

5-2008

# The Relationships Among Work Related Stress, Health Status, and Physical Activity Participation of Nurses in Teaching Hospitals in Taipei, Taiwan

Ming-Hui Yao

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THE RELATIONSHIPS AMONG WORK RELATED STRESS, HEALTH STATUS,  
AND PHYSICAL ACTIVITY PARTICIPATION OF NURSES  
IN TEACHING HOSPITALS IN TAIPEI, TAIWAN

A Dissertation

by

MING-HUI YAO

Presented to the School of Graduate Studies of the  
University of the Incarnate Word  
in Partial Fulfillment  
of the requirements  
for the degree of

DOCTOR OF PHILOSOPHY

The University of the Incarnate Word

May 2008

UMI Number: 3305879

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## ACKNOWLEDGEMENTS

I would like to express my greatest appreciation for and dedicate the achievement of my dissertation to my parents (Lien- Ting Yao and Kuo Mei- Lien Yao), and my parent-in-laws (Yung-Tai Lei and Kuei-Chu Chiu), who have provided me with tremendous support, care and endless love for my growth and studies. It is with their love that I have realized my dream for a doctoral degree.

I would also like to dedicate my heartfelt gratitude to my dissertation committee, who have mentored me throughout the process of writing the dissertation: Dr. Judith E. Beauford, Dr. Absael Antelo, Dr. Dianna Tison, and Dr. Timothy Henrich. Dr. Judith E. Beauford is the Chair of my committee. She has been succinct and direct in guiding me through the statistical analysis and throughout the course of my research project. Dr. Absael Antelo, Dr. Dianna Tison, and Dr. Timothy Henrich have guided me through the critical thinking processes of writing the dissertation, and shared with me their expertise and insights. Without the continuous support, guidance and encouragement of these professors, I would not have been able to complete my doctoral studies.

My special thanks go to Dr. James G. Anderson (Nursing Stress Scale), Dr. J. E. Ware (SF-36 Health Survey), Dr. Bradley J. Cardinal (Stage of Exercise Scale), and Dr. Steve N. Blair (7-Day Physical Activity Recall Questionnaire) for their generosity in sharing their instruments with me.

Finally, I would like to thank my husband, Wen-Chieh Lei, for taking care of me while I was writing this dissertation. Without his help and encouragement, I would not have been able to finish this undertaking in due time.

## Abstract

THE RELATIONSHIPS AMONG WORK RELATED STRESS, HEALTH STATUS,  
AND PHYSICAL ACTIVITY PARTICIPATION OF NURSES  
IN TEACHING HOSPITALS IN TAIPEI, TAIWAN

Ming-Hui Yao

Chair of Committee: Judith E. Beauford, Ph.D.

University of the Incarnate Word, 2008

The purpose of this study was to investigate the relationship among work-related stress, health status, and physical activity participation of the nurses in teaching hospitals in Taipei, Taiwan. A quantitative research design was used in this study. Participants were 420 female nurses systematically selected from 5 teaching hospitals. The participants were asked to complete a survey package including 4 instruments (Nurse Stress Scale (NSS), SF-36 Health Survey, Stage of Exercise Scale (SOES), Seven-Day Physical Activity Recall Questionnaire and a demographic questionnaire.

The results showed that among the 7 factors of nursing stress, work load was rated the highest by the participants. The result of MANOVA showed a relationship between age groups and levels of job-related stress. The nurses under 20 years old reported more stress than those who were over 21 years old. The nurse participants had evidenced negative correlation between nursing stress and nurse's physical ( $r = -.251$ ) and mental ( $r = -.30$ ) health status. This result showed that higher levels of nursing stress related to lower levels of mental and physical health. Logistic Regression showed that health was predicted by job related stress in nursing.

The current study showed that physical activity was positively correlated with both physical and mental components of nurses' health. Correlation statistics result showed that there was a positive relationship between physical activity and physical ( $r = .10$ ) and mental ( $r = .12$ ) health status. The result of MANOVA confirmed that the participants who had not participated in exercise during the 6-month period experienced lower physical and mental health than those who had participated in exercise and physical activity in the same period.

Higher levels of physical activity participation were associated with lower levels of nursing stress. The result of the standard regression in this study indicated that the activity level of the 7 Days Physical Activity contributed a negative relationship ( $\beta = -.199$ ) to prediction of nursing stress scores. Nurses participated in higher level of physical activity related to lower level of stress.

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## Chapter 1: Introduction

Nursing is a highly stressful profession (AbuAlRub, 2004; Bianchi, 2004; Engel, 2004; Callaghan, Shui, & Wyatt, 2000; Shirey, 2006; Stacciarini & Troccoli, 2004; Tseng, 2004; Xianyu & Lambert, 2006). Research has shown that nurses are under a tremendous amount of job-related stress, often working in unstable and tense environments (Callaghan, Shui, & Wyatt, 2000; Lee, 2005; Yang, 2005). The demanding nature of the health care profession determines that nurses constantly work in stressful situations including dealing with death, sickness, heavy workloads, night-shift work, difficult communication with patients and their families, and possible conflicts with physicians, medical teams, fellow nurses and supervisors (Callaghan et al., 2000; Xianyu & Lambert, 2006).

Research on stress has well evidenced a significant relationship between stress and “the occurrence of both concurrent and subsequent health problems” (DeLongis, Folkman, & Lazarus, 1988, p. 486). Stress, either short-term or chronic, can affect a person physiologically and psychologically, reflecting in behavioral disorders (AbuAlRub, 2004; Altman, 2001; Bianchi, 2004; Callaghan, Shui, & Wyatt, 2000; Evans & Kelly, 2004; Iso-Ahola & Park, 1996; Lee, 2005; Lox, Martin, & Petruzzello, 2003; Yang, 2005; Yung, Fung, Chan, & Lau, 2004; Wheeler & Riding, 1994). Workplace stress is detrimental and can cause generic health problems for nurses (AbuAlRub; Bianchi; Callaghan et al.; Lee; Wheeler & Riding; Xianyu & Lambert, 2006; Yang; Yung et al.).

Physiologically, stress causes a rise in heart rate, blood pressure, cholesterol level, muscle tension, calcium loss, and a less active or even suppressed immune system. Chronic stress can cause conditions including headache and sleeplessness resulting from

reduced immuno-competence (Altman, 2001; Yang, 2005). It can cause chronic pain in various parts of the body, such as backache and skin or joint irritations (Altman). Moreover, chronic stress can lead to more complicated mood disturbances (DeLongis et al., 1988), feelings of helplessness, anxiety or depression, and behavioral disorders (Wheeler & Riding, 1994). The consequence of high levels of work demand is likely to cause emotional exhaustion, which is the onset of the burnout process (Cordes & Dougherty, 1993; Maslach, Schaufeli, & Leiter, 2001).

The disabling conditions of workplace stress create a loss of normal productivity due to illness and absence (Edwards & Burnard, 2003; Lox et al., 2003). They adversely affect the quality of patient care and safety in hospitals (Shirey, 2006). As a result, they create an economic burden to the organization (Edwards & Burnard).

The study on work place stress in nursing has expanded beyond the original United States borders and become an international endeavor. Differences exist in the average levels of job burnout in nations (Maslach, Schaufeli, & Leiter, 2001). An annual review of job burnout research reported that data collected within 12 countries, exclusively Asian or East-European. Among the 21 samples of 7000 employees, the highest incidences of most advanced burnout phases were found in Japan and Taiwan (between 48% and 69%). Comparing with the 62 samples of over 25,000 North American employees, only over 20% of them were judged to be in the most advanced burnout phrase (Maslach, Schaufeli, & Leiter). While nurses in North America experience enormous stress at work, nurses in Taiwan are working even more stressful conditions in the health care services (Lee et al., 2005; Yang, 2005).

The need to alleviate workplace stress in nursing is critical. Research has shown

abundant evidence that exercise and physical activity is an effective way of influencing stress and anxiety (Lox et al., 2003). Research on subjects other than nurses has established with a fair degree of confidence that physical activity can result in improvements in fitness and benefit health (Gill, 2000). Exercise and physical activities are believed to relieve some of the symptoms caused by stress (AbuAlRub, 2004; Bianchi, 2004; Yung et al., 2004).

Having been a nurse and head nurse working in an intensive care unit (ICU) unit for years in a major hospital in Taiwan, this researcher has had an in-depth understanding of the job-related stress that plagues nurses. In this study, the author explores the relationship among nurses' perceived work-related stress, their health status, and nurses' participation in physical activity in Taipei, Taiwan. It is this researcher's intention to expand the awareness of the nurses in participating in exercise and physical activity as a way of coping with work place stress. It is also this researcher's expectation to make it salient the buffering effects of physical activities and exercise in relieving work place stress for nurses in Taiwan, as well as those in other countries.

#### *Statement of the Problem*

Because of the advancement of modern medicine and the implementation of a nationwide health care system in Taiwan, each citizen is entitled to comprehensive health care provided by the government. At the same time, the senior population has increased substantially. Consequently, the role of nurses has changed. In the past, nurses were assistants to doctors, carrying out orders. Now nursing has become a profession in its own right. People have higher expectations of nurses for the medical service they deliver to the society they serve. Therefore, nursing has become more demanding, more

challenging, and more complicated (Tseng, 2004).

Nurses in Taiwan are trained at nursing schools, junior (two-year) colleges, and four-year universities (Ministry of Health of Taiwan, 2000). Nurses are licensed and registered before going into health care service. Serving in health care facilities, nurses take responsibility for providing medical care in many different departments and perform diverse routines within their care units. They rotate on three eight-hour shifts, in order to provide 24-hour daily care to the patients. Due to the shift work, work-load demand, and the nature of caring service, nurses often suffer from a variety of health problems (Bureau of Employment and Vocational Training, 2000).

Nursing as a profession is structured and hierarchical in Taiwan. At the top of the organizational structure of nursing is a director, who heads associate directors. The associate directors are in charge of human resources and administration, clinical services, and teaching and research (Organizational structure of nursing department, 1998). Under the associate directors are committee supervisors. They supervise the training and education of the nurses, human resources and recruitment, quality of medical care, safety of medical facility, research and development, provision of benefits for the nurses, and so on. The division of training and education facilitates training and education programs, constantly upgrading the knowledge and skills of nurses as professionals. It provides nurses with pre-service and in-service training, continuous education, and training at research institutions abroad or in Taiwan. The research and development committee provides supervision on the quality of medical service, administration, and research. It promotes research by hosting lectures and seminars by well-known medical professionals who share their research. The human resources and recruitment committee is responsible

for regulating nurses' obligations and rights, deploying nurses to their appropriate posts, and assessing job performance.

There is a promotion system that encourages nurses to focus on their professional growth. The benefit committee ensures that hospital administration provides nurses with satisfying salaries, shift allowances, bonuses, dormitories, and leisure activities to ensure a peaceful environment for them. The quality-control committee monitors the quality of medical service by regulating standards of service, gathering feedback from patients, and conducting regular evaluations to improve the services (Organizational structure of nursing department, 1998).

According to the Bureau of employment and vocational training, by the end of 2006, the total number of occupational medical staff in Taipei, Taiwan, had reached 39,695. The number included 7,409 medical doctors, 660 herb doctors practicing traditional Chinese medicine, 2,362 dentists, 3,938 pharmacists, 834 pharmacy personnel, 1,676 medical technicians, 44 lab technicians, 907 radiologists, 17 radiological technicians, 16,958 registered professional nurses (RPN), and 3,409 registered nurses (RN). The nursing professionals included 184 male (0.9%), and 17,560 (86.2%) female registered professional nurses (RPN) and 11 (0.05%) male and 3,799 (18.6%) female registered nurses (RN) for a total of 20,367 nurses in Taipei.

The statistics clearly indicates that the nursing staff constitutes the majority among the medical professionals in Taiwan. In order to ensure and improve the quality of care the medical system providing to the general public in Taiwan, it is essential to address the job-related stress and consequences of such stress on the health status of the nursing staff. It is highly important to raise the awareness of the nurses on work place

stress and ways of coping. It is important for nurses to have the awareness of the benefits of participating in exercise and physical activity in relieving workplace stress.

The Taiwanese government has been taking measures to ensure that nurses are paid a decent salary and bonuses, in an attempt to retain the number of nurses working in the service (Bureau of Employment and Vocational Training, 2006). But pay increases are not enough; the enormous stress and work load are forcing nurses out of the profession (National Association of Nurses Union of the Republic of China, 2006). Studies have demonstrated that nurses in Taiwan are overworked. Nurses may not only have psychosomatic problems, but their productivity in the workplace is reduced. As a result, the quality of their service deteriorates. While the ratio of nurse and patient increased from 1:4 to 1:6 the death rate of the patients increased by 14%. In Taiwan, the ratio of nurse and patients is 1-6 times more than that in the Western countries (National Association of Nurses Union of the Republic of China).

The inadequate ratio between nurses and patients is partially due to the implementation of a unique health care program initiated by the government in Taiwan. Since 1995, a comprehensive health care program, the first of its kind in the world, has become a reality for each and every citizen in Taiwan. Under such a program, everyone has equal access to convenient, nearby, and high-quality medical service. By the end of 2004, there were 590 hospitals in Taiwan, with 556 hospitals practicing Western medicine, and 34 hospitals practicing traditional Chinese medicine. The greater Taipei region, the capital, had a total of 116 hospitals (Department of Health Executive Yuan, Taiwan, 2006). The availability of government-provided health care for every citizen in Taiwan has greatly increased the demand on the health care profession. Nurses' workload has been

increased and their work challenged.

Research studies on adults in Taiwan report the leisure activities most frequently enjoyed by the public are watching TV and chatting Wang (1989, as cited in Lee, 2001). Among the citizens of Taipei lack of exercise and physical activity jeopardizes health in both males and females. Chiang (1998, as cited in Lee) indicated that 76% of the population does not participate in exercise sufficiently. Only 14% of the nurses in a medical center participate in sport and exercise regularly Wu (1997, as cited in Lee). Zhong (1993, as cited in Lee) indicated that only 25% the adult citizens of the over 20 years old in Taipei regularly participate in exercise. On the whole, there exists an insufficient amount of exercise and physical activity in the life style of the people in Taiwan (Lee).

Research on exercise has evidenced that regular exercise such as yoga, walking, breathing exercise, meditation are beneficial to health. Regular exercise can buffer the adverse influence of stress on health. However, the reality is that nurses in Taiwan do not regularly participate in exercise (Lee, 2001), due to the lack of awareness on the benefits of exercise and lack of well-organized intervention programs for nurses.

Therefore, it is highly necessary to bring to the attention of the administration as well as practicing nurses, the problem of work-related stress in nursing in Taiwan and its adverse effects on nurses' health. It is equally necessary to raise the awareness among nurse professionals that exercise can serve as a buffer in coping stress at work.

### *The Purpose of the Study*

The purpose of the study was to investigate (a) job-related stress and stressors of nurses, (b) nurses' health status, and (c) nurse's participation in physical activities. It also (d) explored the differences between the demographic groups in terms of job-related stress, health status, and physical activity participation by nurses; (e) investigated the relationship among the nurses' job-related stress, health status, and participation in physical activity; (f) examined the predictability of health status of the nurses by job-related stress and physical activity; and (g) examined the predictability of health status of nurses by demographic characteristics, nursing stress, and physical activity participation.

### *Research Questions*

The following 4 steps research questions were used to analyze the relationship among nursing stress, health status, and physical activity participation of nurses in teaching hospitals in Taiwan.

#### *Step 1*

Step 1 investigates differences among demographic groupings in nursing stress, health status, and participation in physical activity.

#### *Step 2*

Step 2 investigates of the relationship among nursing stress, health status, and participation in physical activity.

#### *Step 3*

Step 3 examines the predictability among nursing stress, physical activity, health status and demographic characteristics.



#### *Step 4*

Step 4 examines the predictability between nursing stress and physical activity.

#### *Theoretical Framework*

This study is primarily based on three theoretical frameworks: theories of job-related stress and burnout, stress and adverse impact on health, and theory of physical activity and exercise in relieving stress.

According to the cognitive theory of stress, which is “the most widely applied theory in the study of occupational stress and stress management” developed by Lazarus and Folkman, stress is defined from a demand-perception response perspective (McVicar, 2003, p. 633). The theory postulates that stress is related both to an individual’s perceived demands required of them at work, and to their perceived capability to meet the demands. A mismatch of individual’s perception and job demand will make an individual’s stress exceed its threshold. Therefore, it triggers a stress response (AbuAlRub, 2004; McVicar).

Another predominant theory in research on job burnout is pioneered by Maslach and colleagues. Job burnout is defined as a psychological reaction to chronic stressors at work. The three-component conceptualization of job burnout is characterized by emotional exhaustion, depersonalization (a distant attitude toward job and clients), and diminished professional accomplishment (Alimoglu & Donmez, 2005; Cordes & Dougherty, 1993; Maslach, Schaufeli, & Leiter, 2001).

The cognitive theory of stress posits that stress is a causal factor in illness (DeLongis, Folkman, & Lazarus, 1988). Stress is a system of variables and “a system of interdependent processes.” It mediates “the frequency, intensity, duration, and the type of psychological and somatic response” to environment (DeLongis, Folkman, & Lazarus, p.

486). Sustained level of stress can inflict somatic, psychological and behavioral disorders (DeLongis, Folkman, & Lazarus; Edwards & Burnard, 2003; Lox, Martin, & Petruzzello, 2003; Maslach, Schaufeli, & Leiter, 2001; Weyers et al. 2006; Xianyu & Lambert, 2006).

Individuals suffering from stress or severe distress can exhibit psychological and physiological disorders (Edwards & Burnard, 2003; McVicar, 2003; Shirey, 2006; Weyers et al., 2006; Xianyu & Lambert, 2006). Fatigue, short temper, indigestion, persistently elevated blood pressure, coronary heart disease, menstrual problems in women, emotional exhaustion, and decreased personal accomplishment are just a few. For some individuals, stress can be “severely maladaptive and possibly life threatening” (McVicar, p. 634). If stressors are prolonged and not resolved, an individual can become overloaded, leading to anxiety, depression, and numerous insidious stress-related disorders (Lox, Martin, & Petruzzello, 2003).

In addition to the adverse impact on health and the quality of medical service nurses provide, occupational stress leads to job dissatisfaction, increased turnover rate, and significant organizational losses. The problems of retaining qualified and experienced nursing staff has become acute (Xianyu & Lambert, 2006). The National Health Service (NHS) Executive reported “difficulties both in recruiting and retaining nursing staff generally” (Edwards & Burnard, 2003, p.170).

In coping, research studies point out that participating in physical activity and exercise can relieve stress in general and job burnout. A fairly extensive body of research literature on the relationship between exercise and anxiety developed over the past forty years show exercise and physical activity are a potential tool in preventing and treating anxiety (Lox, Martin, & Petruzzello, 2003).

Studies on stress in general, stress management, and stress reduction have substantially evidenced that exercise and relaxation mechanisms have positive effects on coping with stress and burnout (De Vries, 1981; Feuerstein, Nicholas, Huang, Dimberg, Ali, & Rogers, 2004; Johnsgard, 1989; Kohn & Henderson, 2004; Lox, Martin, & Petruzzello, 2003; MacDonald, 2006; Martinsen & Morgan, 1997; Martinsen & Stanghelle, 1997).

The theoretical basis suggested that exercise and physical activity can relieve undue resting neuromuscular tension. When exercising, small temperature rises in either the brain stem or the whole body “result in decreased muscle spindle activity and synchronized electrical activity in the cortex of the brain, which are both typical of a more relaxed state” (De Vries, 1981, p.48). Appropriate types of exercise and physical activity with appropriate intensity and duration can produce a significant soothing effect. It is believed that “rhythmic exercise such as walking, jogging, cycling, and bench stepping for 5 to 30 minutes at 30% to 60% of maximum intensity was most effective” (De Vries, p. 47).

Benefits of exercise have been documented in numerous studies. However, there is a distinct paucity of literature on buffering effects of exercise on job-related stress in nursing. There are few existing studies examining the relationships of work place stress, its impact on health, and its relationship with physical activities and exercise participation in Taiwan. Such a study deserves the attention of researchers. Investigation and exploration on such a topic would help nurses better cope with their work place stress.

### *Definition of Terms*

**Burnout**—Burnout is a prolonged response to chronic stressors on the job (Maslach, Schaufeli, & Leiter, 2001). “Burnout is a unique type of stress syndrome, characterized by emotional exhaustion, depersonalization, and diminished personal accomplishment” (Cordes & Dougherty, 1993, p. 621).

**Coping with stress**—Coping is defined as “active or passive attempts to deal with a situation perceived as stressful” (Bianchi, 2004, p.739). The aim of the coping can be to modify the problem (problem-focused coping) or to reduce the emotional discomfort (emotion-focused coping) (Bianchi).

**Emotional exhaustion**—Emotional exhaustion is “the key to the experience of burnout” and “the first stage of the burnout process.” It is the consequence of high levels of work demand (Cordes & Dougherty, 1993, p. 640).

**Exercise**—Exercise can be defined as “physical activity that is planned, structured, repetitive and purposive in the sense that improvement or maintenance of one or more components of physical fitness is the objective” (U.S. Department of Health, Education, and Welfare, 1998).

**Exercise duration**—“Duration is the average time, measured by minutes that participants actually spent in each session of physical activity” (Chiang, 1998, p. 55).

**Exercise frequency** —Frequency refers to the number of times that participants engage “in each physical activity during a one-week period” (Chiang, 1998, p. 54).

**Intensity of exercise**—Intensity “is the level of effort put forth in physical activities by each participant” (Chiang, 1998, p. 55).

**Registered nurse (RN)**—Refers to those who have completed their training for the

nursing profession at public or certified private vocational or more advanced institutions for nurses or mid-wives, or have completed their training at recognized international vocational or more advanced institutions for nurses or mid-wives abroad. They have to have achieved satisfactory result for their practicum, and gained their diploma for Registered Nurse; they have to have passed the examination for Registered Nurse, and have gotten the certificate of Registered Nurse issued by the Ministry of Health in Taiwan (National Association of Nurses Union of the Republic of China, 2006).

Registered Professional Nurse (RPN)—Refers to those who have been trained for the nursing at public or certified private two-year colleges or more advanced institutions, or at recognized two-year or more advanced international institutions for nursing abroad. They have to have achieved satisfactory result, have gained their diploma for nursing; they have to have passed the examination for Registered Professional Nurse, and have gotten the certificate of Registered Professional Nurse issued by the Ministry of Health in Taiwan (National Association of Nurses Union of the Republic of China, 2006).

Physical activity—According to the definition of the World Health Organization (WHO), physical activity includes “all movements in everyday life, including work, recreation, exercise and sporting activities” (Chen, 2004, p. 103). “In fact, physical activity is a broad term that encompasses activities that range in intensity from taking the stairs regularly, dancing and walking briskly, to jogging, biking and practicing sports. Moderate physical activity can be carried out by anyone, at no cost, and be accommodated into any daily life schedule” (Chen, p. 103).

Regular exercise—Regular exercise refers to one’s participation in exercise “equal to three or more days per week for 20 minutes or more each day (e.g., swim,

walk)” (Cardinal, 1997, p. 69).

**Stress**—Stress is a condition or a feeling experienced when a person perceives a situation that is beyond his or her ability to handle. Quite often it is the body’s natural reaction to a challenge. It is a survival mechanism, warning of danger, and is essential as a stimulant to activity to overcome that danger. Only if stress is excessive and is endured for long periods can it sometimes lead to physical and mental ill health (McVicar, 2003).

**Work-related stress in nursing** —Work-related stress is the body’s reaction to an actual or perceived imbalance between the demands of a job and one’s capabilities. More simply, work-related stress is a reaction in which an individual feels that he or she cannot cope with the demands of a job. It can be “any work situation perceived by the participants as threatening because of the mismatch between the situation’s demands and the individual’s coping abilities” (AbuAlRub, 2004, p. 75).

**Job-related stress in nursing**—This type of stress is defined as “negative biopsychological reaction,” such as anger, feelings of helplessness, anxiety, or depression, “usually accompanied by potentially pathogenic physiological changes (e.g., increased heart rate, blood pressure, catecholamine levels and corticosteroid activities) and behavioral consequences resulting from aspects of the job and mediated by the perception that work demands constitute a threat to self-esteem or wellbeing and exceeding the ability to cope” (Wheeler & Riding, 1994, p. 528).

#### *Intensities of Physical Activity*

*Mild intensity* refers to the physical activity that requires “minimal effort,” such as walking and bowling. As a result of physical activity, an individual’s breathing and heart rate increase “by a small amount” (Chiang, 1998, p. 59).

*Moderate physical activity* refers to physical activity that brings “about noticeable increase in heart rate and breathing but not exhausting” (Chiang, 1998, p. 59). Such activities include fast walking and dancing

*High intensity physical activity* refers to physical activities performed with “substantial effort, increased heart rate and breathing, and high levels of sweating” (Chiang, 1998, p. 59).

### *Significance of Study*

The significance of the study is two fold. First, it would inform the nursing professions and administrators in Taiwan about the day-to-day work-related stressors experienced by the nurses, and the potential harmful effects of stress on the nurses’ health. Second, it will inform the nurses in Taiwan about the benefits of regular exercise. It will empower the nurses with the awareness and importance of participating regularly in physical activities to resolve stress associated with their jobs.

The information gathered in this study was to inform the nurse leaders in understanding the particular stress experienced by nurses in their departments and clarify the role of physical activities in coping with stress. If the study can generate some new understanding of the benefits of physical activities and exercise in coping with job-related stress in nursing, the result may not only inform the nurses in northern Taiwan, who are under intense job-related stress, but also those who are working at various hospitals and health care facilities in different areas in Taiwan.

In summary, it is necessary that nurses be empowered with an awareness of the sources of stressors at work and the consequences of such stressors on their physiological and mental health. It is important to empower nursing administrators the awareness of the

benefits of participation in physical activity and exercise in relieving stress and maintain their health status. Such a study in the context of Taiwan would make distinct and valuable contribution to a better understanding of nursing stress and job burnout, their impact on nurses' health and well-being, and the awareness of the benefits of physical activity and exercise in relation to work place stress.

#### *Delimitation of the Study*

This study was confined through the use of surveys to measure the relationships among work related stress, health status, and physical activity participation of registered professional nurses (RPN) or registered nurses (RN) in five district teaching hospitals in Taipei, Taiwan.

#### *Limitations of the Study*

This study also was limited because respondents were all women; no men were included. The questions of conflict with other nurses or physicians are sensitive issues in the nursing profession. Participants might not have been honest about the real situation. This study focused on nursing stress and did not include variables of family, work environment, life stress, and personal economics. Nurses' health status also relied solely on the self-report of the nurses, which might have potential discrepancies with health concepts in this study.

Additionally, the 7-Day Physical Activity Recall Questionnaire was used to investigate participation in physical activity. Participants had to recall the duration, frequency, and intensity of their physical activity in the past 7 days; therefore, participants might not have reported activities correctly.



## Chapter 2: Review of Literature

The literature review of this study presents a brief overview of research related to workplace stress in nursing, stress and its impact on nurse's health, stress and its impact on organization, and participation in physical activity and exercise as a way of buffering workplace stress. A summary and synthesis of the research literature is at the end of this chapter.

### *Introduction*

Job-related stress in nursing is prevalent. The quantities and magnitude of workplace stress have classified nursing universally as one of the most stressful professions (AbuAlRub, 2004; Edwards & Burnard, 2003; Shirey, 2006). Eight of the 12 most stressful jobs today are positions in health care (Messner & McDowell, 1992 ). The most stressful factors reported by nurses are overwork, short staffing, the strain of dealing with patients (Messner & McDowell; Shirey), lack of time for family, lack of respect and a voice in hospital decision-making, and pay that is not commensurate with responsibilities and education (Messner & McDowell).

Research has reaped abundant evidence that job-related stress is “significantly correlated with psychosomatic health problems” (Shirey, 2006, p. 197). It is “influenced through four types of closely interrelated mechanisms—emotional, cognitive, behavioral, and physiological factors” (Levi, 1990, p. 1141). Nurses suffering from stress undergo psychological processes and exhibit a response syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment (Cordes & Dougherty, 1993; Espeland, 2006; Shirey).

Moreover, stress is correlated with “prevalence of occupational morbidity and

mortality” (Levi, 1990, p. 1142). Workplace stress in nursing is an important contributing factor to organizational inefficiency and, more seriously, to dysfunctions including absenteeism due to stress-caused sickness, reduced productivity, decreased job satisfaction, increased turnover rate, decreased quality of medical care that nurses provide, and increased cost of health care (AbuAlRub, 2004; Altman, 2001; Chang, Hancock, Johnson, Daly, & Jackson, 2005; Cordes & Dougherty, 1993; Edwards & Burnard, 2003; Shirey, 2006; Weyers et al., 2006; Xianyu & Lambert, 2006). Workplace stress has made nursing one of the most crippling professions. It is estimated that by 2020, there will be a 20% shortage of necessary nursing staff (Shirey).

Nurses are primary caregivers in health care institutions. They are the key players in providing quality services to the general public. The pervasiveness of workplace stress in nursing is detrimental to nurses’ health, as well as to the quality of health care and the retention of qualified nurses. In order to address the pervasiveness of workplace stress in nursing, and in order to manage stress, it is imperative to study the factors contributing to job-related stress in nursing. Nurses must understand stress and actively take measures to ensure their physical and psychological well-being to keep up with the expectations of their jobs.

This study on the relationship among physical activity and the job-related stress and health status in nursing will not only allow the nursing professions to have an in-depth understanding of workplace stress, but also empower them with coping strategies that can buffer workplace stress and help nurses’ physical and psychological well-being and their job performance. As a result, it will better ensure the quality of nurses’ service and help with the retention of qualified nursing staff in the workforce.

### *Research on Job-Related Stress and Burnout*

Stress at work and the relationship people have with those at their workplace have been recognized as a significant phenomenon of the modern era. It is a social problem, and has become a focus of systematic study by researchers (Maslach, Schaufeli, & Leiter, 2001). Research on job-related stress has generated a plethora of literature (Chang, Hancock, Johnson, Daly, & Jackson, 2005; Edwards & Burnard, 2003; Espeland, 2006; Shirey, 2006; Xianyu & Lambert, 2006).

Stress is a system of interdependent variables. It involves a person with certain characteristics and an environment with certain characteristics (Gill, 2000). Stress at work occurs when stressful situations are perceived as exceeding one's resources (Chang et al., 2005; Cordes & Dougherty, 1993), and when there is a disparity between one's expectation to achieve and what is actually being achieved (Maslach, Schaufeli, & Leiter, 2001).

The term job-related burnout first appeared with some regularity in the 1970s in the United States. The term describes the stress phenomenon at work, especially among people working in the human service (Maslach, Schaufeli, & Leiter, 2001). Job burnout is a stress reaction (Chang et al., 2005), a severe form of stress (Cronin-Stubbs, 1984). It is a prolonged psychological response to chronic emotional and interpersonal stressors on the job. It is especially distinct in stressful work conditions featured with high levels of interpersonal contact (Alimoglu & Donmez, 2005; Cordes & Dougherty, 1993; Maslach, Schaufeli, & Leiter).

The three key dimensions of job burnout are overwhelming exhaustion, depersonalization and detachment from the job, and a sense of reduced efficacy and lack

of accomplishment (Alimoglu & Donmez, 2005; Cordes & Dougherty, 1993; Maslach, Schaufeli, & Leiter, 2001).

Job burnout is “a malady that spreads gradually and continuously over time, putting people into a downward spiral from which it is hard to recover” (Espeland, 2006, p. 179). In addition, job burnout has important dysfunctional ramifications for individuals and organizations. It leads to occupational morbidity and mortality. It is associated with substantial costs for organizations and for individuals, due to stress-caused sickness, absenteeism, reduced productivity, diminished job satisfaction, decreased quality of service, and the increased turnover rate (Bianchi, 2004; Cordes & Dougherty, 1993; Edwards & Burnard, 2003; Leveck & Jones, 1996; Levi, 1990; McVicar, 2003; Shirey, 2006).

### *Three Dimensions of Job Burnout*

The most common definition of burnout is the three-component conceptualization developed by Maslach and the colleagues: emotional exhaustion, depersonalization, and diminished personal accomplishment (Alimoglu & Donmez, 2005; Cordes & Dougherty, 1993; Maslach, Schaufeli, & Leiter, 2001). It is the predominant theoretical framework in the research on job burnout (Maslach, Schaufeli, & Leiter).

The first component, emotional exhaustion, refers to a feeling of being overstretched and depleted of one’s emotional and physical resources. It is the most widely reported and obvious manifestation of job burnout (Maslach, Schaufeli, & Leiter, 2001). It occurs when excessive chronic work demands drain individuals’ emotional resources. Individuals suffering from job-related stress manifest a lack of energy and a feeling that one’s emotional resources are used up (Alimoglu & Donmez, 2005; Cordes &

Dougherty, 1993). They feel frustrated as they “recognize the discrepancy between their current attitude and their original optimistic expectations about their potential contribution to society” and to the organization (Cordes & Dougherty, p. 624). As a result, emotional exhaustion takes a harmful toll on individuals’ job performance. Such individuals are not able to serve their clients as before. A common symptom is that they dread going to work (Chang et al., 2005; Cordes & Dougherty; Edwards & Burnard, 2003; Weyers et al., 2006). Exhaustion prompts individuals to distance themselves emotionally and cognitively from their work. Within the human services, such as nursing, “the emotional demands of the work can exhaust a service provider’s capacity to be involved with, and responsive to, the needs” of their clients (Maslach, Schaufeli, & Leiter, p. 403).

The second component, depersonalization or dehumanization, refers to a negative, callous, or excessively detached attitude to one’s job (Cordes & Dougherty, 1993; Maslach, Schaufeli, & Leiter, 2001). Depersonalization is an attempt to put distance between oneself and clients one serves. It is marked by individuals treating their clients as objects rather than people, “by actively ignoring the qualities that make them unique and engaging people.” The clients’ demands would be more manageable when they are considered impersonal objects of one’s work (Maslach, Schaufeli, & Leiter, p. 399). At work, individuals go strictly ‘by the book’ to deal with clients rather than becoming personally involved enough to tailor a solution or an approach to the client’s needs. Further, they may use derogatory or abstract language, or distant themselves from their co-workers (Cordes & Dougherty, p. 623).

The third component of burnout, diminished personal accomplishment, refers to the feelings of incompetence, inefficiency, and reduced productivity at work. A work

place overwhelmed with chronic stress, which subsequently causes exhaustion and depersonalization, is likely to erode one's sense of accomplishment (Maslach, Schaufeli, & Leiter, 2001). This is characterized by a tendency to evaluate oneself negatively. Individuals may experience a feeling of declined job competence and achievement or interactions with people (Cordes & Dougherty, 1993). A decline in personal achievement may penalize nurses to be routinely disciplined by their supervisor, because of their not-so-satisfactory performance at work. This, in turn, further hurts their perception of themselves, making them feel as if they "were bailing out a leaky boat and realized that the boat may sink" (Cordes & Dougherty, p. 624).

Job burnout is a common phenomenon in human service, where the core of the job is relationship between the service provider and the receiver. "Health care providers, especially nurses, are generally being considered as an above risk group regarding work stress and burnout" (Alimoglu, & Donmez, 2005, p. 550).

#### *Three Categories of the Antecedents of Burnout*

The antecedents of burnout can be categorized into three broad categories. They are job and role characteristics, organizational characteristics, and personal characteristics (Cordes & Dougherty, 1993).

*Job and role characteristics.* The job and role characteristics category consists of interpersonal relations, role conflict, role ambiguity, and role overload (Cordes & Dougherty, 1993). The role of interpersonal relation with client in emotionally demanding human service, the expectation of the service provider, and job dealing with people in stressful situations contribute a great deal of stress at the job (Cordes & Dougherty; Maslach, Schaufeli, & Leiter, 2001). Helping professions endure the greatest emotional

strain at work, because they are constantly dealing with other people and their problems. Those professions are required to have extensive, direct face-to-face, and intense interaction with their clients in often emotionally charged situations (Cordes & Dougherty). Nursing is a profession delivering human service. Nurses are reportedly more at risk to experience the detrimental effects of stress and job burnout (Alimoglu & Donmez, 2005; Shirey, 2006).

### *Roles of Interpersonal Relations*

#### *Interaction with clients*

Research indicates that more frequent, direct, intense interactions, longer duration of the interaction, or chronic (versus acute) client problems are usually associated with higher levels of stress. Moreover, clients who are aggressive, suffering beyond cure or dying, can be an awesome and exhausting burden on the health care professionals, who assume they are solely responsible for the well-being of their patients (AbuAlRub, 2004; Barnes, 2006; Bianchi, 2004; Chang et al., 2005; Cordes & Dougherty, 1993; Edwards & Burnard, 2003; Xianyu & Lambert, 2006).

#### *Interaction with coworkers and supervisors*

In addition to stress dealing with patients, stress at work can be compounded by association with supervisors and physicians. Research suggests that the nurses' pleasant contact with their supervisors is negatively related to depersonalization, while unpleasant nurse-supervisor relations are positively related to emotional exhaustion (Cordes & Dougherty, 1993; Shirey, 2006).

#### *Excessive workload*

Research studies point out workload and time pressure are strongly and

consistently correlating to job burnout. Role conflict occurs when conflicting demands at job have be met. Role ambiguity occurs when there is a lack of information concerning the job (Maslach, Schaufeli, & Leiter, 2001). Furthermore, excessive workload is detrimental to nurses' stress, since excessive workload means the increase of the number of clients to be served. As a result, the service providers' personal resources are further taxed. Burdened with chronic excessive workload, nurses are vulnerable to stress (AbuAlRub, 2004; Barnes, 2006; Bianchi, 2004; Chang et al., 2005; Chiang, 1998; Cordes & Dougherty, 1993; Shirey, 2006).

#### *Organizational characteristics*

The second category of burnout antecedents is organizational characteristics. One of the factors is job context. Job context in this category suggests that "specific context affects the incidence of stress and burnout in the workplace" (Cordes & Dougherty, 1993, p. 632). Work shift, psychological environment, gender difference, and the nature of employee-client relationships are related to burnout. Job-related contacts with differences in frequency, intensity, or context would in turn contribute to burnout differently (Cordes & Dougherty).

However, the work takes place within a larger organization that includes hierarchies, operation rules, resources, policies, values "that shape the emotional and cognitive relationship that people develop with their work" (Maslach, Schaufeli, & Leiter, 2001, p. 409). If employees are expected to give more of their time, effort, skills, service, and receive less of support, career opportunities, lifetime employment, job security, and so on, such a violation of the psychological contract is likely to lead to stress and job burnout. Such an organization culture "erodes the notion of reciprocity," a crucial



element for employees to maintain their health and well-being (Maslach, Schaufeli, & Leiter, p. 409).

#### *Personal characteristics*

Research indicates that certain personal characteristics are prone to burnout, while others remain unaffected. Men and women may experience different levels of burnout components. Younger persons are reported to have higher levels of burnout, while more experienced employees report lower levels of emotional exhaustion (Cordes & Dougherty, 1993). Moreover, personal expectations of their profession, their organization, and “their own personal efficacy also make a significant contribution to burnout” (Cordes & Dougherty, p. 636).

#### *Consequences of burnout and stress*

The three essential features of workplace burnout, emotional exhaustion, depersonalization, and low personal accomplishment, result in individual dysfunction and negative organizational outcomes. Burnout is potentially costly and damaging since it inflicts physical, emotional, and behavioral disorders in an individual (AbuAlRub, 2004; Altman, 2001; Bianchi, 2004; Callaghan, Shui, & Wyatt, 2000; Cordes & Dougherty, 1993; Iso-Ahola & Park, 1996; Lee, 2005; Yang, 2005; Yung et al., 2004).

#### *Physiological, Psychological and Behavior Disorders*

Research studies suggest stress inserts adverse impact on human body and has been recognized as an additional contributing factor to illness and disease. Routine and minor stressors, such as loud noises and busy schedules, can affect a person’s health (Altman, 2001; Frey, 1999). Chronic stress can have cumulative results, which can help cause physiological, psychological, behavior disorders and disease (Altman; AbuAlRub,

2004; Barnes, 2006; Bianchi, 2004; Chen, 2004; Chang, Hancock, Johnson, Daly, & Jackson, 2005; Chiang, 1998; Cordes & Dougherty, 1993; Cronin-Stubbs, 1984; Edwards & Burnard, 2003; Espeland, 2006; Gruss et al., 2004; Lee, 2004; Levi, 1990; Shirey, 2006). Stress affects one's job performance adversely (Cronin-Stubbs).

Stress and burnout inflict a variety of psychosomatic problems (Cordes & Dougherty, 1993; Leiter, 2005). Stress is a significant etiological factor in heart disease, stroke, high blood pressure, colitis, ulcers, and headaches. Physiologically, stress causes symptoms, such as a rise in heart rate, blood pressure, muscle tension, stomach or intestine problems, heightened cholesterol level, diabetes, headache, skin or joint irritation (Altman, 2001; Barnes, 2006; Bianchi, 2004). Physical health problems include poor appetite, chest pains, fatigue, insomnia, and gastrointestinal disturbances. Moreover, stress may exacerbate hypertension, heart disease, alcohol/drug abuse, anxiety, depression, and gastrointestinal disorders (Altman).

Psychologically, stress causes anxiety, panic, difficulty with concentration, emotional exhaustion (Altman, 2001; Barnes, 2006; Bianchi, 2004; Espeland 2006), anger, irritability, depression, sadness, and mood swings (Altman). More psychological disorders include decreased feelings of self-esteem, depression, irritability, helplessness, and anxiety (Altman; Cordes & Dougherty, 1993).

*Depersonalization* refers to “a negative, callous or excessively detached response” to one's job (Alimoglu & Donmez, 2005, p. 549). Individuals suffering from workplace stress often develop negative attitudes toward their clients, their jobs, the organization they are affiliated with, or even themselves. In addition, dissatisfaction with jobs is likely to result in lower levels of job commitment (Cordes & Dougherty, 1993; Shirey, 2006;

Xianyu & Lambert, 2006). Studies point out that work place stress inherent in the health care occupations could be “excessively harmful or debilitating” for nurses (Cordes & Dougherty, p. 622). Stress causes behavior disorder resulting in an individual a sense of depersonalization and diminished personal accomplishment (Cordes & Dougherty; Edwards & Burnard, 2003; Weyers et al., 2006).

*Low personal accomplishment* refers to reduced self-efficacy: “feelings of incompetence and lack of achievement and productivity at work” (Alimoglu & Donmez, 2005, p. 550). Burnout deteriorates interpersonal relationships at work, with family and friends. Individuals experiencing burnout tend to withdraw from their friends and reduce their socializing. At work, burnout victims experience more work-related conflicts, and in turn, influence the frequency of negative interactions and relations with clients and their associates at work. This is especially true with childcare workers, who generally experience higher levels of stress, which make them moody, as well as less patient and tolerant (Cordes & Dougherty, 1993).

Finally, stress-related illness contributes to disability. It is adversely related to shortage of workforce and organization efficiency (Shirey, 2006). Workplace stress leads to negative organizational outcomes in increased turnover rate, absenteeism, and decreases in the quality and quantity of job performance. Studies indicate nurses who suffer from burnout may have the intention to leave their job and have poor job performance (Chang et al., 2005; Cordes & Dougherty, 1993; Weyers et al., 2006; Shirey; Xianyu & Lambert, 2006).

#### *Research on Job-Related Stress in Nursing*

The stressful nature of nursing as a health care profession has been receiving

increasing attention and has been the focus of research (AbuAlRub, 2004; Alimoglu & Donmez, 2005; Chiriboga & Bailey, 1986; Evans, & Kelly, 2004; Espeland, 2006; Hillhouse & Adler, 1997; Lambert & Lambert, 2001; Lambert, et al., 2006; Levi, 1990; Malik, 1996; McNeal, 1997; Rout, 2000; Shirey, 2006; Weyers, Peter, Boggild, Jeppesen, & Siegrist, 2006; Xianyu & Lambert, 2006; Weyers et al., 2006). A substantial number of studies on workplace stress in nurses have been conducted in a variety of nurse groups. Nursing is a universally recognized highly stressful occupation (Lambert, Lambert, & Ito, 2004; Lambert, et al., 2004; McVicar, 2003; Rout; Shirey, 2006; Weyers et al.).

“Job burnout as a unique type of stress syndrome that pervasively affects the nursing profession” (Espeland, 2006, p.178). A national panel of experts of the American Association of Critical-Care Nurses reported that “nursing stress and nursing burnout as being among the top 10 research priorities facing the profession” (Chiriboga & Bailey, 1986, p. 84). In a review of literature on job-related stress and burnout in nursing, Espeland (2006) reported that burnout is a global phenomenon and is becoming increasingly common in nursing profession, affecting nurses in “all areas of clinical practice from intensive care units to mental health units” (p. 178).

Research has indicated that nurses are under high levels of stress from a wide range of sources (McVicar, 2003; Rout, 2000; Shirey, 2006; Weyers et al., 2006). First, nursing as a health care service has a demanding nature dealing with patients with “24-hour delivery of care” (McVicar, p. 634). Second, it implies excessive workloads (AbuAlRub, 2004; Bianchi, 2004; Callaghan, Shui, & Wyatt, 2000; Chiriboga & Bailey, 1986; Engel, 2004; Lambert & Lambert, 2001; Lambert, et al., 2006; Rout; Shirey; Stacciarini & Troccoli, 2004; Xianyu & Lambert, 2006). Moreover, it is a profession that

requires a high level of skill, teamwork in a variety of situations, and is often referred to as “emotional labor” (McVicar, p. 634). Nurses need to constantly deal with dying and death, a feeling of helplessness due to the limits of medicine, and “the need to maintain an empathic relationship with patients who are suffering or dying” (Quattrin, et al., 2006 p.815). To some extent, nursing is classified as a “career with no return” (Shirey, p. 197).

Indeed, job stress in nursing has become an “omnipresent threat” (Barnes, 2006, p. 21). It is pervasively affecting the nursing profession, and to nurses’ physical and psychological well being, to the quality of their care work, their relations with patients, and those they associate with at work (Barnes; Chiriboga & Bailey, 1986; Espeland, 2006; Lambert & Lambert, 2001; Lambert, et al., 2006; Shirey, 2006). Moreover, work place stress leads to low productivity (Chiriboga & Bailey), job dissatisfaction in nurses (Barnes; Espeland; Hyrkas, 2005; Rout, 2000; Shirey), and excessive job turnover rate (Chiriboga & Bailey; Evans, Bryant, Owens, & Koukos, 2004). Job dissatisfaction among hospital nurses in the United States is “four times greater than the average for all U. S. workers” (Espeland, p. 178).

Nurses are often perceived as “a highly mobile occupational group” (Chiriboga & Bailey, 1986, p. 86). The retention of nurses in the work force, therefore, becomes increasingly challenging. Somehow, the exodus of nurse staff in the work force is alarming (Shirey, 2006).

#### *Sources of stress in nursing*

Studies on job-related stress in nursing have examined a variety of variables. The major stressors identified are excessive workload, strains of dealing with patients, shortage of staff, and the work environment (Chiriboga & Bailey, 1986; Maslach,

Schaufeli, & Leiter, 2001; McVicar, 2003; Perry, 2005; Rambur, et al., 2005; Rolf, 1999; Schwirian, 1978; Shirey, 2006), dealing with death and dying patients, inadequate preparation, uncertainty concerning treatment (McVicar), types of work unit (Chiriboga & Bailey), shift work (Bianchi, 2004; Perry), relationships with physicians and management (Bianchi; Chiriboga, & Bailey; Lambert, et al., 2006; McVicar; Perry; Rout, 2000; Shirey), professional isolation, ineffective communication, inadequate support, supervision, training (Bianchi; Rout), and the lack of reward (Bianchi).

McVicar (2003) contends that workload, conflicts with physician and supervisor, and working in “emotional labor” have been “the main collective sources of distress for nurses for many years” (pp. 636-637). Those job-related stressors adversely impact nurses’ physical and psychological well-being.

### *Dealing with Patients*

Researchers indicated that client-related emotional stressors, such as interacting with patients, frequent contact with chronically ill or terminally ill patients, and confronting death and dying account for additional stress. It is especially so when nurses are emotionally empathic and have to display or suppress emotions on the job. In some cases, these score higher than other job stressors (Maslach, Schaufeli, & Leiter, 2001).

The relationship with patients is one of the causes of high levels of burnout associated with the nursing profession. Nurses have to deal with death and dying of patients, and other situations that make them feel helpless and powerless (Maslach, Schaufeli, & Leiter, 2001; McNeal, 1997; Quattrin, et al., 2006).

The nature of the nursing professions and the working environment demand that nurses confront stark suffering, grief and death as few other people do. Many nursing

tasks are mundane and unrewarding. Many are, by normal standards, distasteful and disgusting. Others are often degrading; some are simply frightening everyday (Hingley, 1984). Nursing is a human service, dealing with patients (Cordes & Dougherty, 1993; Shirey, 2006). It is an “emotional labor” (Mann & Cowburn, 2005, p. 154).

One of the factors that can contribute to burnout among nurses is the “incurable client,” when a patient is not going to live no matter how much care nurses have provided (Espeland, 2006, p.179). Dealing with death and dying is highly stressful for nurses. In a study investigating the job burnout of 100 Italian nurses working, Quattrin and colleagues (2006) report that nurses working in oncology and AIDS care units “are exposed to higher work-related stress” (p. 815). Nurses in those wards have to frequently deal with dying and death. Their feeling of helplessness is especially acute when they confront the limitation of medicine in pathologies of AIDS and oncology, the length of disease, the empathy toward patients “are potentially stressful situations for healthcare professionals” (p. 815). Nurses in childcare profession report high levels of work place stress. Evans et al. (2004) point out the most troubling finding in the study that 80% childcare professionals reported low levels of personal accomplishment, 45% reported high levels of emotional exhaustion, and 14% reported high levels of depersonalization. Given that those professionals work with children on daily basis, the finding concerns the researchers. Studies point out nurses experience high levels of depersonalization are likely to have “lower-self-esteem and greater learned helplessness”. Those experience burnout are likely to view the children as irritants rather than individuals need assistance. As a result, the quality of care is ultimately diminished (Evans, Bryant, Owens, & Koukos, 2004, p. 365).

Moreover, when nurses perceive their work is non-rewarding, their feeling of burnout is especially acute (Chiriboga & Bailey, 1986; Espeland, 2006). When nurses believe that they have invested more in their patients than has been acknowledged, in positive feedback, when nurses work hard but feel underpaid, or when they believe their efforts are not being adequately recognized and appreciated, those no-win situations (Espeland) result in emotional exhaustion, depersonalization, and a sense of diminished personal accomplishment (Cordes & Dougherty, 1993).

#### *Work Condition and Excessive Workload*

Among the work place stressors, work overload is cited as the most stressful to nurses and the most damaging to psychological health of nurses (Lambert & Lambert, 2001; Lambert, et al., 2006; Rout, 2000). The nature of nursing as a health care profession determines that nurses' work condition is not static. It fluctuates moment by moment. Such temporal changes generate un-anticipated stressors (McVicar, 2003). "Work conditions encompass time pressure" and extra workload (Bianchi, 2004, p. 738).

A study on registered nurses at the intensive care unit (ICU) reports that nurses are working under great stress in a condition short of staff. Their working environment is in "a fast-paced, highly technologic setting." They provide care for patients with different and complex needs. In the intensive care unit, the most prevalent stressors nurses perceive within their work environment are "noisy work environment (67.4%), exposure to death and dying (53.4%), and feelings of inadequacy (52.6%)" (All, Mannahan, Cuaderes, & Wallace, 2006, p. 189).

A study conducted by Chiriboga and Bailey (1986) on nurses at the critical care unit (CCU) and those at the medical surgical unit (MSU) indicates that nurses' work



environment is characterized with excessive workload and patient demand. CCU nurses (43%), with more professional experience, worked more 12-hour shifts than MSU nurses. They also worked on more night shifts. A survey conducted by the American Nurses Association (ANA) of nearly 7300 nurses reports that 40–60% of participants reported that “they frequently skipped meals and breaks to care for patients, felt increased pressure to accomplish their work, and participated in mandatory overtime” (Chang et al., 2005, p. 58). Gruss and the colleagues’ (2004) report excessive workload of certified nurse assistants (CNAs) in the long-term care (LTC) nursing homes for dementia patients. CNAs constitute 85 % of the staff in the nursing homes. However, they have to provide 90 % of direct care to residents in LTC facilities (Gruss, et al., 2004).

While overworked, nurses usually “cannot say no and keep taking on more responsibility than can be handled until burnout occurs” (Espeland, 2006, p. 179). Time and resource constraints make nurses feel powerless (Shirey, 2006).

#### *Relations with physician and supervisor*

In addition to the stress of dealing with patients, nurses often encounter conflicts with physicians, supervisors, and fellow nurses (Bianchi, 2004; Shirey, 2006). Conflict with physicians is an important stressor for highly trained nurses in the private sector (Rout, 2000). Nurses often work in “no-win situations” in which their work is not appreciated or satisfactory no matter how hard they work (Espeland, 2006, p. 179). Moreover, due to the hierarchical structure in medical institutions, nurses usually are not expected to participate in decision-making in the nursing department. Instead, they often have to endure bureaucracy at work (Bianchi).

While supervisors and physicians are supposed to offer support to nurses,

ironically, it is reported that “nurses who relied more on their supervisor for support proved more likely to report burnout. In the zero order correlations . . .reliance on coworkers for support was also related to greater evidence for burnout” (Chiriboga & Bailey, 1986, p. 90).

The excessive physical and psychosocial work load, shift work in a relatively poor work environment, restricted promotion prospects and emotional distress interacting with patients and colleagues, in turn, increases nurses’ dissatisfaction with their work environment, poorer physical and psychological health increased levels of sickness and absence, and a lack of capacity to care for self. The results are higher turn over rates and higher probability of leaving the job (Weyers et al., 2006). Turnover is an important indicator of nurses suffering from high levels of work place stress (Malik, 1996, p. 8).

#### *Demographic Characteristics*

Among the demographic variables in work place stress in nursing, age is a variable that “has been consistently related to burnout.” Younger employees report higher level of stress or burnout than employees over 30 or 40 years old. Further, age is related with work experience. As a result, burnout tends to be more of a risk for younger nurses and earlier in their career (Maslach, Schaufeli, & Leiter, 2001, p.409). Younger nurses are more sensitive to death and have more difficulty in caring for patients with cancer (Quattrin, et al., 2006, p.819).

With regard to marital status, studies show that singles seem to experience higher stress levels than those who are married. Unmarried individuals (especially male) tend to be more prone to succumb to work place stress or job burnout than those who are married (Maslach, Schaufeli, & Leiter, 2001).

### *Adverse Impact of Job Stress on Nurses' Health*

Job-related stress and burnout in nursing, as in other job in human service, contribute to emotional upheaval, psychological and physical problems. It is reported that job stress in nursing is “omnipresent threat to one’s health, to the quality of working environment and activities engaged therein” (Barnes, 2006, p. 21). Barnes calls for recognition of work stress in nursing and appropriate ways to deal with work place stress and job burnout.

For the adverse impact on health, the exhaustion component is more correlated to the health outcomes than the other two components of job burnout. Research contends that there is a link between burnout and substance abuse (Maslach, Schaufeli, & Leiter, 2001, p. 406). Further, work place stress and job burnout have been linked to “the personality dimension of neuroticism and the psychiatric profile of job-related neurasthenia.” It might be argued that “job burnout is itself a form of mental illness” (Maslach, Schaufeli, & Leiter, p. 406).

Research points out that stress triggers stress hormones in one’s brain, which is harmful to one’s health. The function of stress hormones is to “divert blood glucose to muscles that are active, the amount of glucose (hence energy) that reaches the hippocampus is diminished. This creates an energy crisis in the hippocampus, which makes it unable to create new memories” (Barnes, 2006, pp. 22-23).

Warning signs of chronic job stress exhibit in anger (Barnes, 2006; Bianchi, 2004; *Harvard Men's Health Watch*, 2005; McVicar, 2003), negative attitude, “sarcasm directed to peers; passive-aggressive behavior; lost energy and lost enthusiasm for their work; fatigue; trouble sleeping” (Barnes, p. 23). Symptoms such as irritability, anxiety,

depression (Bianchi; *Harvard Men's Health Watch*; McVicar), impatience, and an inability to concentrate or remember may occur. Long-term exposure to stress is believed to have deleterious consequences (*Running & FitNews*, 2004).

Additional disorders of nurses under stress include chronic exhaustion, cynical detachment, and feelings of ineffectiveness. If problems are not dealt with and the situation worsens, the victims may exhibit symptoms such as lack of purpose in life, lack of energy, feelings of emptiness, and decreased self-esteem (Barnes, 2006; Bianchi, 2004; Chen, 2004; Chiang, 1998; Espeland, 2006).

Many studies have examined the relationship between job-related stress and physical ailments (Greggs-McQuilkin, 2004). Stress is defined as “the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources and needs of the work. . . .Stress can trigger the brain to set off a response that prepares the body for a defensive action” (Greggs-McQuilkin, p.141). When people are under stress and constantly in a “hyper-alert state,” their physical health and mental well-being will suffer. “Stress can play a major role in several types of chronic problems such as cardiovascular disease, musculoskeletal disorders and psychological disorders” (Greggs-McQuilkin, p.141).

The demise of job-related stress manifests in nurses' constant struggle to maintain balance between organizational factors and the caring element of the work. Nurses feel drained emotionally, physically and spiritually. When they are depleted, they surrender their emotions to fear and anger (Engel, 2004).

Physically, constant exposure to the stressful work environment triggers “tension and fatigue” in nurses (Engel, 2004, p. 4). It can lead to health problems, such as altered

appetite, changes in weight, headache, backache, skin rashes, general tiredness, and muscle tension (*Running & FitNews*, 2004). More seriously, it can lead to health problems such as high blood pressure, suppressed immunity, heart disease, and cardiac arrest and accelerate some effects of aging (Bianchi, 2004; *Harvard Men's Health Watch*, 2005). There is a tendency that increased daily stress is likely "to be associated with a decline in health and mood" (DeLongis, Folkman, & Lazarus, 1988, p. 492).

Psychologically, stress and job burnout cause mental dysfunction. It precipitates adverse impact on mental health. Problems such as anxiety, depression, decrease in self-esteem, would occur (Maslach, Schaufeli, & Leiter, 2001). Stress can cause its victims "to harbor emotions such as anxiety, depression, fear and anger. In response to these feelings, healthy behaviors are inhibited and behaviors such as overeating, alcohol consumption and smoking are utilized to cope with the *stress*" (Engel, 2004, p. 4).

It is reported that "eighty-three percent of Americans experience" work-related stress. The problem is especially acute in nursing. A typical work day of a registered nurse, who works at a large inner-city hospital, often feels exhausted after a day's work. She has to take care of 20 critically ill patients, including a patient with terminal state lung cancer. She "doesn't ask for help. She pulls patients up in bed by herself, passes medications with a weary smile, practices good infection control techniques, documents everything she's accomplished--in short, tries to be all things to all people" (Messner & McDowell, 1992, p. 132).

In the case of long-term-care nursing homes, certified nurse assistants (CNAs) who are taking care of patients suffering from dementia, a common form of Alzheimer's disease, often experience high levels of job-related stress because of work overload and

dealing with dementia patients in a non-empowered environment (Gruss, McCann, Edelman, & Farran, 2004).

Perry (2005) conducted a qualitative study on the relationship between the job-related stress of 20 certified registered nurse anesthetists (CRNAs) and their job performance regarding their patients and peers. CRNAs have to endure as high a volume of work as general nurses. They have to coordinate and communicate with surgeons and staff from different departments. Misunderstanding and difficulties in communication are extra burdens to CRNAs. Moreover, they have specific stressors related to their expertise. For example, patient-care-related stressors include certain surgical cases (e.g., premature newborn cases), patient complications (e.g., difficult laryngospasm), and they have to endure devastation confronting anticipated or unanticipated death under their care, because “a death in operating room usually is deemed an anesthetic death” (Perry, p. 353). One particular nurse, who has seen two deaths on the OR table, says, “They were both devastating to me. There is nothing worse than losing a young, innocent child” (Perry, p. 353).

High levels of job-related stress have been affecting nurses’ physical health as well as their mental health (AbuAlRub, 2004; Bianchi, 2004; Engel, 2004; Greggs-McQuilkin, 2004; Gruss et al., 2004; Shirey, 2004). Nevertheless, in a literature review by McVicar (2003), it is reported that “only 53% of nurses with significant signs of poor psychological health were receiving counseling or other supportive help” (p. 640).

Studies on job-related stress in nursing have attempted to measure, or have speculated on, the effects of such stress on nurses’ health and well-being. There appears to be a general agreement that the experience of work-related stress generally detracts

from the quality of nurses' working lives, increases minor psychiatric morbidity, and may contribute to some forms of physical illness and psychological illness such as depression (AbuAlRub, 2004; Bianchi, 2004; Yung et al., 2004).

Workplace stress is "likely to be most detrimental for nurses' health" (McVicar, 2003, p. 634). It can "spread like cancer to other aspects of nurses' life" (Espeland, 2006, p. 180), and is closely linked to staff absenteeism and poor staff retention (McVicar; Shirey, 2006). As a result, it is imperative for nurses and nursing leaders to become cognizant of the causes and symptoms related to job-related burnout and stress in order to prevent debilitating effects from impairing nurses' health and well-being.

#### *Job stress and negative impact on organization*

Research studies indicate that job-related stress constantly leads to "impaired organizational efficiency" (Wheeler & Riding, 1994, p. 527). Job-related stress in nursing has contributed to organizational inefficiency, high staff turnover, sickness absenteeism, lower productivity, decreased quality and quantity of care, increased costs of health care, and diminished job satisfaction (Maslach, Schaufeli, & Leiter, 2001; McVicar, 2003; Shirey, 2006; Wheeler & Riding). Consequently, it leads to reduced commitment to the job and the organization (Maslach, Schaufeli, & Leiter).

Moreover, work place stress and job burnout is "contagious" and may "perpetuate itself through informal interactions on the job" (Maslach, Schaufeli, & Leiter, 2001, p. 406). Individuals who are stressed out can influence their colleagues negatively. They may cause greater conflict and disrupt job tasks (Maslach, Schaufeli, & Leiter).

Job-related stress or burnout "has been associated with an array of negative work related performance and health outcomes" (Raedeke & Smith, 2004, p. 525). Job-related

stress in nursing can affect a professional's job performance in negative ways. This is because when a person is under stress, his or her performance declines (AbuAlRub, 2004; Bianchi, 2004; Caelli, Downie, & Caelli, 2003; Cohen-Katz, Wiley, Capuano, Baker, & Shapiro, 2004; Greggs-McQuilkin, 2004; Yung et al., 2004).

Perry (2005) reported that "perceived occupational-related" stress identified by anesthesiologists affects "anesthesia work in general," which includes the quality of patient care, inadequate surgical preparation, the operating room environment, and job relations, to name a few (p. 353). Engel (2004) pointed out that one of the signs of how nurses are reacting to *stress* is interpersonal abandonment, in addition to the manifested physical and emotional problems.

Indeed, job-related stress has been deemed as a critical "contributing factor to organizational inefficiency, high staff turnover, absenteeism because of sickness, decreased quality and quantity of care, increased cost of health care, decreased job satisfaction" (AbuAlRub, 2004, p. 73).

One of the consequences of job-related stress in nursing is a shortage of nursing staff in medical care facilities. Although the shortage may not be solely triggered by the excessive workloads that burden the nurse professionals and work-related stress that impairs the health of professional nurses, it is predicted that the trend of shortages will continue (Messner & McDowell, 1992).

Shirey (2006) pointed out that the "nursing profession is in the midst of one of the most crippling nursing shortages in its history" (p. 193). Researchers project that due to the stressful work environment and heavy workload, by 2020 the nurse workforce will "be nearly 20% below the projected requirements." The severe shortage is expected to



reach 800,000 registered nurses (Shirey, p. 193).

There is a high rate of absenteeism and turnover among the certified nurse assistants (CNAs), due to the physically demanding and emotionally draining tasks of dealing with death and dying, inadequate staffing, and a nonempowered working environment (Gruss et al., 2004). The reported turnover rate for nursing home staff ranges from 40% to 75%. The turnover rates of CNAs are “unacceptably high.” The national turnover rate among CNAs in the United States was 78.1% in 2001 and 71% in 2002. Because of such high turnover rates, there is a serious shortage of long-term care (LTC) staff. The figure for the year 2002 is 52,000 in the United States. Such a shortage of CNAs would cause the decline of quality of health care. Moreover, the economic burden is substantial when nursing homes have to recruit, supervise, and train new nursing staff. It is estimated that it costs “\$3,000 to \$5,000 to replace a CNA” (Gruss et al., p. 208).

This anticipated shortage not only puts the availability of future nurses at risk, but also that of nursing leaders (Shirey, 2004). A National Institutes of Health study (2002) reported that “43% of nurses who cited job burnout planned on leaving their job within the next year” (Espeland, 2006, p. 178). The severity of the consequence of nurse stress and nurse shortage calls for both the knowledge of the “mechanisms of burnout and the strategies to prevent and manage them are important for nurses’ psychophysical health and constitute a fundamental requirement in a policy that aims to improve the quality of healthcare services” (Quattrin, et al., 2006, p. 819).

### *Coping with Job-Related Stress in Nursing*

Coping strategies act as mediators in an individual's stress response (Chiriboga, & Bailey, 1986). Studies on burnout find out that coping resources alleviate the burnout process in three aspects. "First, it moderates the relationship between the demand stressors and emotional exhaustion. Second, it moderates the relationship between emotional exhaustion and depersonalization. Finally, it moderates the relationship between depersonalization and feelings of personal accomplishment" (Cordes & Dougherty, 1993, p. 648). A large number of studies have been conducted on coping with work place burnout and stress. Methods of coping include time management, improvement of communication, consultation and support networks (Alimoglu & Donmez, 2005).

Research on social support in alleviating stress includes organizational social support and personal social support (Cordes & Dougherty, 1993), which is work support and non-work support (Chiriboga & Bailey, 1986). Organizational social support at the work place provides the resources necessary for workers to deal successfully with work place stress. It aims at bolstering the individuals' perceived ability to cope with challenging situations. Social support includes professional support, co-worker support, supervisor support and skill utilization (Cordes & Dougherty). Personal social support includes to support and comfort from family and friends. Such support enhances individuals' ability to cope with the demands of and reactions to the work environment (Cordes & Dougherty).

Major theoretical tenets postulate that stress coping involves both problem-focused and emotion-focused factors (Folkman & Lazarus, 1980). Coping is an attempt at

“managing or altering the problem (problem focused coping), or regulating the emotional response to the problem. Problem focused coping includes problem-solving activities and seeking information” (Healy & McKay, 2000, p. 682). The individual takes steps to seek solutions to resolve the stress at its sources (Evans, Bryant, Owens, & Koukos, 2004). Nevertheless, emotion-focused coping includes cognitive activities such as denial of facts to distort reality (Healy & McKay).

As a result, in coping with job-related stress in nursing, it is important for nurses to be aware of their responses to stress in order to better handle their responses and to deal with occupational stress effectively (Engel, 2004). Nurses need to learn how to cope with stress for the sake of their own health, for their job performance, and for the quality of service to the public (Greggs-McQuilkin, 2004). The coping initiative by the government of the United Kingdom has helped improved some situations in nursing and is an attempt to remove the problems (McVicar, 2003).

In a qualitative study, Murphy (2004) explored the job-related stress experienced by the nephrology nurses at a major nephrology center in Northern Ireland. The study was conducted with a sample of 10 nurses through semi-structured taped interviews. The study reveals the different sources of stress that are affecting the health and work performance of the nurses concerned. Although some coping mechanisms are adopted by those nurses, there is no intervention initiated by the hospital administrators or other managers to help nurses deal with their work-related stress more effectively (Murphy).

In Asia, research has shown that exercising self-control is a cultural character trait common in nurses. Self-control is utilized as a major coping mechanism in job-related stress in nursing (Lambert et al., 2004). Intervention programs actively seeking to relieve

work place stress are not in existence in most of the cases.

The adverse impact of job-related stress on nurses' health makes it imperative for nurses to have the awareness of work place stress, and learn to care for their physical and mental health. They need to have the strategies to cope with stress at work. Among a variety of ways of coping, such as using humor, eating well, social support, exercise and leisure activity are believed to be true buffers to stress (Oplin, 1996). Participating in exercise such as aerobics, yoga, walking and sports are believed to be beneficial to buffer stress and job burnout (Espeland, 2006).

#### *Participating in Physical Activity and Exercise as a Way of Coping*

Research has been conducted on ways of coping with work place stress and burnout in nursing (Alimoglu & Donmez, 2005; Espeland, 2006; Healy & McKay, 2000; Rout, 2000; Shirey, 2006). Ways of coping with work place stress include emotion-focused and problem-focused.

Research indicates that work place stress coping in nursing is mainly emotion-focused (Shirey, 2006). The emotion-focused strategies used in coping include trying to see humor in the situation, avoidance, detachment, assignment of blame to self or to others, and fatalism. On the contrary, the problem-focused way of coping includes seeking information, trying to get help, and taking action (Folkman & Lazarus, 1980). Furthermore, coping with workplace stress in nursing includes improving time management, planning, communication, and offering consultation and a support network (Rout, 2000).

A fairly extensive body of literature on the relationship between exercise and anxiety has been developed over the past 40 years (Lox et al., 2003). Studies on stress in

general, stress management, and stress reduction have substantially evidenced that exercise and relaxation mechanisms have positive effects on coping with stress and burnout (De Vries, 1981; Feuerstein et al., 2004; Johnsgard, 1989; Kohn & Henderson, 2004; Lox et al.; MacDonald, 2006; Martinsen & Morgan, 1997; Martinsen & Stanghelle, 1997).

Lox et al. (2003) cited that “Exercise has the effect of defusing anger and rage, fear and anxiety. Like music, it soothes the savage in us that lies so close to the surface. It is the ultimate tranquilizer” (p. 159). Physical activity and exercise have been examined as “a potential tool in preventing and treatment of stress-induced psychological disorders” (Lox et al., p. 164).

Studies show that exercise and leisure experience are characterized by cognitive (i.e., thoughts, images) and affective (i.e., feelings, sensation) attributes to some degree, regardless of the intensity of such endeavors (Tinsley & Tinsley, 1986). Exercise and leisure experience allow individuals to be absorbed in the ongoing activity, divert their attention from themselves. This may offer individuals a feeling of freedom, “lack of constraint, enriched perception of objects and events, increased intensity of emotion, increased sensitivity to feelings, and decreased awareness of the passage of time” (Tinsley & Tinsley, p. 7). Moreover, exercise benefits are associated with levels of exercise and its intensity (Speck & Looney, 2006; Tinsley & Tinsley). Less vigorous exercise allows individuals to experience its attributes to a minimal degree, while more vigorous endeavors will result in more salient attributes (Tinsley & Tinsley).

Research studies have pointed out that one of the general ways of influencing emotion is to act on the body. Since “the foundation of the emotion is a state of

physiological arousal or bodily perturbation, it is understandable that bodily effects can have emotional consequences. A variety of physical methods (e.g., jogging, aerobics, controlled breathing, muscular relaxation). . . are used by people for emotional self-regulation” (Rosenberg, 1990, p. 11).

Exercise is a helpful mechanism in coping with stressful burdens. The American Psychological Association advocates the promotion of exercise. Exercise can have positive effects on buffering stress and improving one’s health and fitness (*Running & FitNews*, 2004). Studies show that within the first 30 minutes of physical activity, the human body will release serotonin, a neurotransmitter that stimulates the brain’s happy centers (*Running & FitNews*). Exercise stimulates the release of endorphins, which block pain messages and can elevate an individual’s mood (Espeland, 2006; *Running & FitNews*). Furthermore, “endorphins lower blood pressure, reduce levels of stress hormones, and boost immune system functions” (Espeland, 2006, p. 182). As a result, exercise offers peripheral benefits to health (*Running & FitNews*).

According to the National Institutes of Health, stress management can be as simple as a walk in the park. Among the three things that researchers believe can be beneficial in dealing with psychological burdens, exercise is one simple yet important component including social support, spiritual prayer, and meditation (*Pain & Central Nervous System Week*, 2004).

Regular exercise is a great way of dissipating the physical manifestations of stress hormones in the body. Exercise, even regular stretching, can relieve tension in the muscles (*Running & FitNews*, 2004). Most importantly, studies show that moderate physical activity can bolster the immune response, counteracting the anxiety adrenaline

and cortisol may cause when they flood the bloodstream.

Keric (1998) contended that:

Game and sport are justified in therapy, especially while treating behavior of mentally ill and emotionally unstabled persons ... Psychoanalytic theories of game point out of some of its exceptional therapeutic possibilities. Game is a 'valve' for unpleasant feelings, generator of joy, ecstasy and other pleasant emotions. (p. 47)

Martinsen and Morgan (1997) pointed out that exercise, such as physical activity, is a simple, inexpensive, and effective approach to treat and prevent depression. Studies have shown "clear correlations between physical activity level and mental health" (p. 93). Johnsgard (1989) reported that exercise, such as brisk walking, jogging, or strenuous exercise, has the power to trigger "euphoria-producing beta endorphins" in the brain both during and after daily exercise periods in patients with depression (p. 161). Participating in team sport or a game, such as swimming laps at a swimming pool or a club, joining a bicycling or running club, etc., would grant people health benefits. Indeed, "recreational and team sports can keep endorphin levels high, while keeping stress low" (Thompson, 2006, p. S5). Moreover, engaging in certain physical activities and exercises, such as deep breathing, yoga, and calisthenics, can help reduce stress (Thompson). Studies indicate that cardiorespiratory fitness can be achieved by "30 minutes of moderate-intensity physical activity daily" (Peterson, Yates, Atwood, & Hertzog, 2005, p. 94). Cardiovascular activity, such as deep breathing, is not only good for our bodies, but also can help manage stress and clear minds. If practiced regularly, deep breathing may also prevent stress (Thompson).

Simple exercises, such as walking, a moderate-intensity activity, which is favored

by many, brings important health benefits (Dishman & Buckworth, 1997; Guillot, et al., 2004; MacDonald, 2006; Nies & Partridge, 2006; Speck & Looney, 2006). Lox et al. (2003) reported that walking or jogging, a moderate-intensity exercise, is sufficient to reduce anxiety and increase fitness. Johnsgard (1989) contended that exercise such as jogging can reduce state anxiety in individuals with low to high levels of anxiety. The positive effect of such activities is predictable, and “has been consistently demonstrated in both laboratory and natural settings” (Johnsgard, p. 194).

Studies show that taking a brisk walk or jogging for 30 minutes will benefit the participants. Brisk walking or jogging will pump up the heart rate and blood flow. In this way, people can expect to take time away from the stressful situation (Thompson, 2006). Yoga, the traditional physical exercise in Eastern culture, has also been found to be very helpful in coping with stress and in gaining peace in mind. The science of yoga indicates that the nerves in the human body are all in the spinal column. When an individual feels “stress or tension, these nerves become blocked and create pain in our neck, back, shoulders and joints. Stretching not only increases flexibility, but it can also reduce stress levels” (Thompson, p. S5). “Pose in yoga frees tension in the back and shoulders while calming the mind and relaxing the brain” (Thompson, p. S5).

In a study of a four-week stress reduction program, Altman (2001) reported that yoga, combined with breathing exercise and mindful meditation resulted in significant reductions in the average heart rates, systolic blood pressures, and respiration rates of the research participants. The study concludes that a brief therapy model with the above exercises is effective in reducing stress.

Similarly, in a study on 102 female nurses, Taylor (1991) found that regular



exercise and music-listening for a brief period of 6 weeks exhibited a significant main effect on subjects posttreatment stress level in addition to the effects gained from social support.

Although yoga and cardiovascular activities help individuals cope with stress, “other physical exercises like calisthenics (sit-ups, push-ups) greatly improve the overall physique and health and lower stress levels in the process” (Thompson, 2006, p. S5). A study on 252 Taekwondo sport participants found that leisure activity has significant buffering effects on stress and stress-related physical and mental problems (Iso-Ahola & Park, 1996).

In a study on a 9-week support program in a private hospital, Gray-Toft and Anderson (1983) used structured exercises to help nurses relieve stress. The result indicates that the program was effective in buffering nurses’ stress, increasing their job satisfaction and decreasing job turnover (Gray-Toft & Anderson).

Kohn and Henderson (2004) reported on the Mindfulness-based Stress Reduction program developed in 1979 by Jon Kabat-Zinn at the University of Massachusetts Medical Center in Worcester, Massachusetts. In this particular study, yoga and meditation are both shown effective in reducing life stress (Kohn & Henderson).

Cohen-Katz, Wiley, Capuano, Baker, and Shapiro (2004) suggested that coping with job-related stress in nursing include the mindfulness-based stress-reduction program in a hospital system as a way to lower burnout and improve well-being among nurses. It is a study using both quantitative and qualitative data. It is focused on self-care, involving exercise, compassion, and healing, which makes it relevant as an intervention for helping nurses manage stress and reduce burnout. The program has been implemented in the

hospital system and has achieved considerable effect in dealing with work-related stress in nursing.

In a different study, Messner and McDowell (1992) strongly suggested that nursing professionals should, first of all, be aware of the stress they experience. In quoting Linda Smith, a nurse educator, Messner and McDowell advocated that “You don’t have the time not to take care of yourself. . . .when you take care of your own health, you feel better, are more productive, and are less prone to accidents and errors” (p.110). In addition to getting sufficient rest and eating a proper diet, Messner and McDowell suggested that nurses need to exercise to manage the stress associated with their jobs.

In another study on nursing managers under increased stress, Yung et al. (2004) found that stress management training programs are beneficial. The subjects in the experimental group in this study were 35 nurse managers in Hong Kong. Those nurse managers, who received stretch-release relaxation training and cognitive relaxation training, have enhanced their mental health status.

An 8-week stress-management program taught by a nurse practitioner and professor at the University of Texas-El Paso proved to be effective in stress reduction. It is a good option to help people “manage personal stress or anxiety without relying on medication” (Kohn & Henderson, 2004, p. 45). The program taught participants basic yoga and meditation and encourages them to practice at home in order for them to become “mindful of the moment” to combat their stress. A 50-year-old man who struggled with post-traumatic stress disorder and had chronic pain in his neck and back was able to enjoy a good night’s sleep after attending the stress-reduction workshop. A

woman who used to have a substance abuse problem and is battling with depression, anxiety, and arthritis also benefited from the program.

Shelton and Horne (2004) asserted that certain exercises such as stretching can be helpful in buffering stress in general. The benefits of exercise also manifest in children. Atkins (2005) found that engaging children in deep-breathing, imagining pleasant scenes, and identifying feelings proves to be beneficial to ease anxiety and to help children to cope with stress.

In conclusion, “exercise is essential to a healthy life and stress management; Maintaining health-related fitness and good shape (Body Mass Index 19–23), could enhance regular physical activity and reduce physical stress” (Chen, 2004, p. 102). In coping with job-related stress, “the best results come when one combines learned behavior changes with an arsenal of coping skills. Regular moderate physical activity is the ideal way to cope with physical stress because it is effective, long-lasting, and inexpensive, while providing positive health benefits” (Chen, p. 102).

#### *The Need for Research on Coping with Job-Related Stress in Nursing*

Occupational stress in nursing and its detrimental impact on health and the job performance of nurse professionals deserves the attention of research on the “variables that might reduce or buffer the negative effects of stress” (AbuAlRub, 2004, p. 74). It is important to understand the significance of using verified sources to prevent and relieve work-related stress, and enhance job performance of the highly stressed nursing professional (AbuAlRub). Due to the lack of generally accepted examples or guidelines by which to implement or evaluate health-promotion practice in nursing, Caelli and his colleagues (2003) suggest the need to conduct research on promotion of nurse health.

Nursing professionals need to be able to identify work-related stress and be empowered with effective coping strategies and stress-prevention techniques. Nurses should not be passive victims of job-related stress; instead, they should be professional practitioners better able to control and manage workplace stress.

The reviewed literature on job-related stress in the nursing profession in the United States, Taiwan, and other countries indicates that there are coping strategies for reducing work-related stress in nursing, which are effective in some ways. Such coping strategies have improved the attitude of nurses toward their jobs, improved their job performance, decreased the rate of absenteeism, and in a way helped retain the nurse staff in the workforce. Numerous studies on coping with workplace stress in nursing, the research on the relationship between job-related stress in nursing and participating in exercise and physical activity adds new literature on the topic and points out a new venue for nursing professions in dealing with the demanding nature of their work in Taiwan.

It is important for nurses and nurse managers to have the awareness of the sources of workplace stress to have the skills to detect the symptoms of work-related stress in the first place. Next, they need to learn to prevent, recognize, and manage stress effectively. As Hans Selye, the pioneer of stress research, pointed out, it's not what happens to you; it is how you take it (Messner, & McDowell, 1992). Nurse professionals should be empowered to cope with workplace stress.

### Chapter 3: Methodology

This study used a quantitative research methodology, exploring the relationships among job-related stress, health status, and physical activities of nurses in five teaching hospitals in Taipei, Taiwan. The study focused on perceived job-related stress as measured by the Nursing Stress Scale and health status as measured by the SF-36 Health Survey. The study also examined the frequency, intensity, and duration of nurses' participation in a variety of physical activities as measured by the 7-Day Physical Activity Recall Questionnaire and Stage of Exercise Scale. This chapter contains a discussion of the research design, population and sample, the elements of the instrumentation, research questions, data analysis, protection of human subjects, procedure, data collection, and pilot tests.

#### *Research Design*

A quantitative research design was used in this study. Creswell (2003) indicated that quantitative research “primarily used postpositivist claims for developing knowledge such as cause and effect thinking, reduction to specific variables and hypotheses and questions, use of measurement and observation, and the test of theories” (p.18). Leedy and Ormrod (2005) said, “Quantitative research is used to answer questions about relationships among measured variables with the purpose of explaining prediction and controlling phenomena” (p. 94). Therefore, a quantitative research design was appropriate to examine the relationships among the variables and to generate statistically reliable and valid results. The data was analyzed using SPSS 13.0 for Windows. This study calculated the degree of relationships between a dependent variable (health status) and independent variables (nursing stress, physical activity participation, and demographic data).

### *Population and Sample*

The hospitals chosen for this study were in the metropolitan part of northern Taiwan and provide comprehensive medical care to the general public. They also serve as medical research centers and medical instruction bases for those who are in the medical profession or pursuing a career in health care.

The selection of the nurses was based first on the fact that Taipei Taiwan is clustered with fast-paced, modern city. Compared to those in central or southern Taiwan, comprehensive hospitals in Taipei provide the best medical services in the country, with better-trained and more experienced medical professionals. Generally speaking, medical professionals in Taipei are well educated; some of them have been educated abroad and have the expertise that is in demand by residents of the metropolis. Moreover, the medical equipment and facilities are excellent. The hospitals often cooperate with medical schools and serve as medical research centers and training camps for medical students.

Second, the job is more challenging and demanding for nurses in hospitals in Taipei Taiwan than in hospitals in other areas. People in Taipei generally have higher education levels. Therefore, they demand quality medical service, and as a result, the stress levels for those nurses are higher.

Third, there are more departments in hospitals in Taipei Taiwan, providing more comprehensive medical care. Having a sample of nurses working in different departments at different shifts helped the researcher examine a variety of job-related stressors.

Finally, life in densely populated and fast-paced Taipei Taiwan is more stressful than that in the central and southern Taiwan, where population is less dense and the pace

of life is relatively slower.

McMillan and Schumacher (2001) explained that “the general rule in determining sample size is to obtain a sufficient number to provide a credible result” (p.177). Gay and Airasian (2003) indicated that “beyond a certain point (at about 5,000 units or more), the population size is almost irrelevant, and a sample size of 400 should be adequate” (p.113). Currently, nurses are the major working force working full-time in the hospitals. There were 1,859 nurses in the five teaching hospitals in Taipei. This study excluded those who are contract nurses, or paid by an hourly wage, or part-time nurses. The sample size was adequate for this study because it was large enough to approximate the characteristics of the population.

The researcher used a systematic sample of 420 registered nurses in the five teaching hospitals. A systematic sample of 600 nurses was generated using a database of nurses from the five teaching hospitals. Each nursing director organized the nurses' employee numbers, every 5th number was selected from the database (i.e., the first name selected was the 5th number in the database, the second was the 10th number).

#### *Instrumentation*

This quantitative study used four questionnaires: the Nurse Stress Scale (NSS) (Gray-Toft & Anderson, 1981), which was translated into Chinese by Lee (2004); version 2 of the SF-36 Health Survey (SF-36v2; Ware, 1992); the Stage of Exercise Scale (SOES; Cardinal, 1995) as translated into Chinese version by Lee (2001); and the 7-Day Physical Activity Recall (PAR) Questionnaire (Blair, 1985) as translated by Chiang (1998).

The Nurse Stress Scale (NSS) has been used widely in research studies in job-related stress in nursing. The NSS was used in this study to determine the job-related

stressors and stress levels perceived by the nurses in five teaching hospitals in Taipei. The questionnaire contains 34 items in seven stress factors: Death and Dying, Conflict with Physicians, Inadequate Preparation, Lack of Support, Conflict with Other Nurses, Work Load, and Uncertainty Concerning Treatment that requires written response. A 4-point Likert scale was used to indicate the frequencies of stress nurses perceive from 1 (*never*) to 2 (*occasionally*) to 3 (*frequently*) to 4 (*very frequently*).

For the internal consistency of English version of the NSS, the Spearman-Brown coefficient was 0.79, Guttman split-half coefficient was 0.79, coefficient alpha was 0.89, and standardized alpha was 0.89. The test-retest reliability was 0.81, which is considered satisfactory. Hillhouse and Adler (1997) confirmed that the NSS had good reliability (test-retest  $r = 0.81$ , Cronbach's alpha = 0.89). "It has been used widely in a number of studies involving a variety of nursing specialties" (Hillhouse & Adler, p. 1,782). Lee (2004) did not report the reliability and validity of the translated version. The researcher used Spearman's rho to test the Cronbach's alpha value in the pilot test.

The second survey used in this study was version 2 of the SF-36 Health Survey (SF-36v2). The translated Chinese version of the survey was requested and obtained from the Medical Outcome Trust (MOT), Health Assessment Laboratories (HAL), and Quality Metric Inc.

The SF-36v2 is a short, self-administration measurement, including 36 items to assess an individual's general health status. It is designed to be used in clinical practice and research, and for monitoring a general or particular population. It takes about 5–10 minutes to complete. The SF-36 has been translated and adapted for use in 29 countries; translations include the Chinese version. The SF-36v2 divides an individual's health into



10 subscales: physical component, mental component, physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. In norm-based scoring, each scale is scored to have the same average (50) and the same standard deviation (10 points).

Table 1

*Abbreviated Content for Items in Each SF-36v2 scale*

Health status	Scale	Abbreviated item content
Physical component summary	Physical functioning	Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports
		Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf
		Lifting or carrying groceries
		Climbing several flights of stairs
		Climbing one flight of stairs
		Bending, kneeling, or stooping
		Walking more than a mile
		Walking several hundred yards
		Bathing or dressing yourself
	Role physical	Cut down the amount of time you spent on work or other activities
		Accomplished less than you would like
		Were limited in the kind work or other activities
		Had limited in the kind of work or other activities
	Bodily pain	Intensity of bodily pain
		Extent pain interfered with normal work
	General health	Is your health: excellent, very good, good, fair, poor
		I seem to get sick a little easier than other people
		I am as healthy as anybody I know
		I expect my health to get worse
		My health is excellent
Mental component summary	Vitality	Feel full of life
		Have a lot of energy
		Feel worn out
		Feel tired

Table 1 (*continued*)

Health status	Scale	Abbreviated item content
Mental component summary	Social functioning	Extent health problems interfered with normal social activities Frequency health problems inferred with social activities
	Role emotional	Cut down the amount of time spent on work or other activities Accomplished less than you would like Did work or other activities less carefully than usual
	Mental health	Been very nervous Felt so down in the dumps that nothing could cheer you up Felt calm and peaceful Felt downhearted and depressed Been happy

*Note.* From “How to score version 2 of the SF-36 Health Survey” by John E. Ware, Mark Kosinski, and James E. Dewey, 2000, p. 13. Copyright 2000 by the Medical Outcomes Trust and Quality Metric Incorporated. Adapted with permission of the author.

The SF-36 health survey has a high reliability. “Cronbach’s alpha on all scales of the SF-36 exceed alpha of 0.8, except for social functioning ( $\alpha = 0.76$ )” (Medical Outcome Short Form (36) Health Survey, 2005). An alpha of 0.76 for the social functioning dimension was considered acceptable because the dimension contains only two items using a 5-point scale. “The Physical Functioning dimension has consistently exceeded 0.90” (Medical Outcome Short Form (36) Health Survey). The test-retest reliability of the SF-36 shows that in “all dimensions 91-98% of cases lay within the 95% confidence interval. The maximum mean difference in dimension scores was 0.80” (Medical Outcome Short Form (36) Health Survey). In terms of validity, each scale of the SF-36 “reportedly provides a valid representation of the criterion to be measured” (Ware, as cited in Medical Outcome Short Form (36) Health Survey). Items pertaining to each dimension of the survey are appropriate and “representative of the conceptual domains of

Physical Functioning, General Health and Vitality. . . . content validity compares favourably with other widely used generic health surveys” (Ware, as cited in Medical Outcome Short Form (36) Health Survey).

Table 2

*The Eight Health Profiles Including Number of Items, Cronbach’s Alpha, and Item Internal Consistency*

Scale	Number of items	Internal consistency reliability	Range of item internal consistency
Physical functioning	10	$\alpha = 0.93$	0.64–0.83
Social functioning	2	$\alpha = 0.90$	0.39–0.56
Role physical	4	$\alpha = 0.82$	0.86–0.89
Bodily pain	2	$\alpha = 0.95$	0.26–0.56
General health	5	$\alpha = 0.82$	0.65–0.83
Mental health	5	$\alpha = 0.80$	0.62–0.77
Role emotional	3	$\alpha = 0.83$	0.83–0.77
Vitality	4	$\alpha = 0.82$	0.77–0.83

*Note.* From “How to score version 2 of the SF-36 Health Survey” by John E. Ware, Mark Kosinski, and James E. Dewey, 2000, p. 17. Copyright 2000 by the Medical Outcomes Trust and Quality Metric Incorporated. Adapted with permission of the author.

Additionally two composite summary scores measure physical health and mental health (Ware, 2000). Reliability estimates for these composite physical and mental summary scores usually exceed 0.90.

The SF-36 health survey has a clear convergent and discriminant validity, which can “discriminate between mental health and physical health among medical and psychiatric patients” (McHorney et al., as cited in Medical Outcome Short Form (36) Health Survey). There is also a strong convergent and discriminant validity for the role physical and role emotional scale. The social function scale has a moderate to strong convergent and discriminant validity (McHorney et al.). Moreover, general health perception has “good convergent validity for physical health but poor convergent validity

for mental health. Bodily pain showed strong convergent validity in physical health and poor convergent in medical severity clinical test” (McHorney et al.). This may be due to the fact that the “medical conditions used in the study were not dominated by pain” (McHorney et al.).

The third instrument used in this research study was the Stage of Exercise Scale (SOES), which was based on the Transtheoretical Model of behavior change (Cardinal, 1995). In a study of the health behavior of 178 female adults, Cardinal found that stage-specific intervention was successful in applying to health behaviors and helped in understanding exercise initiation and maintenance process. The SOES was used to investigate the nurses’ participation in exercise over a 6-month period. The questionnaire contains five items: regular participation in exercise for more than 6 months, regular participation in exercise for less than 6 months, participation in exercise but not regular, no exercise, and no plan to exercise during the next 6 months.

For test-retest reliability ( $p < 0.001$ ), all correlations were significant and in the predicted direction. The Spearsman’s rho for the SOES was 1.00 ( $p < 0.0001$ ) (Cardinal, 1995). In a test of concurrent validity for the instrument, “all Pearson’s correlation coefficients were statistically significant ( $p < 0.001$ ) and were in the predicted direction (ranged from 0.36 to 0.40)” (Cardinal, p. 89).

Lee (2001) did not report any statistical information concerning the Chinese version of the SOES. Flath (2005) reported that the Chinese version was translated first by the author. Then three native speakers of Mandarin Chinese, one with a doctorate in education and two with doctoral candidates at the Public Health and Human Development and Family Sciences Department, back translated the Chinese version into

English. All three translations were compared and given to a small group of Chinese students for a pilot study. Flath said, “Cronbach’s alpha was used to measure the psychometric property of the Chinese versions of the measure” (p. 19). Flath did not report a Cronbach’s alpha. Therefore, the researcher used Spearman’s rho to test the Cronbach’s alpha value in a pilot test.

The fourth instrument used in this study was the 7-Day Physical Activity Recall (PAR) Questionnaire. The PAR Questionnaire has been used in research examining risk behavior in adolescents and in a national health survey in the Taiwan (Chiang, 1998). The survey’s Cronbach’s alpha of validity and reliability are .72 and .82, respectively (Chiang, 1998). The Chinese version of the questionnaire was used to examine nurses’ participation in physical activities in this research. Blair et al. (as cited in Chiang, 1998) contended that the “recall of the precise activities from the past week is more accurate than a common question such as “What is your usual activity?” (p. 59). The Chinese version was used to determine the health benefits of exercise 1998 (Chiang). The survey consists of 22 types of physical activities. Participants circle the activities they engaged in during a 1-week period. The frequency of the physical activities was measured on a 1–6 scale. The duration also was measured on a 1–6 scale with each number representing a 10-minute interval and a total duration of 60 minutes. The intensity of the physical activities was measured on a 1–3 scale, which represented mild, moderate and high intensity.

Mild intensity physical activity means that the person’s breathing and heart rate increase “by small amount” and the activity is “performed with minimal effort” such as walking and bowling (Chiang, 1998, p. 59). Moderate physical activities are those that

bring about a noticeable increase in heart rate and breathing but not an exhausting level. Such activities include fast walking, and dancing. Finally, the high intensity physical activities refer to activities performed with “substantial effort, increased heart rate and breathing, and high levels of sweating” (Chiang, p. 59).

Demographic data on the nurse participants were collected using a translated demographic questionnaire by Lee (2004). The data collected included gender, education, years of nursing experience, specialty you currently work, marriage status, and age.

#### *Data Collection*

The five surveys were sent to a systematic sample of 600 nurses in five teaching hospitals in Taipei Taiwan. When the nurses completed the survey, they returned them in an envelope provided by the researcher. Descriptive statistics and inferential analysis were calculated with the four surveys and demographic characteristics to determine if there was a relationship among the variables: the nurses’ perceived job-related stress, health status, the participation of the physical activities of the nurses.

#### *Procedures*

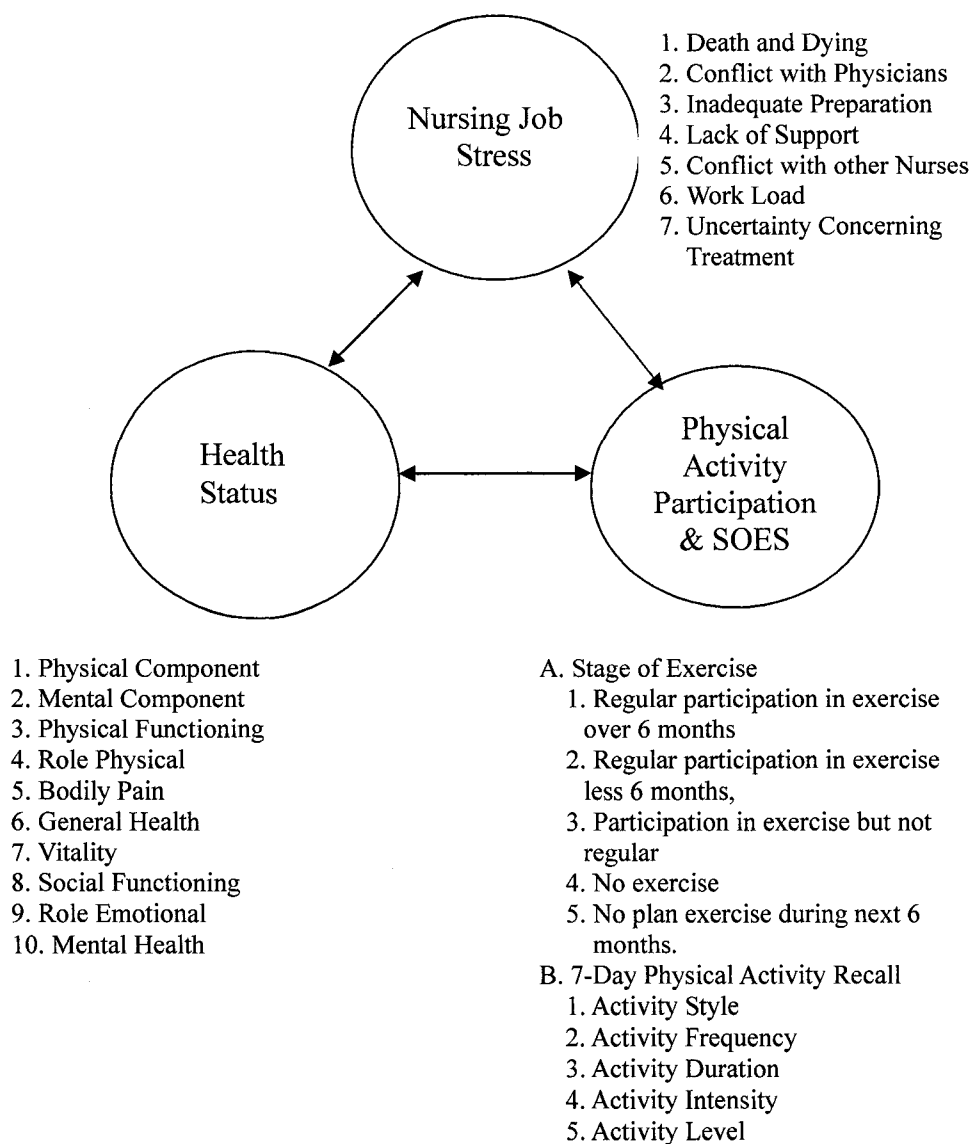
The survey packages were sent to the directors of nursing departments in five teaching hospitals. The directors of nursing departments distributed the questionnaire packages to the participants. The questionnaire package included a cover letter, consent form, Demographic Information Questionnaire, Chinese version of the NSS, the Chinese version of the SF- 36v2, the Chinese version of the 7-Day PAR Questionnaire, and the Chinese version of the SOES.

The participants were informed in a cover letter that the purpose of the study was to investigate the relationships among the job-related stress, health status, physical

activity participation of nurses in five teaching hospitals in Taipei. Nurse participants were instructed on how to complete the surveys and how long it would take them to complete the surveys. The nurses were requested to return the completed questionnaires in self-addressed envelopes provided by the researcher.

*Assumed Concept Model Variables*

This study was designed to investigate the relationship among the job stress, physical activity participation, and health status of nurses in Taipei, Taiwan. Figure 1 shows the assumed concept model and variables.



*Figure 1.* Assumed concept model and variables.

The operational definitions of the main variables are:

1. Nursing Stress Scale— This scale was measured using 34 NSS items in seven stress factors: Death and Dying, Conflict with Physicians, Inadequate Preparation, Lack of Support, Conflict with Other Nurses, Work Load, Uncertainty Concerning Treatment.



2. SF-36v2—This scale was measured using 36 items in 10 categories:  
Physical Component, Mental Component, Physical Functioning, Role  
Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role  
Emotional, and Mental Health.
3. SOES—This physical activity scale was measured using five items:  
Regular participation in exercise for more than 6 months  
Regular participation in exercise for less than 6 months  
Participation in exercise but not regular  
No exercise  
No plan for exercise during the next 6 months
4. 7-Day PAR Questionnaire—This survey was measured using five items  
(physical activity style, frequency, duration and intensity, and activity level).

#### *Research Questions*

Four steps and 16 research questions were used to guide the analysis of the relationships among the nursing stress, health status, and physical activity participation among nurses in Taipei Taiwan. Figure 2 illustrates the model of research variables.

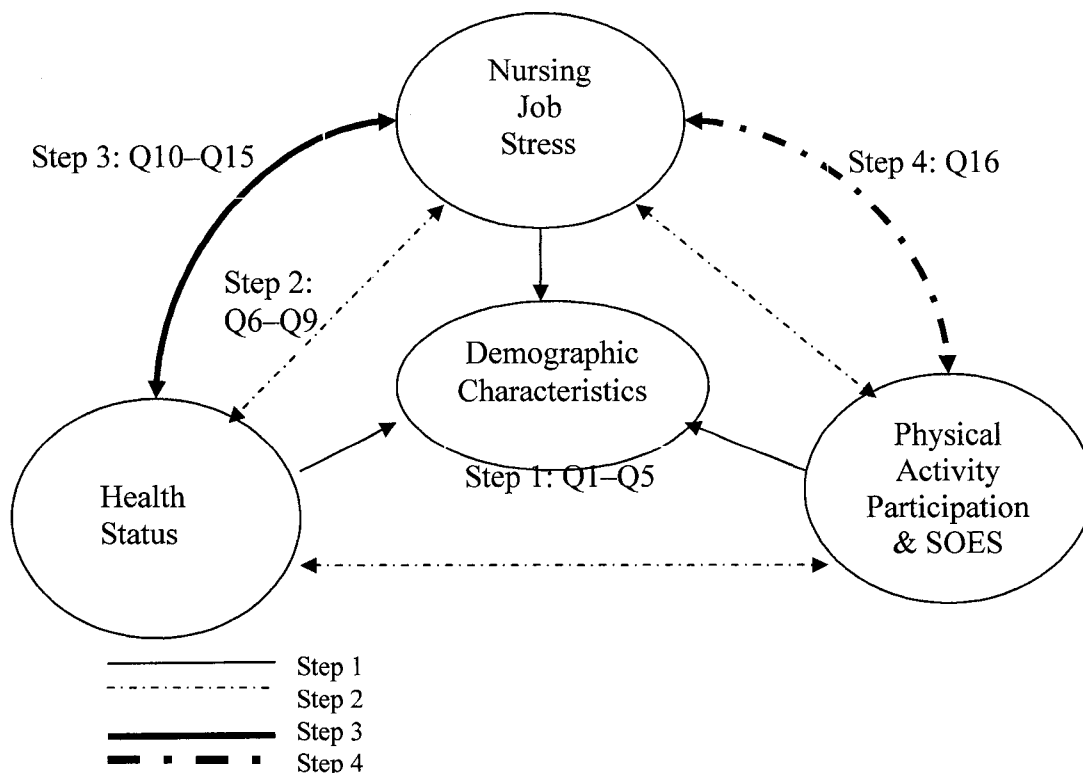


Figure 2. The model of research variables.

### Step 1

Step 1 investigates differences among demographic groupings in nursing stress, health status, and participation in physical activity. These potential differences were evaluated via the following research questions.

1. Is there a significant difference among age groups in nursing stress, physical activity participation, and health status of nurses in five hospitals in Taipei, Taiwan?
2. Is there a significant difference among age groups in factors of the NSS for nurses?

3. Is there a significant difference among work departments in nurses' stress and physical activity participation of nurses?
4. Is there a significant difference between registered professional nurses (RPNs) and registered nurses (RNs) in seven factors of the NSS?
5. Is there a significant difference among the stages of exercise in nursing stress and health status of nurses in five hospitals in Taipei, Taiwan?

### *Step 2*

Step 2 investigates of the relationship among nursing stress, health status, and participation in physical activity. Following are the research questions associated with Step 2.

6. Is there a significant relationship between nursing stress and health status of nurses in five hospitals in Taipei, Taiwan?
7. Is there a significant relationship between nursing stress and physical activities participation of nurses?
8. Is there a significant relationship between physical activity participation and health status of nurses?
9. Is there a significant relationship among stress, physical activity level, and health status of nurses?

### *Step 3*

Step 3 examines the predictability among nursing stress, physical activity, health status and demographic characteristics. The following research questions were addressed.

10. Can physical health be predicted by mental health of nurses in five hospitals in Taipei, Taiwan?

11. If the nurses' stress is controlled, is the mental health of the nurses still able to predict their physical health of nurses in five hospitals in Taipei, Taiwan?
12. Can mental health be predicted by physical health of nurses in five hospitals in Taipei, Taiwan?
13. If the nurses' stress is controlled, is the physical health of nurses still able to predict the mental health of nurses in five hospitals in Taipei, Taiwan?
14. Do nursing stress and demographic characteristics predict the health status of nurses in five hospitals in Taipei, Taiwan?
15. Do nurses' demographics and health status predict the stress of nurses in five hospitals in Taipei, Taiwan?

#### *Step 4*

Step 4 examines the predictability between nursing stress and physical activity.

16. Can job stress be predicted by the physical activity participation of nurses in five hospitals in Taipei, Taiwan?

#### *Plans for Data Analysis*

The data for this research were collected and recorded. The Statistical Package for Social Science (SPSS 13.0) was used to analyze the data for statistical relationships among perceived job-related stress, health status, and nurses' participation in physical activity. Beauford (1999) recommended that data analysis methods be presented based on the variables' characteristics and research questions. The data results are presented in Chapter 4.

Factor analyses were used to evaluate the validity and reliability of the survey instruments. Pallant (2001) indicated that "in principal component analysis the original

variables are transformed into a smaller set of linear combinations, with all of the variance in the variables being used” (p. 151). Principal component analysis with varimax rotation and Cronbach’s alpha were used to present the validity and reliability of the survey instruments.

Means, standard deviation, frequencies, and percentages distribution tables were structured to present the results of the demographic characteristics of the participants (nurses) and their nursing stress, health status, and physical activity participation. The Pearson product-moment and Spearman’s rho correlation coefficients were used to examine the relationship among variables (nursing stress, physical activity participation, and health status).

A one-way multivariate analysis of variance (MANOVA) was conducted to compare the differences of means in the variables. Tabachnick and Fidell (2001) indicated that “Regression techniques can be applied to a data set in which the independent variables are correlated with one another and with the dependent variable to varying degrees” (p. 111). In this study, multiple regression analyses were used to examine the interrelationships and influence value among the variables. Hierarchical regression is “interpreted as the amount of variance added to  $R^2$  by each independent variable at the point that it enters the equation” (Tabachnick & Fidell, p. 142). In this study, hierarchical regression (sequential) was employed to determine if the addition of nursing stress and then mental health improved predictions afforded by differences in physical health. A direct logistic regression analysis was used to explain the prediction of health status by stress and demographic characteristics.

*Summary of Data Analysis*

Table 3 presented an explanation of the purpose of the study, research questions, and statistical analysis in this study.

Table 3

*The Summary of Study Purpose, Research Question, and Statistical Analysis*

Purpose of study	Research question	Statistical analysis
1. job-related stress and stressors of nurses 2. nurses' health status 3. nurse's participation in physical activities	Presented the results by descriptive analysis.	Percentage, mean, standard deviation, frequency, minimum, maximum and range
4. To explore the difference between the demographic groups in their job related stress, health status, and physical activity participation by nurses	1. Is there a significant difference among age groups in nursing stress, physical activity participation and health status of nurses in five teaching hospitals in Taiwan?	MANOVA, Scheffe post-hoc test
	2. Is there a significant difference among age groups in factors of Nursing Stress Scale of nurses in five hospitals in Taiwan?	MANOVA, Scheffe post-hoc test
	3. Is there a significant difference among nurse's work departments in nurses' nursing stress and physical activity participation of nurses in five teaching hospitals in Taiwan?	MANOVA, Scheffe post-hoc test
	4. Is there a significant difference between registered professional nurses (RPN) and registered nurses (RN) in 7 factors of Nursing Stress Scale (NSS) in Taipei, Taiwan?	Independent samples <i>t</i> -test
	5. Is there a significant difference among stages of exercise (SOES) in nursing stress and health status of nurses in five teaching hospitals in Taiwan?	MANOVA, Scheffe post-hoc test

Table 3 (Continued)

Purpose of study	Research question	Statistical analysis
5. To investigate the relationship among the nurses' job-related stress, health status, and physical activity participation by the nurses	6. Is there a significant relationship between nursing stress and health status of nurses in five teaching hospitals in Taiwan?	Correlation
	7. Is there a significant relationship between nursing stress and physical activities participation of nurses in five teaching hospitals in Taiwan?	Correlation
	8. Is there a significant relationship between physical activities participation and health status of nurses in five teaching hospitals in Taiwan?	Correlation
	9. Is there a significant relationship among nursing stress, physical activity level and health status of nurses in five teaching hospitals in Taiwan?	Correlation
6. To examine the predictability of health status of the nurses by the job related stress and physical activity	10. Can physical health be predicted by mental health?	Standard multiple regression
	11. If the nurses' nursing stress is controlled, is the mental health still able to predict the physical health of nurses in five teaching hospitals?	Hierarchical multiple regression
	12. Can mental health be predicted by physical health?	Standard multiple regression
	13. If the nurses' nursing stress is controlled, is the physical health still able to predict the mental health by nurses?	Hierarchical multiple regression
	14. Do nursing stress and demographic characteristics predict health status?	Logistic regression
7. To examine the predictability of health status of nurses by the demographic characteristics, nursing stress and physical activity participation.	15. Do nurses' demographics and health status predict nursing stress?	Standard multiple regression
	16. Can the job stress be predicted by physical activity participation?	Standard multiple regression

### *Protection of Human Subjects*

The Institutional Review Board (IRB) of the University of the Incarnate Word reviewed this research for protection of human subjects' rights and approved the project. Participation in this study was voluntary. Each participant received a consent letter in Mandarin Chinese that explained the purpose of the study as well as the role and time commitment required of participants in this research study. For privacy protection, the nurse participants were assured of the confidentiality of their individual responses. Complete anonymity was maintained throughout the process of this study. Personal names did not appear on questionnaires. Participants were asked to fill out the demographic data. Any personal information that appeared on the forms was kept strictly confidential. Only the group data were computed and analyzed for research purposes.

### *Pilot Test*

Two pilot studies were conducted on the Chinese versions of the Nursing Stress Scale and Stage of Exercise Scale. Figure 3 illustrates the pilot test procedure. For the first pilot study, two bilingual (Chinese/English) professors who received doctorates in physical education and early childhood education in the United States confirmed the translation of the surveys from English to Chinese. In addition, 10 bilingual doctoral students completed both the Chinese and English versions of the NSS and SOES within an interval of 4 days.



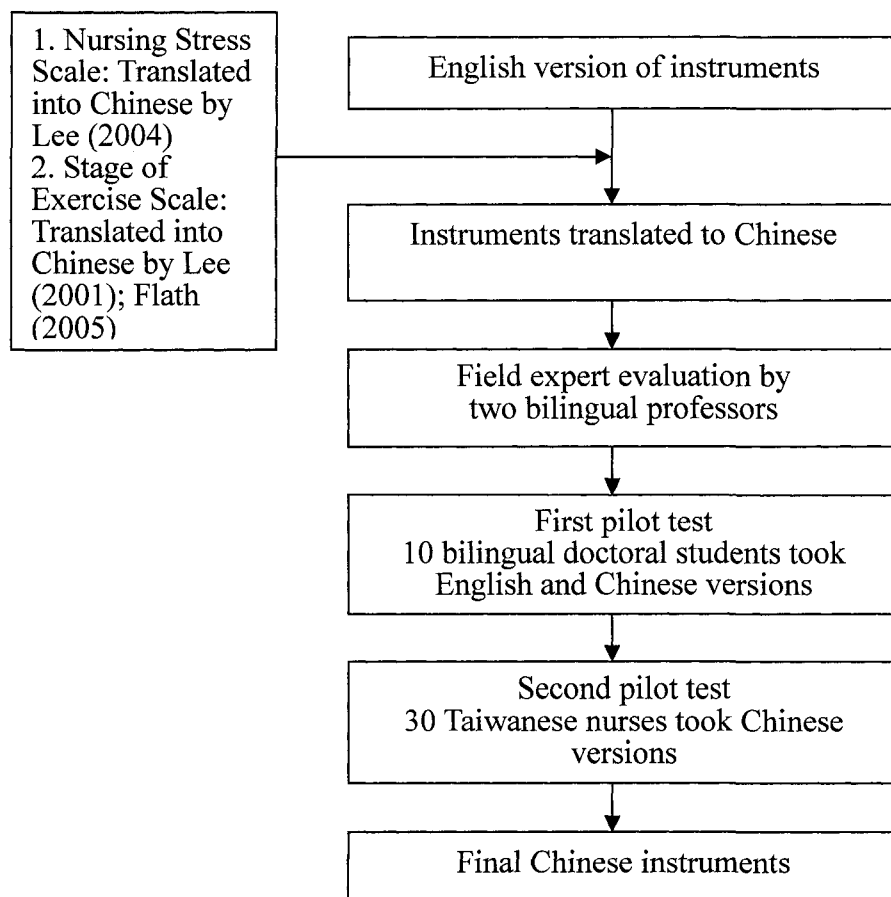


Figure 3. The process of the pilot study.

After the first pilot study, a reliability coefficient for the Chinese version of the Nursing Stress Scale was computed ( $\alpha = .91$ ). The English version of the scale had a reliability coefficient of  $\alpha = .86$ . A Spearman's rho test was completed, and the correlation coefficient shows a strong correlation ( $r = .902$ ).

Table 4

*Translation Test of the Nursing Stress Scale*

Instrument	Nursing Stress Scale
Chinese version ( $N = 10$ )	.91
English version ( $N = 10$ )	.86
Spearman's correlation of Chinese and English versions	.902

For the Stage of Exercise Scale, the Spearman's correlation coefficient of both the Chinese and English versions was  $\alpha = .965$ .

Table 5

*Translation Test of the Stage of Exercise Scale*

Instrument	Stage of Exercise Scale
Spearman's Correlation of Chinese and English versions	.965

A second pilot study was conducted with 30 clinical nurses in Taipei to assess the reliability of the instruments. Each participant took 15 minutes to complete the Chinese version of the Nursing Stress Scale and SF-36v2. The Cronbach's coefficient was used to test the reliability of the measures. All of the coefficients were greater than 0.7. Therefore, the scales can be considered reliable.

Table 6

*Internal Consistency Reliability Coefficient of Pilot Study (N=30)*

Reliability Coefficient	NSS	SF-36v2
Cronbach's alpha( $\alpha$ )	$\alpha = .979$	$\alpha = .917$

An item-total analysis was performed to explore the degree of correlation for each question of the Nursing Stress Scale. Table 7 shows the results of the correlation analysis for each item of the Nursing Stress Scale.

Table 7

*Pilot Study for Item Analysis of the Nursing Stress Scale*

Item	Mean	Corrected item-total correlation NSS $\alpha = .979$	Cronbach's alpha if item deleted
1	2.00	.750	.979
2	1.90	.811	.978
3	2.10	.799	.978
4	2.13	.748	.979
5	1.93	.826	.978
6	2.06	.816	.978
7	2.03	.784	.978
8	1.86	.788	.978
9	1.86	.665	.979
10	2.00	.710	.979
11	1.76	.870	.978
12	1.83	.859	.978
13	1.56	.684	.979
14	2.00	.734	.979
15	2.03	.712	.979
16	1.80	.735	.979
17	1.83	.739	.979
18	1.86	.736	.979
19	1.66	.733	.979
20	1.86	.671	.979
21	2.26	.671	.979
22	2.06	.784	.978
23	2.23	.667	.979
24	1.83	.922	.978
25	2.20	.652	.979
26	1.70	.929	.978
27	2.16	.711	.979
28	2.20	.631	.979
29	1.93	.718	.979
30	1.96	.862	.978
31	1.86	.772	.978
32	1.80	.700	.979
33	2.00	.805	.978
34	2.16	.711	.979

An item-total analysis also was performed to explore the degree of correlation for each question of the SF-36v2.

Table 8

*Pilot Study for Item Analysis of SF-36v2*

Components	Mean	Corrected item-total correlation	Cronbach's alpha if item deleted
SF-36v2 $\alpha = .917$			
Physical component	51.69	.619	.913
Mental component	40.99	.773	.904
Physical functioning	52.59	.644	.913
Role physical	44.88	.814	.900
Bodily pain	51.92	.637	.912
General health	44.71	.673	.910
Vitality	47.06	.700	.908
Social functioning	44.77	.693	.908
Role emotional	40.84	.821	.901
Mental health	41.25	.662	.910

## Chapter 4: Results

The chapter contains the answers to the research questions and findings of the possible relationships among the nursing stress, health status, and physical activity participation of nurses in Taipei Taiwan. The presentation and analysis of data were presented as follows: (a) sampling results, (b) validity and reliability analysis of the Nurse Stress Scale, (c) description of sample demographic data, (d) descriptive statistics of job-related stress experienced, the health status of nurses, and participation in physical activities by nurses, and (e) inferential analysis of the relationships among job-related stress in nursing, health status, and nurses' participation in exercise and physical activities. The latter analyses used correlation, Independent *t*- test, a one-way multivariate analysis of variance (MANOVA), standard multiple regression, hierarchical regression and logistic regression.

### *Description of the Sample*

Surveys for this study were administered to 600 nurses at the five teaching hospitals in Taipei, Taiwan. The total number of nurses at the five hospitals was 1,859; 32% of these nurses, or 600, were recruited to participate in the study. Among the 600, 430 nurses responded. Ten questionnaires were eliminated because of incomplete data. The usable rate of the survey was 70% ( $N = 420$ ).

### *Test of Reliability and Validity*

#### *Nurse Stress Scale (NSS)*

Factor analysis was conducted on the translated Mandarin Chinese version of the Nurse Stress Scale (NSS) to validate whether or not its constituent items loaded on the same factor compared with that of the original 34-item NSS English version. The English

version of the NSS is categorized into seven factors: Death and Dying, Conflict with Physicians, Inadequate Preparation, Lack of Support, Conflict with Other Nurses, Work Load, and Uncertainty Concerning Treatment.

A principle components analysis was performed on 34 items grouped by the factors found in the English version of the scale. The correlation matrix showed that all of the coefficients were greater than .3 as recommended by Pallant (2001). One component was extracted in each factor. The results of the Kaiser-Meyer-Olkin (KMO) analysis were larger than 0.69, however, Barlett's Test of Sphericity was statistically significant at  $p < .001$ , "as occurs with large sample sizes" (Tabachnick & Fidell, 2007, p. 614). Two items of Factor 1 (Death and Dying) were deleted. They were item 12 (factor loading = .37) "The death of a patient with whom you developed a close relationship" and item 13 (factor loading = .19) "Physician not being present when a patient dies." Table 9 presents the reliability of the factors (Cronbach's alpha), the factor loadings, and the cumulative variance.

Table 9

*Principal-Components Analysis: KMO, Loadings, Cumulative Variance and Cronbach's Alpha of Factors of the Nursing Stress Scale (NSS)*

Item	KMO	Factor loading	% Cumulative variance	Cronbach's alpha
Factor 1: Death and Dying	0.795		51.9	0.767
Item 3		0.699		
Item 4		0.778		
Item 6		0.715		
Item 8		0.724		
Item 21		0.684		

Table 9 (continued)

Item	KMO	Factor loading	% Cumulative variance	Cronbach's alpha
Factor 2: Conflict With Physicians	0.752		50.6	0.752
Item 2		0.722		
Item 9		0.808		
Item 10		0.685		
Item 14		0.619		
Item 19		0.711		
Factor 3: Inadequate Preparation	0.701		69.9	0.779
Item 15		0.837		
Item 18		0.817		
Item 23		0.848		
Factor 4: Lack of Support	0.696		71.8	0.800
Item 7		0.804		
Item 11		0.872		
Item 16		0.865		
Factor 5: Conflict With Other Nurses	0.728		48.4	0.729
Item 5		0.643		
Item 20		0.676		
Item 22		0.704		
Item 24		0.738		
Item 29		0.712		
Factor 6: Work Load	0.784		47.6	0.768
Item 1		0.392		
Item 25		0.712		
Item 27		0.766		
Item 28		0.777		
Item 30		0.714		
Item 34		0.706		
Factor 7: Uncertainty Concerning Treatment	0.804		55.2	0.796
Item 17		0.752		
Item 26		0.729		
Item 31		0.758		
Item 32		0.696		
Item 33		0.777		

N = 420

### *Descriptive Statistics*

Tabachnick and Fidell (2001) indicated that descriptive statistics describe samples of subjects in terms of variables or combinations of variables. Descriptive statistics are used to provide estimations of central tendency in the population. Table 10 presents a summary of the sample by age, gender, education, type of license, years of experience, and specialty of current work. Subjects ages 20–30 made up 80% of the sample. Female nurses constituted 100% of the sample ( $N = 420$ ). The majority of the nurses surveyed hold associate's degrees (71.9%). Among the surveyed nurses, 87.6% were registered professional nurses (RPN) and 12.4% were registered nurses (RN). Most nurses reported 1–3 years of experience (41.7%). The majority of the nurses also worked in their current job between 1 and 3 years (56.4%). About half of the nurses reported no overtime work (53.3%). The majority of the nurses participated in the study work in the Internal Medicine (32.6%), Intensive Care Unit (ICU) (15.5%), or Emergency Department (ER) (14.5%).

Table 10

*Sample Characteristics (N = 420)*

Characteristics	Frequency	Percentage
<b>Age</b>		
Under 20 years old	14	3.3
21–25 years old	171	40.7
26–30 years old	165	39.3
31–35 years old	46	11.0
Over 36 years old	24	5.7
<b>Gender</b>		
Female	420	100
Male	0	0
<b>Education</b>		
Diploma	13	3.1
Associate's degree	302	71.9
Bachelor's degree	99	23.6



Table 10 (Continued)

Characteristics	Frequency	Percentage
Master's degree	3	.7
Doctoral degree	3	.7
License		
RN	52	12.4
RPN	368	87.6
Years of experience		
1-3 Years	175	41.7
4-6 Years	102	24.3
7-9 Years	96	22.9
10-12 Years	23	5.4
More than 13 years	24	5.7
Years of experience as a nurse in current nursing unit		
1-3 Years	237	56.4
4-6 Years	113	26.9
7-9 Years	53	12.6
10-12 Years	7	1.7
More than 13 years	10	2.4
Overtime work		
No	224	53.3
Yes	196	46.7
Specialty you currently work		
Internal medical ward	137	32.6
ICU	65	15.5
Emergency room	61	14.5
Surgery ward	45	10.7
Pediatric ward	39	9.3
Operating room	38	9.1
OB/GYN Ward	35	8.3
Marriage status		
Single	284	67.6
Married	130	31.0
Other	6	1.4
Have children		
Yes	120	28.6
No	300	71.4

*N* = 420, Other: Separated, Divorced and Widowed

### *Job-Related Stress Experienced by the Nurses*

The Nurse Stress Scale (NSS) developed by Gray-Toft and Anderson (1981) has been used widely in research studies of job-related stress in nursing. This research study employed the translated Chinese version of NSS to determine the job-related stressors and stress levels perceived by the nurses in five hospitals in northern Taiwan. The survey contains 32 items requiring a written response. A 4-point Likert scale was used to indicate the frequencies of stress nurses perceive: 1 (*never*), 2 (*occasionally*), 3 (*frequently*), and 4 (*very frequently*).

#### *Item Correlation with NSS Subscale and Total Scale Score*

The mean scores of all 32 items of the NSS Chinese version ranged from 1.69 to 2.35. A higher score indicates greater work-related stress experienced by the participants in the study. Items 30, 4, and 28 scored higher than 2.29 and represent the most stressful factors experienced by the participants in order of stress level reported. Specifically, those are item 30 ( $M = 2.35$ ), “not enough time to complete all of my nursing tasks;” item 4 ( $M = 2.33$ ), “feeling helpless in the case of a patient who fails to improve;” and item 28 ( $M = 2.29$ ), “not enough time to provide emotional support to a patient.” The three items with the lowest scores were items 5, 9, and 22. Specifically, those are item 5 ( $M = 1.69$ ), “conflict with a supervisor;” item 9 ( $M = 1.77$ ) “conflict with a physician;” and item 22 ( $M = 1.73$ ), “difficulty in working with a particular nurse outside the unit.” Table 11 lists the mean scores, standard deviations, subtotal scores, and their relationship with total scale scores.

Table 11  
*Items Correlation with Subscale Score and Total Scale Score of the Chinese Version of  
 the Nursing Stress Scale*

	<i>M</i>	<i>SD</i>	Item correlation with	
			subscale score	total scale score
Subscale 1: Death and dying				
3. Performing procedures that patients experience as painful	2.226	0.772	0.717	0.472
4. Feeling helpless in the patient fails to improve	2.331	0.723	0.769	0.612
6. Listening to a patient approaching death	1.798	0.708	0.714	0.565
8. The death of a patient	2.000	0.734	0.728	0.566
21. Watching a patient suffer	2.176	0.627	0.670	0.516
Subscale 2: Conflict with physicians				
2. Criticism by a physician	1.990	0.708	0.709	0.588
9. Conflict with a physician	1.771	0.718	0.785	0.661
10. Fear mistake in treating a patient	2.186	0.759	0.656	0.574
14. Disagreement concerning the treatment of a patient	1.874	0.674	0.675	0.639
19. Making a decision concerning patients when the physician is unavailable	2.007	0.749	0.721	0.641
Subscale 3: Inadequate preparation				
15. Inadequately prepared to help with the emotional needs of patients family	2.081	0.650	0.848	0.591
18. Being asked a question by a patients for which I do not have a satisfactory answer	2.071	0.602	0.819	0.673
23. Inadequately prepared to help with the emotional needs of a patient	2.005	0.565	0.834	0.686
Subscale 4: Lack of support				
7. Lack opportunity to talk problem	1.921	0.821	0.827	0.567
11. Lack an opportunity to share experience and feeling	1.910	0.755	0.862	0.610
16. Lack of an opportunity to express negative feeling toward patients	1.886	0.742	0.852	0.652
Subscale 5: Conflict with supervisor				
5. Conflict with a supervisor	1.690	0.673	0.631	0.514
20. Floating to other units that are short-staffed	1.764	0.846	0.704	0.538

Table 11 (continued)

	<i>M</i>	<i>SD</i>	Item correlation with	
			subscale score	total scale score
22. Difficulty in working with a particular nurse outside the unit	1.733	0.754	0.707	0.552
24. Criticism by a supervisor	1.786	0.664	0.710	0.585
29. Difficulty in working with a particular nurse on the unit	1.857	0.784	0.719	0.573
Subscale 6: Work load				
1. Breakdown of computer	2.276	0.898	0.536	0.511
25. Unpredictable staffing and scheduling	2.276	0.898	0.492	0.407
27. Too many non-nursing tasks required, such as clerical work	2.240	0.864	0.692	0.556
28. Not enough time to provide emotional support to a patient	2.298	0.911	0.747	0.571
30. Not enough time to complete all of my nursing tasks	2.357	0.866	0.751	0.623
34. Not enough staff to adequately cover the unit	2.188	0.797	0.685	0.564
Subscale 7: Uncertainty concerning treatment				
17. Inadequate information from physician about the medical condition of a patient	2.019	0.711	0.748	0.700
26. Physician ordering what appears to be inappropriate treatment for a patient	1.938	0.732	0.736	0.660
31. A physician not being present in a medical emergency	1.969	0.798	0.771	0.640
32. Not knowing what a patient and patient's family ought to be told about the patient's treatment	1.910	0.706	0.766	0.630
33. Uncertainty about the operation or functioning of equipment	2.012	0.661	0.689	0.546

*N* = 420

#### *Comparison of the Mean Scores on the Nursing Stress Scale*

Stress scores ranged from 1 to 4 with the higher score indicating more stress.

Table 12 shows that the highest nursing stressor was "work load,"  $M = 2.3$ , with a standard deviation of 0.60. The lowest stressor was "conflict with other nurses,"  $M = 1.76$ ,

with a standard deviation of 0.51.

Table 12

*Comparison of the Mean Scores on the Nursing Stress Scale*

	<i>M</i>	<i>SD</i>
1. Death and dying	1.9639	.51207
2. Conflict with physicians	1.9657	.51179
3. Inadequate preparation	2.0524	.50551
4. Lack of support	1.9056	.65367
5. Conflict with other nurses	1.7662	.51747
6. Work load	2.3000	.60193
7. Uncertainty concerning treatment	1.9695	.53625

*Stress Experienced by Marriage Status*

The total mean scores of stress experienced by marriage status are listed in Table 13. Single nurses reported experiencing higher stress ( $M = 64.94$ ,  $SD = 14.19$ ) than nurses who were married and other marriage status. A one-way analysis of variance (ANOVA) did not show a significant difference between marriage status and NSS scores.

Table 13

*Total Mean Scores and Standard Deviations of the Chinese Version of the Nursing Stress Scale by Marriage Status*

	<i>n</i>	<i>M</i>	<i>SD</i>
Single	284	64.94	14.19
Married	130	64.24	13.81
Other marriage status	6	64	5.32

*Note.* Other includes separated, divorced and widowed.

$N = 420$

*Stress Experienced by Have Children*

Table 14 lists the total mean scores of stress experienced by nurses who have children. The nurses who have no children reported experiencing higher stress ( $M = 65.24$ ,  $SD = 14.22$ ) than the nurses who have children. An independent samples *t*-

test revealed no significant difference in child status and NSS scores.

Table 14

*Total Mean Scores and Standard Deviations of the Chinese Version of the Nursing Stress Scale by Children*

	<i>n</i>	<i>M</i>	<i>SD</i>
Have Children	120	63.39	13.31
Non Children	300	65.24	14.22

*N* = 420

*Analysis of the SF-36 Health Survey*

The SF-36 Health Survey developed by Ware (2000) divides an individual's health into a physical component and a mental component with eight subscales: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. In norm-based scoring, each scale is scored to have the same average (50) and the same standard deviation (10).

Table 15

*The Eight Health Profiles and Definition of Subscales*

Subscale	Definition of Scale
Physical functioning	Health problems limit in physical activity
Social functioning	Physical or emotional problems limit in social activities
Role physical	Physical health problems limit in usual role activities
Bodily pain	Presence of pain and limitations due to pain
General health	Self evaluation of personal health
Mental health	Psychological distress and well-being
Role emotional	Emotional problems limit in usual role activities
Vitality	Energy and fatigue

*Note.* From "How to score version 2 of the SF-36 Health Survey" by John E. Ware, Mark Kosinski, and James E. Dewey, 2000, p. 29. Copyright 2000 by the Medical Outcomes Trust and Quality Metric Incorporated. Adapted with permission of the author.

Higher scores on the SF-36 indicate better health. It can be interpreted that when a scale score is below 50, the person's health status is below average, and each point is 1/10 of a standard deviation from the mean. The SF36-Health Scales results for participants in

this study indicate that the three highest mean scores were physical component (50.6), physical functioning (50.3), and bodily pain (50.3), while the lowest two mean scores were mental component (39.1) and role emotional (39.4). The nurses' health status was generally reported to be at average or below average levels with mental emotional health at the lowest levels. Table 16 lists the 10 subscale scores.

Table 16

*Means and Standard Deviations of SF-36 Health Scales (10 subscales)*

	<i>M</i>	<i>SD</i>
Physical component summary	50.6	6.6
Mental component summary	39.1	10.0
Physical functioning	50.3	7.7
Role physical	43.9	9.1
Bodily pain	50.3	8.9
General health	43.9	9.2
Vitality	46.4	8.1
Social functioning	43.6	8.9
Role emotional	39.4	11.1
Mental health	40.3	9.4

*Stage of Exercise Scale*

This study employed the translated Chinese version of the Stage of Exercise Scale (SOES) originally developed by Cardinal (1995). The survey was used to investigate the nurses' participation in exercise over a 6-month period. The questionnaire contains five items: (a) regular participation in exercise over 6 months, (b) regular participation in exercise less 6 months, (c) participation in exercise but not regular, (d) no exercise, and (e) no plan to exercise during next 6 months.

Among the participants ( $N = 420$ ), 41.4 % reported some level of exercise during the past 6 months while 58.6% did not plan to exercise at all in the following 6 months. A chi-square test showed there were no significant differences among stages of exercise in

age, education, work unit, overtime work, marriage status, and children.

Table 17

*Nurses' Participation in Exercise and Physical Activities*

Items	N	Percent	Cumulative Percentage
Regular participation in exercise over 6 months	26	6.2	6.2
Regular participation in exercise less 6 months	42	10	16.2
Participation in exercise but not regular	106	25.2	41.4
No exercise	109	26	67.4
No plan to exercise during next 6 months	137	32.6	100.0

*N* = 420

*7-Day Physical Activity Recall Questionnaire*

This study employed a Chinese version of the original 7-Day Physical Activity Recall (PAR) Questionnaire developed by Blair (1985). Exercise participation was analyzed by type, frequency, duration, intensity, and total level of physical activity.

The survey consisted of 22 types of physical activities. The participants were required to circle the activities they engaged in during 1-week period. The frequency of the physical activities was measured with a Likert-like scale from 1 to 6 times per week. The duration of the physical activities participation was measured in 10-minute intervals with a maximum duration of 60 minutes. The intensity of the physical activities was measured according to mild, moderate, and high intensity.

*Exercise Participation by Activity Type*

Table 18 presents in descending order the exercise and physical activities the nurse participants in this study pursued during the 7-day period. The exercise and physical activities reported by the most nurses were doing chores 206 (33.3%), walking 179 (28.9%), and jogging 38 (6.1%). Seven activities listed in the survey were not chosen by any participants, and so, were not included in the table.



Table 18

*Number of Participants Reporting Physical Activities*

Ranking	Exercise	<i>N</i>	Percentage
1	Chores	206	33.3
2	Walking	179	28.9
3	Jogging	38	6.1
4	Bicycling	37	5.9
5	Hiking	35	5.6
6	Dancing	23	3.8
7	Swimming	18	3.0
8	Basketball	17	2.8
9	Badminton	16	2.5
10	Other	13	2.1
11	Table tennis	12	1.9
12	Bowling	11	1.7
13	Baseball	5	0.8
14	Yoga	5	0.8
15	Tennis	3	0.4

Other means push-ups, weight training, and sit-ups

*N* = 420

*Physical Activity Participation by Frequency*

More nurses did chores, but reported walking more often than doing chores. The most frequent activity engaged in by the nurses was walking more than 6 times a week ( $n = 46$ , or 25.6%). The activity engaged in second most frequently was doing chores twice a week ( $n = 52$ , or 25.2%) Results are shown in Table 19.

Table 19  
*Frequency of 7-Day Physical Activities*

Activity	Frequency					
	Once/Week	Twice/Week	3 Times/Week	4 Times/Week	5 Times/Week	More than 6 Times/Week
	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>
Chores	31	52	50	26	19	28
Percent within Chores	(15)	(25.2)	(24.2)	(12.6)	(9.2)	(13.5)
Walking	30	32	42	7	22	46
Percent within Walking	(16.7)	(17.8)	(23.4)	(3.9)	(12.2)	(25.6)
Jogging	16	11	4	6	—	1
Percent within Jogging	(42.1)	(28.9)	(10.5)	(15.7)		(2.6)
Bicycling	9	7	10	2	3	6
Percent within Bicycling	(24.3)	(18.9)	(27)	(5.4)	(8.1)	(16.2)
Hiking	25	5	2	1	2	—
Percent within Hiking	(71.4)	(14.2)	(5.7)	(2.8)	(5.7)	
Dancing	6	9	8	—	—	—
Percent within Dancing	(26)	(54)	(48)			
Swimming	8	8	2	—	—	—
Percent within Swimming	(44.4)	(44.4)	(11.1)			
Basketball	7	7	3	—	—	—
Percent within Basketball	(41.1)	(41.1)	(17.6)			
Badminton	9	3	4	—	—	—
Percent within Badminton	(56.2)	(18.7)	(25)			
Other	3	2	4	—	1	3
Percent within Other	(23)	(15.3)	(30.7)		(7.6)	(23)
Table tennis	6	3	3	—	—	—
Percent within Table tennis	(50)	(25)	(25)			
Bowling	5	4	2	—	—	—
Percent within Bowling	(45.4)	(36.3)	(18.1)			
Baseball	4	1	—	—	—	—
Percent within Baseball	(80)	(20)				
Yoga	3	1	1	—	—	—
Percent within Yoga	(60)	(20)	(20)			
Tennis	3	—	—	—	—	—
Percent within Tennis	(100)					
Total	165	145	145	35	25	84
Percent within Total	(27.5)	(24.2)	(24.2)	(5.8)	(4.1)	(14)

Other means push-ups, weight training, and sit-ups

*N* = 420.

### *Duration of Exercise Participation*

The 7-Day Physical Activity Recall (PAR) Questionnaire was employed to investigate the duration in minutes that participants spent on each activity, the average duration participants spent each time, and the perceived exercise intensity. Among all activities, yoga sessions lasted longer (43 minutes) than other activities. However, only six nurses participated in yoga. Walking was the most frequently pursued activity. Twenty-three nurses (12.8%) walked for less than 10 minutes, 51 (28.5%) spent 10–19 minutes; 53 (29.6%) spent 20–29 minutes; 17 (9.5%) spent 30–39 minutes; 13 (7.3%) spent 40–49 minutes, and 22 (12.3%) spent 50–59 minutes on walking. Most (52.7%) nurses reported spending 20–40 minutes at their chosen physical activity. The duration of physical activity by minutes is shown in Table 20.

Table 20

#### *Duration of 7-Day Physical Activities by Minutes*

		<10m	10–19m	20–29m	30–39m	40–49m	>50–59m
	Average minutes	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>
Chores	26	20	49	79	32	15	19
Percent within Chores		(9.3%)	(22.9%)	(37%)	(15%)	(7%)	(8.9%)
Walking	26	23	51	53	17	13	22
Percent within Walking	—	(12.8%)	(28.5%)	(29.6%)	(9.5%)	(7.3%)	(12.3%)
Jogging	25	6	8	13	9	2	3
Percent within Jogging		(14.6%)	(19.5%)	(31.7%)	(22%)	(4.9%)	(7.3%)
Bicycling	29	3	5	14	4	1	6
Percent with in Bicycling	—	(9.1%)	(15.1%)	(42.4%)	(12.1%)	(3%)	(18.1%)
Hiking	39	1	1	9	10	6	12
Percent within Hiking		(2.5%)	(2.5%)	(23%)	(25.6%)	(15.3%)	(30.7%)
Dancing	32	—	4	7	7	5	1
Percent within Dancing	—	—	(16.6%)	(29.1%)	(29.1%)	(20.8%)	(4.1%)
Swimming	35	1	2	7	4	1	6
Percent within Swimming	—	(4.8%)	(9.5%)	(33.3%)	(19%)	(4.8%)	(28.5%)

Table 20 (Continued)

		<10m	10-19m	20-29m	30-39m	40-49m	>50-59m
	Average minutes	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>
Basketball	25	1	4	6	4	1	—
Percent within Basketball		(6.2%)	(25%)	(37.5%)	(25%)	(6.2%)	—
Badminton	29	1	—	11	4	3	—
Percent within Badminton	—	(5.2%)	—	(57.8%)	(21%)	(15.7%)	—
Other	27	3	3	2	1	2	2
Percent within Other		(23.1%)	(23.1%)	(15.3%)	(7.7%)	(15.4%)	(15.4%)
Table tennis	28	—	4	5	4	2	0
Percent within Table tennis	—	—	(26.7%)	(33.3%)	(26.6%)	(13.3%)	—
Bowling	36	—	1	6	—	4	3
Percent within Bowling	—	—	(7.1%)	(42.8%)		(28.5%)	(21.4%)
Baseball	25	—	2	3	2	—	—
Percent within Baseball	—	—	(28.5%)	(42.8%)	(28.5%)		
Yoga	43	—	1	1	—	—	4
Percent within Yoga	—	—	(16.6%)	(16.6%)	—	—	(66.6%)
Total	—	59	135	252	98	41	78
Percent within Total	—	(8.9%)	(20.3%)	(38%)	(14.7%)	(6.2%)	(11.8%)

Note. Other means push-ups, weight training, and sit-ups

*N* = 420

### *Intensity of Exercise Participation*

This study examined the participants' intensity of exercise and physical activity. The reported intensity is arranged from the most strenuous activity to the least strenuous ones in Table 21. For intensity of physical activity, 3 equals easy intensity, 5 equals moderate intensity, and 9 equals hard intensity (Chiang, 1998; Godin & Shephard, 1985). More than one half (56.7%) of the reported frequencies were classified as easy intensity. Moderate and hard intensity levels of activities were reported as 38.3% and 5%, respectively.

Table 21  
*Intensity of 7-Day Physical Activities*

	Easy		Moderate		High	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Chores	127	64	72	36	1	1
Walking	115	73	40	25	2	1
Jogging	13	35	20	54	4	11
Bicycling	9	33	17	64	1	4
Hiking	12	32	20	53	6	16
Dancing	5	24	15	71	1	5
Swimming	2	11	16	82	1	5
Basketball	5	31	9	56	2	13
Badminton	5	29	8	47	4	24
Other	5	56	2	22	2	22
Table tennis	4	36	7	64	—	—
Bowling	6	60	1	10	3	30
Baseball	—	—	2	50	2	50
Yoga	—	—	4	100	—	—
Tennis	—	—	3	100	—	—
Total	308	56.7	208	38.3	27	5

*Note.* Other means push-ups, weight training, and sit-ups

*N* = 420

#### *Physical Activity Participation by Activity Level*

Measurement of physical activity energy expenditure (ActMET) is extensively used in researches (Cardinal, 1995). Cardinal indicated that the Blair's 7-Day Physical Activity Recall (PAR) Questionnaire provides reliable and valid estimation of energy expenditure. Physical activity metabolic equivalents (METS) are "calculated by multiplying the time spent at each given intensity level by its MET value" (American College of Sports Medicine, 2000; Cardinal, p. 89). Sleep is assigned a value of 1 MET unit when an individual is at rest. The energy expenditure of easy intensity activity was defined as 3 METs, moderate intensity activity was 5 METs, and hard intensity activity was 9 METs (Chiang, 1998; Godin & Shephard, 1985). Physical activity level was

assessed as the sum of MET  $\times$  minutes, obtained from the reported frequency, duration, and intensity of each type of physical activity that the nurses performed during 1 week (Chiang). Figure 4 shows the distribution of the total energy expenditure for participants' leisure activity. The mean score of the participants' activity level as measured by the 7-Day PAR instrument was 634.7.

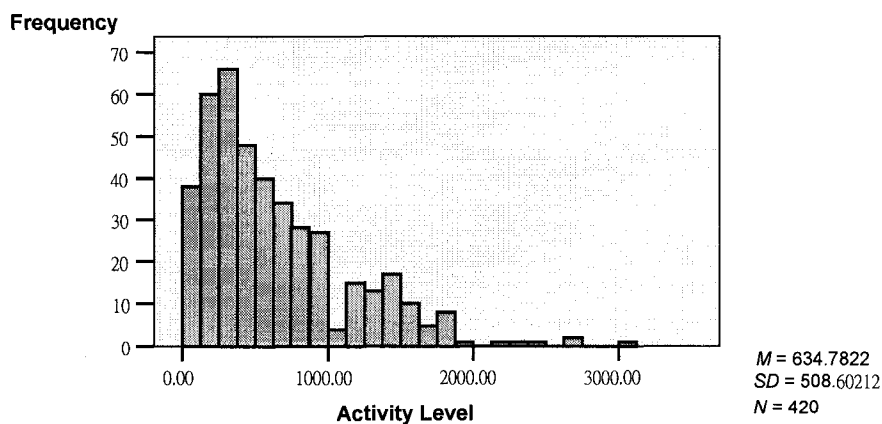


Figure 4. Distribution of total MET  $\times$  minutes for physical activity level.

Activity level had a minimum score of 30 and a maximum score of 3,055. The standard deviation of the activity level was 508.6, as shown in Table 22.

Table 22

*Physical Activity Level*

	Minimum	Maximum	<i>M</i>	<i>SD</i>
Activity level	30	3,055	634.7	508.6

*Physical Activity Level by Children*

Table 23 lists the total mean scores for physical activity by the nurses who have children were listed. The nurses with children had higher physical activity levels ( $M = 659.3$ ,  $SD = 562$ ) than the nurses without children. An independent samples *t*-test

showed that there was no significant difference in the relationship of have children and physical activity.

Table 23

*Total Mean Scores and Standard Deviations for Physical Activity Level by Children*

	<i>n</i>	<i>M</i>	<i>SD</i>
With children	120	659.3	562
Without children	300	624.9	486.2

### *Inferential Analysis*

Inferential statistical techniques test hypotheses about differences in populations on the basis of measurements made on samples of subjects (Tabachnick & Fidell, 2001).

In this study, the researcher applied inferential statistics to describe the data and find reliable differences and relationships, as well as to estimate population values for the reliable findings.

Correlations were computed to test the relationships among the Nursing Stress Scale, version 2 of the SF-36 Health Survey, and 7-Day Physical Activity Recall Questionnaire. The differences among demographic characteristics in relation to the nursing stress, health status, and physical activity were investigated by one-way multivariate analysis of variance (MANOVA). When assumptions are met in a MANOVA and a significant result is found, post-hoc tests are conducted to provide answers to questions (Carver, 2005). The Scheffe's post-hoc test was used to explain the difference between the variables. Beauford (2007) suggested that the Scheffe's test is one of the most flexible, and conservative analyses. The Scheffe's test is "no limit to the number and complexity of comparisons that can be performed" (Tabachnick & Fidell, 2001, p. 51). Carver said that "the linear regression analysis was used to perform an estimated

regression line to estimate or predict dependent variable values” (p. 177).

#### *Assessing Normality and Univariate Outliers*

All variables on the three survey instruments were tested for normality, outliers, and linearity. The distribution of scores of the NSS, 7-Day PAR Questionnaire, and the SF-36v2 did not violate the assumption of normality.

#### *Multivariate Outliers*

According to Tabachnick and Fidell (2001), Mahalanobis distance analysis will pick up any cases that have a strange pattern of scores. In this study, the largest Mahalanobis distance for all cases was 15.345, which was less than the critical value 16.27. No outliers were found. The scatterplot of the standardized residuals and normal probability plot showed that assumptions about residuals were met. All results indicated that assumptions were not violated (see Appendix R).

#### *Addressing the Research Questions*

The researcher used the following four steps and 16 research questions were used to analyze the relationship among the nursing stress, health status, and physical activity participation of nurses in Taipei Taiwan. Figure 5 shows the procedure for statistics and analyses.



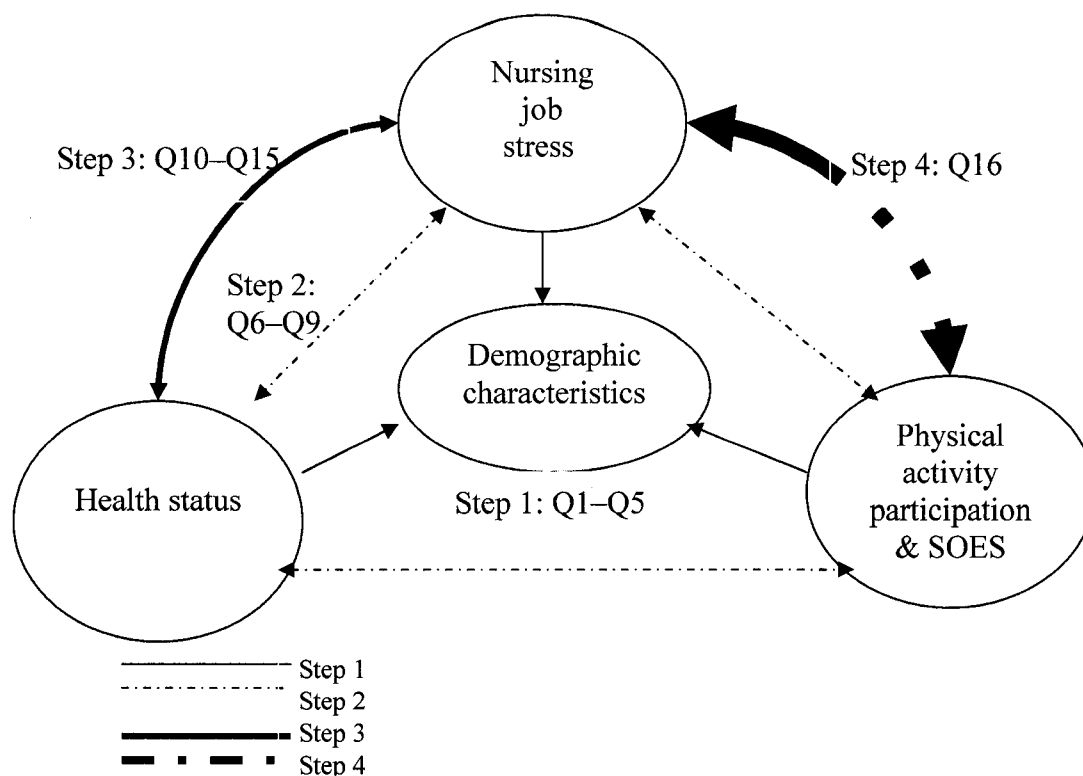


Figure 5. The procedure for statistics and analyses.

#### Step 1: Questions of Difference

MANOVA was used to answer questions of difference in nursing stress, health status, and participation in physical activity among demographic groupings.

Question 1: Is there a significant difference among age groups in nursing stress, physical activity participation and health status of nurses in five hospitals in Taipei Taiwan?

The total mean scores of physical activity by age groups are listed in Table 24. Participants who were age 31–35 had higher activity levels ( $M = 653.5$ ,  $SD = 633.5$ ) than other age groups.

Table 24

*Total Mean Scores and Standard Deviations of Physical Activity by Age Groups*

Age Group	M	SD
Under 20 years old	558.0	447.2
21–25 years old	642.4	484.5
26–30 years old	640.4	521.8
31–35 years old	653.5	633.5
Over 35 years old	550.4	371.6

A one-way MANOVA was conducted, comparing the means of a combination of the four dependent variables: the total nursing stress score, the level of the 7-day physical activity score, and the physical and mental component summaries among age groups. The independent variable was the nurses' age groups. All variables were tested for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity, as shows in Appendix R.

The chi-square test indicated that the four dependent variables had a critical value of 18.47. One multivariate outlier was deleted. After deleting the outlier, the distribution of scores for the NSS ( $N = 419$ ) were reasonably normal. The  $p$ -value of homogeneity of variance-covariance matrices was 0.03 ( $p < .05$ ), and Box's Test was significant. With the Levene's test of Equality of Error variances, the  $p$ -value of the physical component summary was 0.26 ( $p > .05$ ), the  $p$ -value of the mental component summary was 0.48 ( $p > .05$ ), the  $p$ -value of the NSS was 0.84 ( $p > .05$ ) and the  $p$ -value of the activity level was 0.12 ( $p > .05$ ). These results affirmed the null hypothesis that the error variance of the dependent variables was equal across groups.

The  $p$ -value of the MANOVA was .001,  $p < .05$ , indicating the difference among the nurses' age groups in a combination with the total of the nursing stress score, activity level, and the physical and mental component summaries. This was a statistically

significant difference at  $p < .05$  in a combination of the total of the nursing stress score and the physical and mental component summaries [ $F(16,1256.263) = 4.887, p = .000$ ; Wilks' Lambda = .832]. The effect size, calculated using  $\eta^2$ , was 0.045. According to Cohen (1988), this would be considered a small effect size.

To investigate the difference in nurses' age on each dependent variable, the Bonferroni adjustment was used to generate a new alpha level, which uses the normal alpha level divided by pairwise comparisons (Pallant, 2001). In this study, the new alpha level was .0125 (.05 divided by 4). Table 25 shows that the variable with the greatest influence was the total of NSS score ( $F(4,414) = 14.34, p = .001$ , partial  $\eta^2 = 0.122$ ) with a significant difference among nurses' age groups.

The Scheffe post-hoc test showed that nurses age 20 or younger experienced higher nursing stress than nurses 21 or older. Additionally, nurses age 20 and younger had a higher mental health score than nurses 21 or older. No significant difference was found among age groups in physical activities and physical health.

Table 25

*Multivariate and Univariate Analyses of Variance for Age Groups*

Source	Multivariate	Univariate			
	$F(16,1256.263)$	Nursing Stress $F(4,414)$	MCS $F(4,414)$	PCS $F(4,414)$	Activity level $F(4,414)$
Age group	4.887***	14.34***	9.265***	2.89	0.696
$\eta^2$	0.045	.122	.082	.027	.007
Post- hoc		1 > 2, 3, 4, 5	1 > 2, 3, 4, 5		

*Note.* Multivariate  $F$  ratio was generated for Wilks' Lambda statistic, Mental Component Summary (MCS), Physical Component Summary (PCS),  $\eta^2$  = partial eta squared, 1 = 20 years old and younger, 2 = 21–25 years old, 3 = 26–30 years old, 4 = 31–35 years old, 5 = over 36 years old, \*\*\* $p < .001$

Question 2: Is there a significant difference among age groups in the factors of the Nursing Stress Scale of nurses in five hospitals in Taipei Taiwan?

The MANOVA was conducted to compare the difference of the means of the age groups by the factors of nursing stress. Seven dependent variables were used: death and dying, conflict with physicians, inadequate preparation, lack of support, conflict with other nurses, work load, and uncertainty concerning treatment. The independent variable was the nurses' age group. All variables were tested for normality, outliers, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity. It was assumed that the distribution of scores were satisfied from a normal population, as shown in Appendix R.

According to Pallant (2001), the chi-square test indicated the seven dependent variables had a critical value of 24.32. Six multivariate outliers were deleted. After deleting the outliers, the distribution of factors for the NSS ( $N = 414$ ) were reasonably normal. The  $p$ -value of homogeneity of variance-covariance matrices was 0.01 ( $p < .05$ ), and the Box's Test was significant. With the Levene's test of equality of error variances, the  $p$ -value of death and dying was 0.86 ( $p > .05$ ), the  $p$ -value of conflict with physicians was 0.49 ( $p > .05$ ), the  $p$ -value of inadequate preparation was 0.17 ( $p > .05$ ), the  $p$ -value of lack of support was 0.28 ( $p > .05$ ), the  $p$ -value of conflict with other nurses was 0.79 ( $p > .05$ ), the  $p$ -value of work load was 0.81 ( $p > .05$ ), and the  $p$ -value of lack of uncertainty concerning treatment was 0.14 ( $p > .05$ ). The null hypothesis that the error variance of the dependent variable was equal across groups was accepted for all dependent variables.

The  $p$ -value of the MANOVA test was .000,  $p < .05$ , indicating the difference

between the nurses' age and the factors of Nursing Stress Scale. It was a statistically significant difference at the  $p < .05$  for the following factors (Death and Dying, Conflict With Physicians, Inadequate Preparation, Lack of Support, Conflict With Other Nurses, Work Load, and Uncertainty Concerning Treatment) ( $F(28, 1454.45) = 3.09, p = .000$ ; Wilks' Lambda = .811). The effect size, calculated using  $\eta^2$ , was 0.051. According to Cohen (1988), this would be considered a small effect size.

To investigate the difference in nurses' age on each dependent variable, the Bonferroni adjustment was used to generate a new alpha level (the normal alpha level divided by pairwise comparisons). The new alpha level was .007 (.05 divided by 7). Table 26 shows that the greater influence variable is the uncertainty concerning treatment ( $F(4, 409) = 12.69, p = .000, \text{partial } \eta^2 = 0.11$ ), contributing a significant difference to nurses' age.

The Scheffe post-hoc test indicated that nurses age 20 and younger experienced higher scores for death and dying, conflict with physicians, inadequate preparation, lack of support, conflict with other nurses, work load, and uncertainty concerning treatment than nurses 21 and older.

Table 26

*Multivariate and Univariate of Analyses Variance for Age Groups*

Source	Multivariate	Univariate						
	<i>F</i> (28,1454.45)	DD <i>F</i> (4,414)	CP <i>F</i> (4,414)	IP <i>F</i> (4,414)	LS <i>F</i> (4,414)	CN <i>F</i> (4,414)	WL <i>F</i> (4,414)	UT <i>F</i> (4,414)
Age group	3.09 ***	7.9 ***	11.3 ***	11.0 ***	6.5 ***	12.3 ***	5.4 ***	12.6 ***
$\eta^2$	.051	.072	.10	.097	.060	.107	.05	.11
Post-hoc		1>2,3,4,5	1>2,3,4,5	1>2,3,4,5	1>2,3,4,5	1>2,3,4,5	1>2,3,4,5	1>2,3,4,5

*Note.* Multivariate *F* ratio was generated for Wilks' Lambda statistic. DD = Death and Dying, CP = Conflict with Physicians, IP = Inadequate Preparation, LS = Lack of Support, CN = Conflict with Other Nurses, WL = Work Load, and UT = Uncertainty Concerning Treatment.

$\eta^2$  = partial eta squared, 1 = less than 20 years old, 2 = 21–25 years old, 3 = 26–30 years old, 4 = 31–35 years old, 5 = over 36 years old

\*\*\**p* < .001.

Question 3: Is there a significant difference among nurse's work departments in nurses' nursing stress and physical activity participation of nurses in Taiwan?

The mean scores and the standard deviations of job-related stress reported by the participants are arranged in descending order in Table 27. The highest mean score of stress experienced was 86.85; this was reported by 61 nurses working in the emergency department. The lowest mean score of stress was 61.73; this was reported by 45 nurses working in the surgery ward (post-operation).

Table 27

*Mean Scores of Nursing Stress, Standard Deviations and Number of Nurses in Work Department*

	<i>M</i>	<i>N</i>	<i>SD</i>
Emergency department	86.85	61	11.95
Intensive critical unit (ICU)	82.33	65	14.33
Operation room (OR)	80.68	38	7.53
Internal medicine ward	71.60	137	12.78
OB/GYN ward	64.82	35	12.42
Pediatric ward	64.76	39	11.40
Surgery post-operation ward	61.73	45	11.75

A one-way MANOVA was conducted to compare the means of a combination of the total nursing stress score and the nurses' physical activity level by work unit. Two dependent variables were used: the total nursing stress score and the 7-day physical activity level. The grouping variable was the nurse's work departments. As shown in Appendix R, the distributions of scores were assumed to be from a normal population (Pallant, 2001).

In this research question, the Mahalanobis distance was smaller than 13.82, and the two dependent variables met the critical value of the chi-square table (Pallant, 2001). No multivariate outliers were deleted, and the sample ( $N = 420$ ) was reasonably normal. All tests were conducted using a 95% confidence level to test an interval that estimates a population parameter. The Levene's test showed that the variance of the dependent variables were not equal across groups ( $p = .025 < .05$ ). Tabachnick and Fidell (2001) recommended that "violations of homogeneity usually can be corrected to use untransformed variables with a more stringent  $\alpha$  level (for nominal  $\alpha = .05$ , use .025 with moderate violation and .01 with severe violation" (p. 80). Therefore, the new  $\alpha$  level of .01 was used ( $p = .001 < .01$ ), indicating that the difference among the nurses' work departments in a combination of the total nursing stress score and the 7-day activity level. There was a statistically significant difference at the  $p < .005$ . ( $F(12,824) = 2.868$ ,  $p = .001$ ; Wilks' Lambda = .921). The effect size, calculated using  $\eta^2$ , was 0.04. According to Cohen (1988), this would be considered a small effect size.

To investigate the difference in nurses' work departments on each dependent variable, the Bonferroni adjustment was used to generate a new alpha level. In this study, the new alpha level was .025 (.05 divided by 2). Table 28 shows that the total of the NSS

score ( $F(6,413) = 3.37, p = .003 (p < .025)$  partial  $\eta^2 = 0.047$ ) contributed a significant difference.

The Scheffe post-hoc test showed that the nurses who work in emergency departments experienced higher stress than the nurses who worked in other departments. Additionally, there was no significant difference between the nurses' work department and the 7-Day physical activity score, as shown in Table 28.

Table 28

*Multivariate and Univariate Analyses of Variance for Nurses' Work Department*

Source	Multivariate $F(16,1256.263)$	Univariate	
		NSSTTL $F(6,413)$	7-Day Physical Activity $F(6,413)$
Work department	2.868***	3.37**	2.34
$\eta^2$	0.04	0.047	.033
Post- hoc	ER > Other Units		

*Note.* Multivariate  $F$  ratio was generated for Wilks' Lambda statistic.

NSSTTL= Total Score of Nursing Stress, ER= Emergency Room,  $\eta^2$ = Partial Eta Squared

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

Question 4: Is there a significant difference between registered professional nurses (RPNs) and registered nurses (RNs) in the seven factors of the Nursing Stress Scale (NSS) in Taipei, Taiwan?

The total scores range of nursing stress scale is from 32 to 248. The mean total score of stress experienced by the Nursing Stress Scale in this study was 64.71 among the 420 participants, with a standard deviation of 13.97. Table 29 presents the mean total scores and the mean scores for registered nurses (RN) and registered professional nurses (RPN).



Table 29

*Mean Total Scores and Standard Deviations of the Chinese Version of the Nursing Stress Scale by Level of License*

	<i>n</i>	<i>M</i>	<i>SD</i>
Nursing stress	420	64.71	13.97
Registered professional nurses	368	65.01	14.08
Registered nurses	52	62.59	13.16

*N* = 420

Independent samples *t*-tests were conducted to calculate the differences in license levels by the seven factors of the NSS. Table 30 shows that registered professional nurses (RPNs) had higher nursing stress scores than registered nurses (RNs) in all seven factors (Death and Dying, Conflict with Physicians, Inadequate Preparation, Lack of Support, Conflict with Other Nurses, Work Load, and Uncertainty Concerning Treatment).

There was a significant difference in Conflict with Physicians between RPNs ( $M = 9.99$ ,  $SD = 2.63$ ) and RNs ( $M = 9.33$ ,  $SD = 2.24$ ); [ $t = (418) = -2.257$ ,  $p < .05$ ]. There was a significant difference in Work Load between RPNs ( $M = 14.08$ ,  $SD = 3.66$ ) and RNs ( $M = 12.92$ ,  $SD = 3.31$ ); [ $t = (418) = -2.847$ ,  $p < .05$ ]. Registered professional nurses had higher levels of Conflict with Physicians and Work Load than registered nurses. Cohen (1988) said the guidelines for interpreting value are .01 equals a small effect, .06 means a moderate effect, and .14 equals a large effect. In this study, an inspection of the mean scores indicated that RPNs reported slightly higher scores for Conflict with Physicians than RNs ( $\eta^2 = .012$ ), and RPNs reported slightly higher scores for Work Load than RNs ( $\eta^2 = .02$ ) (see Table 30).

Table 30

*Difference between Registered Professional Nurses (RPNs) and Registered Nurses (RNs) in the Factors of Nursing Stress Scale*

Variable	RPNs (n = 368)		RNs (n = 52)		df	t	$\eta^2$
	M	SD	M	SD			
Death and Dying	10.54	2.56	10.49	2.58	418	-.184	
Conflict With Physicians	9.99	2.63	9.33	2.24	418	-2.257*	.012
Inadequate Preparation	6.21	1.59	6.0	1.33	418	-1.20	
Lack of Support	5.17	1.97	5.76	1.93	418	.284	
Conflict With Other Nurses	8.82	2.71	8.4	2.08	418	-1.93	
Work Load	14.08	3.61	12.92	3.31	418	-2.84**	.02
Uncertainty Concerning Treatment	9.95	2.79	9.52	2.25	418	-1.42	

Note. N= 420;  $\eta^2$  = eta squared; \* $p < .05$ , \*\* $p < .01$

Question 5: Is there a significant difference among stages of exercise (SOES) in a combination of nursing stress and health status of nurses in five hospitals in Taiwan?

A one-way MANOVA was conducted. The MANOVA was used to compare the means in the total score of nursing stress and the physical and mental component summaries among the stages of participation in exercise over 6 months. Three dependent variables were used: the total score of nursing stress and the physical and mental component summaries. The independent variable was the four levels of the SOES: periodic exercise, do exercise, no exercise, and no exercise for the next 6 months. The dependent variables were tested for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity (see Appendix R).

According to Pallant (2001), the critical value of the chi-square for Mahalanobis

distance is 16.27 for these three dependent variables. In this study, one multivariable outlier was found and deleted ( $n = 419$ ). The Levene's test showed that the variance of the dependent variables were not equal across groups ( $p = .01, p < .05$ ). Tabachnick and Fidell (2001) recommended that "violations of homogeneity usually can be corrected for using untransformed variables with a more stringent  $\alpha$  level (for nominal  $\alpha = .05$ , use .025 with moderate violation and .01 with severe violation" (p. 80). Therefore, the new  $\alpha$  level = .01 was used in analysis of this research question, indicating the significant difference between the period of 6 months of exercise participation (SOES) and the total score of nursing stress and the physical and mental component summaries healthy. It was a statistically significant difference at the  $p < .001$  in the total score of nursing stress, physical and mental component summaries, and physical activity, [ $F(9, 1005.284) = 6.184, p = .001$ ; Wilks' Lambda = 0.877]. The effect size, calculated using  $\eta^2$ , was 0.043. According to Cohen (1988), this would be considered a small effect size.

To investigate the difference in the stage of 6 months of exercise participation on each dependent variable, the Bonferroni adjustment was used to generate a new alpha level, with the normal alpha level divided by pairwise comparisons (Pallant, 2001). In this study, a new alpha level was .017 (.05 divided by 3). Table 31 shows a significant difference among the stages of 6-month exercise participation. The higher effect size was the total score of nursing stress:  $\eta^2 = .097$  that was largest effect size.

The Scheffe post-hoc test indicated that the participants who had not exercised during the 6-month period suffered higher job stress than those who participated in exercise and physical activity during the same period. Additionally, the participants who had no exercise during the 6-month period experienced lower physical and mental

component health than those who participated in exercise and physical activity in the same period. The test results are shown in Table 31.

Table 31

*Multivariate and Univariate Analyses of Variance in Nursing Stress and Health Status among Stages of Exercise*

Source	Multivariate	Univariate		
	$F(9,1005.284)$	NSSTTL $F(3,415)$	PCS $F(3,415)$	MCS $F(3,415)$
6-month exercise	6.184***	14.68***	5.574**	5.699**
$\eta^2$	0.043	0.097	0.039	0.040
Post- hoc		4>1	1>4	1>4

*Note.* Multivariate  $F$  ratio was generated for Wilks' Lambda statistic.

$\eta^2$  = Partial eta squared, 1 = Regular participation in exercise over 6 months., 4 = No plan to exercise during next 6 months

\*\* $p < .01$ . \*\*\* $p < .001$

### *Summary of Step 1*

The results of a MANOVA showed that the total NSS score ( $F[4,414] = 14.34$ ,  $p = .001$ ) contributed a strong significant difference among nurses' age groups. The Scheffe post-hoc test showed that nurses age 20 and younger experienced higher nursing stress scores than nurses 21 and older. The Scheffe test also indicated that nurses age 20 and younger experienced higher scores on all seven factors than nurses age 21 and older.

In addition, a MANOVA showed that there was a statistically significant difference between nursing stress and work unit at the  $p < .005$ ,  $F(6,413) = 3.37$ ,  $p = .001$ . The Scheffe post-hoc test showed that the nurses who worked in emergency departments experienced higher stress than the nurses who worked in others departments.

Results from an Independent samples  $t$ -tests showed that registered professional nurses had higher levels of Conflict with Physicians and Work Load than registered nurses. The test showed that there was a significant difference in the Conflict with

Physicians factor between RPNs and RNs, [ $t = (418) = -2.257, p < .05$ ]; as well as in Work Load between RPNs and RNs, [ $t = (418) = -2.847, p < .05$ ].

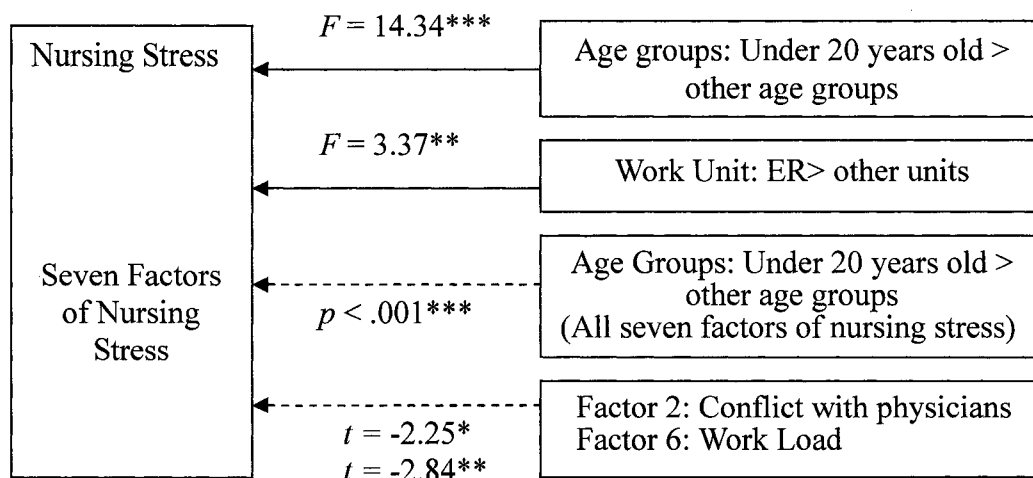


Figure 6. The summary of nursing stress and demographic characteristics (age groups, work units, and license).

There was a difference between age groups and the mental component summary. The Scheffe post-hoc test showed that nurses age 20 and younger had a higher score for mental health than the nurses age 21 and older.

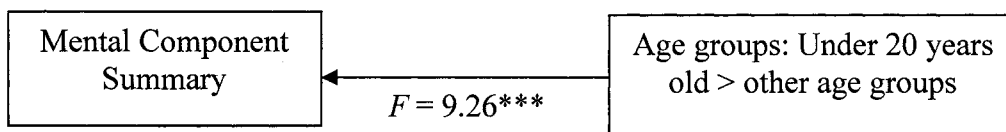
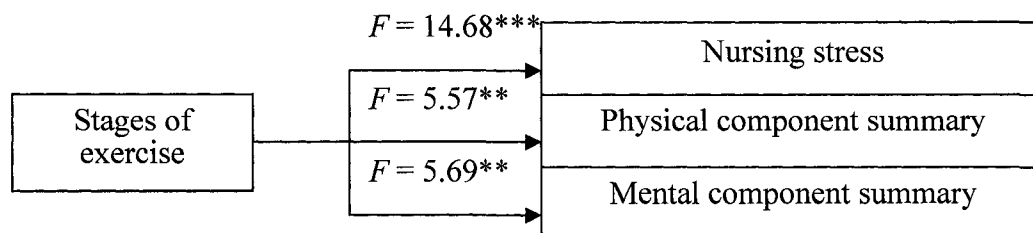


Figure 7. The summary of health status and demographic characteristics (age groups).

There was a statistically significant difference at the  $p < .001$  in the total score of nursing stress, physical and mental component summaries, and physical activity,  $F(9, 1005.284) = 6.184, p = .000$ . The effect size, calculated using  $\eta^2$ , was 0.043. The Scheffe post-hoc test indicated that the participants who had not exercised during the 6-month period suffered higher job stress than those who did. Additionally, the participants who had no exercise during the 6-month period experienced lower physical and mental

component health than those who participated in exercise and physical activity in the same period (see Figure 8).



*Figure 8.* The difference among stages of exercise, nursing stress, physical and mental component summary.

### *Step 2: Question of Relationships*

Pearson product-moment correlation was used to answer questions of the relationships among nursing stress, health status, and participation in physical activity. Following are the research questions associated with Step 2.

Question 6: Is there a significant relationship between nursing stress and health status of nurses in five teaching hospitals in Taipei Taiwan?

A bivariate Pearson product-moment correlation was computed to investigate the relationship among the subscales of job-related stress (NSS) and health status (SF-36v2). The Pearson correlation coefficients ( $r$ ) calculated the strength and direction of relationships among the variables. Cohen (1988) suggested that a correlation of .1–.29 indicates a weak correlation; .3–.49 indicates a moderate correlation; .5–1 indicates a strong correlation, and “the negative sign only refers to the direction of the relationship” (p. 120). There existed significant intercorrelations among the seven subscales of nursing stress (Death and Dying, Conflict with Physicians, Inadequate Preparation, Lack of

Support, Conflict with Other Nurses, Work Load, Uncertainty Concerning Treatment).

The correlations ranged from  $r = .471$  to  $r = .747$ , with all coefficients significant at  $p < .01$ . The strongest correlations were between Conflict with Physicians and Uncertainty Concerning Treatment,  $r = .747$  (see Table 32).

Table 32

*Inter-subscale Correlations for the Nursing Stress Scale (N= 420)*

	1	2	3	4	5	6	7
1. Death	—						
2. Physicians	.630**	—					
3. Preparation	.635**	.671**	—				
4. Support	.484**	.585**	.488**	—			
5. Nurses	.497**	.675**	.539**	.531**	—		
6. Work	.471**	.579**	.513**	.476**	.547**	—	
7. Uncertainty	.563**	.747**	.687**	.573**	.636**	.588**	—

Death and Dying, Conflict With Physicians, Inadequate Preparation, Lack of Support, Conflict With Other Nurses, Work Load, and Uncertainty Concerning Treatment.

\*\* Correlation is significant at the 0.01 level.

Intercorrelations among the 10 subscales of health status (physical component, mental component, physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health) were all positive weak to strong correlations, ranging from  $r = .161$  to  $r = .820$ , with all coefficients significant at  $p < .01$ . Table 33 shows the strongest correlations were between the mental component summary and mental health ( $r = .820$ ), between the mental component summary and vitality ( $r = .706$ ) and between the mental component summary and role emotional ( $r = .705$ ). The weakest correlations were between vitality and physical functioning ( $r = .161$ ).

Table 33

*Inter-subscale Correlations for SF-36v2 Health Survey (N = 420)*

	1	2	3	4	5	6	7	8	9	10
1.PCS	1									
2.MCS	.224**	1								
3.PF	.629**	.179**	1							
4.RP	.611**	.501**	.356**	1						
5.BP	.686**	.359**	.328**	.377**	1					
6.GH	.584**	.543**	.261**	.463**	.476**	1				
7.VT	.272**	.706**	.161**	.356**	.407**	.500**	1			
8.SF	.494**	.680**	.358**	.499**	.567**	.557**	.525**	1		
9.RE	.416**	.705**	.324**	.723**	.372**	.539**	.511**	.597**	1	
10.MH	.266**	.820**	.240**	.453**	.424**	.582**	.724**	.630**	.577**	1

*Note.* PCS = physical component, MCS = mental component, PF = physical functioning, RP = role physical, BP = bodily pain, GH = general health, VT = vitality, SF = social functioning, RE = role emotional, and MH = mental health.

\*\*Correlation is significant at the 0.01 level (2-tailed).

*N* = 420

The correlations across subscales between the job-related stress and the health status were significant, positive, and weak ( $r = 0.115$  to  $r = 0.30$ ), at  $p < .001$ . The strongest correlations were between the mental component summary and stressors,  $r = .195$  to  $r = .30$ . The weakest correlations were between the stress of death and dying and factors of health status,  $r = .115$  to  $r = .223$ , as shown in Table 34.



Table 34

*Correlation Matrix Across Subscales in the NSS and Subscales of the SF-36v2*

	DD	CP	IC	LS	CS	WL	UT
PCS	0.174**	0.225**	0.162**	0.181**	0.217**	0.191**	0.228**
MCS	0.207**	0.244**	0.300**	0.210**	0.289**	0.195**	0.267**
PF	0.168**	0.160**	0.173**	0.116*	0.149**	0.138**	0.179**
RP	0.155**	0.196**	0.201**	0.191**	0.209**	0.172**	0.246**
BP	0.115*	0.201**	0.162*	0.172**	0.226**	0.179**	0.204**
GH	0.200**	0.195**	0.152**	0.167**	0.205**	0.157**	0.206**
VT	0.133**	0.171**	0.195**	0.177**	0.236**	0.123*	0.185**
SF	0.223**	0.281**	0.273**	0.201**	0.260**	0.192**	0.248**
RE	0.168**	0.243**	0.232**	0.208**	0.260**	0.219**	0.241**
MH	0.140**	0.219**	0.218**	0.195**	0.255**	0.156**	0.229**

Note. PCS = physical component, MCS = mental component, PF = physical functioning, RP = role physical, BP = bodily pain, GH = general health, VT = vitality, SF = social functioning, RE = role emotional, and MH = mental health.

DD = Death and Dying, CP = Conflict With Physicians, IC = Inadequate Preparation, LS = Lack of Support, CS = Conflict With Other Nurses, WL = Work Load, and UT = Uncertainty Concerning Treatment.

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

N = 420

Question 7: Is there a significant relationship between nursing stressors and physical activities participation of nurses in five hospitals in Taiwan?

The participants' activity level was categorized into low, medium, and high physical activity. The low activity level ranged from 30 to 240 and constituted 25% of the participants. The medium activity level ranged from 240.1 to 774 and constituted 50%, while the high activity level ranged from 774.1 to 3,055 and constituted 25% of the participants. The scores for the physical activity levels are listed in Table 35.

Table 35

*Intensity of Physical Activity level*

	Range	Percent
Low activity level	30 to 240	25
Medium activity level	240.1 to 774	50
High activity level	774.1 to 3055	25

Pearson correlation coefficients were calculated to describe the relationships among the nurses' job-related stress, intensities, frequency, duration, and activity level of physical activity. The correlations across the subscales between job-related stress and physical activity participation were not significant ( $r = -.006$  to  $r = 0.393$ ). The duration, frequency, and activity level showed weak positive correlation,  $r = .161$  to  $r = .393$ ,  $p < .01$ . Table 36 shows there was no significant relationship between the NSS total score and the duration, frequency, intensity, and activity level of the 7-Day PAR survey.

Table 36

*Correlation among the Duration, Frequency, Intensity, and Activity Level of the 7-Day PAR Questionnaire and the Nursing Stress Score (NSS)*

	1	2	3	4	5
Duration	1				
Frequency	-.097*	1			
Intensity	.010	.043	1		
Activity level	.161**	.393**	.018	1	
Nursing stress	.026	.028	-.006	.054	1

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

$N = 420$

Question 8: Is there a significant relationship between physical activities participation and health status of nurses in five hospitals in Taiwan?

Pearson correlation coefficients were calculated to describe the relationships among the nurses' health status (physical and mental components) and the duration, frequency, and intensity of physical activity participation of the nurses in Taiwan.

Table 37 showed no significant relationship among the physical and mental health components and duration, frequency, intensity, and activity level,  $r = .01$  to  $r = .224$ .

Table 37

*Correlation among the 7-Day Physical Activity of Duration, Frequency, Intensity, and the Health Status*

	1	2	3	4	5
Duration	1				
Frequency	-.097*	1			
Intensity	.010	.043	1		
Physical component	-.050	-.016	-.057	1	
Mental component	-.071	-.043	-.036	.224**	1

$N=420$

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

Question 9: Is there a significant relationship among nursing stress, physical activity level and health status of nurses in five hospitals in Taiwan?

A bivariate Pearson product-moment correlation was calculated. The Pearson correlation coefficient ( $r$ ) calculated the strength and direction of relationships among the variables. When the  $p$ -value is less than 0.05, a significant relationship exists. In this study, the correlations across the subscales were weak significant ( $r = 0.120$  to  $r = -0.30$ ),  $p < .01$ , within the scores of the nurses' activity level in 7-day physical activity, physical and mental health status, and the nurses' nursing stress score. There was a significant weak negative relationship between the total of nursing stress and activity level of the 7 day physical activity score,  $r = -.141$ . The result showed that higher level of physical activity related lower level of nursing stress. There also was a significant weak negative relationship between the total of nursing stress and health status,  $r = -.251$  to  $r = -.30$ ,  $p < .01$ . There was a significant relationship between activity level and health physical and mental component,  $r = .120$  to  $r = .122$ ,  $p < .01$ . The result indicated that higher level of activity related higher level of health status (physical and mental component summaries).

Table 38

*Correlation Matrix for Variances of the NSS, 7-Day PAR Questionnaire, and Physical Component and Mental Component Summaries of SF-36 Health Survey*

	1	2	3	4
Nursing stress	1			
Activity level	-0.141**	1		
Physical component summary	-0.251**	0.120*	1	
Mental component summary	-0.300**	0.122*	.224**	1

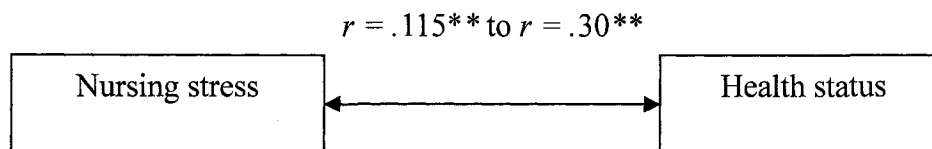
$N = 420$

\* Correlation is significant at the 0.05 level (2-tailed).

\*\*Correlation is significant at the 0.01 level (2-tailed).

### *Summary of Step 2*

The correlations across subscales between the job-related stress and the health status were significant, positive, and weak ( $r = 0.115$  to  $r = 0.30$ ) at  $p < .001$  (see Figure 9).



*Figure 9.* The correlation between nursing stress, physical, and mental component summary.

The correlations across the subscales were weak significant ( $r = 0.120^*$  to  $r = -0.30^{**}$ ),  $p < .01$ , which occurred within the scores of nurses' activity level, physical and mental health status, and the nurses' nursing stress score. There was a significant, weak, negative relationship between the NSS total and activity level on the 7-Day PAR survey,  $r = -.141$ . There also was a significant, weak, negative relationship between the total of nursing stress and health status,  $r = -.251^{**}$  to  $r = -.30^{**}$ ,  $p < .01$ . There was a significant, relationship between the physical activity and health status,  $r = .12^*$  to  $r = .122^*$ ,  $p < .01$ .

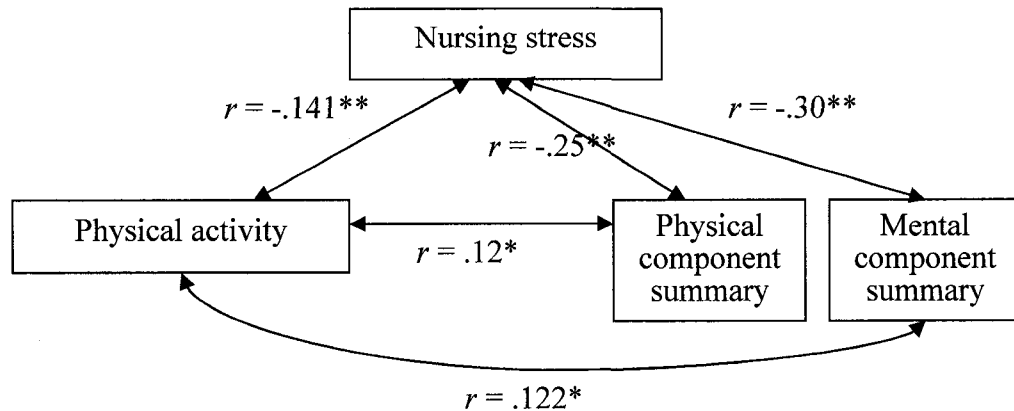


Figure 10. The correlation among nursing stress, physical activity, physical, and mental component summary

### Step 3: Question of Prediction

Standar regression and Hierarchical regression were used to answer questions of prediction among nursing stress, physical activity, health status and demographic characteristics. Following are the research questions associated with Step 3.

Question 10: Can physical health be predicted by mental health?

A multiple regression technique enabled the researcher to explain how much the dependent variable (physical health) could be explained by independent variables (factors of mental health from the SF-36 survey).

A standard multiple regression was conducted using physical component summary as the dependent variable with vitality, social functioning, role emotional, and mental health as the independent variables. Using the  $p < .001$  criterion for Mahalanobis distance, six multivariate outliers were identified and deleted, leaving 414 cases for analysis. A residual analysis was conducted to check assumptions. A scatterplot of the standardized residuals and normal probability plot was developed, and assumptions about residuals were met (see Appendix R).

Vitality, social functioning, role emotional, and mental health contributed significantly to the prediction of the physical component summary score,  $p < .001$ . The test showed that 28.5% (adjusted  $R^2$ ) of the variability in the physical component summary score was predicted by vitality, social functioning, role emotional, and mental health. Table 39 presents the unstandardized and standardized regression coefficients and  $p$ -value of the  $t$ -test for the accompanying independent variables. The  $t$ -values of social functioning, role emotional, and mental health were statistically significant at  $p < .05$ . This regression model was significantly different from zero,  $F(4,409) = 42.07, p < .001$ . The physical component summary score was significantly predicted by three predictor variables. The regression model could be summarized to a linear model physical component summary =  $34.05 + .333$  (social functioning) +  $.143$  (role emotional) +  $.109$  (mental health). From the statistic of standardized coefficients, social functioning (physical or emotional problems limit in social activities) had the greatest influence ( $\beta = .444$ ) on the physical component summary score, followed by role emotional (emotional problems limit in usual role activity) and mental health (psychological distress and well-being).

Table 39

*Standard Multiple Regression Analysis of Mental Health Predicting Physical Component Summary Score*

Variable	B	SEB	$\beta$	$t$
Social Functioning	.333	.045	.444	7.409***
Role emotional	.143	.036	.235	3.993***
Mental health	.109	.049	.154	2.227*

Note.  $R^2 = .292$ , Adjusted  $R^2 = .285$  ( $N = 414$ ).

\* $p < .05$ , \*\*\* $p < .001$

Question 11: If the nurses' nursing stress is controlled, is the mental health summary still able to predict the physical health of nurses?

Hierarchical (sequential) multiple regression was performed to determine addition of the nursing stress change the prediction of physical health by mental health. With the use of  $p < .001$  criterion for Mahalanobis distance, four multivariate outliers were deleted, leaving 416 cases ( $N = 416$ ) for analysis. A residual analysis was performed to check assumptions. The scatterplot of the standardized residuals and normal probability plot, assumptions about residuals were met. (See Appendix R)

Model 1 showed the result of regression by control variable (nursing stress),  $F(1,414) = 27.32, p < .001$ . Six percent (adjusted  $R^2$ ) of the variability in the physical component summary score. Model 2 showed the result of regression by enter method. Nursing stress (NSS), vitality (VT), social functioning (SF), role emotional (RE) and mental health (MH) contributed significantly to the prediction of the physical component summary score,  $p < .001$ . Twenty nine percent (adjusted  $R^2$ ) of the variability in the physical component summary score was predicted by the nursing stress (NSS), vitality (VT), social functioning (SF), role emotional (RE) and mental health (MH) on there five independent variables. Table 40 presents the unstandardized and standardized regression coefficients and  $p$ -value of t-test for accompanying independent variables. The t-values of the nursing stress (NSS), social functioning (SF), role emotional (RE) and mental health (MH) are statistically significant at  $p < .05$ . This regression model was significantly different from zero. The physical component summary score was significantly predicted by four predictor variables. From the statistic of standardized coefficients, social functioning (SF) had the greatest influence (Beta = .43) to physical component summary

score, followed by role emotional (RE: emotional problems do not limit in usual role activity), mental health (MH: psychological distress and well-being), and nursing stress (NSS). Therefore, controlling for nursing stress, did not change predictability of physical component summary by mental health factors.

Table 40

*Hierarchical Regression Analysis Summary for the Nursing Stress Predicting Physical Health with Mental Health*

Variable	B	SEB	$\beta$	$R^2$	$\Delta R^2$
Model 1—Nursing stress	.110	.023	.249***	.062	.06
Model 2—Nursing stress	.101	.021	.121*	.298	.290
Vitality	.022	.051	.027		
Social functioning	.326	.044	.433***		
Role emotional	.134	.035	.223***		
Mental health	.114	.049	.161*		

N = 416, \*  $p < .05$ , \*\*\*  $p < .001$

Question 12: Can mental health be predicted by physical health?

A regression technique is used to answer this question. A multiple regression technique enabled the researcher to explain how much the dependent variable (mental component summary) could be explained by independent variables (factors of physical health). A standard multiple regression was conducted by using the mental component summary as dependent variable, and physical functioning (PF), role physical (RP), bodily pain (BP), and general health (GH) as the independent variables. With the use of  $p < .001$  criterion for Mahalanobis distance, four multivariate outliers were deleted, leaving 416 cases (N= 416) for analysis. A residual analysis was conducted to check assumptions. The scatterplot of the standardized residuals and normal probability plot, assumptions about residuals were met, as shows in Appendix R.

Table 41 shows the result of regression by Enter method. The physical functioning (PF), role physical (RP), bodily pain (BP), and general health (GH)



contributed significantly to prediction of the mental component summary score,  $p < .001$ . Thirty eight percent (adjusted  $R^2$ ) of the variability in the mental component summary score was predicted by physical functioning (PF), role physical (RP), bodily pain (BP), and general health (GH). Table 41 presents the unstandardized and standardized regression coefficients and p-value of  $t$ -test for accompanying independent variables. The  $t$ -values of the physical health is statistically significant at  $p < .05$ . This regression model was significantly different from zero,  $F(4,411) = 64.57, p < .001$ .

Mental health was predicted by the four predictor variables. From the statistic of standardized coefficients, general health (GH) had the greatest influence (Beta = .375) on mental health, followed by role physical (RP: physical health problems limit in usual role activities).

Table 41

*Standard Multiple Regression Analysis of Physical Health Predicting Mental Health*

Variable	B	SEB	$\beta$	$t$
Physical functioning	.107	.062	.072	1.644
Role physical	.374	.052	.333	7.241***
Bodily pain	.090	.052	.080	1.726
General health	.412	.051	.375	8.011***

Note.  $R^2 = .386$ . Adjusted  $R^2 = .38$  ( $N = 418$ ).

\*\*\* $p < .001$

Question 13: If the nurses' stress is controlled, does physical health still predict the mental health of nurses?

Hierarchical (sequential) multiple regression was performed to determine if the addition of the nursing stress score changed the prediction of mental health by the physical component summary. With the use of  $p < .001$  criterion for Mahalanobis distance, three multivariate outliers were deleted, leaving 417 cases ( $N = 417$ ) for analysis. A residual analysis was performed to check assumptions. The scatterplot of the

standardized residuals and normal probability plot, assumptions about residuals were met. (See Appendix R)

The correlation among the variables, unstandardized coefficients (B, SEB), standardized coefficients ( $\beta$ ), *R* Square and Adjusted *R* Square at each step. The result with all independent variables in the equation was significantly different from zero,  $F(4,411) = 53.98, p < .001$ . (See Table 42)

Model 1 showed the result of regression by control variable (nursing stress),  $F(1,415) = 41.60, p < .001$ . Eight point nine percent (adjusted  $R^2$ ) of the variability was in the physical component summary score. Model 2 showed the result of regression by enter method. Nursing stress (NSS), physical functioning (PF), role physical (RP), bodily pain (BP), and general health (GH) contributed significantly to the prediction of the mental component summary score,  $p < .001$ . Thirty nine point seven percent (adjusted  $R^2$ ) of the variability in the physical component summary score was predicted by the nursing stress (NSS), physical functioning (PF), role physical (RP), bodily pain (BP), and general health (GH) on these five independent variables. Table 42 presents the unstandardized and standardized regression coefficients and p-value of t-test for accompanying independent variables. The t-values of the nursing stress (NSS), physical functioning (PF), role physical (RP), bodily pain (BP), and general health (GH) are statistically significant at  $p < .05$ . This regression model was significantly different from zero. The mental component summary score was significantly predicted by five predictor variables. From the statistic of standardized coefficients, general health (GH) have the greatest influence (Beta = .362) to mental component summary score, followed by nursing stress (NSS), physical functioning (PF: health problems Limit in physical activity), role physical (RP:

physical health problems limit in usual role activities). Therefore, controlling for nursing stress, did not change the predictability of mental component summary by physical health factors.

Table 42

*Hierarchical Regression Analysis Summary for the Nursing Stress Predicting the Mental Health with Physical Health*

Variable	B	SEB	$\beta$	$R^2$	$\Delta R^2$
Model 1—Nursing stress	.219	.034	.302***	.091	.089
Model 2—Nursing Stress	.107	.029	.147***	.404	.397
Physical functioning	.149	.064	.102*		
Role physical	.349	.051	.314***		
Bodily pain	.082	.051	.073***		
General health	.397	.051	.362***		

\*  $p < .05$ , \*\*\*  $p < .001$

Question 14: Do the nursing stress and age predict by health status?

The researcher divided the self perceived health status into two categories:

healthy and not healthy. A direct logistic regression analysis was performed on health status and two predictors (nursing stress score and age levels). Using Mahalanobis distance, no outlier was deleted, leaving all 420 cases for analysis. A test of the full model with both predictors generated a constant-only model that was statistically reliable,  $\chi^2(2, N = 420) = 28.456$  and  $p < .001$ , indicating that the predictors reliably distinguished between self-perceived healthy and not healthy status. The Hosmer and Lemeshow Goodness of Fit Test,  $\chi^2(8, N = 420) = 9.54$  and  $p = .299$ , indicated this model was of value. The Cox and Snell  $R^2$  value and the Nagelkerke  $R^2$  values were .066 and .088, respectively, recommending that between 6.6% and 8.8% of variability was explained.

Table 43 shows the results of the accurate prediction, with 35.6% of healthy status correctly predicted and 80.1% not-healthy status correctly predicted, for an overall prediction rate of 61.7%.

Table 43

*Results of the Accurate Prediction*

Health status	Actual total in group (N)	Predicted group membership		Percentage correct (%)
		Healthy	Non-healthy	
Health	174	62	112	35.6
Non-health	246	49	197	80.1
Overall percentage				61.7

Table 44 shows regression coefficients, odds ratios, and Wald statistics for each of the three predictors. According to the Wald criterion, the total score of nursing stress score and age ( $p < .01$ ) contributed a significant predictive ability to this model.

According to Tabachnick and Fidell (2001), “the odds ratio is the increase (or decrease if the ratio is less than one) in odds of being in one outcome category when the value of the predictor increases by one unit” (p. 548). The total nursing stress score showed an odds ratio value of 1.036. Age showed an odds ratio value of 0.729. The result indicated that health status can be predicted by nursing stress.

Table 44

*Summary of Logistic Regression Analysis Predicting Health Status*

Variable	B	SE	Odds ratio	Wald statistic	95% confidence for odds ratio	
					Lower	Upper
Nursing stress score	.035	.008	1.036	18.594***	1.019	1.053
Age levels	-.351	.116	.729	7.428	0.58	.915

$N = 420$ , \*\*\*  $p < .001$

Question 15: How well can the nurses' perceived stress (NSS) be predicted by work unit and physical and mental component of health status?

A multiple regression technique enabled the researcher to explain how much the dependent variable (stress) could be explained by the independent variables of over time, work unit (currently work unit: ICU, OB/GYN, pediatric ward, internal medical ward,

surgery ward, emergency room, and operating room), physical component summary, and mental component summary. Tests of assumptions included normality, outliers, linearity, and homoscedasticity of residuals. Using Mahalanobis distance, two multivariate outliers were deleted, leaving 418 cases for analysis. A residual analysis was conducted to check assumptions. The scatterplot of the standardized residuals and normal probability was plotted, and assumptions about residuals were met (see Appendix R).

Table 45 shows the result of the regression by Enter method. Physical component summary, mental component summary, overtime, and emergency room unit contributed significantly to prediction of the nursing stress score,  $p < .001$ . Just over 19% (adjusted  $R^2$ ) of the variability in the nursing stress total score was predicted by the physical component summary, mental component summary, overtime, and emergency room unit.

Table 45 presents the unstandardized and standardized regression coefficients and  $p$ -value of  $t$ -test for accompanying independent variables. This regression model was significantly different from zero,  $F(9,408) = 11.984$ ,  $p < .001$ . The nurse stress score was predicted by four predictor variables. The regression model could be summarized to a linear model stress total score (NSS) =  $24.856 + 4.962$  (overtime) +  $.358$  (physical component summary) +  $.328$  (mental component summary) +  $7.764$  (emergency room). From a review of the standardized coefficients, overtime had the greatest influence ( $\beta = .247$ ) on job related stress, followed by mental component summary, emergency room, and physical component summary.

Table 45

*Regression Analysis Summary for Demographics, Physical and Mental Health Status Variables Predicting Nursing Stress*

Variable	<i>B</i>	<i>SEB</i>	$\beta$	<i>t</i>
Overtime	4.962	.939	.247	5.283***
Physical component summary	.358	.096	.169	3.710***
Mental component summary	.328	.064	.237	5.157***
OB/GYN ward	2.289	1.904	.059	1.202
Pediatric ward	.907	2.400	.018	.378
Internal medicine ward	2.121	2.285	.044	.928
Surgery ward	-2.379	2.172	-.053	-1.095
Emergency Room	7.764	1.969	.195	3.943***
Operating room	-.070	2.365	-.001	-.029

Note.  $R^2 = .209$ , adjusted  $R^2 = .192$ , ( $N = 418$ ,  $p < .000$ ).

\*\*\* Correlation is significant at the 0.001 level (2-tailed).

*Summary of Step 3*

Standard regression analysis result showed that this model was significantly different from zero,  $F(4,409) = 42.07$ ,  $p < .001$ . The physical component summary score was significantly predicted by three predictor variables. Hierarchical regression analysis showed that the result with all independent variables in the equation was significantly different from zero,  $F(4,410) = 34.44$ ,  $p < .001$ . As shown in Figure 11, for nursing stress, social functioning, role emotional and mental health explained the largest portion of variance in the physical health (adjusted  $R^2 = .290$ ).

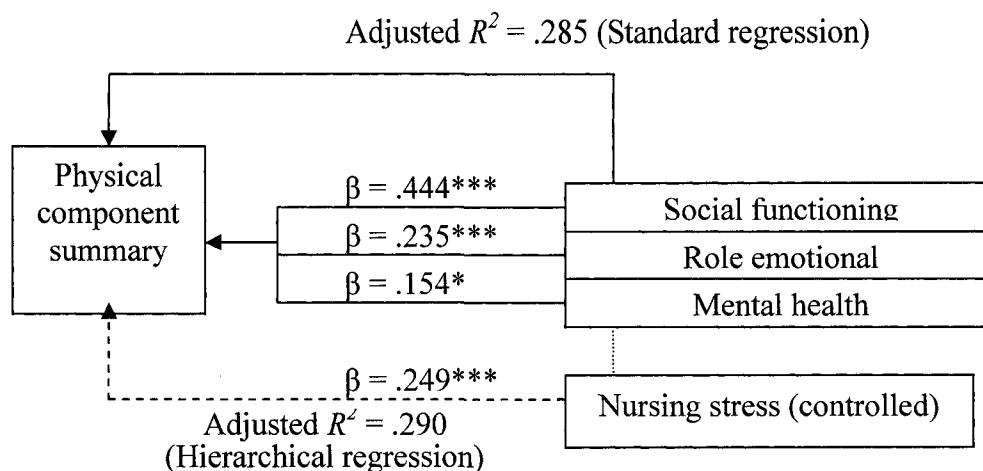


Figure 11. Standard regression and hierarchical regression analysis summary for the nursing stress predicting physical health with mental health.

Standard regression analysis result showed that the  $t$ -values of the physical health were statistically significant at  $p < .05$ . This regression model was significantly different from zero,  $F(4,411) = 64.57, p < .001$ . Mental health was predicted by the two predictor variables. Hierarchical regression analysis showed that with all independent variables in the equation, the result was significantly different from zero,  $F(4,411) = 53.98, p < .001$ . About 39.7% (adjusted  $R^2$ ) of the variability in the mental component summary score was predicted by nursing stress, role physical, and general health (see Figure 12).

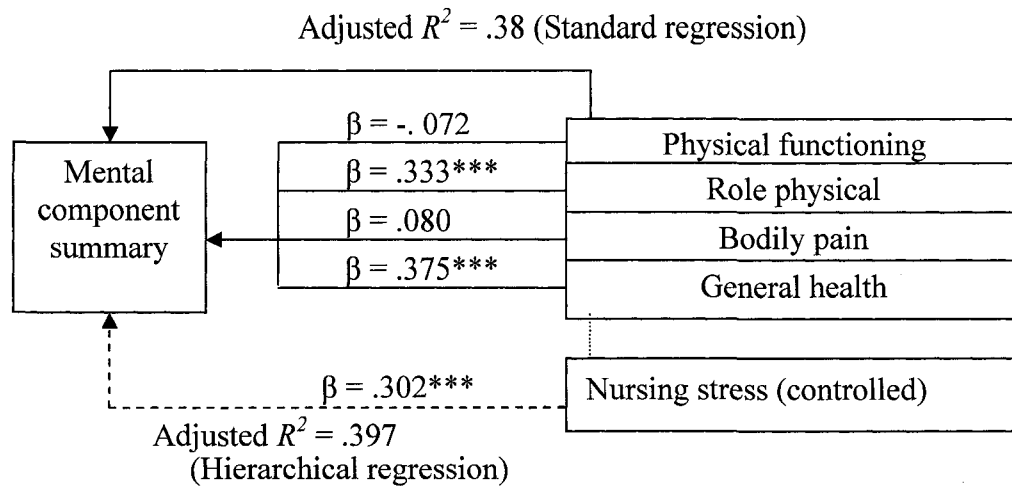


Figure 12. Standard regression and hierarchical regression analysis summary for nursing stress predicting mental health with physical health.

Logistic regression analysis, a test of the full model with all two predictors, generated a constant-only model that was statistically reliable,  $\chi^2(2, N = 420) = 28.456$  and  $p < .001$ , indicating that the predictors reliably distinguished between self-perceived healthy and not healthy status. The Hosmer and Lemeshow Goodness of Fit Test showed  $\chi^2(8, N = 420) = 9.54$  and  $p = .299$ , indicating this model had value, for an overall prediction rate of 61.7% (see Figure 13).

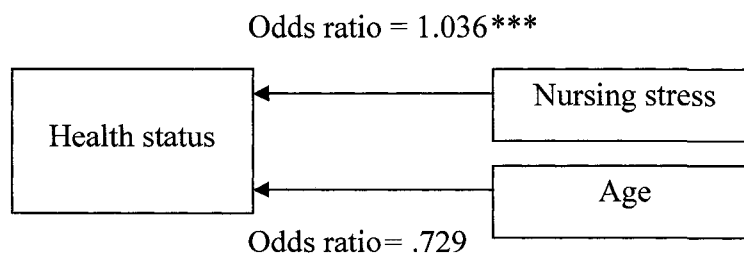


Figure 13. Logistic regression analysis summary for nursing stress and age predicting the health status.



Standard regression showed that this model was significantly different from zero,  $F(9,408) = 11.984, p < .001$ . The nurse stress score was predicted by four predictor variables. Physical component summary, mental component summary, overtime, and emergency room unit contributed significantly to prediction of the nursing stress score, 19.2% (adjusted  $R^2$ ) (see Figure 14).

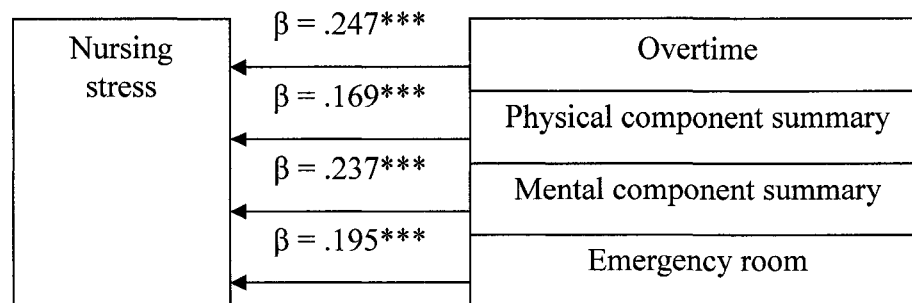


Figure 14. Standard regression analysis summary for the mental health, physical health, and demographic characteristic predicting nursing stress.

#### Step 4: Question of Prediction

Standard regression was used to answer questions of prediction between nursing stress and physical activity. Following is the research question associated with Step 4.

Question 16: Can job stress be predicted by physical activity participation?

A multiple regression technique was used to explain how much of the dependent variable (stress) could be explained by independent variables (the duration, frequency, intensity and activity level).

A standard multiple regression was conducted with the nursing stress score as the dependent variable. The duration, frequency, and intensity of activity level of the 7-Day PAR Questionnaire were the independent variables. Assumption testing was presented to identify outliers and test for normality, linearity, and homoscedasticity of residuals (see

Appendix R).

According to Pallant (2001), the critical value of the chi-square indicated that the four dependent variables had a critical value of 18.47. Using Mahalanobis distance, six multivariate outliers were deleted, leaving 414 cases for analysis. The assumption testing was conducted by residual analysis. All tests used a 95% confidence level to calculate an interval that estimates a population parameter. The scatterplot of the standardized residuals and normal probability was plotted, and assumptions about residuals were met.

Table 46 shows the result of regression by Enter method. The 7-Day exercise participation scores for duration, frequency, intensity, and exercise level contributed significantly to prediction of the NSS,  $p < .05$ . Only .025 (adjusted  $R^2$ ) of the variability in the total nursing stress score was predicted by duration, frequency, intensity, and activity level. Table 46 presents the unstandardized and standardized regression coefficients and  $p$ -value of the  $t$ -test for the accompanying independent variables. This regression model was significantly different from zero,  $F(4,409) = 3.621$ ,  $p = .006$ . In this model, the 7-Day physical activity score contributed a significant negative coefficient to the prediction of nursing stress scores. Nurses participated in a higher level of activity related to a lower level of stress. The duration, frequency, and intensity of physical activity were not good predictors of nursing stress scores in this study.

Table 46

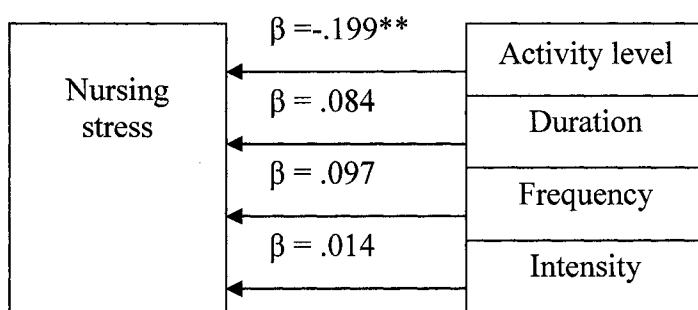
*Standard Multiple Regression Analysis of Perceived Intensity, Exercise Duration, Exercise Frequency, and Exercise Level Predicting Nursing Stress*

Variable	<i>B</i>	<i>SEB</i>	$\beta$	<i>t</i>
Activity level	-.006	0.002	-.199	-3.707**
Duration	.650	0.398	0.084	1.631
Frequency	0.615	0.333	0.097	1.855
Intensity	0.324	1.159	0.014	0.279

Note.  $R^2 = .034$ , adjusted  $R^2 = .025$  ( $N = 414$ ); \*\* $p < .01$

#### Summary of Step 4

A standard regression model showed that this model was significantly different from zero,  $F(4,409) = 3.621, p = .006$ . Only .025 (adjusted  $R^2$ ) of the variability in the NSS total score was predicted by duration, frequency, intensity, and activity level. In this model, the activity level contributed a significant negative coefficient to the prediction of nursing stress scores. The duration, frequency, and intensity of 7 days physical activity were not good predictors of nursing stress scores in this study (see Figure 15).



*Figure 15.* Standard regression analysis summary for the activity, duration, frequency, and intensity of physical activity predicting nursing stress.

#### Summary

There were 420 usable surveys in this study. The Nursing Stress Scale, SF-36v2 Health Status survey, Stage of Exercise Scale, 7-Day Physical Activity Recall Questionnaire, and demographic characteristic questionnaire research were found to be reliable and valid for the population examined.

The eight variables used in this research were nursing stress; frequency, duration, intensity, and activity level of physical activity, stage of exercise scale, physical and mental component summaries. Sixteen research questions were tested to investigate the relationships among nursing stress, health status, and physical activity participation

among nurses in Taipei, Taiwan. Table 47 shows a summary of all statistic analyses.

Table 47

*Summary of all Statistical Analyses*

Question	Analysis	Main Results
Step 1: Question of Difference		
Demographic and nursing stress, health status and exercise participation (7-day physical activity)		
Question 1	MANOVA	Age groups to nurse stress, physical activity, and health status Multivariate $F(16,1256.263) = 4.887^{***}$
Question 2	MANOVA	Age groups to 7 factors of nurse stress Multivariate $F(28, 1454,45) = 2.868^{***}$
Question 3	MANOVA	Work unit to physical activity and nurse stress Multivariate $F(16,1256.263) = 2.868^{***}$
Question 4	Independent Sample t-test	Licensed to 7 factors of nurse stress Conflict with physicians $t = -2.257^*$ Work Load $t = -2.84^{**}$
Question 5	MANOVA	Nursing stress and health status to physical activity participation (Stage of Exercise) Multivariate $r(9,1005.284) = 6.184^{***}$
Step 2: Question of relationship		
Nursing stress, health status, physical activity		
Question 6	Correlation	Nursing stress to health, $r = .11^*$ to $r = .30^{**}$
Question 7	Correlation	Nursing stress to frequency, duration and intensity of physical activity, $r = -.006$ to $r = .393$
Question 8	Correlation	Health and frequency, duration and intensity of physical activity, $r = .01$ to $r = .224$
Question 9	Correlation	Nursing stress, physical activity and health status, $r = -.25^*$ to $r = -0.30^{**}$
Step 3: Question of Prediction		
Examine the prediction among the nursing stress and health status		
Question 10	Standard multiple regression	Mental health to physical health Social functioning $\beta = .444^{***}$ Role emotional $\beta = .235^{***}$ Mental health $\beta = .154^*$ Adjusted $R^2 = 0.285$
Question 11	Hierarchical multiple regression	Nursing stress and mental health to physical Health Model 1: Nursing stress $R^2 = .062$ $\Delta R^2 = .06$ Model 2: $R^2 = .298$ $\Delta R^2 = .290$

Table 47 (Continued)

Question	Analysis	Main Results
Question 12	Standard multiple regression	Physical Health to Mental Health Physical functioning $\beta = -.072$ Bodily pain $\beta = .083$ General health $\beta = .375^{***}$ Role Physical $\beta = .333^{***}$ Adjusted $R^2 = 0.38$
Question 13	Hierarchical multiple regression	Nursing stress and physical health to mental health Model 1: nursing stress $R^2 = .091^{***}$ $\Delta R^2 = .089$ Model 2: $R^2 = .404^{***}$ $\Delta R^2 = .397$
Question 14	Logistic regression	Health status to nursing stress and demographics Nursing stress, odds ratio = $1.036^{***}$
Question 15	Standard multiple regression	Nursing stress, health status, demographics characteristics Overtime $\beta = .247^{***}$ Physical component summary $\beta = .169^{***}$ Mental component $\beta = .237^{***}$ Emergency room $\beta = .195^{***}$ Adjusted $R^2 = .192$
Step 4: Question of Prediction To examine the predictability of nursing stress by physical activity		
Question 16	Standard multiple regression	Predictability of nursing stress by physical Activity Physical activity $\beta = -.199$ Adjusted $R^2 = 0.025$

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

## Chapter Five: Discussions

This chapter reviews and summarizes the findings of this research and discusses the conclusion and implications. It addresses the implication of this study and suggests the direction for future studies on the work place stress in nursing and coping with participating in exercise and physical activity.

This research study employed a quantitative methodology. The research questions have investigated the factors that attribute to work place stress in nursing in Taipei Taiwan; how stress affecte the health status of the nurses; ways of coping with job-related stress; the status of nurses' participation in exercise and physical activity; the relationship between job-related stress and nurses' health; and relationship between physical activity and work place stress.

### *Summary of Findings*

The summary of the findings of this study is divided into three sections: (a) job-related stress in nursing in Taiwan, (b) the health status of nurses and its relations with work place stress and physical activty, and (c) the status of nurses' participation in physical activities and such status in relations with stress.

### *Job-Related Stress in Nursing*

The sources of stress are measured with the Chinese version of the Nurse Stress Scale (NSS), originally developed by Gray-Toft and Anderson (1981), to determine the job-related stressors and stress levels perceived by the nurses in northern Taiwan. Job-related stress reported by nurses in Taiwan is divided into seven categories with 32 items. The seven categories of stress are death and dying, conflict with physicians, inadequate preparation, lack of support, conflict with other nurses, workload, and uncertainty

concerning treatment.

In this study, the analysis of individual stressors presented with mean scores that ranged from 1.690 to 2.357 on a 4-point Likert scale, where a higher score indicates more stress. The currently study confirms that among the seven categories of workplace stress, workload ( $M = 2.3$ ) is rated the highest by the nurse participants in Taiwan. This finding is similar to the results of previous researches in the Western culture (Lambert & Lambert, 2001; Lambert, et al., 2006; Mc Neal, 1997; Rout, 2000) and in Asian countries (Xianyu & Lambert, 2006). This study confirmed that among the variables of work place stress in nursing, excessive work load was the most stressful for nurses. Specific scores of items provide a clear picture of sources of work-related stress in nursing. Table 48 shows the mean score for each item under workload, with the items arranged in descending order of means.

Table 48  
*Items and Mean Scores for the Workload*

Number	Item	<i>M</i>
30	Not enough time to complete all of my nursing tasks	2.35
28	Not enough time to provide emotional support to a patient	2.29
25	Unpredictable staffing and scheduling	2.27
1	Breakdown of computer	2.27
27	Too many non-nursing tasks required, such as clerical work	2.24
34	Not enough staff to adequately cover the unit	2.18

The results of this study showd that nurses have to juggle multiple tasks at work. Nurses not only have to provide professional medical service, but also provide appropriate emotional support to patients, and deal with unpredictable situations at work, such as staff shortage, change of schedule, computer problems, and clerical work.

The second-highest-rated category of work-related stress in this study was death and dying. Three items out of five are rated the highest. "Feeling helpless if the patient fails to improve" is the most stressful. The next two were "patients experience as painful" and "watching a patient suffer." The result is in congruence with studies by Espeland (2006), Lambert et al. (2006), Mann and Cowburn (2005), and McVicar (2003), in which all contend that nursing is an emotionally charged job. The emotional stress when confronting incurable patients and watch them dying can be very exhausting and draining. According to Cordes and Dougherty (1993), the nature of a job determines whether it is stressful or not. Nursing is a human service job (Cordes & Dougherty). Any job dealing with people can be stressful. Nursing is more so because it not only deals with people but with those who are suffering or dying from a variety of illnesses. When nurses invest energy and care in their patients and their patients fail to respond to the medical treatment or continue to suffer, the emotional strain is enormous for nurses as caregivers.

A similar conclusion is reported in Xianyu and Lambert's study (2006) that dealing with death and dying of patients is the second most stressful in nursing for nurses in Asia. It is postulated that the traditional education of the Asian nurses does not provide sufficient training in dealing with death and dying of patients. As a result, nurses do not know how to control or express their emotion under the circumstance (Xianyu & Lambert).

This researcher considers the explanation applicable. On the one hand, nursing as a human service job, deals a lot with emotion: the emotion of the patients and their family members, and the self-regulation of the emotion of the nurses as care givers. On the other hand, lack of training of the nurses in dealing with emotional draining of death and dying



of patients can be another factor in work place stress in nursing.

The third-highest-rated category of work-related stress in this study was inadequate preparation. This subscale consisted of three items, all involved with emotion: “inadequately prepared to help with the emotional needs of patient’s family,” “being asked a question by a patient for which I do not have a satisfactory answer,” and “inadequately prepared to help with the emotional needs of a patient.” These three items had very similar scores. The result further confirms that nursing, a care-giving service, is a highly emotionally charged labor (Cordes & Dougherty, 1993; McVicar, 2003; Xianyu & Lambert, 2006). In addition to provide medical service, nurses need to present themselves with the appropriate emotion when dealing with patients and their family members.

In the current study, the least stressful among the work-related stressors for nurses in Taiwan is conflict with supervisor. This differs from what is reported in Lambert et al. (2006), in which one of the three most frequently cited workplace stressors is conflict with physicians and supervisors, with excessive workload and dealing with death and dying rated as the first and second.

The factor “Conflict with supervisor and physician” was rated the least stressful among the work-related stressors in this current study. It may be due to the difference between Asian and Western cultures. According to Lambert and Lambert (2001), the majority of research studies are conducted in the contexts of the United States and United Kingdom and by researchers from those countries. There are only two studies on nursing in the Taiwan context. The possible explanation for such a result may be that in Asia, most individual desire societal identification and the avoidance of disharmony with

others (Lambert, et al., 2006). Further, nurses are subordinates to their supervisors. The hierarchical Asian culture dictates that a subordinate be obedient to his/her superiors. When an individual is culturally conditioned to be obedient, minor disagreement between nurses and their supervisors is unlikely to escalate. Conflict with a supervisor may be unlikely to occur, affecting the emotion of nurses to the extent as it may in other cultures. It is also possible in the Taiwanese culture, nurses may not feel comfortable to report disagreement or conflict. Such can well be the applicable reasons why conflict with a supervisor or physician is rated the least stressful in this study.

#### *Stress Levels Experienced by Nurses in Different Age Groups*

In this study the results indicated that 83.3% of the nurses surveyed are under the age of 30. Only 5.7% of the nurse population is older than age of 36. Many nurses start their career as soon as they graduate from their professional training. However, they often work for only a few years before they transfer to other careers. Job-related stress is the culprit. Nursing becomes a short-lived career, with no prospect of further career development. As a result, the cost of training and providing education to maintain an adequate supply of nurses increases. Moreover, this turnover affects the quality of service nurses provide as a profession (Doncevic, 1998; Healy, 2000; Lee, 2000).

The current research showed a relationship between age and levels of job-related stress. In this study nurses under 20 reported higher level of stress than that of nurses who were older than 20. The result confirms the reports in Cordes and Dougherty (1993) Maslach, Schaufeli and Leiter (2001) and Yang (2005) that younger nurses reported higher levels of stress than older ones, while more experienced nurses report lower levels of emotional exhaustion.

This researcher attributes the phenomenon to the fact that nurses under 20 years old are often newly graduated from school. They are often inexperienced. Being new to a workplace, especially a hectic place, is stressful. Young and newly employed nurses need time and guidance to get oriented and adjusted. The lower levels of stress reported by older or veteran nurses may attribute to the fact that those nurses are more experienced, more familiar with their work environment, and have the necessary skills to cope with the daily hassle at work. Moreover, it is possible that the experienced nurses may be participants in regular physical activity and exercise, and are able to reap the buffering benefits of such activities in relieving the stress from their work.

#### *Stress Levels Experienced by Nurses in Different Working Units*

Among the 420 participants in this study, nurses at different working units experience different levels of work-related stress. Stress levels reported in this study are valid indicators of the nature of particular departments. Among the seven working units surveyed, three departments have the highest scores of stress: 61 (14.5%) nurses working at the emergency department ( $M = 86.85$ ) reported the highest level of stress; 65 (15.5%) nurses working at the intensive care unit ( $M = 82.33$ ) reported the second highest level of stress; and 38 (9.0%) operating room ( $M = 80.68$ ) nurses reported the third highest stress score.

It is understandable that nurses working in emergency department report the highest work-related stress among any other nurses. Cordes and Dougherty (1993) assert that “specific context affects the incidence of stress and burnout in the workplace” (p.632). The emergency room is a department full of life threatening situations and challenges, dealing with unpredictability and emergency around the clock: death, dying,

accidents, and other life-threatening incidents. Instead of working on a pre-set schedule, nurses at emergency room (ER) have to work around the clock whenever patients are rushed in. They are not able to take breaks regularly. Their working hours can be stretched long and they are likely to work overtime often without a break. They have to attend to the critical medical conditions of the patients as long as the situations required of them.

#### *Stress Levels Reported by Different Marital Status and Children*

This study found a slight difference of stress levels experienced by married nurses and single nurses by ANOVA. The stress of single nurses ( $M = 64.94$ ) was slightly higher than that of married nurses ( $M = 64.24$ ). Although slight, the result is in congruence with the studies of Maslach, Schaufeli and Leiter (2001), Callaghan's (2000) on 500 Hong Kong nurses, and Hsu (2002), in which it is believed that marriage and harmonic family relations are supportive resources that help individuals to fend off stress at work.

Further, this study found that nurses who have no children ( $M = 65.24$ ) reported higher levels of stress than nurses who have children ( $M = 63.39$ ). Su (1993) explains that having children or not may relate to work stress. Children are an inseparable part of family support. Having children and being able to communicate with children help relieve and balance emotion. It may be further supported by Cordes and Dougherty (1993) that social support and comfort from family and friends help people cope with demands at work.

#### *The Health Status of the Nurses*

The SF-36v2 with 10 subscales was used in this study to investigate the health status of nurses: physical component, mental component, physical functioning, role

physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health (Weyers, Peter, Boggild, Jeppesen, & Siegrist, 2006). In this research, correlation statistic showed that intercorrelations among the 10 subscales of health status were all positive, ranging from weak to strong correlation, ranging from  $r = .161$  to  $r = .820$ , with all coefficients significant at  $p < .01$ .

In the current study, the health status of the nurses was generally reported at average or below-average levels with mental-emotional health at the lowest ( $M = 39.1$ ). A score of 50 is the division differentiating average health from poor health. A score below 50 indicates a person's poor health status.

The results of the current study showed that the nurse participants had below-average scores in mental component summary ( $M = 39.1$ ), role physical ( $M = 43.9$ ), general health ( $M = 43.9$ ), vitality ( $M = 46.4$ ), social functioning ( $M = 43.6$ ), role emotional ( $M = 39.4$ ), and mental health ( $M = 40.3$ ). The mental component ( $M = 39.1$ ) of the nurses in the study was the lowest among all health components.

This study reaped the similar result as that in a number of studies on nursing stress. Research on nursing stress in Asia by Lambert (2004) reported that the mental component health of nurses is the lowest of all the health items among nurses from China ( $M = 29.3$ ), Japan ( $M = 31.9$ ), and Korea ( $M = 32.8$ ). Lee's (2005) reported an average or below-average levels of nurses' health, with mental component ( $M = 39.1$ ) in a study on physical fitness and health of the nurses in Taiwan.

Current research indicated that mental component health was the most influential factor impacting one's overall health. The World Health Organization (1974) reported that health is a state of complete physical, mental and social well-being and not merely

the absence of disease or infirmity (as cited in Hsu, 2002). Therefore, mental health is an important part of health in general. Physical and mental health are two closely related factors. When individuals are under stress, they tend to evade stimuli; the result may be mental disease and a decrease in physical functioning.

In this study, standard regression showed a 28.5% (adjusted  $R^2$ ) of explanation rate for variances in physical component summary, social functioning, role emotional, and mental health. That is, one's mental health has a relationship with one's general health.

In this study, physical health also predicted mental health; the results with standard regression statistics showed a 38% (adjusted  $R^2$ ) of explanation rate for variances in mental component summary, role physical and general health. The perception of health is based on an individual's background and self-estimate. Nurses need to have the awareness of the close link between their mental and physical health.

#### *Correlation between Nursing Stress and Health Status of Nurses*

The result of the current study indicated that workplace stressors correlate with nurses' mental health, which is identical with Xianyu and Lambert's (2006) reported on the study of job-related stress of 92 head nurses in China, their ways of coping, and mental health. An analysis of Nurse Stress Scale and the subscales of the SF-36v2 evidenced a negative correlation between nursing stress and nurses' physical ( $r = -.251$ ) and mental ( $r = -.30$ ) health status. This showed that higher levels of nursing stress are related to lower levels of mental and physical health, confirming the theory and literature on workplace stress. Correlations between mental component summary and stressors ranged from  $r = .195$  to  $r = .30$ ,  $p < .001$  in this study. Nurses were under a variety of

stressors, confronting many different challenges. As a result, their mental and physical health are affected. Nurses need to have effective ways of coping with stress. In the cost-benefit analysis, improving employees' health and work-stress management can reduce absenteeism, promote morale, lower job turnover, and decrease the training costs of new nurses.

Hierarchical regression was employed in this study; the results showed that after controlling for nursing stress, social functioning, role emotional, and mental health explained the largest portion of variance in physical health. In other words, when considering nursing stress, mental health can predict physical health. The explanation rate for the variance is 28.9% (adjusted  $R^2$ ). Moreover, hierarchical regression showed that after controlling for nursing stress, following general health, physical functioning and role physical explained the largest portion of variance in mental health. In nursing stress, physical health can affect mental health. Variance explained is 39.7% (adjusted  $R^2$ ). The results reflect that after controlling for nursing stress, mental and physical health are still strongly correlated.

In this study, logistic regression showed that health is predicted by job-related stress in nursing. The Cox and Snell  $R^2$  value and the Nagelkerke  $R^2$  values were only 6.6% and 8.8%. This means that stress plays some role in nurses' health but that other factors should be considered.

#### *Levels of Physical Activity Participation*

Among the respondents ( $N = 420$ ) to the Stage of Exercise Scale, 67.4% of the nurses reported to have exercised regularly or occasionally over the last 6 months. However, 32.6% of the respondents reported they had no exercise in the last 6 months. In

this study, participation in exercise and physical activity showed no relationship with an individual's age or marital status by chi-square analysis. This is different from Cardinal's (1997) study on 235 American women, which found that marital status and age correlate with stage of exercise participation.

The result of current study is also different from Lee's (2001) study, investigating the stage of exercise and physical-activity participation of 504 middle-aged adults; 89.6% reported some level of exercise during the last 6 months and 10.4% of participants did not plan to exercise at all in the following 6 months. Lee's study showed that participating in exercise and physical activity has a relationship with an individual's age but no relationship with marital status.

In this study, the 7-Day Physical Activity Recall Questionnaire was used to examine the nurses' physical activity participation. Doing chores was the most frequent activities nurses in this study participated (206 nurses constituted 33.3%). Next was walking 179 (28.9%), and jogging 38 (6.1%). Compared with Lee's (2001) study, the most frequent physical activities of a sample of Taiwanese women were walking (57.8%) and chores (28.9%).

Many researchers have indicated that men participate more in physical activity than women (Chiang, 1998; Moss, 1986). In the traditional Taiwanese culture, women play the role of housewives, in addition to their roles at work place. They spend most of their spare time taking care of the family and may neglect the importance of physical activity to maintain their health status. Women working as nurses have responsibilities for taking care of both their family and their own profession. Therefore, they may not have much time to care for themselves while enduring a lot of stress at work place.



This postulation may be confirmed by Chiang's (1998) study, in which it investigated 405 high school students about physical activity behavior. The mean score of students' activity level was 987.7, while the mean score of nurses' activity level in the current study was 634.7. The significant difference may be partially due to difference in population. High school students can afford time to pursue a variety of physical activities. They are more active than the general population in participating in physical activity. However, the statistics may provide a different lens to examine the nurses' dilemma. Nurses are overworked and are physically, emotionally, and mentally exhausted. They may not have the time and energy to engage themselves in exercise and physical activities, especially when they do not have the awareness of the buffering effects of such activities on stress.

#### *Levels of Physical Activity in Relation with Age and Child Factors*

Among the participants in this study, nurses 31 to 35 years old reported higher activity levels ( $M = 653.5$ ) than other age groups of nurses.

An independent sample *t*-test showed that there was no difference between nurses who have children ( $M = 659.3$ ) and those who have no children ( $M = 624.9$ ) in their levels of physical activity and exercise participation. The result is similar to that of Lee's (2001), study in which having with children was shown not be related to physical activity levels.

#### *Participating in Physical Activity in Relation with Job-Related Stress*

In this study, the measurement of the relationship between exercise and the physical and mental components of nurses' health status showed that exercise and physical activity positively affect the physical and mental components of nurses' health.

This is in congruence with the previous research findings that physical activity has a buffering effect on stress (Altman, 2001; Lox, Martin, & Petruzzello, 2003; Martinsen & Stanghelle, 1997).

The Pearson result showed a significant correlation,  $r = -.141, p < .05$ . The MANOVA results showed that nurse participants who participated in physical activity during the 6-month period experienced less stress than those who do not report physical activity in the same period. The more nurses participate in physical activity, the less stress they perceive. Higher levels of physical activity participation are associated with lower levels of nursing stress. The result of the standard regression in this study showed that the activity level within the previous 7 days contributed a negative relationship ( $\beta = -.199, p < .05$ ) to prediction of nursing stress scores. Nurses participated in a higher level of physical activity reported lower level of stress.

However, in this study, correlation statistics showed that duration, frequency, and intensity of nurses' exercise and physical activity have no relationship with job-related stress. The duration, frequency, and intensity of physical activity during the previous 7 days were not good predictors of nursing stress scores in this study.

Physical activities can help nurses relax physically, psychologically, and emotionally. This is based on the theory model that exercise can buffer or relieve stress. When a person participates in exercise as simple as walking or jogging, the individual may feel relaxed, in control, and experience a sense of well-being. The person is better able to manage workplace stress and alleviate stress-induced symptoms and illness. This can be explained by the fact that participating in physical activity focuses one's attention on the activity and the accomplishment of exercise goals instead of minor annoyances.

Furthermore, when one is engaged in physical activity, the friendship and support received from association with others serve as a cathartic and can greatly relieve stress or tension from conflict at work.

### *Benefits of Physical Activity and Exercise to Health*

Research literature indicated that there was a relationship between physical activity and health. The literature indicated that the more often people participate in physical activity, the healthier they would become (Nies & Partridge, 2006; Warm, et al., 2007). The measurement of the relationship between physical activity and nurses' health status shows that exercise positively affects physical and mental components of nurses' health in this study. Correlation analysis examining the relationship among the scores of the 7-Day Physical Activity Questionnaire, Stage of Exercise Scale, and SF-36v2 showed that there was a weak positive relationship between physical activity and physical ( $r = .10$ ) and mental ( $r = .12$ ) health status. Those who are less physically active have poorer physical and mental health. Additionally, the results of a MANOVA confirmed that the participants who had not participated in exercise during the 6-month period reported lower physical and mental health status than those who had participated in exercise and physical activity in the same period.

In this study, correlation statistics showed no significant relationship among the physical and mental health component, duration, frequency, intensity, and activity level of physical activity,  $r = .01$  to  $r = .224$ ,  $p > .05$ . Further, it is not in agreement with the findings of a number of studies: De Vries (1981), Kohn and Henderson (2004), Lox, Martin, and Petruzzello (2003), Mac Donald (2006), Martinsen and Morgan (1997), Martinsen and Stanghelle (1997), and Tinsley and Tinsley (1986). All concluded that

exercise benefits are related with exercise intensity, duration, and frequency.

Theoretically, duration, intensity, frequency of exercise and physical activity should be related to, and be strong predictors of one's health status. However, this study relied solely on the participants' self-report to recall activity over a period of a week or six-month. Self-reported data may not be as accurate as a researcher's recorded data. American College of Sports Medicine (2000), which recommended that a typical exercise program consisted of cycling on an ergometer, 3–5 days per week for 30 minutes per session for a period of time be expected to achieve increased general well-being and improved aerobic fitness of an individual. Additional, adhering to the right regime of physical activity program will result in salient improvement in health status.

### *Implications*

#### *Recommendations for Nurses*

Nurses need to understand their own work-related stress and seek social support and solutions when confronted with problems. They need to take care of their own health by taking an active role in learning how to cope with the emotional stress of death and dying of their patients; in learning to voice their concerns regarding their workload and other workplace stress.

Nurses need to be aware of the benefits of physical activity in buffering stress by active participation in physical activities. By actively participating in exercise and leisure activities, nurses will be able to, at least, maintain their health status, their job performance, and boost their self confidence.

*Recommendations for Supervisors and Medical Institutions*

It is important for nurse supervisors and administrators to recognize the consequences of job-related stress to nurses, to the health care institutions, and to the patients. Whenever episodes of physical, psychological, emotional disorders, and absenteeism resulted from high levels of workplace stress occur, supervisors should be available to offer support and solutions. Supervisors should provide training courses to enhance confidence and efficiency in work to help nurses cope with their stress.

Supervisors should establish applicable communication channels to enhance two-way communication between nurses and supervisors. In addition, supervisors should take the initiatives to care for nurses' health, encouraging and supporting regular physical examinations followed by appropriate treatment.

Supervisors need to monitor the workload of the nurses, adjust the ratio between nurse and patients, pay attention to the particular circumstance in a particular department, and resolve the extra load of work by dispatching backup forces.

Supervisors should plan and implement intervention programs, in particular, exercise and leisure activity programs, for nurses. In addition to structured programs, administrators need to consider providing a place for physical activity (e.g., fitness center, health club) in the hospital or other health care institutions, and encourage nurses to participate in a variety of physical activity classes on daily basis (e.g., yoga and aerobic courses).

Research indicates that knowledge about exercise benefits, self-efficacy, goal setting, and social support may influence the behavior of participants in exercise and physical activity. An intervention program will be more effective if educational materials

about physical activity and its benefits are distributed. Studies show that a brief telephone call about the benefits of physical activity was successful in increasing walking activity in study participants.

#### *Recommendations for Nurse Education*

Nursing education may incorporate specific humanistic disciplines that deal with relationships with patients, especially with patients suffering from incurable illness, in chronic or terminal stage of illness.

Nurse education need to incorporate strategies of coping with workplace stress and job burnout. In addition to a variety of ways of coping, education on benefits of exercise and physical participation should be salient for future nurses.

#### *Recommendations for Future Research*

There is a need for future studies on relationships among workplace stress in nursing, nurses' health status, and the benefits of participating in exercise and physical activity. For future studies, an experimental study with treatment group and compare group is recommended.

Tests need to be conducted on the stress levels of the nurses before and after the treatment. Health status of the participants should be monitored by routine check-ups on health related items. Data should be recorded and analyzed.

Exercise or physical activity sessions should be planned and implemented. Participation in activity should be stretched for a certain period of time. Appropriate exercise frequency, duration and intensity should be enforced for a salient result.

In the current study, a significant percentage of participants reported doing chores as physical activity. Physical activity may be re-defined in such a study. Whether survey

should include “daily chores” as an item needs to be reconsidered.

### *Conclusion*

Nurses are key players of health care service. Knowledge of the mechanisms of workplace stress and job burnout in nursing and the strategies to effectively manage and cope with such stress are important for nurses’ physiological, psychological and emotional health. These are the fundamentals for retaining a healthy and productive nurse work force, and sustaining the quality of healthcare services. Therefore, an education course about nursing stress, burnout, and ways of coping becomes highly necessary in nurse training.

In summary, this study has contributed to the validation of the NSS questionnaire in the Chinese language. The findings suggest that the NSS and its translated Chinese version are useful instruments for measuring job-related stress in nursing. A summary of the investigation of the factors pertaining to job-related stress in nursing is presented. Findings of this study have added to a substantial body of robust evidence of the adverse impact of stress on nurses’ health.

Moreover, this study supports the efforts of theory-guided prevention of work stress in health care professions by documenting job-related stress in nursing in the Taiwan context, the health status of the nurses under stress, and the nurses’ participation in exercise and physical activity. By investigating the relationships among nurses’ job-related stress, the nurses’ health status, and their participation in exercise and physical activity, this study has defined a promising future direction of research, in particular with regard to the buffering effects of exercise and physical activity in relieving job-related stress in nursing.

## References

- AbuAlRub, R. F. (2004). Job stress, job performance, and social support among hospital nurses. *Journal of Nursing Scholarship, 36*(1), 73–78.
- Alimoglu, M. K., & Donmez, L. (2005). Daylight exposure and the other predictors of burnout among nurses in a university hospital. *International Journal of Nursing Studies, 42*, 549–555.
- All, A., Mannahan, C., Cuaderes, E., & Wallace, D. (2006). Reported stressors and ways of coping utilized by intensive care unit nurses. *Dimensions of Critical Care Nursing, 25*(4), 185–193.
- Altman, K. E. R. (2001). *A brief therapy model to reduce stress by practicing breathing exercises, mindful meditation, and yoga stretching*. Unpublished doctoral dissertation, Capella University, Minneapolis, Minnesota.
- American College of Sports Medicine. (2000). *ACSM's guidelines for exercise testing and prescription*. Philadelphia: Lippincott Williams & Wilkins.
- Atkins, A. (2005). Help kids cope with stress. *Woman's Day, 68*(4), 79.
- Aurelio, J. (1993). An organizational culture that optimizes stress: Acceptable stress in nursing. *Nurse Administration Quarterly, 18*(1), 1–10.
- Barnes, I. (2006). Workplace stress. *Canadian Nursing Home, 17*(2), 21–26.
- Beauford, J. E., (2004) *Which Test Flow Chart?* Unpublished manuscript, University of the Incarnate Word, San Antonio, Texas.
- Beauford, J. E., (2007) *Which Post Hoc Test?* Unpublished manuscript, University of the Incarnate Word, San Antonio, Texas.
- Bianchi, E. R. F. (2004). Stress and coping among cardiovascular nurses: A survey in



- Brazil. *Issues in Mental Health Nursing*, 25(7), 737–746.
- Blair, S. N., Haskell, W. L., Ho, P., Paffenbarger, R. S., Vranizan, K. M., Farquhar, J. W. et al. (1985). Assessment of habitual physical activity by a seven day recall in a community survey and controlled experiments. *American Journal of Epidemiology*, 122, 794-804.
- Bureau of employment and vocational training. (n.d.). *Nurses and nursing*, Retrieved on August 5, 2006, from <http://www.evta.gov.tw/employee/emp/001/009/bb1/bb1-18.htm>
- Caelli, K., Downie, J., & Caelli, T. (2003). Towards a decision support system for health promotion in nursing. *Journal of Advanced Nursing*, 43(2), 170–181.
- Callaghan, P., Shui, A. T., & Wyatt, P. A. (2000). Factors related to stress and coping among Chinese nurses in Hong Kong. *Journal of Advanced Nursing*, 31(6), 1518–1527.
- Cardinal, B. J. (1995). The stages of exercise scale and stages of exercise behavior in female adults. *Journal of Sports Medicine and Physical Fitness*, 35(2), 87–92.
- Cardinal, B. J. (1997). Construct validity of stage of change for exercise behavior. *American Journal of Health Promotion*, 12(1), 68–74.
- Chang, E. M., Hancock, K. M., Johnson, A., Daly, J., & Jackson, D. (2005). Role stress in nurses: Review of related factors and strategies for moving forward. *Nursing and Health Sciences*, 7, 57–65.
- Chen, T. (2004). *A study of stress, regular physical activity and health-related fitness of nursing school students in south Taiwan*. Unpublished doctoral dissertation, Spalding University, Louisville, Kentucky.

- Chiang, T. (1998). *An analysis of leisure physical activity behavior and determinants among adolescents in Taiwan*. Unpublished doctoral dissertation, University of Northern Colorado, Greeley.
- Chiriboga, D. A., & Bailey, J. (1986). Stress and burnout among critical care and medical surgical nurses: A comparative study. *Critical Care Quarterly*, 9(3), 84–92.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24, 385–396.
- Cohen-Katz, J., Wiley, S. D., Capuano, T., Baker, D. M., & Shapiro, S. (2004). The effects of mindfulness-based stress reduction on nurse stress and burnout. *Holistic Nursing Practice*, 18(6), 302–309.
- Cordes, C. L., & Dougherty, T. W. (1993). A review and an integration of research on job burnout. *Academy of Management Review*, 18(4), 621–656.
- Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.) Thousand Oaks, CA: Sage.
- Cronin-Stubbs, D. (1984). *The relationships among occupational stress, life stress, social support and the burnout experienced by staff nurses working in diverse hospital-based specialty areas*. Unpublished doctoral dissertation, Loyola University, Chicago.
- DeLongis, A., Folkman, S., & Lazarus, R. (1988). The impact of daily stress on health and mood: Psychological and social resources as mediators. *Journal of Personality and Social Psychology*, 54(3), 486–495.

- Department of Health Executive Yuan, Taiwan. (2006). *National Health Insurance*, Retrieved on September 12, 2007, from [http://www.doh.gov.tw/cht2006/index\\_populace.aspx](http://www.doh.gov.tw/cht2006/index_populace.aspx)
- De Vries, H. A. (1981). Tranquilizer effect of exercise: A critical review. *Physician and Sports Medicine*, 9(11), 47–54.
- Dishman, R. K., & Buckworth, J. (1997). Adherence to physical activity. In W. P. Morgan (Ed.), *Physical Activity and Mental Health*. (pp. 63–80). Washington DC: Taylor & Francis.
- Doncevic, S. T., Romelsjo, A., & Theorell, T. (1998). Comparison of stress, job satisfaction of control, and health among district nurses in Stockholm and prewar Zagreb. *Scandinavian Journal of Public Health*, 26(2), 106–114.
- Edwards, D., & Burnard, P. (2003). A systematic review of stress and stress management interventions for mental health nurses. *Journal of Advanced Nursing*, 42(2), 169–200.
- Engel, B. (2004). Are we out of our minds with nursing stress? *Creative Nursing*, 10(4), 4–6.
- Espeland, K. E. (2006). Overcoming burnout: How to revitalize your career. *The Journal of Continuing Education in Nursing*, 37(4), 178–184.
- Evans, G. D., Bryant, N. E., Owens, J. S., & Koukos, K. (2004). Ethnic differences in burnout, coping, and intervention acceptability among childcare professionals. *Child & Youth Care Forum*, 33(5), 349-371.
- Evans, W. & Kelly, B (2004). Pre-registration diploma student nurse stress and coping measures. *Nurse Education Today*, 24, 473-428.

- Feuerstein, M., Nicholas, R. A., Huang, G. D., Dimberg, L., Ali, D., & Rogers, H. (2004). Job stress management and ergonomic intervention for work-related upper extremity symptoms. *Applied Ergonomics*, 35(6), 565–574.
- Flath, S. C. (2005). *Cross cultural comparison of college students' physical activity behaviors in the US and ROC using transtheoretical model constructs*. Unpublished doctoral dissertation, Oregon State University, Corvallis.
- Folkman, S., & Lazarus, R. S. (1980). An analysis of coping in a middle-aged community sample. *Journal of Health and Social Behavior*, 21, 219–239.
- Gay, L.R., & Airasian, P. (2003). *Educational research: Competencies for analysis and application* (7th ed.). Upper Saddle River, NJ: Prentice Hall.
- Gill, D. L. (2000). *Psychological dynamics of sport and exercise*. (2<sup>nd</sup> edition). Champaign, IL: Human Kinetics.
- Godin, G., & Shephard, R. J. (1985). A simple method to asses exercise behavior in the community. *Canadian Journal of Applied Sport Sciences*, 10, 141–146.
- Gray-Toft, P. A., & Anderson, J. G. (1981). The Nursing Stress Scale: Development of an instrument. *Journal of Behavioral Assessment*, 3, 11–23.
- Gray-Toft, P. A., & Anderson J. G. (1983). A hospital staff support program: Design and evaluation. *International Journal Nurse Studies*, 20(3), 137–147.
- Greggs-McQuilkin, D. (2004). The stressful world of nursing. *MEDSURG Nursing*, 13(3), 141–189.
- Gruss, V., McCann, J., Edelman, P., & Farran, C. (2004). Job stress among nursing home certified nursing assistants. *Alzheimer's Care Quarterly*, 5(3), 207–216.
- Guillot, J., Kilpatrick, M., Hebert, E., & Hollander, D. (2004). Applying the

- transtheoretical model to exercise adherence in clinical settings. *American Journal of Health Studies*, 19(1), 1-10.
- Healy, C. M., & McKay, M. F. (2000). Nursing stress: The effects of coping strategies and job satisfaction in a sample of Australian nurses. *Journal of Advanced Nursing*, 31(3), 681–688.
- Hillhouse, J.J., & Adler, C.M. (1997) Investigating stress effect patterns in hospital staff nurses: Results of a cluster analysis. *Social Science and Medicine*, 45(12), 1,781–1,788.
- Hingley, P. (1984). The humane face of nursing, *Nursing Mirror*, 159, 19–22.
- Hojat, M., Gonnella, J. S., Erdmann, J. B., & Vogel, W. H. (2003). Medical students' cognitive appraisal of stressful life events as related to personality, physical well-being, and academic performance: A longitudinal study. *Personality and Individual Differences*, 35, 219–235.
- Horowitz, M. J., & Zaslav, M. (2004). A clinical guide to the treatment of the human stress response. *American Journal of Psychiatry*, 161(9), 1,728–1,729.
- Hsu, B. C. (2002). Mental hygiene and health promotion. In H.H. Wang (Ed.), *Health promotion and nursing: Theory and practice*. Taipei, Taiwan: Way Far Books.
- Iso-Ahola, S. E., & Park, C. J. (1996). Leisure-related social support and self-determination as buffers of stress-illness relationship. *Journal of Leisure Research*, 28(3), 169–187.
- Janssen, P. P. M., de Jonge, J., & Bakker, A. B. (1999). Specific determinants of intrinsic work motivation, burnout and turnover intentions: A study among nurses. *Journal of Advanced Nursing*, 29(6), 1,360–1,369.

- Johnsgard, K. W. (1989). *The exercise prescription for depression and anxiety*. New York: Plenum Publishing.
- Keric, M. (1998). Game, sport and emotional health. *Physical Education, 1*(5), 47–53.
- Kohn, C., & Henderson, C. W. (2004, December 27). Low-income patients beating stress with yoga, meditation. *Managed Care Weekly Digest*, 43-46.
- Lambert, V. A., & Lambert, C. E. (2001). Literature review of role stress/strain on nurses: An international perspective. *Nursing and Health Sciences, 3*, 161–172.
- Lambert, V. A., Lambert, C. E., Itano, J. Inouyeb, J. Kimc, S., Kuniviktikuld, W., et al. (2004). Cross-cultural comparison of workplace stressors, ways of coping and demographic characteristics as predictors of physical and mental health among hospital nurses in Japan, Thailand, South Korea and the USA (Hawaii). *International Journal of Nurse Studies, 41*, 671–684.
- Lambert, V. A., Lambert, C. E., & Ito, M. (2004). Workplace stressors, ways of coping and demographic characteristics as predictors of physical and mental health of Japanese hospital nurse. *International Journal of Nurse Study, 41*, 85–97.
- Lambert, V. A., Lambert, C. E., Petrini, M., Li, X., & Zhang, Y. (2006). Predictors of physical and mental health in hospital nurses within the People's Republic of China. *International Nursing Review, 54*, 85–91.
- Lee, M.H. (2004). *The impact of work stressors on caring behaviors and professional job satisfaction among nurses in Taiwan*. Unpublished doctoral dissertation, University of California, San Francisco.
- Lee, P. H., Zhang, W. C., Jen-Chen, T., Lin, M., High, J. Q., Hsaio-Lien, C., & Cheng-chi, J. (2005). A study of physical fitness and health-related quality of life among

- nursing staff. *Journal of New Taipei Nursing*, 7(1), 53–62.
- Lee, P. S. (2001). *The stage of exercise, physical activity and their determinates: A study of the middle- aged from the Chung Shan district in Taipei*. Unpublished doctoral dissertation, National Taiwan Normal University. Taipei.
- Leedy, P. D., & Ormrod, J. E. (2005). *Practical research: Planning and design* (8th ed.). Upper Saddle River, NJ: Pearson Education.
- Leiter, M. P. (2005). Perception of risk: An organizational model of occupational risk, burnout, and physical symptoms. *Anxiety, Stress, and Coping*, 18(2), 131–144.
- Leveck, M. L., & Jones, C. B. (1996). The nursing practice environment, staff retention, and quality of care. *Research in Nursing & Health*, 19, 331–343.
- Levi, L. (1990). Occupational stress: Spice of life or kiss of death? *American Psychologist*, 45(10), 1142–1145.
- Lox, C. L., Martin, K. A., & Petruzzello, S. J. (2003). *The psychology of exercise: Integrating theory and practice*. Scottsdale, AZ: Holcomb Hathaway.
- MacDonald, P. (2006). Small steps make a big difference. *Practice Nurse*, 31(1), 26–27.
- Malik, A. (1996). *The relationship of personal hardiness and perceived stress in critical care nurses*. Unpublished Master of Science thesis. School of Health and Human Service, D'Youville College, Buffalo, New York.
- Mann, S., & Cowburn, J. (2005). Emotional labour and stress within mental health nursing. *Journal of Psychiatric and Mental Health Nursing*, 12(2), 154–162.
- Martinsen, E. W., & Morgan, W. P. (1997). Antidepressant effects of physical activity. In W. P. Morgan (Ed.), *Physical Activity and Mental Health* (pp. 93–106). Washington DC: Taylor & Francis.

- Martinsen, E. W., & Stanghelle, J. K. (1997). Drug therapy and physical activity. In W. P. Morgan (Ed.), *Physical Activity and Mental Health* (pp. 81–90). Washington DC: Taylor & Francis.
- Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology*, 52, 397–422.
- Mc Millan, J. M., & Schumacher, S. (2001). *Research in education: A conceptual introduction* (5<sup>th</sup> ed.). New York: Addison Wesley Longman.
- Mc Neal, L. (1997). *The effects of perceived non-work social support and hope upon oncology nurses' occupational stress*. Unpublished doctoral dissertation, The University of North Carolina, Greensboro.
- McVicar, A. (2003). Workplace stress in nursing: A literature review. *Journal of Advanced Nursing*, 44(6), 633-642.
- Medical Outcome Short Form (36) Health Survey*. (2005). Retrieved on September 30, 2006, from <http://www.swin.edu.au/victims/resources/assessment/health/sf36.html>
- Messner, R. L., & McDowell, W. A. (1992). Job stress-nursing. *Vibrant Life*. Retrieved on February 5, 2005, at: [http://www.findarticles.com/p/articles/mi\\_m0826/is\\_n5\\_v8/ai\\_12561240](http://www.findarticles.com/p/articles/mi_m0826/is_n5_v8/ai_12561240)
- Ministry of Health of Taiwan*. (n.d.). Retrieved on September 2, 2007, from <http://healthtw.24drs.com/CHT/MedicalDevelop/MedicalDevelop.aspx>
- Moss, L. H. (1986). *A study examining the relationship between leisure participation and life satisfaction among college seniors at the Florida state university*. Unpublished doctoral dissertation, Florida State University, Tallahassee.
- Murphy, F. (July, 2004). Stress among nephrology nurses in Northern Ireland.



*Nephrology Nursing Journal*, 31(4), 423–432.

Murray, M., Lefort, S., Ribeiro, V. (1998). The SF-36: Reliable and valid for the institutionalized elderly? *Aging & Mental Health*, 2(1), 24–27.

National Association of Nurses Union of the Republic of China. (2005) *Nurse statistics*, Retrieved on December 11, 2005, from: [www.nurse.org.tw](http://www.nurse.org.tw)

National Association of Nurses Union of the Republic of China. (2006, August 9). Retrieved on August 16, 2006, from [www.nurse.org.tw](http://www.nurse.org.tw)

Nies, M. A., & Partridge, T. (2006). Comparison of 3 interventions to increase walking in sedentary women. *American Journal of Health Behavior*, 30(4), 339–352.

*Organizational structure of nursing department*. (1998). (n.d.). Retrieved on April 5, 2007, from: <http://wwwu.tsgh.ndmctsgh.edu.tw/nur/introduction/tissue.htm>

*Pain & Central Nervous System Week*. (2004). American Psychological Association recommends ways to reduce stressful burdens.140.

Perry, T. R. (2005). The certified registered nurse anesthetist: Occupational responsibilities, perceived stressors, coping strategies, and work relationships. *AANA Journal*, 73 (5), 351–356.

Peterson, J. A., Yates, B. C., Atwood, J. R., & Hertzog, M. (2005). Effects of a physical activity intervention for women. *Western Journal of Nursing Research*, 27(1), 93–110.

Pallant, J. (2001). *SPSS survival manual: A step by step guide to data analysis using SPSS for Windows*. New York: Open University Press.

Quattrin, R., Zanini, A., Nascig, E., Annunziata, M. A., Calligaris, L., & Brusaferrro, S. (2006). Level of burnout among nurses working in oncology in an Italian region.

*Oncology Nursing Forum*, 33(4), 815–820

- Raedeke, T. D., & Smith, A. L. (2004). Coping resources and athlete burnout: An examination of stress mediated and moderation hypotheses. *Journal of Sport & Exercise Psychology*, 26(4), 525–541.
- Rambur, B., McIntosh, B. Palumbo, M. V., & Reinier, K. (2005). Education as a determinant of career retention and job satisfaction among registered nurses. *Journal of Nursing Scholarship*, 37(2), 185-192.
- Rolf, M. J. (1999). *Acute care nursing: Are perceived work stressors different for nurses working in critical care and non-critical?* Unpublished Master's thesis, Kirkhof School of Nursing, Grand Valley State University.
- Rosenberg, M. (1990). Reflexivity and emotions. *Social Psychology Quarterly*, 53(1), 3–12.
- Rout, U. R. (2000). Stress among district nurses: a preliminary investigation. *Journal of Clinical Nursing*, 9, 303–309.
- Running & Fit News*. (2004) Exercise your stress. 22 (5), 3.
- Schwirian, P. M. (1978). Evaluating the performance of nurses: A multidimensional approach. *Nursing Research*, 27(6), 347–351.
- Scott, K. M., Tobias, M. I., Sarfati, D., & Haslett, S. (1999). SF-36 health survey reliability, validity and norms for New Zealand. Australian and New Zealand. *Journal of Public Health*, 23(4), 401–406.
- Shelton, L., & Horne, N. (2004). Strong, serene & centered. *Natural Health*, 34(9), 88–92, 11c.
- Shirey, M. R. (2004). Social support in the workplace: Nurse leader implications.

- Nursing Economics*, 22(6), 313–319.
- Shirey, M. R. (2006). Stress and coping in nurse managers: Two decades of research. *Nursing Economics*, 24(4), 193–204.
- Speck, B. J. & Looney, S. W. (2006). Self-reported physical activity validated by pedometer: A pilot study. *Public Health Nursing*, 23(1), 88-94.
- Stacciarini, J. R., & Troccoli, B. T. (2004). Occupational stress and constructive thinking: health and job satisfaction. *Journal of Advanced Nursing*, 46(5), 480–487.
- Harvard Men's Health Watch*. (2005). Stress and the heart: Treatment helps. 9(7), 7.
- Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4rd ed.). Boston: Ally & Bacon.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Ally & Bacon.
- Taylor, M. W. (1991). *Effects of initial stress level, social support, and participation in an exercise or music condition on the posttreatment stress, depression, and anxiety of nurses*. Unpublished doctoral dissertation, St. John's University, New York.
- Thompson, S. (2006). Physical activities to help manage stress. *Fairfield County Business Journal*, 45(17), S5–S11.
- Tinsley, H. E. A., & Tinsley, D. J. (1986). A theory of attributes, benefits, and causes of leisure experience. *Leisure Sciences*, 8(1), 1–45.
- Tseng, C. Y. (2004). *The study of the correlation between job strain and nurses' well-being in medical center*. Unpublished master's thesis, National Taiwan University, Taiwan.
- Xianyu, Y., & Lambert, V. A. (2006). Investigation of the relationships among workplace

- stressors, ways of coping, and the mental health of Chinese head nurses. *Nursing and Health Sciences*, 8, 147–155.
- Ware, J. E., Kosinski, M., & Dewey, J. E. (2000). *How to score version 2 of the SF-36 health survey*. Lincoln, RI: QualityMetric.
- Warms, C. A., Belza, B. L., & Whitney, J. D. (2007). Correlates of physical activity in adults with mobility limitations. *Family & Community Health*, 30, 5–16.
- West, J., Otte, C., Geher, K., Johnson, J., & Mohr, D. C. (2004). Effects of hatha yoga and African dance on perceived stress, affect and salivary cortisol. *Annals of Behavioral Medicine*, 28(2), 114–118.
- Weyers, S., Peter, R., Boggild, H., Jeppesen, H. J., & Siegrist, J. (2006). Psychosocial work stress is associated with poor self-rated health in Danish nurses: A test of the effort-reward imbalance model. *Scandinavian Journal of Caring Sciences*, 20(1), 26–34.
- Wheeler, H. & Riding, R. (1994). Occupational stress in general nurses and midwives. *British Journal of Nursing*, 3, 527–534.
- Yang, Y. Y. (2005). Events of job stress among nurses in the outpatient department. *Chang Gung Nursing (Taiwan)*, 16(2), 113–125.
- Yung, P. M. B., Fung, M. Y., Chan, T. M. F., & Lau, B. W. K. (2004). Relaxation training methods for nurse managers in Hong Kong: a controlled study. *International Journal of Mental Health Nursing*, 13(4), 255–262.

Appendix A

Application for Institutional Review Board Approval Form

University of the Incarnate Word

- 1. Principal Investigator (type name): Ming-Hui Yao
- 2. Co-Investigator; Faculty Supervisor; Thesis or Dissertation Chair: Dr. Beauford, Judith E.
- 3. Division/Discipline: Ph. D. in Education/ Organizational Leadership
- 4 Research Category: a.  Exempt b.  Expedited Review c.  Full Board Review

Purpose of Study:

The purpose of the study is to investigate the relationship among participation in exercise, health status and the work-related stress among registered nurses in hospitals in northern Taiwan. The study will also examine the frequency, the intensity and the duration of nurses' participation in a variety of physical activity and exercises in an attempt to determine whether there is a relationship of exercises and health status in the nurses' perceived job-related stress.

6. Number of Subjects: 600 registered nurses      Controls: 0

7. Does this research involve any of the following:

	YES	NO		YES	NO
Inmates of penal institutions	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Fetus in utero	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Institutionalized mentally retarded	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Viable fetus	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Institutionalized mentally disabled	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Nonviable fetus	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Committed patients	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Dead fetus	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Mentally retarded outpatient	<input type="checkbox"/>	<input checked="" type="checkbox"/>	In vitro fertilization	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Mentally disabled outpatient	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Minors (under 18)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pregnant women	<input type="checkbox"/>	<input checked="" type="checkbox"/>			

For each "Yes", state what precautions you will use to obtain informed consent.

8. Duration of study: One year

9. How is information obtained? (Include instruments used)

Survey: The questionnaires of this research include instruments of Nursing Stress Scale, Stage of Exercise, Seven-Day Physical Activity Questionnaire, Health Survey (SF-36) and Demographical data.

10. Confidentiality – (Are identifiers used for subjects?:  Yes  No)

11. Benefit of research:

The significance of the study will be two-fold. First, it will inform the nursing professions about the day-to-day work-related stress perceived by nurses in Taiwan, and its harmful effects on the nurses' health. Second, it will inform the nurses about the coping strategies in managing job-related stress, and equip them with the knowledge and skill to participate in physical activity and exercise to reduce the stress.

12. Possible risk to subjects: With Confidentiality safeguards, there will be no risk for participants.

\*\*\*IF CHANGE IN RESEARCH OCCURS THE BOARD MUST BE NOTIFIED BEFORE RESEARCH IS CONTINUED.\*\*\*

Principal Investigator signature

\_\_\_\_\_ Date \_\_\_\_\_

IRB Approval signature

\_\_\_\_\_ Date \_\_\_\_\_

Application # \_\_\_\_\_

## Appendix B

## Permission Form for Nursing Stress Scale



DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY

Ming Hui Yao  
6700 N. Vandiver Rd. #1108  
San Antonio, Texas, 78209

RE: Nursing Stress Scale

I have enclosed a copy of the Nursing Stress Scale. You have our permission to use the Nursing Stress Scale in your research. Please cite the original source in the Journal of Behavioral Assessment, Vol. 3, No. 1, 1981, pp. 11-23. Please note that six of the items were dropped on the basis of the factor analysis. I have checked the final 34 items that were included on the enclosed copy of the NSS.

Good luck. I would be most interested in receiving a copy of any of the publications that result from the research. Please call me at (765) 494-4703 if you have any questions.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "James G. Anderson".

James G. Anderson, Ph.D.  
Professor of Medical Sociology  
Professor of Health Communication  
(765) 494-4703  
FAX: (765) 496-1476  
e-mail: andersonj@purdue.edu



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[www.cla.purdue.edu/academic/soc](http://www.cla.purdue.edu/academic/soc)

## Appendix C

## Permission Form for Nursing Stress Scale (Chinese)

----- Original Message -----

From: "Mei-Hua Lee" <mefalee@yahoo.com>

To: "姚明慧" <edi8811@hotmail.com>

Sent: Monday, June 19, 2006 2:12 PM

Subject: Re: May I get the survey permission of Chinese version from you? I appreciate your help.

> Dear Ming-Hui,

> No problem. You have my permission to use the Chinese

> version of the NSS in your doctoral research. Do you

> have a copy of the Chinese version of the NSS?

> Thank you for interesting in the Chinese version of

> the NSS.

>

> Mei-Hua

>

> ---姚明慧<edi8811@hotmail.com> 說：

>> Dear Dr. Lee Mei-Hua:

>> My name is Yao Ming-Hui. I am a Ph.D. student in

>> University of the Incarnate Word in San Antonio,

>> Texas. My major is organizational leadership and

>> concentrate on nursing. I am doing a research that

>> is to explore the relationship between exercise and

>> reduction of work-related stress among nursing

>> personnel in medical centers in Taipei, Taiwan.

>> I read your research study: The impact of work

>> stressors on caring behaviors and professional job

>> satisfaction among nurses in Taiwan. I am interested

>> in the survey (Nursing stress scale (NSS): Pamela

>> Gary-Toft and James G. Anderson, 1981) which was

>> used in this research. I also want to use this

>> survey in my research. Fortunately, I have had the

>> survey permission from the original author (James G.

>> Anderson). Therefore, may I get the survey

>> permission of Chinese version from you? I appreciate

>> your help.

>>

>> Thank you very much

>>

>> Sincerely,

>> Yao Ming-Hui

## Appendix D

## Permission Form for The Stage of Exercise Scale

----- Original Message -----

From: Brad Cardinal

To: Yao, Ming-Hui (Christine)

Sent: Tuesday, November 07, 2006 1:29 PM

Subject: Re: May I get the permission from you? (Stage of Exercise Scale (SOES))

Dear Ming-Hui,

Yes, you have my permission to use the scale. All as I ask in return is (a) that you appropriately cite the scale's origins, and (b) that you share your results with me (once your work is published and/or available in abstract form). Thank you. And, best wishes with your dissertation research.

Warm regards,

Brad

Bradley J. Cardinal, Ph.D., Past-President  
Research Consortium of the American Alliance for  
Health, Physical Education, Recreation and Dance  
Website: <http://www.aahperd.org/research/>

-----  
Bradley J. Cardinal, Ph.D., Professor  
Department of Nutrition and Exercise Sciences  
220 Langton Hall  
Oregon State University  
Corvallis, OR 97331-3303

(541) 737-2506 (Office Phone)

(541) 737-2788 (Office FAX)

Brad.Cardinal@oregonstate.edu (E-Mail)

<http://www.hhs.oregonstate.edu> (Website)

---

On 11/6/06 9:24 PM, "Yao, Ming-Hui (Christine)" <edi8811@pchome.com.tw> wrote:

Dear Dr. Cardinal:

I want to use your stage of exercise scale in my dissertation. Therefore, May I get the permission from you?

Thank you for your help, I have got the survey (SOES) permission of Chinese version from Dr. Sharon Gallnat.

Thank you very much



Sincerely,

Ming-Hui Yao

Dissertation Chair:

Judith E. Beauford Ph.D

beauford@uiwTx.edu <mailto:beauford@uiwTx.edu> <mailto:beauford@uiwTx.edu>

## Appendix E

## Permission Form for The Stage of Exercise Scale (Chinese)

----- Original Message -----

**From:** Gallant, Sharon

**To:** Yao, Ming Hui

**Sent:** Thursday, April 27, 2006 11:26 PM

**Subject:** RE: I am interested in your dissertation research

Dear Yao:

Just want you to know that I received your emails. I am inundated with my work at this moment. The research you are doing is very interesting. I am please to share with you my Chinese version of the survey. I will get it out for you this weekend. By the way, which three hospitals in Taiwan you are going to survey may I ask? My research will be published as a book chapter by NOVA Science soon. I will send you the link when I get to it. Thank you for your patience. Cheers,

Sharon C. Flath PhD

Executive Assistant to Dep. Chair and Graduate Education Manager

OSU Department of Public Health

Office/ Mail: 254 Waldo

Corvallis, OR 97330-6406

Phone 541-737-3825 | Fax 541-737-4001

Toll Free in OR: 1-888-284-5957

Email: [sharon.gallant@oregonstate.edu](mailto:sharon.gallant@oregonstate.edu)

## Appendix F

## Permission Form for The Stage of Exercise Scale (Chinese)

----- Original Message -----

**From:** pihsia

**To:** Yao, Ming-Hui (Christine)

**Sent:** Sunday, June 11, 2006 3:42 PM

**Subject:** Re: 煩請李教授可否再寄一份授權許可書給我,以英文書寫?

You are welcomed to use this instrument.

Lee, Pi-Hsia

----- Original Message -----

**From:** Yao, Ming-Hui (Christine)

**To:** pihsia

**Sent:** Saturday, June 10, 2006 12:14 PM

**Subject:** Fw: 煩請李教授可否再寄一份授權許可書給我,以英文書寫?

親愛的李教授:

我是 University of the Incarnate Word 的博士班生姚明慧.很高興得到您的“中文許可書”,授權使用中文問卷 (Stage of Exercise Scale 和 Seven-Day physical Activity Survey).

我的論文是以英文書寫,所以也需要附上您的“英文許可書”.煩請李教授可否再寄一份授權許可書給我,以英文書寫?並附上您的英文姓名.

十分感激您的幫忙,謝謝.

Thank you very much

Yao, Ming Hui

The University of the Incarnate Word

San Antonio, Texas

## Appendix G

## Permission Form for The 7-Day Physical Activity Recall Questionnaire

----- Original Message -----

**From:** Blair, Steve

**To:** Yao, Ming Hui

**Sent:** Saturday, May 20, 2006 8:38 PM

**Subject:** RE: May I have the survey permission from you?

You have my permission to use the questionnaire. Good luck with your research.

Steve Blair

Steven N. Blair

President and CEO

The Fred and Barbara Meyer Chair in Preventive Medicine

The Cooper Institute

12330 Preston Road

Dallas, TX 75230

telephone--(972) 341 3240

telefax--(972) 341 3225

---

From: Yao, Ming HUI [mailto:edi8811@pchome.com.tw]

Sent: Saturday, May 20, 2006 2:05 AM

To: Blair, Steve

Subject: May I have the survey permission from you?

Dear Dr. Blair,S.N.:

My name is Yao, Ming-Hui. I am a Ph.D student in the University of the Incarnate Word in San Antonio, Texas. My major is organizational leadership and concentrate on nursing. I am doing a research that is to explore the relationship between exercise and reduction of work-related stress among nursing personnel in three medical centers in Taipei, Taiwan.

I read your survey from a journal article: Seven-Day Physical Activity Survey. I want to use this survey in my dissertation research. Therefore, may I have the survey permission from you? I appreciate your help.

Thank you very much

Sincerely,

Ming-Hui Yao,

Dissertation Chair:

Judith E. Beauford Ph.D

beauford@uiwTx.edu

University of the Incarnate Word

## Appendix H

## Permission Form for The 7-Day Physical Activity Recall Questionnaire (Chinese)

----- Original Message -----

**From:** jack36

**To:** edi8811@pchome.com.tw

**Sent:** Thursday, October 19, 2006 2:00 PM

**Subject:** Re: May I get the survey permission of Chinese version from you

Dear Yao, ming-Hui:

Sorry for my late reply. You have my permission to use the Chinese version of the survey.

Sincerely,

Tser-chyun Chiang

-----Original message-----

**From:** Yao, Ming-Hui (Christine)<edi8811@pchome.com.tw>

**To:** jack36<jack36@mail.ntpu.edu.tw>

**Date:** Tue, 17 Oct 2006 14:18:27 +0800

**Subject:** May I get the survey permission of Chinese version from you

Dear Dr. Chiang, Tser Chyun:

My name is Yao, Ming-Hui. I am a Ph.D. student in University of the Incarnate Word in San Antonio, Texas. My major is organizational leadership. I am doing my dissertation research that is to explore the relationship between exercise and reduction of work-related stress among nursing personnel in medical centers in Taiwan.

I am interested in the surveys Seven-Day physical Activity Survey: Blair, S.N.) which was used in your research (An analysis of leisure physical activity behaviors and determinants among adolescents in Taiwan). I have received the survey permission from original authors. Therefore, may I get the survey permission of Chinese version from you? I appreciate your help.

Thank you very much

Sincerely,

Yao, Ming Hui

TEL: (1210-269-5788)

Dissertation Chair:

Judith E. Beauford Ph.D

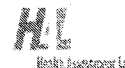
beauford@uiwTx.edu

The University of the Incarnate Word

San Antonio, Texas

## Appendix I

## Permission Form for SF36 Health Survey (English &amp; Chinese)




---

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**License Number: F1-102006-28547**


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- SF-36v2™ Health Surveys
  - Taiwan (English) – Standard Recall
  - Taiwan (Chinese) – Standard Recall

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November 8, 2006

Customer Initials: \_\_\_\_\_ Date Signed: \_\_\_\_\_

Page 1 of 3



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- How to Score Version 2 of SF-36® Health Survey

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**University of the Incarnate Word**  
**Ming-Hui Yao**  
**6700 N. Vandiver Road #1108**  
**San Antonio, TX 78209**

Signature: Ming-Hui Yao  
 Name: Ming-Hui Yao  
 Title: \_\_\_\_\_  
 Date: Nov. 9, 2006



## Appendix J: Translation Checks

*Survey Instrument Translation Check I*

----- Original Message -----

**From:** Yi- chuan Lee <rlee@cyut.edu.tw>  
**To:** Yao, Ming Hui[mailto:edi8811@pchome.com.tw]  
**Sent:** Saturday, May 20, 2006  
**Subject:** RE: Survey Instrument Translation Check

In reply to request for checking your research questionnaire, I think the translation in Chinese is okay. Good luck on your dissertation.

Sincerely,

Yi- Chuan Lee  
Assistant Professor  
Chaoyang University of Technology  
Department of Early Childhood Development and Education

---

*Survey Instrument Translation Check II*

----- Original Message -----

**From:** Wen- Guu Lei <lei7831@mail.dyu.edu.tw>  
**To:** Yao, Ming Hui[mailto:edi8811@pchome.com.tw]  
**Sent:** Saturday, May 25, 2006  
**Subject:** RE: Survey Instrument Translation Check

I have checked on your research questionnaire, your translation is great. I admit your effort and also look forward to reading your accomplished work.

Sincerely,

Wen- Guu Lei Assistant Professor  
Department of Sport Business Management  
Da-Yeh University  
Phone: 04-851-1888#3494

---

## Appendix K

## Permission Form for Tables of SF-36 Health Survey

Ming Hui:

I am pleased to grant you permission to reproduce this table with proper reference in your dissertation.

Good luck with your research.

John

**John E. Ware, Jr., Ph.D.**

CEO and Chairman of the Board

QualityMetric Incorporated

640 George Washington Hwy, Suite 201 | Lincoln, RI 02865

Phone: 401.334.8800 ext 242 | Fax: 401.642.9326

[www.QualityMetric.com](http://www.QualityMetric.com)

---

**From:** Yao, Ming-Hui (Christine) [mailto:edi8811@pchome.com.tw]

**Sent:** Monday, April 14, 2008 1:35 AM

**To:** John Ware

**Subject:** May I have your permission to put this table in my dissertation?

**Dear Dr. Ware,**

I am Ming Hui Yao,. I have got your permission to use survey (SF-36 V2). My License Number: 28547.

I still work on my dissertation. I would like to use the “Table: The 8 Health Profiles including number of items, Cronbach’ s alpha and item internal consistency” , “ Table : Abbreviated Content for Items in Each SF-36v2 scale” to present in my dissertation from the Website of SF-36 Health Survey.

Therefore, may I have your permission to put the tables in my dissertation?

Thank you very much.

Sincerely,

Ming Hui Yao,

## Appendix L

## Consent Form

## Letter to Director of Nursing Department

Doctoral Candidate: Ming-Hui Yao  
University of the Incarnate Word  
USA (210)7891523 or TW (02)22368855  
Email:edi8811@pchome.com.tw

Dear Director of nursing department,

I am a doctoral candidate in organizational leadership. Currently, I am doing a research that is An Investigation of the Relationship between Exercise and Work-related Stress among 600 Nurses in Medical Centers in Taipei, Taiwan. Because nursing personnel experience strong stress from their jobs, their participation in the study is especially valuable. This resource will help us to understand nurses' job stress level, exercise behavior and health status. This study does not involve any risk or problem in your job. The researcher will hold the information you share in strictest confidence. Your name will not appear on any report or publication of the study result.

If you are willing to be a participant, please complete this consent form and return it by mail or email to me. Each participant will get a consent form to participate in this study.

If you have any questions about this study, Please contact with Ming-Hui Yao

Email:edi8811@pchome.com.tw  
My Chair Dr. Judi Beauford (0021-210-828-3171)  
Dr. Kenin vkichcales, (0021-210-829-2759)  
Dean of graduate students and Research  
University of the Incarnate Word  
Sincerely,

Ming-Hui

Email:edi8811@pchome.com.tw  
My Chair Dr. Judi Beauford (0021-210-828-3171)  
Dr. Kenin vkichcales, (0021-210-829-2759)  
Dean of graduate students and Research  
University of the Incarnate Word

I have read the information provided. I am willing to participate in this research.

---

Signature of participant Date

## Appendix M

## Consent Form

## Letter to Director of Nursing Department

親愛的護理部主任:

本人姚明慧正從事一份學術性研究,調查「台灣台北市醫學中心 600 名護理人員的工作壓力及運動參與之相關性」。由於護理人員正處於強烈的壓力工作,因此您提供的資料寶貴對於此研究是極為寶貴與重要的。這個研究將有助於護理人員改善個人工作壓力及健康狀況。護理人員參與此研究不會造成任何風險或問題在於工作職位上。研究人員會極保密您所提供的寶貴資料及保護您的隱私。此問卷結果採匿名方式,在結果分析時不會出現您的姓名。若您對此研究問卷有任何建議,請您書寫在問題旁。謝謝。

如果您的護理部門願意參與此研究,請回寄此封文件,每一位參與的護理人員都會有一封參與研究同意書

您在填寫中有任何問題或建議時,歡迎與研究人員姚明慧連絡

USA (210)7891523 or TW (02)22368855

Email:edi8811@pchome.com.tw

Ming Hui Yao

Ph.D Candidate

University of the Incarnate Word

非常感謝您的耐心與參與此研究

我已經了解這個研究的目的,並願意參與本項研究

---

參與者簽名 日期

## Appendix N

## Survey Consent Form to Nurse

Doctoral Candidate: Ming-Hui Yao  
University of the Incarnate Word  
USA (210)7891523 or TW (02)22368855  
Email:edi8811@pchome.com.tw

Dear nurse:

The purpose of the study is to investigate the relationship between participation in exercise, work-related stress and health status among registered nurses. You are being asked to participate in a study to learn about nurses' job stressors, exercise benefit and health status. Because you experience the strong stress from your nursing job, your participation in the study is especially valuable. This resource will help us to understand nurses' job stress level, exercise behavior and health status.

To participate in this study you will complete four questionnaires and a survey of demographic information. It will take about 20 minutes of your time. This study does not involve any risk or problem in your job. The researcher will hold the information you share in strictest confidence. Your name will not appear on any report or publication of the study result.

Please return these questionnaires within two weeks to the designated boxes, which are located at nursing lounge of each unit. Please feel free to leave any comments next to the questionnaire.

If you have any questions about this study, please contact with Ming-Hui Yao

Sincerely,

Finally, thank you for your patient to read this letter and participate in this study.

Email:edi8811@pchome.com.tw  
My Chair Dr. Judi Beauford (0021-210-828-3171)  
Dr. Kenin vkichcales, (0021-210-829-2759)  
Dean of graduate students and Research  
University of the Incarnate Word

I have read the information provided. I am willing to participate in this research.

---

Signature of participant Date

## Appendix O

## Survey Consent Form to Nurse (Chinese)

親愛的白衣天使:

本研究目的在了解護理人員的工作壓力源,運動參與及身體健康狀況.由於護理人員處於高壓力工作環境,犧牲您個人的健康.因此您對本研究所提供的資料是非常珍貴與重要的.您所提供的寶貴資料,將有助於改善護理人員的工作壓力值,運動行為與健康狀況.

參與這項研究需請您填寫四份問卷有關於您的工作壓力源,運動參與及健康狀況問卷.這些問卷大概需要 15 分鐘來完成.參與此研究不會使您遭受任何風險或問題在您的工作上.研究人員會極力保密您所提供的寶貴資料及保護您的隱私.此問卷結果採匿名方式,在結果分析時不會出現您的名字.

請於二週內完成此問卷,並投入各病房護理人員休息室的問卷回收箱.若您對此研究問卷有任何建議,請您書寫在問題旁.謝謝.

您在填寫中有任何問題或建議時,歡迎與姚明慧連絡

USA (210)7891523 or TW (02)22368855

Email:edi8811@pchome.com.tw

Ming Hui Yao

Ph.D Candidate

University of the Incarnate Word

非常感謝您的耐心與參與此研究

我已經了解這個研究的目的,並願意參與本項研究

---

參與者簽名 日期

## Appendix P

## Questionnaires

## Nursing Stress Scale

Below is a list of situations that commonly occur on a hospital unit. Please read each item carefully and CIRCLE the ONE NUMBER that best describes **HOW OFTEN** on your present unit you have found the situations to be **STRESSFUL**.

During the PAST TWO WEEKS, DID YOU FIND THE FOLLOWING STRESSFUL?

	never	occasionally	frequently	very frequently
1. Breakdown of computer.	1	2	3	4
2. Criticism by a physician.	1	2	3	4
3. Performing procedures that patients experience as painful.	1	2	3	4
4. Feeling helpless in the case of a patient who fails to improve.	1	2	3	4
5. Conflict with a supervisor.	1	2	3	4
6. Listening or talking to a patient about his/her approaching death.	1	2	3	4
7. Lack of an opportunity to talk openly with other unit personnel about problems on the unit.	1	2	3	4
8. The death of a patient.	1	2	3	4
9. Conflict with a physician.	1	2	3	4
10. Fear of making a mistake in treating a patient.	1	2	3	4
11. Lack of an opportunity to share experiences and feelings with other personnel on the unit.	1	2	3	4
12. The death of a patient with whom you developed a close relationship.	1	2	3	4
13. Physician not being present when a patient dies.	1	2	3	4
14. Disagreement concerning the treatment of a patient.	1	2	3	4
13. Physician not being present when a patient dies.	1	2	3	4
14. Disagreement concerning the treatment of a patient.	1	2	3	4



During the PAST TWO WEEKS, DID YOU FIND THE FOLLOWING STRESSFUL?	never	occasionally	frequently	very frequently
15. Feeling inadequately prepared to help with the emotional needs of a patient's family.	1	2	3	4
16. Lack of an opportunity to express to other personnel on the unit my negative feelings toward patients.	1	2	3	4
17. Inadequate information from a physician regarding the medical condition of a patient.	1	2	3	4
18. Being asked a question by a patient for which I do not have a satisfactory answer.	1	2	3	4
19. Making a decision concerning a patient when the physician is unavailable.	1	2	3	4
20. Floating to other units that are short-staffed.	1	2	3	4
21. Watching a patient suffer.	1	2	3	4
22. Difficulty in working with a particular nurse (or nurses) outside the unit.	1	2	3	4
23. Feeling inadequately prepared to help with the emotional needs of a patient.	1	2	3	4
24. Criticism by a supervisor.	1	2	3	4
25. Unpredictable staffing and scheduling.	1	2	3	4
26. A physician ordering what appears to be inappropriate treatment for a patient.	1	2	3	4
27. Too many non-nursing tasks required, such as clerical work.	1	2	3	4
28. Not enough time to provide emotional support to a patient.	1	2	3	4

During the PAST TWO WEEKS, DID YOU FIND THE FOLLOWING STRESSFUL?	never	occasionally	frequently	very frequently
29. Difficulty in working with a particular nurse (or nurses) on the unit.	1	2	3	4
30. Not enough time to complete all of my nursing tasks.	1	2	3	4
31. A physician not being present in a medical emergency.	1	2	3	4
32. Not knowing what a patient or a patient's family ought to be told about the patient's condition and its treatment.	1	2	3	4
33. Uncertainty regarding the operation and functioning of specialized equipment.	1	2	3	4
34. Not enough staff to adequately cover the unit.	1	2	3	4

## Stage of Exercise Scale

**Directions:** Please CHECK the mark on the ladder that best describes your present exercise behavior. “regular exercise” equals three or more days per week for 20 minutes or more each day ( e.g., swim, walk).

**Please indicate the statement that most closely applies to your activity level.**

- I presently exercise on a regular basis and have been doing so for longer than 6 months
- I presently exercise on a regular basis, but I have only begun doing so within the past 6 months
- I presently get some exercise, but not regularly
- I presently do not exercise, but I have been thinking about starting to exercise within the next 6 months.
- I presently do not exercise and do not plan to start exercising in the next 6 months.

## SEVEN-DAY PHYSICAL ACTIVITY SURVEY

1. Please circle the number of all activities listed below that you have done except for physical education classes in the past 7 days (e.g. Today is Wednesday. The period will be from last Wednesday to this Tuesday), and then estimate the average amount of time and intensity in that activity. Try your best to be as accurate as possible.

## Example:

Physical Activity	Number of times							Average minutes actually spent on each time							Perceived intensity		
	1	2	3	4	5	6	Other	≤ 10	10-19	20-29	30-39	40-49	50-59	Other	Easy	Moderate	Hard
1. Basketball	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
2. Baseball	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
3. Badminton	1	2	3	4	5	6	_____	1	2	3	4	5	6	70	1	2	3

- \*Perceived Intensity: Easy— A small increase in heart rate or breathing.  
 Moderate— A moderate increase in heart rate or breathing, some perspiration.  
 Hard— A large increase in heart rate or breathing, heavy perspiration.

Physical Activity	Number of times							Average minutes actually spent on each time							Perceived intensity		
	1	2	3	4	5	6	Other	≤ 10	10-19	20-29	30-39	40-49	50-59	Other	Easy	Moderate	Hard
1. Basketball	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
2. Baseball	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
3. Badminton	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
4. Soccer	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
5. Softball	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
6. Volleyball	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
7. Table Tennis	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
8. Tennis	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
9. Jogging	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
10. Roller Skating	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
11. Ice Skating	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
12. Skateboarding	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
13. Weight Training	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
14. Martial Arts	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
15. Bowling	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
16. Hiking	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
17. Swimming	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
18. Dancing	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
19. Bicycling	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
20. Walking	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
21. Chores	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
22. Other	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3
23. Other	1	2	3	4	5	6	_____	1	2	3	4	5	6	_____	1	2	3

2. On the average, how much time did you spend watching TV per day for the past seven days?  
 \_\_\_\_\_ Hours \_\_\_\_\_ Minutes.

## SF36 Health Survey

**INSTRUCTIONS:** This set of questions asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. Answer every question by marking the answer as indicated. If you are unsure about how to answer a question please give the best answer you can.

1. In general, would you say your health is: (Please tick **one** box.)

Excellent   
 Very Good   
 Good   
 Fair   
 Poor

2. Compared to one year ago, how would you rate your health in general now? (Please tick **one** box.)

Much better than one year ago   
 Somewhat better now than one year ago   
 About the same as one year ago   
 Somewhat worse now than one year ago   
 Much worse now than one year ago

3. The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much? (Please circle **one** number on each line.)

Activities	Yes, Limited A Lot	Yes, Limited A Little	Not Limited At All
3(a) <b>Vigorous activities</b> , such as running, lifting heavy objects, participating in strenuous sports	1	2	3
3(b) <b>Moderate activities</b> , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	1	2	3
3(c) Lifting or carrying groceries	1	2	3
3(d) Climbing <b>several</b> flights of stairs	1	2	3
3(e) Climbing <b>one</b> flight of stairs	1	2	3
3(f) Bending, kneeling, or stooping	1	2	3
3(g) Walking <b>more than a mile</b>	1	2	3
3(h) Walking <b>several blocks</b>	1	2	3
3(i) Walking <b>one block</b>	1	2	3
3(j) Bathing or dressing yourself	1	2	3

4. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health? (Please circle **one** number on each line.)

	Yes	No
4(a) Cut down on the <b>amount of time</b> you spent on work or other activities	1	2
4(b) Accomplished less than you would like	1	2
4(c) Were <b>limited</b> in the <b>kind</b> of work or other activities	1	2
4(d) Had <b>difficulty</b> performing the work or other activities (for example, it took extra effort)	1	2

5. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (e.g. feeling depressed or anxious)? (Please circle **one** number on each line.)

	Yes	No
5(a) Cut down on the <b>amount of time</b> you spent on work or other activities	1	2
5(b) Accomplished less than you would like	1	2
5(c) Didn't do work or other activities as <b>carefully</b> as usual	1	2

6.	During the <u>past 4 weeks</u> , to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups? (Please tick <b>one</b> box )						
	Not at all	<input type="checkbox"/>					
	Slightly	<input type="checkbox"/>					
	Moderately	<input type="checkbox"/>					
	Quite a bit	<input type="checkbox"/>					
	Extremely	<input type="checkbox"/>					
7.	How much <u>physical</u> pain have you had during the <u>past 4 weeks</u> ? (Please tick <b>one</b> box.)						
	None	<input type="checkbox"/>					
	Very mild	<input type="checkbox"/>					
	Mild	<input type="checkbox"/>					
	Moderate	<input type="checkbox"/>					
	Severe	<input type="checkbox"/>					
	Very Severe	<input type="checkbox"/>					
8.	During the <u>past 4 weeks</u> , how much did <u>pain</u> interfere with your normal work (including both work outside the home and housework)? (Please tick <b>one</b> box.)						
	Not at all	<input type="checkbox"/>					
	A little bit	<input type="checkbox"/>					
	Moderately	<input type="checkbox"/>					
	Quite a bit	<input type="checkbox"/>					
	Extremely	<input type="checkbox"/>					
9.	These questions are about how you feel and how things have been with you <u>during the past 4 weeks</u> . Please give the one answer that is closest to the way you have been feeling for each item.						
	(Please circle one number on each line.)						
		All of the Time	Most of the Time	A Good Bit of the Time	Some of the Time	A Little of the Time	None of the Time
9(a)	Did you feel full of life?	1	2	3	4	5	6
9(b)	Have you been a very nervous person?	1	2	3	4	5	6
9(c)	Have you felt so down in the dumps that nothing could cheer you up?	1	2	3	4	5	6
9(d)	Have you felt calm and peaceful?	1	2	3	4	5	6
9(e)	Did you have a lot of energy?	1	2	3	4	5	6
9(f)	Have you felt downhearted and blue?	1	2	3	4	5	6
9(g)	Did you feel worn out?	1	2	3	4	5	6
9(h)	Have you been a happy person?	1	2	3	4	5	6
9(i)	Did you feel tired?	1	2	3	4	5	6
10.	During the <u>past 4 weeks</u> , how much of the time has your <u>physical health or emotional problems</u> interfered with your social activities (like visiting with friends, relatives etc.) (Please tick <b>one</b> box.)						
	All of the time	<input type="checkbox"/>					
	Most of the time	<input type="checkbox"/>					
	Some of the time	<input type="checkbox"/>					
	A little of the time	<input type="checkbox"/>					
	None of the time	<input type="checkbox"/>					
11.	How TRUE or FALSE is <u>each</u> of the following statements for you?						
	(Please circle one number on each line.)						
		Definitely True	Mostly True	Don't Know	Mostly False	Definitely False	
11(a)	I seem to get sick a little easier than other people	1	2	3	4	5	
11(b)	I am as healthy as anybody I know	1	2	3	4	5	
11(c)	I expect my health to get worse	1	2	3	4	5	
11(d)	My health is excellent	1	2	3	4	5	

## Demographic Information

Please CHECK the blank that is applicable to you.

1. Gender: Female Male
2. Age: \_\_\_\_\_ Years Old (in Lunar Calendar)
3. Highest degree:
 

<input type="checkbox"/> Diploma	<input type="checkbox"/> Associate's Degree	<input type="checkbox"/> Bachelor's Degree
<input type="checkbox"/> Master's Degree	<input type="checkbox"/> Doctoral Degree	
4. Are you also a student in nursing school now? Yes No  
If YES, what degree are you studying for? \_\_\_\_\_
5. \_\_\_\_\_ Years of Experience as a nurse
6. \_\_\_\_\_ Years of Experience as a nurse in this nursing unit
7. What is your job title? N1 N2 N3 N4 Other, please specify \_\_\_\_\_
8. What nursing license do you have? LVN RN
9. What specialty do you currently work?
 

<input type="checkbox"/> ICU settings	<input type="checkbox"/> Internal medicine
<input type="checkbox"/> OB/GYN	<input type="checkbox"/> Surgery
<input type="checkbox"/> Pediatric	<input type="checkbox"/> Emergency Department
<input type="checkbox"/> Cardiology	<input type="checkbox"/> Psychiatric setting
<input type="checkbox"/> Oncology	<input type="checkbox"/> Other, please specify _____
10. In the past two weeks, how many days did you work at each shift?  
Day Shift: \_\_\_\_\_ days Evening Shift: \_\_\_\_\_ days Night Shift: \_\_\_\_\_ days
11. How many patients did you care at each shift?  
Day Shift: \_\_\_\_\_ patients Evening Shift: \_\_\_\_\_ patients Night Shift: \_\_\_\_\_ patients
12. Average overtime: \_\_\_\_\_ hour(s)/per shift
13. Marital Status: Single Married Divorced  
Separated Widowed Other
14. Do you have children? Yes No
12. Average overtime: \_\_\_\_\_ hour(s)/per shift
13. Marital Status: Single Married Divorced  
Separated Widowed Other
14. Do you have children? Yes No

## Appendix Q

## Questionnaires (Chinese)

## 工作壓力問卷表

以下是一些時常發生在醫院中的情況。請仔細地閱讀，並針對每一個情況在過去兩週中使您覺得有壓力的頻率，圈選一個最適切的答案。

在過去兩週中，下列情況是否令您覺得有壓力？

	從未	有時	常常	非常頻繁
1. 電腦故障	1	2	3	4
2. 被醫師批評	1	2	3	4
3. 執行會讓病人疼痛的處置	1	2	3	4
4. 對於病情沒有改善的病人覺得無助	1	2	3	4
5. 與護理主管有衝突	1	2	3	4
6. 傾聽或與病人談論他/她即將死亡的事	1	2	3	4
7. 缺乏機會與其它單位的人員公開地談論病房的問題	1	2	3	4
8. 病人過世	1	2	3	4
9. 與醫師有衝突	1	2	3	4
10. 害怕在治療病人時犯錯	1	2	3	4
11. 缺乏機會與單位的其它人員分享經驗及感覺	1	2	3	4
12. 與您關係密切的病人死亡	1	2	3	4
13. 當病人死亡時醫師不在場	1	2	3	4
14. 不同意病人的治療	1	2	3	4
15. 在幫助病人家屬情緒的需求時，覺得自己準備不足	1	2	3	4
16. 缺乏機會跟單位的其它人員表達對病人負面的感受	1	2	3	4
17. 從醫師那裡所得到的病人醫療情況的資料不足	1	2	3	4
18. 對病人提出的問題我無法給予滿意的答案	1	2	3	4



以下是一些時常發生在醫院中的情況。請仔細地閱讀，並針對每一個情況在過去兩週中使您覺得有壓力的頻率，圈選一個最適切的答案。

	從未	有時候	常常	非常頻繁
<u>在過去兩週中</u> ，下列情況是否令您覺得有壓力？				
19. 當醫師沒空時做涉及到病人的決定	1	2	3	4
20. 輪調到缺乏護理人員的單位支援	1	2	3	4
21. 看著病人受苦	1	2	3	4
22. 很難與單位以外的某特定護理人員(們)一起工作	1	2	3	4
23. 在幫助病人情緒的需求時，覺得自己準備不足	1	2	3	4
24. 被護理長批評	1	2	3	4
25. 護理人力及排班無法預測	1	2	3	4
26. 醫師所開立的醫囑對病人的治療並不恰當	1	2	3	4
27. 需要做太多非護理的工作例如書記或抄寫的工作	1	2	3	4
28. 沒有足夠時間提供病人情緒上的支持	1	2	3	4
29. 很難與單位中的某一位特定護理人員(們)一起工作	1	2	3	4
30. 沒有足夠時間去完成我所有的護理工作	1	2	3	4
31. 在醫療緊急情況時醫師不在場	1	2	3	4
32. 不知道病人的哪些情況及治療是必須告知病人或者他的家屬	1	2	3	4
33. 對於特殊儀器的操作及功能不確定	1	2	3	4
34. 單位內沒有足夠的護理人員	1	2	3	4

## 運動週期間卷

以下所稱的「規律運動」是指每個禮拜至少運動3次，每次至少20分鐘以上。

一、您目前從事「規律運動」的情形？(請勾選一個適合的答案)

- ①我目前從事規律運動已經超過6個月以上的時間
- ②我目前正在從事規律運動，但還未滿6個月
- ③我目前有運動，但沒有規律
- ④我目前沒有運動，但我打算在未來6個月內開始運動
- ⑤我目前沒有運動，在未來6個月內也不打算運動

## 一週運動參與問卷

1. 最近一週(例如今天是星期四,則指上星期四到本星期三為止),除了體育課除以外,您在空閒時間(如上學前,下課時間,放學後,假日),曾從事的體能活動項目有那些?請將它們的代號圈起來,如果您從事的活動不在下列項目,請填入22-23(其他)欄,然後儘可能正確的估計次數,平均活動時間,活動強度,在適當的代號畫“○”,假如您的活動次數,時間超出表列範圍,請以數字填入其他欄。  
範例:

體能活動項目	活動次數							平均活動時間(分鐘) (扣除中斷及休息時間)							活動強度		
	1	2	3	4	5	6	其他	≤10	10-19	20-29	30-39	40-49	50-59	其他	輕度	中度	激烈
①籃球.....	1	②	3	4	5	6	.....	1	2	③	4	5	6	.....	1	2	③
2.棒球.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
③羽毛球.....	①	2	3	4	5	6	.....	1	2	3	4	5	6	70.....	1	②	3

\*運動強度說明:  
 1.輕度:心跳,呼吸次數稍微增加,未達明顯感覺程度。  
 2.中度:心跳,呼吸次數中度增加,達明顯感覺程度,有點流汗。  
 3.激烈:心跳,呼吸次數大幅度增加,大量流汗。

體能活動項目	活動次數							平均活動時間(分鐘) (扣除中斷及休息時間)							活動強度		
	1	2	3	4	5	6	其他	≤10	10-19	20-29	30-39	40-49	50-59	其他	輕度	中度	激烈
1.籃球.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
2.棒球.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
3.羽毛球.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
4.足球.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
5.壘球.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
6.排球.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
7.桌球.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
8.網球.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
9.慢跑.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
10.滑輪鞋.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
11.溜冰(冰刀).....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
12.滑板.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
13.重量訓練.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
14.武術.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
15.保齡球.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
16.爬山.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
17.游泳.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
18.跳舞.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
19.騎腳踏車.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
20.步行.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
21.做家事.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
22.其他.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3
23.其他.....	1	2	3	4	5	6	.....	1	2	3	4	5	6	.....	1	2	3

2. 過去一週,我平均一天看電視約 \_\_\_\_\_小時 \_\_\_\_\_分鐘。

## SF36 健康狀況問卷

1. 一般來說，您認為您目前的健康狀況是：
- 極好的     很好     好     普通     不好
2. 和一年前比較，您認為您目前的健康狀況是，比一年前：
- 好很多     好一些     差不多     差一些     差很多
3. 在過去一個月內，您是否曾因為身體健康問題，而在工作或其他日常活動方面有下列任何的問題？
- a. 做工作或其他活動的時間減少..... 是  否
- b. 完成的工作量比您想要完成的較少..... 是  否
- c. 做工作或其他活動的種類受到限制..... 是  否
- d. 作工作或其他活動有困難(例如，需要吃力)..... 是  否
4. 在過去一個月內，您是否曾因為情緒上的問題(如沮喪或焦慮)，而在工作或其他日常活動方面有下列的問題？
- a. 做工作或其他活動的時間減少..... 是  否
- b. 完成的工作量比您想要完成的較少..... 是  否
- c. 做工作或其他活動時不如以往小心..... 是  否
5. 在過去一個月內，您的健康或情緒問題，對您與家人、朋友、鄰居或社團間的平常活動的妨礙程度如何？
- 完全沒有妨礙     有一點妨礙     中度妨礙     相當多妨礙     妨礙到極點
6. 以下問題是想了解您對周遭生活的感受。請問在過去一個月以來有多少時候...
- |                           | 一直都是                     | 大部分時候是                   | 經常                       | 有時                       | 很少                       | 從不                       |
|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| a. 您覺得充滿活力? .....         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. 您是一個非常緊張的人? .....      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. 您覺得非常沮喪，沒有任何事可以讓您高興起來? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. 您覺得心情平靜? .....         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e. 您覺得精力充沛? .....         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| f. 您覺得悶悶不樂和憂鬱? .....      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| g. 您覺得精疲力竭? .....         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| h. 您是一個快樂的人? .....        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| i. 您覺得累? .....            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
7. 在過去一個月內，您身體健康或情緒問題有多少時候會妨礙您的社交生活(如拜訪親友)？
- 一直都會     大部分時間會     有時候會     很少會     從不會
8. 以下各個陳述，對您來說有多正確？
- |                              | 完全正確                     | 大部份正確                    | 不確定                      | 大部分不正確                   | 完全不正確                    |
|------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| a. 我好像比別人容易生病。.....          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. 和任何一個我認識的人相比，我和他們一樣健康。... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. 我想我的健康會越來越壞。.....         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. 我的健康狀況好得很。.....           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
9. 在過去一個月內，您總共請了幾天病假(或因為身體不適而無法工作)？
- 0天     1-2天     3-5天     6-10天     10天以上

## 個人基本資料

請勾選或回答下列有關於您個人的基本資料

1. 性別：女性      男性
2. 年齡：\_\_\_\_\_足歲（以農曆計算）
3. 教育程度：
  - 高職       專科（包含五專、二專及三專）       大學（包含二技及四技）
  - 碩士       博士
4. 您目前也在唸護理在職進修班嗎？是      不是  
如果是，您目前是進修那一種學位？\_\_\_\_\_
5. 臨床護理工作總年資：\_\_\_\_\_年\_\_\_\_\_月
6. 目前單位護理年資：\_\_\_\_\_年\_\_\_\_\_月
7. 職級：N1    N2    N3    N4    其他，請註明\_\_\_\_\_
8. 護理執照：護士      護理師
9. 目前在什麼科別工作：
 

<input type="checkbox"/> 加護病房	<input type="checkbox"/> 內科病房
<input type="checkbox"/> 婦科/產科病房	<input type="checkbox"/> 外科病房
<input type="checkbox"/> 小兒科病房	<input type="checkbox"/> 急診
<input type="checkbox"/> 心臟科	<input type="checkbox"/> 精神科病房
<input type="checkbox"/> 腫瘤病房	<input type="checkbox"/> 其他，請註明_____
10. 在過去兩週中，每一種班別，平均上幾天班？
 

白班：_____天	小夜班：_____天	大夜班：_____天
-----------	------------	------------
11. 每一種班別平均照顧幾位病人？
 

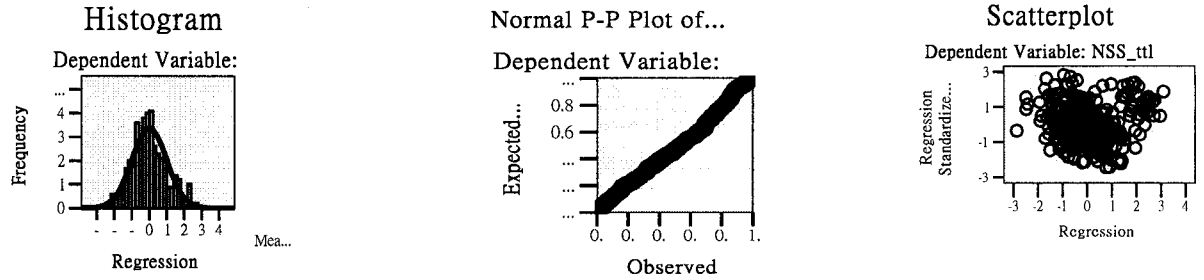
白班：_____位病人	小夜班：_____位病人	大夜班：_____位病人
-------------	--------------	--------------
12. 是否常延後下班？是      不是      每次平均延後\_\_\_\_\_小時下班
13. 婚姻狀況：單身      已婚      離婚  
分居      喪偶      其他，請註明\_\_\_\_\_
14. 您有小孩嗎？有      沒有  
分居      喪偶      其他，請註明\_\_\_\_\_
14. 您有小孩嗎？有      沒有

Appendix R

The Scatterplot of the Standardized Residuals

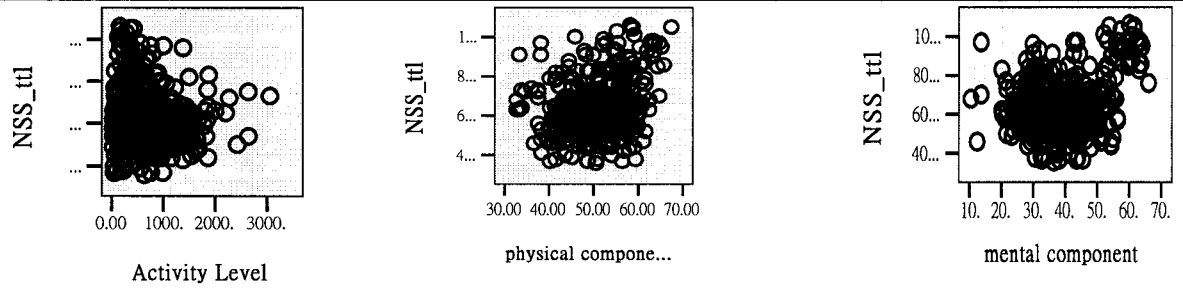
Assumptions Testing

The Scatterplot of the Standardized Residuals and Normal Probability Plot by Nursing Stress Scale, 7-Day Physical Activity Questionnaire and the SF- 36 Health Survey



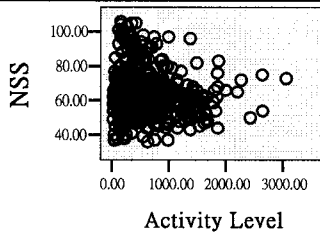
Q1

The Scatterplot of the Standardized Residuals by Nursing Stress Scale, 7-Day Physical Activity Questionnaire, and Health Status



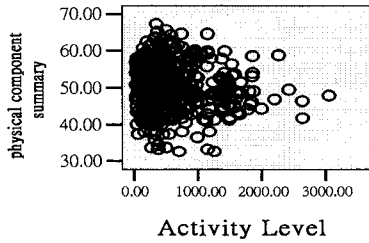
Q2

The Scatterplot of the Standardized Residuals by Nursing Stress Scale, 7-Day Physical Activity Questionnaire



Q3

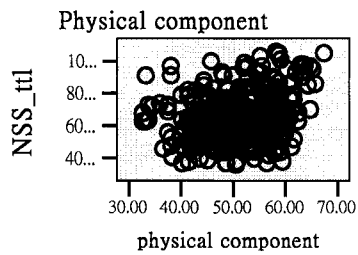
The Scatterplot of the Standardized Residuals by Nursing Stress Scale, 7-Day Physical Activity Questionnaire, and Health Status



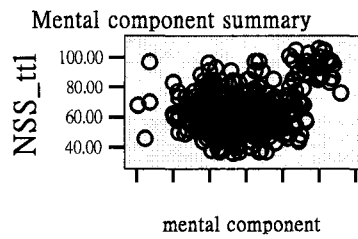
Q9

The Scatterplot of the Standardized Residuals by Nursing Stress Scale and the Physical and Mental Component of Health Status

Nursing Stress Scale



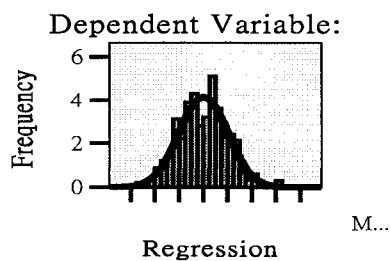
Nursing Stress Scale



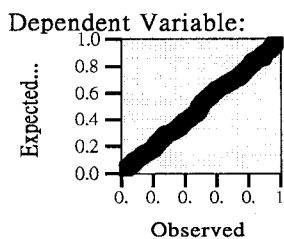
Q10

The Scatterplot of the Standardized Residuals and Normal Probability Plot by and the Physical Health Status and Mental Health Status

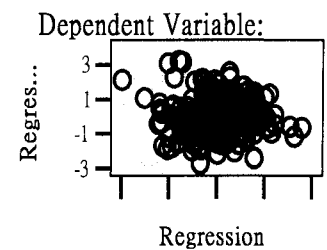
Histogram



Normal P-P Plot of...

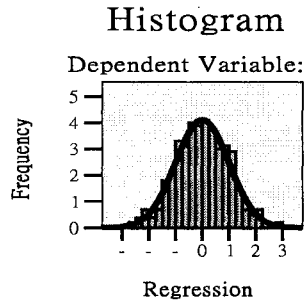


Scatterplot



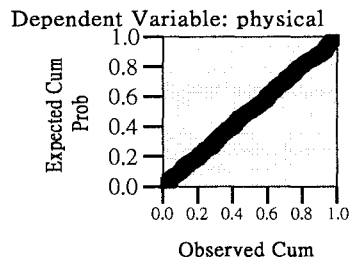
Q11

The Scatterplot of the Standardized Residuals and Normal Probability Plot by Nursing Stress Scale and the Health Status

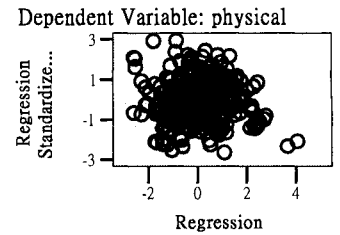


Mea...

Normal P-P Plot of Regressi...

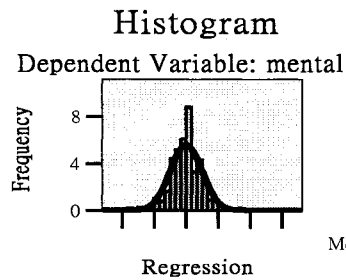


Scatterplot



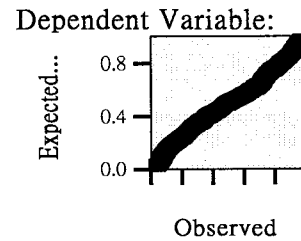
Q12

The Scatterplot of the Standardized Residuals and Normal Probability Plot by Physical Health and the Mental Health

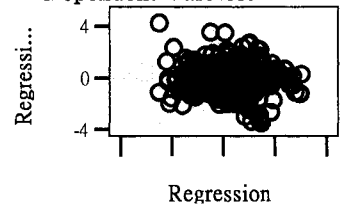


Mea...

Normal P-P Plot of...

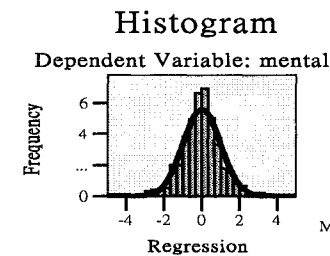


Scatterplot  
Dependent Variable: Regression



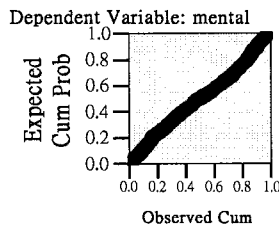
Q13

The Scatterplot of the Standardized Residuals and Normal Probability Plot by Nursing Stress Scale and the Health Status

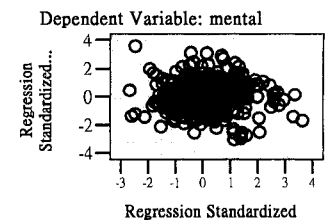


Mea...

Normal P-P Plot of Regression...



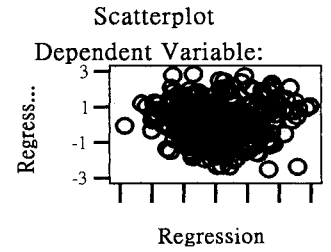
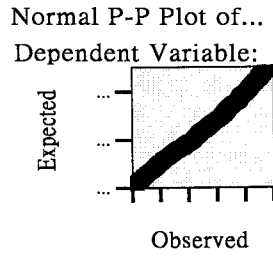
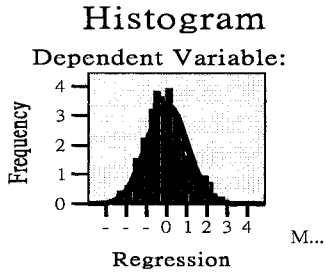
Scatterplot





Q15

The Scatterplot of the Standardized Residuals and Normal Probability Plot by Nursing Stress Scale and the Health Status



Q16

The Scatterplot of the Standardized Residuals and Normal Probability Plot by Nursing Stress Scale and Physical Activity Participation

