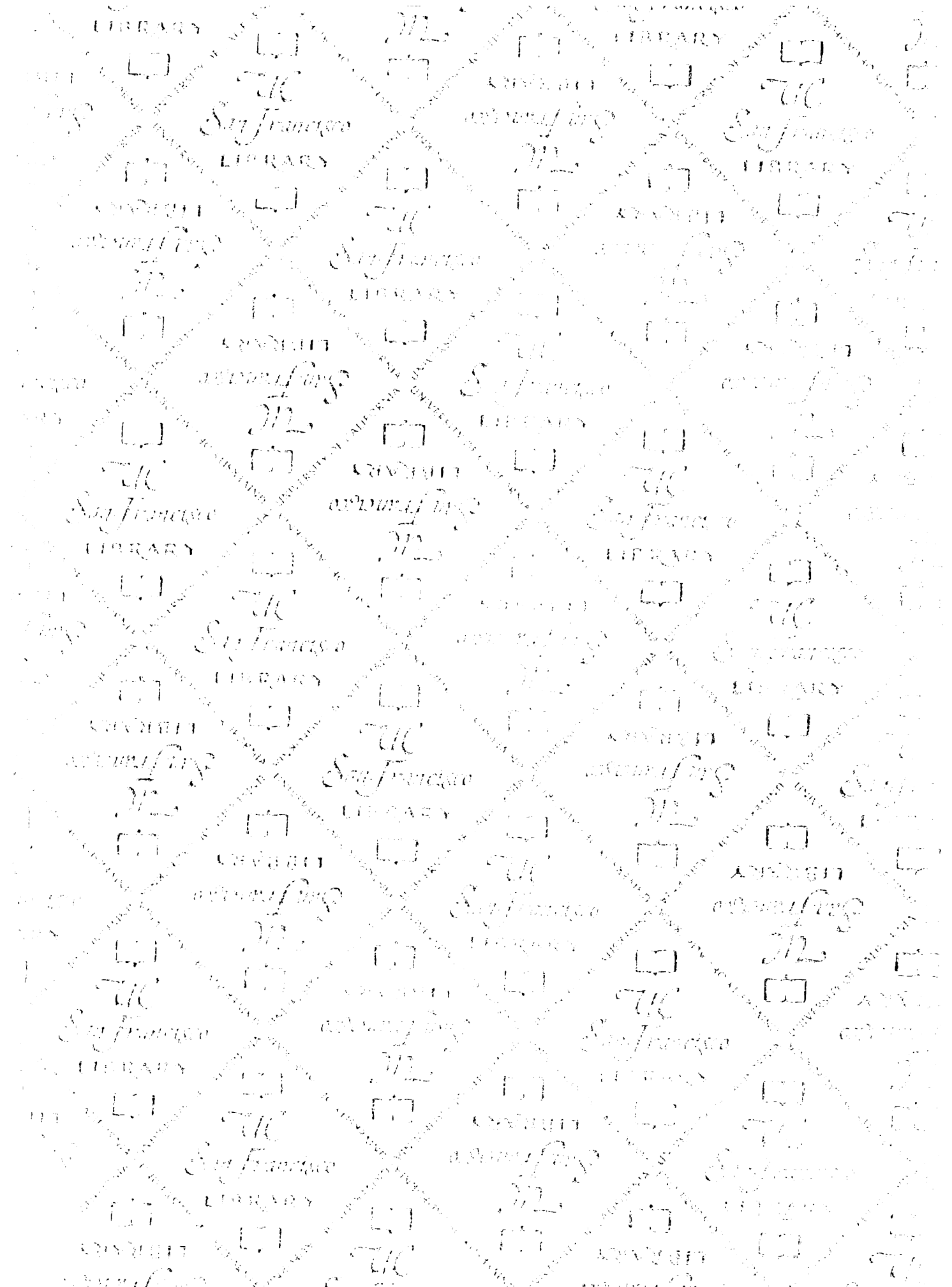
Sincerely,

Donald E. Morisky, Sc.D., M.S.P.H., Sc.M.
Professor
Department of Community Health Sciences

Morisky DE, Ward HJ, Liu KY. Self-reported Medication Taking Behavior: A Valid Indicator for Assessing Compliance. Presentation at 129th APHA Meeting, Atlanta, September, 2001.

Morisky DE, Ward HJ, Ang A. The Psychometric Properties and Predictive Validity of a Self-Reported Measure on Adherence Behavior. Invited Paper, Presented at the Annual Meeting of the APHA, Philadelphia, 2002.