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壓力與護理失誤之關聯性研究－專業倫理的調節角色

The Relationship between Stress and Nursing Errors: The Moderating Role of Professional Ethics

許金田[1] Chin-Tien Hsu
銘傳大學 諮商與工商心理學系
Department of Counseling and Industrial/Organizational Psychology, Ming Chuan University.

摘要：在醫院組織中，護理人員的壓力一直是深受關注的議題。本研究主要探討壓力與護理失誤之間的關係，並檢視專業倫理在此關係中所扮演的調節角色。本研究透過問卷調查法針對台灣地區醫院之專業護理人員進行研究，共獲得有效樣本494份。研究結果發現，兩種不同之壓力源(攸關工作壓力與非攸關工作壓力)均會對護理失誤產生正向影響；此外，專業倫理對攸關工作壓力與護理失誤間的關係具有調節效果，亦即當專業倫理較高時，悠關工作壓力與護理失誤之間的正向關係會被減弱，但對於非攸關工作壓力與護理失誤間關係的調節效果則不顯著，此研究結果拓展了目前壓力與護理失誤相關的文獻。最後，討論本研究的研究限制及未來研究方向。
關鍵詞：壓力；護理失誤；專業倫理

Abstract: The nurses' stress is an important issue in the hospital organizations. This study examines the process linking the relationship between stress and

[1] Corresponding author: Department of Counseling and Industrial Organizational Psychology, Ming Chuan University. Taoyuan County, Taiwan,,E-mail:cthsu@mail.mcu.edu.tw
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nursing errors by focusing on the moderating role of professional ethics. This study adopts the questionnaire and used 494 hospital-based nursing staff in Taiwan. Results demonstrate that two forms of stress (work related and non-work related) are both positively related to nursing errors. In addition, professional ethics moderates the relationship between work related stress and nursing errors, such that the relationship is weaker when nursing staff with the higher professional ethics. However, professional ethics does not interact with non-work related stress to predict nursing errors. This study contributes to the literature on the relationship among stress, professional ethics, and nursing errors. Finally, the limitations of the research are discussed and suggestions for further research are proposed.

Keywords: Stress; Nursing errors; Professional ethics

1. Introduction

Patient safety has long been an issue of concern in the medical industry (Johnstone, 2007). According report titled: "*To err is human, building a safer health system*", published by the Institute of Medicine (IOM) in 2000, medical errors account for more than 98,000 deaths annually in the U.S.; moreover, 58 % of these deaths could have been avoided (Stock, McFadden, and Gowen, 2006). This data indicates that medical errors present a tremendous threat to patient safety. Research argued that highly complex and variable care environments are the most prone to medical errors (Narumi *et al.*, 1999). In such an environment, professional nursing staff plays a crucial role in monitoring patient safety through their frequent contact with patients (Woods and Doan-Johnson, 2002). Thereby, understanding medical errors and the reasons behind for their occurrence is critical in academic research and the practice of healthcare management.

It is important to address the ways by which professional nursing staff produces nursing errors. Previously in clinical practice, medical errors have been attributed to insufficient educational training or violations of discipline. However, senior policy makers Welker-Hood (2006) at the American Nurses Association (ANA) addressed that environmental stress is a primary reason of medical errors.

To further investigate this concept, we performed a review of past literature, and discovered that the literature attributes nursing errors mainly to the nursing staff's lack of knowledge and skills (Leape, 1994; Pelletier, 2001). Though some research has been done on the topic of the stress induced by the environment (Welker-Hood, 2006). Thus the goal of this research is to deepen our understanding of how stress from external environment influences nursing errors produced by professional nursing staff.

In addition, previous studies have focused on the relationship between stress on nursing staff and their performance. Lue *et al.* (2010) indicated that stress, individual character, and emotion directly influence individual burnout. Study targeting Japanese nursing staff also stated that heavy work stress leads to a decline in nursing quality and an elevation in medical risk (Ida *et al.*, 2009). In fact, they explained the effects of stress on individual performance; however, they did not consider the other possible influences of situational factors. Moreover, Baer and Oldham (2006) examined the relationship between stress and performance by focusing individual character and organizational support as moderators. While there is a strong assumption of a link between stress and performance, little empirical evidence has been found to establish a direct relationship between stress of professional nursing staff and their nursing errors.

Among the various situational variables, it is vital to determine moderating variables that affect stress and nursing errors. Bellizzi (2006) and Chen, Pan, and Pan (2009) believed that an individual sense of morality and ethical beliefs are important moderators. Kelly (2010) also discovered that for military nurses, professional ethics can moderate the influence of intense battlefield stress on nursing quality. In other words, in a social environment that emphasizes professionalism, for professional nursing staff that possess special knowledge and skills, their level of belief in professional ethics might affect the relationship between the stress they perceive and their behavior.

However, studies regarding professional ethics mainly focused on its conceptual aspects and descriptive explanations of its importance (Huang, 1996; Jiang, Chen, and Su, 2006; Wang and Chen, 2003; Yeh, 2000). Empirical studies rarely discussed the level of belief in professional ethics. Thereby, this study

considers the nursing staff attitude in professional ethics as a moderator to further understand the relationship between stress and nursing errors. In short, this study hopes to investigate the belief of nursing staff in professional ethics, and its moderating effect on the correlation between stress and nursing errors produced.

Based on the above discussion, this study sets out to investigate two aspects: first, to discuss the relationship between stress in nursing staff and nursing errors; and second, to examine the moderating effect of nursing staff beliefs in professional ethics on the relationships between stress and nursing errors. This study wishes to produce evidence resulting from empirical research to serve as a direction for the improvement of hospital strategies for reducing nursing errors. In addition, hospitals can also understand the stress perceived by current professional nursing staff and their beliefs in professional ethics. Based on this, hospitals will be able provide appropriate assistance and facilitate improvement, in turn promoting the nursing quality of professional staff and providing patients with a safer medical environment.

2. Literature Review

2.1. Stress

Lyon and Werner (1987) indicated that stress can have various definitions. Stress can be considered as a stimulus, a response, or a transaction. In studies related to stress, Lazarus (2000) mentioned that stress is a result of an individual transaction of cognitive appraisal. It is co-initiated by events or thoughts that stimulate stress formulation, responses to stress and stimulation, and environmental factors (Benoliel *et al.*, 1990). Numerous studies tended to define stress from a transactional perspective (Lazarus, 2000; Tsai and Chen, 1996).

Stress is a subjective, individual psychological feeling that is determined by how an individual interprets his/her relationship with the environment. When employees are asked to handle requests (either work related or non-work related) that exceed their individual capacity, they feel a sense of conflict, displeasure, or

physical/psychological burden; this in turn leads to stress (Lazarus, 2000). This is a long-term accumulative process that may continue to exist (Nia, 2001). Jones *et al.* (1988) also argued that the stress employees feel not only includes work-related stress, but also stress from personal events (non-work related). The stress that they perceive may derive from a high stress occupation or organization, dissatisfaction with job contents or workplaces, and stressful life events unrelated to work. Therefore, in practice, the stress that an organization's members feel is not solely derived from work, but can also result from personal affairs unrelated to work. This stress can affect both an individual's psychological feelings and external behaviors.

Moreover, as health care systems change rapidly, advanced equipment and information result in complex nurse-patient relationships. Nursing staff are therefore often in environments under high stress. In addition, nurses account for the majority of staff in a health care system, serving as the main workers in hospitals. Their jobs are wide-ranging and highly complex, their working hours are irregular, and they are often required to play alternative roles and make various decisions when confronting different situations (Anderson, 2002). They constantly need to cope with sources of stress that are unique to their job (Benoeil *et al.,* 1990), and need to withstand tremendous loads of stress (Happell, Pinikahana, and Martin, 2003; Peng, Liu, and Chang, 2003; Tsai and Chen, 1996; Welker-Hood, 2006).

It is important to identify the factors that induce stress in professional nursing staff. From stress studies targeting clinical nursing staff, the following five sources can be concluded: (1) personal reactions, indicating that stress derives from combined physical, cognitive, and emotional responses; (2) personal concerns, indicating that stress is derived from the feeling of encroachment by other players (for example, doctors, patients, and patients, doctor members), in which nursing staff need to emphasize their individual value; (3) work concerns, indicating that stress occurs when an individual needs to focus on his/her required work goals even when facing the influence from others; (4) role competence, indicating that stress originates with an individual's satisfaction with his/her individual or professional behavior; and (5) work completion concerns, indicating

that an individual derives stress from being requested to fulfill requirements beyond his/her typical work duties (Benoliel *et al.,* 1990).

Professional nursing staff with several years of clinical experience express agreement with the above explanations, as they quite accurately reflect actual situations in clinical practice (Tsai and Chen, 1996). To further understand the stress felt by current professional nursing staff, Tsai and Chen (1996) developed a stress scale designed for Taiwan nurses to test and evaluate the stress that they feel. The results indicated that the four major factors (all resulting from the interaction between an individual and the environment) which influence the formation of stress in this target population are: (1) personal reaction, indicating that stress derives from the physical, psychological, cognitive, and emotional responses of nursing staff; (2) work concerns, indicating that stress is derived from communication issues related to the patient, doctor, or patient from com members, personal expectations of professionalism, and the evaluation of health care systems when nursing staff were tending to patient care; (3) work competence, indicating that stress originates from the requirements of nursing staff to fulfill professional and personal capabilities; and (4) the inability to complete personal tasks, indicating that nursing staff derive stress from their personal or household obligations unrelated to work, in addition to their normal work duties. Among these items, this study categorizes work concern and work competence into work-related stress, while personal reaction and the inability to complete personal tasks are categorized as non work-related stress.

Some researchers argued that different sources of stress exerted different influences on personal performance. When stress sources are hindrance-oriented (for instance in job ambiguity), it causes negative effects on job performance; when stress sources are challenge-oriented (such as time stress), this possibly results in positive effects on job performance (LePine, Podsakoff, and LePine, 2005). Studied indicated that there is a non-linear correlation between stress and performance (Yerkes and Dodson, 1908; Robbins and Judge, 2011). Some studies argued the relationship between stress and performance to be constantly inconsistent (Hunter and Thatcher, 2007). However, previous studies reported that the effects of stress on individual performance are mostly negative (Motowidlo,

Packard, and Mannig, 1986; Frankenhaeuser, 1991; McGowan, 2001), inducing unhealthy physical and psychological symptoms (Matheny, Gfroerer, and Harris, 2000; Elangovan, 2001; Tian and Wang, 2005), leading the individual to feel unsatisfied in their work (Burke, 2001), increasing his/her intentions to quit (Şenol-Durak, Durak, and Gençöz, 2006), reducing work performance (Şenol-Durak *et al.,* 2006; Mohr and Puck, 2007), and so forth. Bourbonnais, Comeau, and Vezina (1999) have also suggested that stress can cause mental illnesses, which can be identified through an individual's behavior and responses; stress can furthermore cause negative effects on work productivity (Hollen *et al.*, 2000). Studies also distinctly indicated that stress among nursing staff is often the reason for their low work satisfaction and organization commitment, and higher absenteeism and quitting rates (Hollen *et al.,* 2000). These factors can indirectly affect the nursing quality that they offer. Therefore, in conclusion, stress can cause both physical and psychological discomfort in an individual, which can in turn exert negative effects on an individual's behavior at work, causing members of an organization to perform below expectations (for instance, by committing medical errors) (Williams *et al.*, 2002; Hollen *et al.,* 2000; Şenol-Durak *et al.,* 2006; Mohr and Puck, 2007).

2.2. Nursing Errors

Perrow (1984) indicated that 70% of accidents are the result of human error. Moreover, the field most prone to these errors is the nursing industry (Narumi *et al.,* 1999). Errors include any type of behaviors that deviate from established, requested, or expected criteria, which in turn cause unnecessary or unfavorable time delays, difficulties, problems, accidents, or failure. According to the definition of an error by the IOM, an error is the result of non-compliance with planned actions, or implementing incorrect plans to achieve expected results (Dimant, 2001). Therefore, any unexpected behavior and negative results produced can be defined as an error (Stock *et al.,* 2006). Nursing errors indicate unplanned accidents (for instance, incorrect judgments) caused by professional nursing staff and events that may adversely affect patient safety and nursing quality (Johnstone and Kanitsaki, 2006). Therefore, the errors produced by

professional nursing staff may not only affect patients, their families, other nursing staff, and the health care system as a whole; but they can also increase medical costs and induce the waste of resources (Blendon *et al.*, 2002), and furthermore jeopardize the quality of a hospital's medical care (Meaney, 2004). Thus, preventing or reducing the errors produced by professional nursing staff is a critical issue for health services management (Woods and Doan-Johnson, 2002).

As for the factors that can lead to nursing errors, according to 21 disciplinary cases from 9 national nursing committees in the U.S., there a total of eight categories of nursing errors (which are all produced during systemic operations and practice) (Woods and Doan-Johnson, 2002):

(1)Lack of attentiveness, which indicates that patient safety depends on the complete concentration of nursing staff on the patient's clinical responses and sources of danger during treatment; when nursing staff cannot focus at work, nursing errors tend to occur. For instance, when the number of patients increases, it reduces the ability of nursing staff to treat each patient attentively, which might result in nursing errors due to negligence.

(2)Lack of agency/fiduciary concern, which indicates that there is a fiduciary relationship between professional nursing staff and patients. When the professional knowledge, skills, and care of professional nursing staff cannot obtain the trust of patients and their family members, nursing errors tend to occur. For instance, when nurses fail to notify patients of the inappropriateness of a doctor's orders, nursing errors due to negligence might occur.

(3)Inappropriate judgment, which indicates the case in which professional nursing staff fail to take the patient's actual condition into consideration when making clinical judgments, but instead rely solely on data from medical equipment, further leading to nursing errors. For instance, when a nurse takes notice of an abnormal heart beat in a patient, and fails to identify this problem until it is indicated by a doctor, a nursing error is then produced.

(4)Medication errors, which refer to any nursing errors produced during the medication treatment process attributed to (preventable) improper use of medication, or patient damage that is related to professional medical behavior, health care products, processes, and system. This can happen during the

transcribing of doctor's orders and in the prescription, labeling, packaging, naming, preparation, distribution, administration, patient education, monitoring, and usage of medication. For instance, it includes offering the wrong medication to patients, and failing to administer medication according to the scheduled time.

(5)Lack of intervention on the patient's behalf, which indicates nursing errors due to negligence of patients' responses. For instance, a failure to discover that a patient is still bleeding because of negligence in executing a post-operational examination, resulting in a nursing error.

(6)Lack of prevention, which indicates the lack of preventing, to the extent possible, the occurrence of possible complications, therefore endangering the patient and thus resulting in nursing errors. This includes nursing errors such as letting a patient fall, or not offering proper assistance.

(7)Missed or mistaken physician or health care provider orders, which indicate nursing errors attributed to the execution of improper medical procedures or orders, resulting in enormous impacts. This category includes the conducting of incorrect procedures, thereby endangering patients and in turn producing nursing errors.

(8)Documentation errors, which indicate nursing errors due to the incorrect documentation of processes or medication before termination of their tasks. For instance, incorrect documentation which causes a patient to miss a scheduled treatment can therefore result in nursing errors.

The above eight items are categories of nursing errors that have been utilized in previous studies (Benner *et al.*, 2006). This study also references the above-mentioned cases and situations in questionnaire design. Nursing errors are extensive in scope (Inoue and Koizumi, 2004); however, previous studies on nursing errors either introduce them as a single case (Narumi *et al.*, 1999) or focus more on errors related to medication (Davidhizar and Lonser, 2003). To investigate the overall concept of nursing errors, this study does not focus on nursing errors of a certain range (a single case or topic), but instead considers all of the eight factors described above.

2.3. Professional Ethics

Liaschenko and Peter (2004) define "professionals" as those who possess unique personal knowledge, provide altruistic services to the society, and have independent control over their work content and environment. Professionals can also be seen as an exclusive occupational group formed by several workers who utilize specialized, abstract knowledge when completing tasks (Abbott, 1983). Therefore, professional nursing staffs can be categorized as professionals.

Ethics refers to making judgments on what is right and wrong from an ethical perspective serving as a set of behavioral criteria on right and wrong that can be applied in interpersonal interactions (Yang, 2006). Ethics refers to the excellence of human conduct and behavior, and also serves as a standard for determining right from wrong in human relations. Ethics consists of morality, habits, and behavior, which are interactive with each other (Wang and Hung, 2005). Yeh (2000) also viewed ethics as a norm for individual behavior; it has no specific form, but exists everywhere. Ethics do not merely exist in formal specification, but also has an intangible power that can sculpt a personal sense of value. Robbins and Judge (2011) viewed a sense of value as a fundamental belief that takes the form of a certain behavioral mode or tangible final state, and is superior to other contrary or opposing modes or states. Its importance is in its ability to influence an individual's perceptions. Previous studies indicated that the way salespeople treat customers is significantly and positively correlated with their perceptions of ethics (Pettijohn, Pettijohn, and Taylor, 2008). In other words, if an individual originally possess proper beliefs as to right and wrong, they can affect others during interaction, and perform ethical behavior that conforms to those approved by the society.

In an overview of previous studies, it can be discovered that professional ethics has not been clearly defined. White and Wooten (1986) tried to define professional ethics based on theory. They believe that professional ethics includes five fundamental elements: values, norms, science, laws, and ethics. In addition, they indicated that if professional ethics are to be effective, values have form a

part of its core structure, which can in turn affect an individual core in the surrounding environment. Nelson (2006) indicated that most people see professional ethics as a standard of professional behavior which professionals should possess.

However, professional ethics should include more than written regulations, but should be a value that can be internalized. Consistent ethical behavior can only be achieved by integrating professional ethics into the values of professional workers. In other words, in practice, it is thought that professionals should consider the criteria of professional ethics as the essence of their behavior and intentions. These should be complemented with relevant theories for professionals to possess highly independent judgmental capabilities, and combine them with efficient acts to carry out tasks at work. Therefore, professionals (professional nursing staff) should internalize the criteria of professional ethics to form their core values. This induces them to act ethically instead of deviating from ethical standards, and also helps them deliver better performance at work.

2.4. Stress and Nursing Errors

Benoliel *et al.* (1990) indicated that stress causes professional nursing staff to easily commit errors which deteriorate the quality of medical care (Meaney, 2004). Past studies tended to attribute the reason for these nursing errors to education and training issues, or to behavior which violates regulations, and rarely focus on the relationship between stress and nursing errors. In previous studies regarding stress, the homeostatic model indicates that stress is a result of an imbalance between the demands of an environment and response capacity of workers. When this occurs, an individual tends to feel psychological discomfort, which is considered to be "stress". From this perspective, it can be discovered that sources of stress in an individual's environment can cause damage to his/her resources to respond effectively.

When individuals face different sources of stress and take different actions, their concentration is dispersed or diverted; and when the stress that they face exceeds their capability, they feel exhausted (Simpson, 2002), which can easily lead to errors and affect their performance (Ida *et al.*, 2009). No matter whether

the response results are good or bad, the individual's resources would be damaged, causing psychological discomfort. Hollen *et al.* (2000) also indicated that heavy work stress can induce work burnout, restlessness, low ability for adaptation, dissatisfaction with work, and even negligence in patient care and neglectful attitudes or behavior. Previous studies also shown a positive relationship between work stress and burnout (Burke and Richardsen, 2001; Hobfoll and Shirom, 2001; Pinikahana and Happel, 2004; Sardiwalla, VandenSerg, and Esterhuyse, 2007). The latter causes nursing staff to lapse in focus on their work, in turn leading to nursing errors (Williams *et al.*, 2007).

Furthermore, Cohen (1980) indicated that stress from the working environment (work-related stress) and personal affairs (non-work-related stress) both exert adverse effects on an individual's physical, psychological, and emotional aspects, which in turn affects their work performance (Williams *et al.*, 2001), and even results in cases of human error. In addition, Blendon *et al.* (2002) also indicated that the primary reason for medical errors is a heavy work load, stress, and feelings of burnout. Welker-Hood (2006) indicated that stress is the main cause of errors produced by nursing staff; and under long-term and excessive stress loads, they can easily make blunders in their judgment, decisions, and behavior, and result in errors (Jones *et al.*, 1988). Therefore, the stress that professional nursing staff feel exerts a certain level of influence on the errors that they produce. In conclusion, a potential relationship exists between stress and nursing errors. This study therefore deduces that higher levels stress induce professional nursing staff to produce nursing errors. Thus, this study proposed the following:

H1: Work-related stress is positively related to nursing errors.

H2: Non work-related stress is positively related to nursing errors.

2.5. The Moderating Role of Professional Ethics

This study further sets out to understand the role of professional ethics on the relationship between stress (work related and non-work related) and nursing

errors. Thompson (2004) argued that if doctors do not demonstrate appropriate conduct, they are deviating from their professional ethics. Therefore, the practice of professional ethics serves to increase patient safety and reduce medical errors, allowing professionals to provide behavioral guidance for patients, their family members, and their coworkers. Professional ethics are thus the core guidelines for professional nursing staff in performing their daily tasks (Erlen, 2007).

Written codes of professional ethics cannot provide an in-depth impact on the performance of professionals when they are at work, as they do not have these concepts deeply integrated within them, and thus cannot transform them into external behavior. For professionals to deliver expected professional behavior at work, they need to internalize the concepts of professional ethics to form their personal values, thereby they can inhibit any behavior that deviates from that which is expected. According to cognitive theory, the cognition of individuals to facilitate their development and change their behavior is related to ethics. In other words, an individual's behavior is affected by his/her cognitive differences.

Gick (2003) argued that the stronger one's cognition and concept of professional ethics, the more it alters immoral or unethical behavior. Stress coping theory also states that when an individual faces stress, they achieve relief through cognitive evaluation and adaptation. Professional ethics can enhance one's internal resources, allowing one to effectively evaluate the various stress events in the nursing environment, and adapt to alleviate the negative effects caused by stress. In other words, stronger individual beliefs in professional ethics indicate better internalization thereof (Lazarus and Folkman, 1984). This can help reduce a certain amount of incorrect behavior, and thus the performance exhibited would better adhere to expectations in medical care.

Ivancevich and Matteson (1980) also mentioned that in an integrated model of stress and work, the cognitive differences of an individual do in fact affect their cognition of stress and their behavior. In other words, beliefs in professional ethics (an individual's belief also counts as a form of cognition) can affect the stress (work-related and non-work-related) that professional nursing staff feel and the nursing errors that they commit. Previous studies have also indicated that individual characteristics can moderate the relationship between sources of stress

from the external environment and the responses of the individual (Baer and Oldham, 2006). Based on these conclusions, when professional nurses possess stronger beliefs in professional ethics, they can be clearly aware of the expected criteria of their profession; this can result in a lower incidence of nursing errors attributed to heavy stress.

The above results lead to the understanding that the ethics of professional nursing staff can inhibit the effects of stress (work-related and non-work-related) on nursing errors. This study therefore deduces that when professional nursing staff possess stronger beliefs in professional ethics, the positive relationship between stress (work related and non-work related) and nursing errors might be weakened, and vice versa. Thus, this study proposes the following:

H3: Professional ethics moderates the relationship between work-related stress and nursing errors such that professional nursing service staff with high professional ethics, the weaker the relationship between work related stress and nursing errors.

H4: Professional ethics moderates the relationship between non-work-related stress and nursing errors such that professional nursing service staff with high professional ethics, the weaker the relationship between non-work related stress and nursing errors.

3. Method

3.1. Participants and Procedures

The goal of this study is to understand the relationship between the stress faced by professional nursing staff and nursing errors, and examine the moderating effect of professional ethics on this relationship. This study selected clinical nursing staff from 12 hospitals in Taiwan and distributed a questionnaire survey via purposive sampling to collect data. Questionnaire distribution was performed in person (by the researchers of this study). For those distributed in

person, the subject would also be provided with detailed instructions on answering the questionnaire, and also an envelope in which to seal the completed questionnaire. For those that were distributed by representatives, the contact person was provided with detailed instructions on answering the questionnaire prior to distribution, and the subjects were also provided with envelopes in which to seal their completed questionnaires. Completed questionnaires were collected by contact persons and later sent back by mail. A total of 750 questionnaires were distributed, and 537 were returned. Among these, 43 were incomplete; therefore, a total of 494 valid questionnaires were collected (a valid returned rate of 57.3%). As for subject composition, the average age of the subjects was 27.5 years, and the majority of them possessed college/university diplomas (92%). The majority of subjects had 1 to 5 years of working experience (39.5%). Over half of these subjects were unmarried (59.5%) or did not have children (64.9%). As for work places, most of them worked at medical centers (73.0%), and the majority of them served in general wards (47.2%).

3.2. Measures

3.2.1 Stress

This study refers to stress as the feeling in professional nursing staff caused by an inability to cope with external events or stimulations in working environments, which in turn induce psychological discomfort. For stress measurement, this study referred to a stress scale developed by Benoliel *et al.* (1990) which targeted clinical nursing staff, and utilized it to design a stress questionnaire. Back translation was applied in the translation of the stress scale: the scale was translated into Chinese by a researcher, and then translated back to English by another researcher fluent in both languages to exclude any misinterpretations of the original scale (Brislin, 1980).

The questionnaire consisted of questions on both work related and non-work related stress. The former was divided into "work concern" and "work competence", and consisted of 17 questions; for example, "*I find it hard to concentrate.*" and "*I can complete the required nursing tasks.*". The latter was

divided into "personal reaction" and "inability to complete personal work", and consisted of 23 questions; for example, "*I often feel stressed.*" and "*My wardrobe often needs cleaning.*" The entire questionnaire consisted of 40 questions, and applied a 6-point Likert scale (with 1 = Never and 6 = Always) to evaluate the perceptions of stress in professional nursing staff. Higher scores indicated more intense perceptions of stress, and vice versa. As for the internal consistency of the two aspects of this questionnaire, the Cronbach's α values were respectively 0.90 and 0.93.

3.2.2. Nursing Errors

The definition of nursing errors in this study follows concepts introduced by Johnstone and Kanitsaki (2006), which defined them as unplanned accidents produced by professional nursing staff (for instance, incorrect judgment) and events that can negatively affect patient safety and care quality. Nursing errors are difficult to measure in practice. Employees may not provide actual information due to fear of being reported or receiving punishment. Moreover, in an organization, the documentation of erroneous behavior and the frequency with which it occurs is based on the information received when employees are reported or punished; thereby, the actual occurrence of these errors may be underestimated. In addition, aside from the difficulty in obtaining information, different hospitals might also have inconsistent standards regarding their definition of nursing errors. Based on these conditions, Burke (2003) argued that the most appropriate method for accurately evaluating errors produced by nursing staff is to apply an anonymous and self-evaluating form of measurement. This can better reflect actual situations. Previous studies also applied a self-evaluating method in investigating nursing errors; thus, this study has chosen to adopt the same method.

In addition, this study utilized the eight categories of nursing errors defined by 9 national nursing committees from 21 disciplinary cases, which include: lack of attentiveness, lack of agency/fiduciary concern, inappropriate judgment, medication errors, lack of intervention on the patient's behalf, lack of prevention, missed or mistaken physician or health care provider orders, and documentation errors (Woods and Doan-Johnson, 2002). These eight situations serve as

references in designing a questionnaire that targets nursing errors. To take cognitive differences caused by different cultural backgrounds into consideration, aside from asking three highly-experienced nursing staff (experts) to revise the content of the questionnaire, another eight senior nurses with over 10 years experience were asked to evaluate the questionnaire regarding its relevance, importance, and clarity, and the content validity index (CVI) was calculated accordingly. After revision based on the experts' opinions, questions with importance exceeding 3 and a CVI exceeding 0.8 were retained (Schmitt and Noe, 1983). Expert evaluations ranged from 3.5 to 4 points, with an average of 3.76, and the average CVI was 0.96. A total of 16 questions were retained, and a 6 point Likert scale (with 1 = Strongly disagree and 6 = Strongly agree) was applied for evaluation. Higher scores indicated greater possibilities for nursing errors, and vice versa.

Prior to the empirical research, a pretest was conducted with the questionnaire resulting from the revision. A total of 94 valid questionnaires were returned (16 questions x 5 times), and exploratory factor analysis (EFA) was applied to examine the validity. Principal axis factor analysis was applied to extract common factors, and varimax rotation was applied. After EFA, no questions were deleted, and a dimension of nursing errors was established, with a cumulative explained variance of 50.38% and a Cronbach's α value of 0.86. The example question was "*I often ignore patient signs of pain.*", and during official research, the internal consistency of this aspect was assigned a Cronbach's α value of 0.81.

3.2.3. Professional Ethics

Professional ethics in this study refers to the principles of professional nurses in their field. When designing the questionnaire for this study, this study utilized an ethical scale developed by Fry and Damrosch (1994) in measuring professional ethics, and focused on the aspects of "patient care" that were closely related to the nurse-patient relationship described in this scale. The completed questionnaire consisted of 14 questions. As in the stress scale, back translation was performed from English into Chinese (Brislin, 1980). Sample items included "*I maintain*

absolute the confidentiality of patients' confidential matters and privacy." and "*I report any abnormal events that violate ethical standards to the authorities.*" A 6-point Likert scale (with 1 = Strongly disagree and 6 = Strongly agree) was applied to evaluate the level of principles in professional ethics. Higher scores indicated stronger principles, and vice versa. The internal consistency of this scale was assigned a Cronbach's α value of 0.84.

3.2.4. Control Variables

To accurately measure the causal relationship between variables, previous studies were carefully reviewed, and the age, educational background, work experience, marital status, number of children, workplace, and work unit of nursing staff were listed as control variables, as previous studies have indicated that these can potentially affect individual performance and nursing errors (Narumi *et al.,* 1999; Benner *et al.,* 2002; Lee, and Wang, 2002; Stock *et al.,* 2006).

Due to difficulties in collection and the paired sampling of objective data, all variables were tested via a self-reporting scale, which could possibly result in common method biases (CMV), causing the relationship between variables to be expanded and leading to false relevance (Podsakoff *et al.*, 2003). In addition, the evaluation of professional ethics and nursing errors could possibly lose authenticity due to individual social desirability bias (Peng, Kao, and Lin, 2006). To decrease the effects of common method biases and social desirability bias on the study results, this study not only adopted anonymous, self-sealed methods in answering questionnaires, but also included reverse questions and questions with hidden meanings (Hays, Hayashi, and Stewart, 1989) Moreover, the questionnaire also included 5 questions related to social desirability bias; for instance, "*I sometimes take advantage of other people*". A 6-point Likert scale (with 1 = Strongly disagree and 6 = Strongly agree) was applied to evaluate and control the social expectations of professional nursing staff and enhance the validity of the questionnaire.

Harmans one-factor test proposed by Podsakoff *et al.* (2003) was applied for the subsequent remedying of common method biases to detect the severity of

CMV. Concepts of stress and nursing errors obtained after reliability analysis were applied in exploratory factor analysis. Under conditions without rotation, the number of factors extracted could be applied to determine whether the severity of CMV was high. Analysis results indicated that the primary factor explained 24.59% of the variance, and no factors could explain over 50% of the variance 50%. These results indicate that the effects of CMV are not severe, and that the analysis results of this study are reliable.

3.2.5 Exploratory Factor Analysis

Table 1

Model Summary for Confirmatory Factor Analysis (*N*=494)

Model	χ^2	*df*	$\Delta\chi^2$	GFI	AGFI	NFI	NNFI	CFI	RMSEA
Single factor model	485.44	43	—	.83	.73	.74	.69	.76	.11
Three-factor model	268.86	41	99.58***	.90	.85	.86	.83	.88	.08
Four-factor model	169.28	38	316.16***	.94	.90	.91	.90	.93	.06

Single factor model performed all data merged.

Three-factor model performed the data of work related stress and non-work related stress merged.

Four-factor model performed the data of work related stress, non-work related stress, professional ethics ,and nursing errors merged.

Note : *** $p < .001$

Prior to hypothesis verification, this study first applied LISREL 8.72 to perform confirmatory factor analysis (CFA) on all variables (work-related stress, non work-related stress, professional ethics, and nursing errors) to examine the validity of the study concepts. The results of CFA showed that χ^2 (df = 38, N = 519) = 169.28, indicating that significance was achieved; however, most model moderating indicators verified the four-factor model to be acceptable (GFI = 0.94; AGFI = 0.90; CFI = 0.91; NFI = 0.90; NNFI = 0.93; RMSEA = 0.06) (Hu and

Bentler, 1995). In addition, loading *t* tests of all factors in the four-factor model achieved significance, indicating that questions categorized under the same factor reflected the same concept. Furthermore, according to Table 1, the results of Chi-square difference tests indicated that compared to the one-factor model ($\Delta\chi^2 = 316.16$, $\Delta df = 5$, $p < .001$) and the three-factor model ($\Delta\chi^2 = 99.58$, $\Delta df = 3$, $p < .001$), the preliminary four-factor model provided the best moderation; indicating that the four concepts could be easily distinguished from each other, as shown in Table 1.

4. Results

4.1. Descriptive Statistics

Table 2 shows the mean values, standard deviation, and correlation coefficient matrix of different variables. The mean value for work related stress was 2.94 (standard deviation = 0.61) and that for non-work related stress was 3.31 (standard deviation = .89), indicating that professional nursing staff felt a certain amount of stress either at work or outside of work; in addition, non-work related stress was more evident than work-related stress. The mean value for professional ethics was 4.52 (standard deviation = 0.57), indicating that professional nursing staff commonly possessed principles in professional ethics. The mean value for nursing errors was 2.84 (standard deviation = 0.56), which was quite low, indicating mild levels of severity in the errors committed by nursing staff.

As for the correlation between variables, both work-related stress ($r = .58$, $p < .01$) and non-work related stress ($r = .36$, $p < .01$) were positively correlated with nursing errors; indicating that when nursing staff perceived stronger stress either at work or outside of work, it produced a greater tendency for nursing errors. In addition, the correlation between work-related stress and nursing errors was higher than for non-work-related stress. These analysis results are consistent with previous hypotheses and results of past studies (Jones *et al.,* 1988). As for the correlation between ethics and errors, a negative correlation existed between professional ethics ($r = -.37$, $p < .01$) and nursing errors. This indicated that when

nursing staff possess stronger principles in professional ethics, they tend to produce fewer errors. These results were also consistent with those of previous studies (Gick, 2003).

Table 2

Means, Standard Deviations, Correlations, and Reliabilities (N=494)

Variables	Mean	S.D.[a]	1.	2.	3.	4.
1.Work related stress	2.94	.61	(.90)[b]			
2.Non-work related stress	3.31	.89	.54***	(.93)		
3.Professional ethics	4.52	.57	-.35***	-.14**	(.84)	
4.Nursing errors	2.84	.56	.58***	.36***	-.37***	(.81)

Note : [a]:S.D. = Standard Deviation

[b]: Internal consistency values (Cronbach's Alpha) were shown on the across the diagonal parentheses.

$^{*}p < .05$ 、$^{**}p < .01$ 、$^{***}p < .001$

4.2. The Relationship between Stress and Nursing Errors

This study verified its hypotheses through multiple hierarchical regression analysis. The analysis results are shown in Table 3. In the M1 regression model in Table 3, it can be seen that the age and workplace of professional nursing staff had a significant negative relationship with nursing errors (β = -.25, $p < .01$; β = -.09, $p < .05$), while the number of children of nursing staff had significant positive relationship with nursing errors (β = .10, $p < .05$). This indicates that nursing staff of a younger age, with more children, or who worked in hospitals tended to produce more nursing errors. The results proved that it was appropriate to control for these variables in this study.

After controlling for demographic variables, the M2 regression model in Table 3 indicated that work-related stress is positively related with nursing errors (β = .56, $p < .001$). The M3 regression model in Table 3 also indicated a similar

result for non-work related stress (β = .35, p < .001). Furthermore, in the M4 regression model of Table 3, when the two types of stress are combined, they achieve significant predictive results on nursing errors; work-related stress also exerts a stronger effect on nursing errors than non-work-related errors (β = .52, p < .001; β = .08, p < .5). Combining the above results, it can be concluded that the stronger the stress that nursing staff feel, the higher the possibility of nursing errors. Thus, hypotheses 1 and 2 were both proven supported.

4.3. The Moderating Effect of Professional Ethics on the Relationship between Stress and Nursing Errors

To verify the regulatory effects of professional ethics on the relationship between stress and nursing errors, this study adopted an analytical process proposed by Baron and Kenny (1986): introducing in sequence independent variable, moderating variable, and interactive variables (independent variable × moderating variable) after controlling for demographic variables to predict outcome variables. If the interactive variables are significant in predicting outcome variables, then the moderating effect is determined to be significant. The analysis results are shown in Table 3.

The M6 regression model in Table 3 shows that professional ethics exerts a weakening effect on the positive relationship between work-related stress and work performance (β = -.09, p < .05), but does not exert a significant effect on moderating the relationship between non-work related stress and work performances (β = .06, p > .1). These results indicate that the stronger the principles in professional ethics that nursing staff possess, the lower the possibility of producing nursing errors caused by work-related stress. Professional ethics can therefore effectively inhibit the amount of nursing errors attributed to work-related stress, but does affect those resulting from non-work related stress. Analysis results therefore support ***H3***, but not ***H4***.

To further verify the moderating effects of professional ethics on the relationship between work-related stress and nursing errors, this study refers to a method suggested by Aiken and West (1991): taking the average values of

work-related stress and professional ethics and adding or subtracting one standard deviation, then applying this value in a regression model and applying it in illustration (as shown in Figure 1). The results indicated that professional ethics play a moderating role through weakening effects. In other words, when professional nursing staff possess stronger professional ethical principles, the positive relationship between work-related stress and nursing errors is weakened. This corresponds to Hypothesis 3, and therefore verifies to be supported.

Table 3

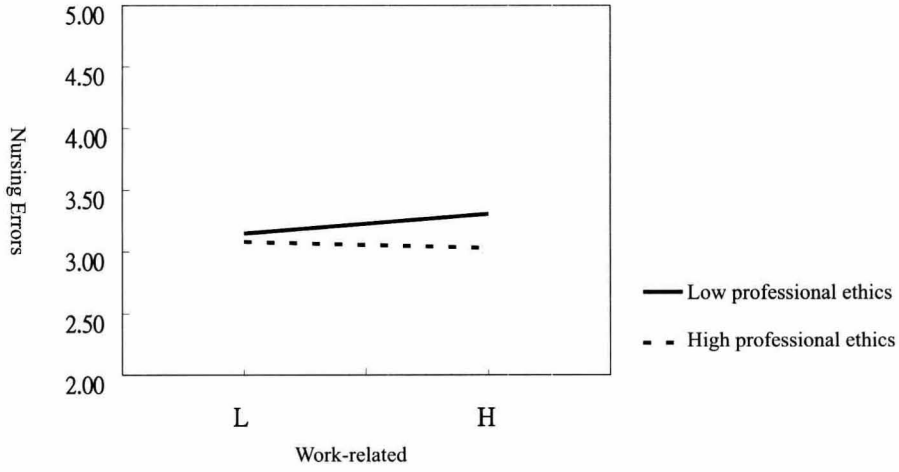
Results of Hierarchical Regression Analysis (*N*=494)

Variables	Nursing Errors					
	M1	M2	M3	M4	M5	M6
Control variables						
1.Age	-.25**	-.18*	-.23**	-.18*	-.15*	-.15*
2.Education Level	-.04	.01	-.00	.02	.01	.01
3.Senioity	-.02	-.06	-.06	-.06	-.06	-.05
4.Marital status	.07	.03	.03	.02	.02	.02
5.No. of children	.10*	.11*	.08	.10*	.10*	.09*
6.Social desirability	-.09*	-.09*	-.09*	-.09*	-.09*	-.10**
7.Work unit	.06	-02	.04	.02	.01	.01
Independent variables						
8.Work related stress (WRS)		.56***		.52***	.46***	.48***
9.Non-work related stress (NWRS)			.35***	.08*	.09*	.08*
Moderator						
10.Professional ethics (PE)					-.16***	-.15***
Interactive effect						
11.WRS × PE						-.09*
12.NWRS × PE						.06
R^2	.07	.38	.19	.38	.40	.41
Adjusted R^2	.06	.37	.18	.37	.39	.40
ΔR^2	.07***	.31***	.12***	.31***	.02*	.01+
F	5.29***	36.33***	14.36***	32.78***	32.38***	27.64***

Note : $^{*}p < .05$; $^{**}p < .01$; $^{***}p<.001$

Figure 1

Interactive Effect of Work-Related Stress and Professional Ethics on Nursing Errors



5. Discussion

5.1. Conclusion

This study was performed with the following two purposes: (1) to understand the relationship between stress and nursing errors in professional nursing staff; and (2) to investigate the moderating effect of professional ethics on this relationship. Aside from the insignificant moderating effect of professional ethics on the relationship between non-work related stress and nursing errors, the study results gave credence to all other hypotheses. The results indicate that both types of stress correlated positively with nursing errors. In addition, professional ethics

exerts weakening effects on the relationship between work-related stress and nursing errors, indicating that professional ethics can effectively inhibit the occurrence of nursing errors as caused by work-related stress. The results of this study not only complement the lack of literature linking stress with nursing errors, but also provide in-depth analysis of the relationship between stress and nursing errors, thereby completing the theory and providing hospitals with an aspect for improvement in reducing nursing errors.

5.2. Theoretical Implications

As for theoretical implications, study results indicate that both work-related stress and non work-related stress have a positive relationship with nursing errors. These results indicate that regardless of the source of the stress, it would cause professional nursing staff to easily commit errors. These results are consistent with studies of clinical nursing staff, which mention that stress caused professional staff to commit errors when carrying out their tasks (Benoliel *et al.,* 1990). These results also verify the conclusions from studies on medical errors produced by medical staff which indicate that stress is a main reason for the occurrence of medical errors (Blendon *et al.,* 2002). Furthermore, studies on nursing errors are quite scarce, especially empirical studies which target the stress of professional nursing staff and nursing errors. The results of this study can serve as empirical evidence for subsequent studies discussing relevant issues.

The results of this study also indicate that professional ethics exert weakening effects on the relationship between work-related stress and nursing errors. In other words, when nursing staff possess strong professional ethical beliefs, they better understand the standards that they should follow in providing medical care, and thus the potential for nursing errors because of work stress are reduced. This also indicates that an individual's cognition can affect the relationship between stress and behavioral response. These results are consistent with those of previous studies (Ivancevich and Matteson, 1980; Baer and Oldham, 2006).

In addition, this study also discovers that professional ethics does not exert a moderating effect on the relationship between non-work related stress and nursing

errors. A possible reason for such results might be correlated with the implications of professional ethics. Professional ethics are the beliefs of a professional in the standards related to his/her profession, and are closely linked to their profession, occupation, and work content. Therefore, it may not play the same role on stress derived from sources external to work, and in turn fails to effectively inhibit nursing errors caused by non work-related stress. These results can be further discussed and verified in subsequent studies.

5.3. Practical Implications

As for practical implications, the study results indicate that the stress felt by professional nursing staff relates positively with the committing of errors. Therefore, this study concludes a possible reason for which nursing staff commit errors, and also provides hospitals with an area for improvement regarding the prevention or reduction of nursing errors. In the future, when establishing regulations, authorities in hospitals and organizations can introduce more ways of relieving the stress of nursing staff, such as permitting leave, travel, or implementing family-friendly policies to alleviate the stress that nursing staff feel both during and outside work, and in turn prevent or reduce the occurrence of nursing errors. Welker-Hood (2006) argued that by effectively reducing the occurrence of nursing errors, the performance of professional nursing staff can thus be improved. Previous studies indicated that medical errors exert negative effects on employee work performance (Stock *et al.,* 2006). Therefore, if hospitals can effectively reduce the feelings of stress among nursing staff, the possibility of nursing errors can therefore be reduced, and the quality of care improved.

The study results indicate that professional ethics exerts weakening effects on the relationship between work-related stress and nursing errors. In other words, when professional nursing staff possess stronger principles in terms of professional ethics, they tend to produce fewer nursing errors. These results provide hospitals another possible aspect for improvement in regards to reducing the number of nursing errors. In the future, hospitals can enhance professional ethical training, either by including this as a mandatory item in education and training courses, or adding it an evaluation item in performance inspections.

Hospitals should also regularly promote and perform evaluations on profession ethical criteria to strengthen beliefs in professional ethics among nursing staff, and in turn achieve the goal of reducing nursing errors. As we move into an era that values professionalism, professionals should be responsible for their behavior. When a professional provides services by concretely adhering to professional ethical standards, positive benefits are exerted on individuals, organizations, and society. If professional nursing staff can internalize professional ethical principles, nursing errors caused by work-related stress can then be effectively reduced, thereby strengthening the image of nursing staff as guardian angels and improving the safety of patients.

5.4. Limitations

As for the study's limitations, as described earlier, all evaluation items of the variables in the questionnaire have been answered by professional nursing staff via a self-report method. This could possibly lead to CMV issues. This study has carried out preliminary preventive and subsequent remedial measures based on the suggestions of previous studies (Podsakoff *et al.,* 2003), with the purpose of reducing the effects of CMV on the study results. Moreover, researchers have also indicated that the effects caused by CMV are less severe than expected (Crampton and Wagner, 1994; Kline, Sulsky, and Rever-Moriyama, 2000). However, CMV is derived from applying the same tool in the measurement of all study variables, causing the interactive levels between variables to be higher than in reality (Podsakoff and Organ, 1986). Therefore, it is recommended that subsequent studies utilize measurement methods from different sources or different points in time, such as by asking the supervisors of professional nursing staff to answer questions regarding nursing errors, or by including other objective indicators (for instance, the documentation of nursing errors) to evaluate cases of nursing errors and effectively reduce the effects cause by this bias.

Second, in the evaluation of nursing errors, objective data are mainly filed based on units or hospitals, and scarcely disclose individual records; moreover, objective data are difficult to obtain. This study mainly targets nursing errors produced by individuals; therefore, during evaluation, only the potential amount

of nursing errors produced by nursing staff can be disclosed. These include accidents that have already taken place and those that might take place. Future studies can attempt to collect more data to distinguish between these two aspects to allow a stricter questionnaire structure. In addition, subsequent studies can also collect objective data to perform in-depth investigation and analysis through group or organization-level research based on accidents that have already taken place, to better understand the relationship between stress, professional ethics, and nursing errors.

Third, this study is a cross-sectional study that evaluates all variables at the same point in time. The study results under this design can merely explain the relationship between variables, or reflect the subject's overall trends of response. To further investigate the causal relationship between variables, it is recommended that subsequent studies perform vertical section research at different time points, which can more accurately evaluate the causal relationship between stress and nursing errors.

Lastly, during the sampling process, this study adopted purposive sampling due to certain limitations. Study samples include 494 professional nursing staff members from 12 hospitals in Taipei, Tainan, and Kaohsiung. The study results cannot thus be extrapolated to all nursing staff in all regions of Taiwan. The representativeness of the sample is thereby somewhat insufficient. In addition, the moderating effect of professional ethics on the relationship between non-work related stress and nursing errors did not achieve significance. Therefore, subsequent studies can perform more extensive investigation on professional nursing staff to further elevate the applicability and contribution of the study results in clinical practice.

5.5. Future Research

This study assumes that there is a linear relationship between stress and nursing errors. However, previous studies discovered an inverted-U relationship between stress and performance, indicating that either excessive or insufficient stress is not beneficial to work performance (Yerkes and Dodson, 1908; Robbins and Judge, 2011). Whether the relationship between stress and nursing errors

resembles this relationship is an area worth investigating and analyzing.

Furthermore, the effects of the sources of stress of an individual on his/her responses to stress can be influenced by differences in character or situation (Lue *et al.*, 2010); for instance, an individual's character, resistance to stress, emotional intelligence, adaptive capability, environmental uncertainty, and work characteristics can all interfere with this relationship. Therefore, subsequent studies can attempt to include these variables in an investigation to fully understand the actual relationship.

Finally, previous studies have indicated that sources of stress can cause an individual to feel emotional effort and exhaustion, eventually leading to work burnout (Brotheridge and Lee, 2002). This can weaken an individual's level of concentration and increase the possibility of errors (Hollen *et al.,* 2000). Thus, future research may attempt to examine the psychological experience of the relationship between sources of stress and nursing errors to understand the intermediary mechanisms and further complete the theoretical model.

6. References

Abbott, A. (1983), "Professional Ethics," *American Journal of Sociology*, 88(5), 855-885.

Aiken, L. S., and West, S. G. (1991), *Multiple Regression: Testing and Interpreting Interactions,* Newbury Park, CA: Sage Publications.

Anderson, C. (2002), "Past Victim Future Victim," *Nursing Management*, 33(3), 26-30.

Baer, M., and Oldham, G. R. (2006), "The Curvilinear Relation between Experienced Creative Time Pressure and Creativity: Moderating Effects of Openness to Experience and Support for Creativity," *Journal of Applied Psychology*, 91(4), 963-970.

Baron, I. L., and Kenny, D. (1986), "The Moderator Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations," *Journal of Personality and Social Psychology*,

51(6), 1173-1182.

Bellizzi. J. A. (2006), "Disciplining Top-Performing Unethical Salespeople: Examining the Moderating Effects of Ethical Seriousness and Consequences," *Psychology and Marketing*, 23(2), 181-201.

Benner, P., Sheets, V., Uris, P., Malloch, K., Schwed, K., and Jamison, D. (2002), "Individual, Practice, and System Causes of Errors in Nursing: A Taxonomy," *Journal of Nursing Administration*, 32(10), 509-523.

Benoliel, J. Q., McCorkle, R., Georgiadou, F., Denton, T., and Spitger, A. (1990), "Measurement of Stress in Clinical Nursing," *Cancer Nursing*, 13(4), 221-228.

Blendon, R. J., DesRoches, C. M., Brodie, M., Benson, J. M., Rosen, A. B., Schneider E., Altman D. E., Zapert K., Herrmann M. J. and Steffenson A. E. (2002), "Views of Practicing Physicians and the Public on Medical Errors," *The New England Journal of Medicine,* 347(24), 1933-1940.

Bourbonnais, R., Comeau, M., and Vezina, M. (1999), "Job Strain and Evolution of Mental Health among Nurses," *Journal of Occupational Health Psychology*, 4(2), 95-107.

Brislin, R. W. (1980), "Translation and Content Analysis of Oral and Written Material," in H. C. Triandis and J. W. Berry (Ed.), *Handbook of Cross-Cultural Psychology,* (Vol. 2, 389-444), Boston, MA: Allyn and Bacon.

Brotheridge, C. M., and Lee, R. T. (2002), "Testing a Conservation of Resources Model of the Dynamics of Emotional Labor," *Journal of Occupational Health Psychology*, 7(1), 57-67.

Burke, R. J. and Richardsen, A. M. (2001), "Psychological Burnout in Organization: Research and Intervention," in R. T. Golembiewski (Ed.), *Handbook of Organizational Behavior,* (327-363), New York, NY: Marcel Dekker.

Burke, R. J. (2001), "Job Stress, Work Satisfaction and Physician Militancy," *Stress and Health*, 17(5), 263-271.

Burke, R. J. (2003), "Length of Shift, Work Outcomes, and Psychological Well-Being of Nursing Staff," *International Journal of Public*

Administration, 26(14), 1637-1646.

Chen, M., Pan, C., and Pan, M. (2009), "The Joint Moderating Impact of Moral Intensity and Moral Judgment on Consumer's Use Intention of Pirated Software," *Journal of Business Ethics*, 90(3), 361-373.

Cohen, S. (1980), "Aftereffects of Stress on Human Performance and Social Behavior: A Review of Research and Theory," *Psychological Bulletin*, 88(1), 82-108.

Crampton, S. M. and Wagner, J. A. (1994), "Percept-percept Inflation in Micro-organizational Research: An Investigation of Prevalence and Effect," *Journal of Applied Psychology*, 79(1), 67-76.

Davidhizar, R. and Lonser, G. (2003), "Strategies to Decrease Medication Errors," *The Health Care Manager*, 22(3), 211-218.

Dimant, J. (2001), "Medication Errors and Adverse Drug Events in Nursing Homes: Problems, Causes, Regulations, and Proposed Solutions," *Journal of American Medical Directors Association*, 2(2), 81-93.

Elangovan, A. R. (2001), "Causal Ordering of Stress, Satisfaction and Commitment, and Intention to Quit: A Structural Equations Analysis," *Leadership and Organization Development Journal*, 22(4), 159-165.

Erlen, J. A. (2007), "Patient Safety, Error Reduction, and Ethical Practice," *Orthopedic Nursing*, 26(2), 130-133.

Frankenhaeuser, M. (1991), "The Psychophysiology of Workload, Stress and Health: Comparison between the Sexes," *Annals of Behavioral Medicine*, 13(4), 197-204.

Fry, S.T., and Damrosch, S. (1994). "Ethics and human rights issues in nursing practice: A survey of Maryland nurses," *Maryland Nurse*, 13(7), 11-12.

Gick, E. (2003), "Cognitive Theory and Moral Behavior: The Contribution of F. A. Hayek to Business Ethics," *Journal of Business Ethics*, 45(1), 149-165.

Happell, B., Pinikahana, J., and Martin, T. (2003), "Stress and Burnout in Forensic Psychiatric Nursing," *Stress and Health*, 19(2), 63-68.

Hays, R. D., Hayashi, T., and Stewart, A. L. (1989), "A Five-Item Measure of Socially Desirable Response Set," *Educational and Psychological Measurement*, 49(3), 629-636.

Hobfoll, S. E. and Shirom, A. (2001), "Conservations of Resource Theory: Applications to Stress and Management in the Workplace," In R. T. Golembiewski (Ed.), *Handbook of Organizational Behavior* (57-80), New York, NY: Marcel Dekker.

Hollen, P.S., Clarke-Steffen, L., Forte, K., Moore, I.M., and Katz, E. (2000), "Studying the Stress-Response Sequence in Pediatric Oncology Nursing," *Journal of Pediatric Oncology Nursing*, 17(2), 81-82.

Hu, L. T. and Bentler, P. M. (1995), "Evaluating Model Fit," in R. H. Hoyle (Ed.), *Structural Equation Modeling: Concepts, Issues, and Applications* (76-99), Thousand Oaks, CA: Sage.

Hunter, L. K. and Thatcher, S. M. B. (2007), "Feeling the Heat: Effects of Stress, Commitment, and Job Experience on Job Performance," *Academy of Management Journal*, 50(4), 953-968.

Huang, K, K. (1996), "Some Basic Concepts for Education of Professional Ethics," *Journal of General Education*, 32(2), 19-32. (In Chinese)

Ida, H., Miura, M., Komoda, M., Yakura, N., Mano, T., Hamaguchi, T., Yamazaki, Y., Kato, K., and Yamauchi, K. (2009), "Relationship between Stress and Performance in a Japanese Nursing Organization," *International Journal of Health Care Quality Assurance*, 22(6), 642-657.

Inoue, K. and Koizumi, A. (2004), "Application of Human Reliability Analysis to Nursing Errors in Hospitals," *Risk Analysis*, 24(6), 1459-1473.

Ivancevich, J. M. and Matteson, M. T. (1980), *Stress and Work: A Managerial Perspective*, New York, NY: Scott Foresman.

Jiang, S. S., Chen, M. B., and Su, I. L. (2006), "Ethical Dilemmas in Caring for Patients with SARS," *The Journal of Nursing*, 53(5), 28-34. (In Chinese)

Johnstone, M. J. and Kanitsaki, O. (2006), "The Ethics and Practical Importance of Defining, Distinguishing and Disclosing Nursing Errors: A Discussion Paper," *International Journal of Nursing Studies*, 43(3), 367-376.

Johnstone, Megan-Jane (2007), "Patient Safety Ethics and Human Error Management in ED Contexts Part I: Envelopment of the Global Patient Safety Movement," *Australasian Emergency Nursing Journal*, 10(1), 13-20.

Jones, J. W., Barge, B. N., Steffy, B. D., Fay, L. M., Kunz, L. K., and Wuebker, L.

J. (1988), "Stress and Medical Malpractice: Organizational Risk Assessment and Intervention." *Journal of Applied Psychology*, 73(4), 727-735.

Kelly, J. (2010), "Battlefield Conditions: Different Environment but the Same Duty of Care," *Nursing Ethics*, 17(5), 636-45.

Kline, T. J. B., Sulsky, L. M., and Rever-Moriyama, S. D. (2000), "Common Method Variance and Specification Errors: A Practical Approach to Detection," *The Journal of Psychology*, 134 (4), 401-421.

Lazarus, R. S. and Folkman, S. F. (1984), *Stress, Appraisal, and Coping.* New York, NY: Spring Publishing Company.

Lazarus, R. S. (2000), "Toward Better Research on Stress and Coping," *American Psychologist*, 55(6), 665-673.

Leape, L. L. (1994), "Error in medicine," *Journal of the American Medical Association*, 272(23), 1851-1857.

Lee, I., and Wang, H. H. (2002), "Perceived Occupational Stress and Related Factors in Public Health Nurses," *Journal of Nursing Research*, 10(4), 253-259.

LePine, J. A., Podsakoff, N. P., and LePine, M. A. (2005), "A Meta-analytic Test of the Challenge Stressor-Hindrance Stressor Framework: An Explanation for Inconsistent Relationships among Stressors and Performance," *Academy of Management Journal*, 48(5), 764-775.

Liaschenko, J. and Peter E. (2004), "Nursing Ethics and Conceptualizations of Nursing: Profession, Practice and Work," *Journal of Advanced Nursing*, 46(5), 488-495.

Lue, B. H., Chen, H. J., Wang, C. W., Cheng, Y., and Cheng, M. C. (2010), "Stress, Personal Characteristics and Burnout among First Postgraduate Year Residents: A Nationwide Study in Taiwan," *Medical Teacher,* 32*(5)*, 400-407.

Lyon, B. L. and Werner, J. S. (1987), "Stress," *Annual Review of Nursing Research*, 5(3), 3-22.

Matheny, K. B., Gfroerer, C. A., and Harris, K. (2000), "Work Stress, Burnout and Coping at the Turn of the Century: An Individual Psychology Perspective," *The Journal of Individual Psychology*, 56(1), 74-87.

McGowan, B. (2001), "Self-reported Stress and Its Effects on Nurses," *Nursing Standard,* 15(42), 33-38.

Meaney, M. E. (2004), "Error Reduction, Patient Safety and Institutional Ethics Committees," *The Journal of Law, Medicine and Ethics*, 32(2), 358-365.

Mohr, A. T. and Puck, J. F. (2007), "Role Conflict, General Manager Job Satisfaction and Stress and the Performance of IJVs," *European Management Journal,* 25(1), 25-35.

Motowidlo, S. J., Packard, J. S., and Mannig, M. R. (1986), "Occupational Stress: Its Causes and Consequences for Job Performance," *Journal of Applied Psychology*, 71(4), 618-629.

Narumi, J., Miyazawa, S., Miyata, H., Suzuki, A., Kohsaka, S., and Kosugi, H. (1999), "Analysis of Human Error in Nursing Care," *Accident Analysis and Prevention*, 31(6), 625-629.

Nelson, W. A. (2006), "Defining Ethics," *Healthcare Executive*, 21(4), 38-39.

Nia, H. (2001), "Management of Work-Related Stress in Nursing," *Nursing Standard*, 16(10), 47-55.

Pelletier, P. L. (2001), "Medication Errors: A Lesson from Long-Term Care," *Nursing Management*, 32(11), 49-50.

Peng, M. Z., Liu, Y. J. Chang, A. R. (2003), "Occupational Stress in Oncology Nurses: A Literature Review," *The Journal of Nursing*, 50(2), 71-76. (In Chinese)

Peng, T. K., and Kao, Y., C., and Lin, C. C. (2006), "Common Method Variance in Management Research: Its Nature, Effects, Detection, and Remedies," *Journal of Managemen*t, 23(1), 77-98. (In Chinese)

Perrow, C. (1984), *Normal Accidents: Living with High-Risk Technologies*, New York, NY: Basic Books.

Pettijohn, C., Pettijohn, L., and Taylor, A. J. (2008), "Salesperson Perceptions of Ethical Behaviors: Their Influence on Job Satisfaction and Turnover Intentions," *Journal of Business Ethics*, 78(4), 547-557.

Pinikahana, J., and Happel, B. (2004), "Stress, Burnout and Job Satisfaction in Rural Psychiatric Nurses: A Victorian Study," *Australia Journal of Rural Health*, 12(3), 120-125.

Podsakoff, P. M. and Organ, D. W. (1986), "Self-Reports in Organizational Research: Problems and Prospects," *Journal of Management*, 12(4), 531-544.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.Y., and Podsakoff, N. P. (2003), "Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies," *Journal of Applied Psychology*, 88(5), 879-903.

Robbins, S. P. and Judge, T. A. (2011), *Organizational Behavior,* New Jersey, NJ Prentice Hall.

Sardiwalla, N., VandenSerg, H., and Esterhuyse, K. G. F. (2007), "The Role of Stressors and Coping Strategies in the Burnout Experienced by Hospice Workers," *Cancer Nursing*, 30(6), 488-497

Schmitt, N. and Noe, R.A. (1983), "Demonstration of Content Validity: An Assessment Ccenter Example," *Journal of Assessment Center Technology*, 6(2), 5-12.

Şenol-Durak, E., Durak, M., and Gençöz, M. (2006), "Development of Work Stress Scale for Correctional Officers," *Journal of Occupational Rehabilitation*, 16(1), 157-168.

Simpson, R. L. (2002), "IT Alleviates Health Care's "Healing Crisis," *Nursing Management*, 33(7), 8-9.

Stock, G. N., McFadden, K. L., and Gowen, C. R. (2006), "Organizational Culture, Critical Success Factors, and the Reduction of Hospital Errors," *International Journal of Production Economics*, 106(2), 368-392.

Thompson, R. E. (2004), "Misbehavior Physicians and Professional Ethics," *Physician Executive*, 30(5), 32-34.

Tian, J. and Wang, X. (2005), "Short Communication: An Epidemiological Survey of Job Stress and Health in Four Occupational Populations in Fuzhou City of China," *Stress and Health*, 21(2), 107-112.

Tsai, S. L., and Chen, M. L. (1996), "A Test of the Reliability and Validity of Nurse Stress Checklist," *The Journal of Nursing Research*, 4(4), 355-362. (In Chinese)

Wang, C. M., and Chen, C. W. (2003), "The Rise of Modern Society and

Professional Ethics in Taiwan: Medical Profession as an Explanation," *Thought and Words,* 41(1), 193-236. (In Chinese)

Wang, S. F., and Hung, Z. H. (2005), "Ethical Issues in Nursing Leadership," *The Journal of Nursing*, 52(5), 51-58. (In Chinese)

Welker-Hood, K. (2006), "Does Workplace Stress Lead to Accident or Error?" *American Journal of Nursing*, 106(9), 104.

White, L. P. and Wooten, K. C. (1986), *Professional Ethics and Practice in Organizational Development: A Systematic Analysis of Issues, Alternatives, and Approaches*. New York, NY: Praeger Publishers.

Williams, E. S., Konrad, T. R., Scheckler, W. E., Pathman, D. E., Linzer, M., McMurray, J. E., Gerrity, M., and Schwartz, M. (2001), "Understanding Physicians' Intentions to Withdraw from Practice: The Role of Job Satisfaction, Job Stress, Mental and Physical Health," *Health Care Manage Review*, 26(1), 7-19.

Williams, E. S., Manwell, L. B., Konrad, T. R., and Linzer, M. (2007), "The Relationship of Organizational Culture, Stress, Satisfaction, and Burnout with Physician-reported Error and Suboptimal Patient Care: Result from the MEMO Study," *Health Care Management Review*, 32(3), 203-212.

Woods, A. and Doan-Johnson, S. (2002), "Executive Summary: Toward Taxonomy of Nursing Practice Errors," *Nursing Management*, 33(10), 45-48.

Yang, C. H. (2006), *Business Ethics*, Taipei, Taiwan: Yang Chih Book Co. (In Chinese)

Yeh, K. S. (2000), "On Professional Ethics," *Journal of Social Sciences and Philosophy*, 23(3), 495-526. (In Chinese)

Yerkes, R. M. and Dodson, J. D. (1908), "The Relation of Strength of Stimulus to Rapidity of Habit Formation," *Journal of Comparative Neurology of Psychology*, 18(5), 459-482.