University of Nevada, Reno

# The Effect of Invalidating Interactions and Emotion Regulation on the Commission of Medical Errors

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy
in Clinical Psychology

by

Wendy M. Crook-Abel

Dr. Alan E. Fruzzetti/Dissertation Advisor

August 2011

University of Nevada, Reno
Statewide • Worldwide

THE GRADUATE SCHOOL

We recommend that the dissertation
prepared under our supervision by

**WENDY M. CROOK-ABEL**

entitled

**The Effect of Invalidating Interactions and Emotion Regulation on the Commission of Medical Errors**

be accepted in partial fulfillment of the
requirements for the degree of

**DOCTOR OF PHILOSOPHY**

Alan E. Fruzzetti, Ph.D., Advisor

Victoria Follette, Ph.D., Committee Member

Holly Hazlett-Stevens, Ph.D., Committee Member

Anthony Papa, Ph.D., Committee Member

Jacqueline Pistorello, Ph.D., Committee Member

Thomas Nickles, Ph.D., Graduate School Representative

Marsha H. Read, Ph.D., Dean, Graduate School

August, 2011

## Abstract

The purpose of this study was to assess the impact of invalidating versus validating social interactions on the commission of medical errors. Medical errors are a significant public health problem and are estimated to be a leading cause of death in the U.S. Several causes of medical errors have been identified, but recent studies have almost exclusively focused on working conditions. This study was designed to look experimentally at social interactions analogous to those in health care settings that would be described as invalidating. Invalidating interpersonal interactions have been shown in previous research to increase emotional arousal and distress, with a variety of negative consequences. Nurses may regularly encounter invalidating responses in their professional environments. We hypothesized that invalidating interactions and the negative emotional arousal they elicit would increase the commission of errors among nursing students and that emotion regulation skills would moderate the likelihood of committing errors. Nursing students were randomly assigned to a validating or invalidating condition. They were given a stressful task and then received validating or invalidating feedback about their stress experiences. Then, they performed a medication calculation and administration task and were evaluated for errors. After 41 participants completed the study, it was apparent that changes in affect did not differ significantly between the validating and invalidating groups. Given that the experimental manipulation did not produce expected changes in affect, an additional post hoc sample was collected to investigate possible explanations of why the experimental manipulation failed. Post-hoc analyses suggested that the amount of invalidating feedback in this study was likely insufficient to produce significant changes in affective arousal, despite findings that similar procedures in other studies had large effects, and current participants may have been buffered

against invalidating responses in part by higher levels of positive affect at baseline. Reasons for these discrepancies are discussed, and additional possible explanations for the findings are explored.

# Introduction

## Problem of Medical Errors

Medical errors are a significant problem and are estimated to be a leading cause of death in the U.S. Between 2002 and 2004, approximately 1.24 million incidents (out of 40 million hospitalizations) that compromised the safety of patients occurred and resulted in excess medical expenses of $9.3 billion. Over 300,000 deaths were attributed to patient safety problems between 2002 and 2004 with over 250,000 of those deaths being potentially preventable (HealthGrades, 2006). Additionally, medical errors appear to be increasing, with a nine percent increase in identified errors between the 2006 report and previous findings published two years earlier (HealthGrades, 2004).

According to the Institutes of Medicine (2000), the definition of a medical error is the "the failure of a planned action to be completed as intended or the wrong plan to achieve an aim" (McNutt, Abrams, & Aron, 2002, p.1998). Looking more broadly, medical errors may occur anywhere in the health care system, with any level of health care professional, and at any point during the continuum of care (Pedroja, 2008). The health care system involves complex interactions among many types of health care providers, including physicians, nurses, and allied health professionals, such as laboratory technicians, pharmacists, and radiology technicians. Therefore, there are many points at which humans, technologies, or systems can fail.

Medication errors are a common medical error. It is estimated that there are between 380,000 and 450,000 preventable medication errors in hospitals each year (Institutes of Medicine, 2006). Several retrospective studies have found that medication administration errors account for the majority of medication errors (Beyea, Hicks, & Becker, 2003; Miller,

Clark, & Lehmann, 2006). Nurses, who bear a large proportion of responsibility for medication administration, have been found to commit many of the reported medication errors (Raju, Kecskes, Thornton, Perry, & Feldman, 2006)

In general, the scope of the problem of medical errors is vast and affects many people. Although several approaches to the problem have been researched, and several initiatives appear to be effective in reducing errors, preventable medical errors remain a significant public health issue. Following is a review of current research and initiatives to reduce medical errors and what information is still lacking in the understanding and prevention of medical error commission.

**Causes of Errors**

Errors can result from faulty individual processes, such as forgetfulness, inattention, and carelessness (Reason, 2000). These are typically identified as the causes of medical errors, and the individual is identified for blame. The problem with this approach is twofold: First, the majority of errors are in most ways ordinary, with the organization's highest performing providers committing errors. Second, this approach also overlooks the context in which errors are made (Reason, 2000), in particular the social and emotional factors that contribute to inattention and carelessness. Although humans are innately subject to "misplaced heuristics, biases, and distractions that make mistakes, slips, and injuries common, especially during complex clinical care situations" (McNutt et al., 2003, p. 1998), social and emotional factors can affect the rate or occurrence of errors in a significant way. Because most errors are not the result of negligence or misconduct, identifying interpersonal and individual factors that create distress and emotional arousal, and in turn influence error rates, should be a focus of error prevention research.

Psychological distress has been shown to increase medical errors. Depressed medical interns were found to be more than six times more likely to make a medical error (Fahrenkopf et al. (2008). Additionally, West et al. (2006) found an association between physician psychological distress and self-perceived error commission. These studies suggest emotional and psychological distress increase error commission. However, neither study investigated whether workplace environmental or interpersonal issues contributed to that distress.

Current research has also focused on organizational factors. For example, the length of shifts has been linked to errors. Scott, Rogers, Hwang, Zhang et al. (2006) found that 62% of a sample of 502 critical care nurses reported working longer than 12.5 hour shifts due to overtime. The increase in shift duration resulted in self-reported fatigue and decreased vigilance. Twenty-seven percent of the nurses reported making at least one error and 38% reported making at least one near error over the 28-day study period. The study found that after working more than 12.5 hours, the nurses' chances of making an error almost doubled. This study provided data to support that shorter working hours, and less fatigue, potentially has a positive impact on the commission of errors. However, the recommendation for limiting work shifts was made by the Institutes of Medicine in 2004 (IOM, 2004) and yet the practice continues. Another key point to be derived from this study was that 27% of the overtime shifts were worked because nurses felt that the overtime was mandatory or coerced. A similar study investigated the relationship between the length of shifts and commission of medical errors in 391 nurses (Rogers, Hwang, Scott, Aiken, & Dinges, 2004). The duration of working hours had a significant negative effect on medical errors with nurses again reporting that nine percent of overtime shifts were mandatory or coerced. Mandatory

overtime in both studies was defined as extra hours that nurses felt compelled to work under the threat of being fired or subjected to disciplinary action if they refused. Nurses in the studies described that coerced overtime was overtime that was voluntary, but that there would be negative repercussions if they refused. Therefore, interactions between management and nurses appeared to be another factor that resulted in longer shifts, fatigue, and medical errors. Specifically, it is unclear whether the working environment made it difficult for nurses to assert their concerns about fatigue or whether fatigue concerns were invalidated by management, leading nurses to acquiesce to unsafe situations.

The predominant approach to reducing medical errors is the construction of defense systems that prevent errors or make errors visible so they can be intercepted and corrected before harm results. An example of a system that prevents errors would be designing equipment so that it cannot be connected improperly, such as the types of prongs on connecting pieces. An example of making an error visible would be a process where nurses independently double check each other on dosing calculations. These approaches make sense and should continue to be pursued. However, human error is still possible in defensive approaches that rely on people double-checking other people. It is also not always possible or feasible to double check every process because of cost and staffing issues.

**Current Approaches and Initiatives**

Current efforts to reduce medical errors focus on methods that realistically accept human error as inevitable and have sought to find “fool-proof” procedures for delivering patient care. There are several weaknesses to this approach. First, identifying factors that lead to errors (or near-misses) may be unique to a specific health-care facility, which limits generalizability. Each facility can be configured differently in terms of organizational

procedures, equipment, staffing configurations, and the arrangement of patient care areas. While there is merit to this process, it may result in the implementation of facility-specific procedure changes rather than identifying more universal factors that would generalize to many health-care settings. Secondly, even information systems that provide checks and balances rely on the willingness of people to use them, and many possible mistakes can result from their design and use. Lastly, there is still human participation, and therefore human error, in virtually all procedures. Human error is still present in approaches that seek to provide a defense network against human error. Therefore, despite the incremental success of the "fool-proofing" approach, investigating quite different ways to reduce the human error which the defense systems are designed to catch is likely to be fruitful.

Research examining the role of fatigue should yield interventions that are more generalizable, as fatigue is a factor that is likely to occur in many settings. Organizational changes, such as reduced working hours and workloads, seem likely to address fatigue. Despite the clarity of fatigue as a factor, extended shifts for health care professionals have persisted. In addition, individuals' experiences of fatigue may be invalidated by management, resulting in them feeling coerced to work while fatigued, which appears to make people more vulnerable to making errors (Rogers et al., 2004; Scott et al., 2006).

There are many other individual factors, in addition to fatigue, that likely contribute to a person's risk of making errors, such as distraction, psychological distress, and emotion dysregulation. Little research has been conducted to understand the impact or causes of these factors. Social interactions, such as invalidating interactions, and their subsequent effect on individual have also been neglected in current research.

**Relationship Between Emotional Arousal or Distress and Errors**

Previous research has also found a link between emotional arousal and the commission of errors. It has long been established that although moderate levels of emotional arousal may be energizing and actually enhance performance, there is a point at which an increase in arousal results in lower performance (Yerkes & Dodson, 1908). With more complex tasks, even lower levels of arousal diminish performance, including cognitive tasks, memory, attention, memory, and problem-solving. These kinds of performance, of course, are integrally related to medical errors.

Previous studies regarding the role of stress and social working conditions on medical errors found that stress was related to medical errors (Agency for Healthcare Research, 2003). Dugan et al. (1996) found a relatively strong correlation between nurses' self-reported stress level and number of patient falls and medication errors. Jones et al. (1988) evaluated the impact of stress on medical errors. Stress included job stress, job dissatisfaction, and organizational stress. Organizational stress included conflict among employees. Results from employees from 91 hospital departments in five different hospitals nationwide showed that higher stress was correlated to a higher risk of malpractice. Risk of malpractice was defined as the level of recorded errors and negligence, such as the administration of improper medications or mislabeled blood. A second study examined hospital employees from 61 hospitals of varying sizes and found that stress was correlated to a higher level of malpractice claims (Jones et al., 1988) These studies demonstrate that high stress in health care professionals and a stressful working environment in hospitals, including conflict among employees, is significantly correlated to medical errors.

Receiving invalidating responses, as previously discussed, has been shown to increase emotional arousal (Shenk & Fruzzetti, in press). Rosenstein and O'Daniel (2008) found that

after a distressing professional interaction, the majority of nurse participants reported being unable to concentrate and felt that there had been a link between the interaction and a specific incident that adversely affected patient care, consistent with this model. Thus, these results taken together support the application of this model (invalidating responses → negative emotional arousal → poorer cognitive functioning) to medical settings and suggest that distressing and invalidating interactions may contribute to errors committed by nurses and others in these settings.

**Invalidation**

Invalidation is an interpersonal process in which an individual's experiences, emotions, opinions, and other behaviors are not understood, but instead are devalued, criticized, dismissed, or punished (Fruzzetti, Crook, Lee, Murphy, & Worral, 2008). In an invalidating interaction, an individual's private emotional experiences and accurate expression of emotion, values, goals, opinions, etc. may be punished or trivialized. The intentions and motivations associated with a behavior or an individual's interpretation of his or her own behavior may be mischaracterized or dismissed. A key characteristic of an invalidating interaction is that the person receives communications from others that his or her experiences and perceptions are inaccurate, illegitimate, or simply wrong.

Invalidation occurs in many forms, from overtly hostile and critical to "supportive" but condescending. At a basic level, invalidation can involve simply not paying attention, communicating distraction, or appearing anxious to leave or end a conversation. Beyond inattentiveness, invalidation may involve a lack of active participation in a conversation and not providing evidence to the other person that you are tracking what they are saying. These

simple, even unintentional kinds of invalidation are problematic in a health care setting where information transfer and communication between professionals is vital to patient care.

Invalidation increases negative emotional arousal, is damaging to relationships and reduces effective communication (Fruzzetti & Iverson, 2009; Shenk & Fruzzetti, in press). The following types of invalidating behaviors are particularly harmful to maintaining good relationships and facilitating accurate communication: those characterized by contradicting what another person thinks, feels, or wants and communicating that either the person doesn't, or shouldn't, think or feel that way. Criticizing, pathologizing, or making judgments about a person's normal or reasonable reactions and behaviors is invalidating and may lead to a person doubting their perception of events. Lastly, being patronizing, condescending, or contemptuous of the other person is extremely invalidating because it communicates that the other person is incompetent, fragile, or less worthy of respect in some way (Linehan, 1993). This type of invalidating behavior in a work setting sets up a power differential that makes effective communication very difficult and may even result in one person feeling intimidated. Functional, working relationships among health care professionals are imperative in providing adequate patient care, and validating responses facilitate keeping emotional reactivity low, fostering good interpersonal relationships, and contributing to a pleasant and satisfying work environment.

**Relationship Between Invalidation and Emotion Arousal (and Emotion Dysregulation)**

Emotions are an integral component of our psychological functioning and provide us with important information about our interactions with other people and our environment (Gross et al., 2006). For example, the emotion of fear provides us with information that our life may be threatened and we need to take action to protect ourselves. Emotional responses

are necessary to engage in everyday life. However, emotions can be processed in a way that is maladaptive and consequently drive behaviors that create problems in daily living for both the person experiencing the emotional response and for those around them.

Emotional responses do not occur in isolation but involve a complex interaction between the individual and the environment (Fruzzetti et al., 2008). Emotions are generated when either an internal or external event occurs that captures the attention of the individual or that the individual merely senses or perceives without the person's full attention. The individual then may or may not evaluate the event, which leads to an emotional response. The emotional response includes physiological reactions, urges, awareness, or overt behaviors. How an individual modulates the emotional response dictates whether the outcome is adaptive and advantageous to the individual or maladaptive and dysfunctional (Gross et al., 2006). Emotion regulation encompasses this entire emotional response set. Gross et al. (2006) define emotion regulation as the "attempts individuals make to influence which emotions they have, when they have them, and how these emotions are experienced and expressed" (p. 14). Social responses are an integral part of emotional reactions and hence influence emotion regulation (Fruzzetti et al., 2008).

Every encounter in a person's life includes an emotional component and requires some level of emotion regulation. Everyday life is composed of many social interactions and these interactions will elicit an emotional response. Workplace environments, especially health care settings, involve many social interactions and opportunities for emotional responses.

Invalidating responses in one person escalate emotional arousal in the other, and can lead to difficulties regulating emotion in general over time. High negative emotional arousal also causes cognitive confusion and behavioral self-management problems. Over time a

transaction can develop which involves the reciprocal relationship between an individual's vulnerabilities to emotion dysregulation and the invalidating responses he or she receives (Fruzzetti et al., 2008). As noted, invalidating responses are characterized by erratic, hostile, or otherwise inappropriate reactions from another to a person's actual experiences (feelings, desires, thoughts, etc.). Examples of invalidating responses include criticizing and disputing the accuracy of a person's correct self-description or experience, including minimizing their suffering. Invalidation also occurs when a person's accurate emotions are misunderstood and disregarded (Fruzzetti et al., 2008; Linehan, 1993).

Invalidating interpersonal interactions, both in close relationships and even between strangers, have been shown in previous research to increase emotional arousal and distress. For example, the transactional model between emotion regulation and invalidation has been applied to couples interactions. An increase in validating interactions and a decrease in invalidating interactions have been shown to decrease negative affect and decrease individual and relationship distress (Fruzzetti & Mosco, 2008; Sayrs & Fruzzetti, 2008).

Perhaps most importantly for understanding errors, invalidating responses have been shown to increase and maintain emotional arousal while an individual is performing stressful tasks, as measured by both physiological and self-report indices. Specifically, validating responses almost immediately led to lower arousal, and invalidating responses exacerbated or maintained high negative arousal, measured by self-report (negative and positive affect), skin conductance, and heart rate (Shenk & Fruzzetti, in press).

**Disruptive Invalidating Interactions in Health Care Environments**

Disruptive behavior has been identified as problematic in the health-care setting. Disruptive behavior is defined as "any inappropriate behavior, confrontation, or conflict",

including verbal abuse (Rosenstein & O'Daniel, 2008, p. 1564). A large survey of 4,530 health care professionals, including physicians, nurses, other healthcare professionals, such as pharmacists and laboratory technicians, inquired about disruptive behavior in the workplace environment and how that behavior impacted medical errors. Responses were received from a cross-section of small rural hospitals to large academic medical centers across the United States. The results showed that disruptive behavior is a prevalent problem. Seventy-four percent of respondents witnessed disruptive behavior in physicians and sixty-four percent reported disruptive behavior in nurses. Interestingly, 70% of nurses reported that the behavior they witnessed came from other nurses. Poor communication, intimidation, and an unwillingness to listen to other types of professionals were cited as examples of problematic disruptive behavior. Any of these behaviors could also be described as invalidating. Respondents were also asked how the disruptive behavior affected them psychologically and behaviorally. Ninety-five percent reported feeling stressed and frustrated, 85% felt they lost the ability to concentrate, 89% felt that information transfer was compromised, and 95% felt that communication was reduced. Most importantly, 71% felt there was a link between the disruptive behavior and medical errors and 14% reported that they were aware of when a specific disruptive behavioral episode resulted in a specific event that adversely affected a patient.

Invalidating interactions between nurses and physicians was identified as a factor that negatively impacted relationships between nurses and physicians. Over 3600 nurses from 30 hospitals were surveyed on the factors that they felt impacted the quality of patient care. A positive relationship with physicians was identified as an important quality factor, particularly in the important exchange of information about patients. The survey identified a

problematic, invalidating behavior of information being given to, but not acknowledged by the other professional. Nurses expressed that this situation decreased effective communication, made them feel their input was not important, and led to an unpleasant power differential (Kramer & Schmalenberg, 2004). While this is an example of nurses experiencing invalidation, similar situations involving a lack of acknowledgment of another professional's information could be experienced between any health professionals.

The complex interactions of multiple health care professionals during the course of caring for patients involve multiple social interactions. These interactions occur between different types of health care professionals, such as nurses and physicians, and between health care providers, patients, and patients' family members. All of these interactions have the potential to include invalidating behavior and result in emotion regulation problems. Nurses in particular have a great deal of interaction with others in the course of providing patient care. For this reason, and the fact that nurses perform many medication administrations that are a large source of errors, nurses will be the specific type of health care provider targeted by this study. However, the findings would be applicable to a broad range of heath care professionals.

In summary, emotional arousal has been shown to adversely affect performance. Additionally, previous research has found that invalidation increases emotional arousal. Lastly, research has shown that nursing environments may be categorized as invalidating. What remains to be found is the link between invalidating professional interactions, the resulting emotion dysregulation, and the commission of errors.

This study has implications beyond a mere understanding of factors that contribute to medical errors. If invalidation and/or a lack of emotion regulation skills are found to impact

error commission, then this understanding may lead to interventions that can be implemented at either an individual or organizational level. Both emotion regulation and validating communication skills have been successfully conducted within the context of Dialectical Behavior Therapy (Linehan, 1993). The same skills training could be simply abstracted from existing skills training and easily implemented in health care organizations. Therefore, the next logical step would be to study the impact of validation and emotion regulation skills training on nurses in an acute care environment and measuring the impact on commission of medical errors.

Another indirect benefit of this study would be to identify means to improve social, professional, and managerial interactions in health care settings. A more pleasant and effective work environment is a factor in nurse job satisfaction. Therefore, this study could also be instrumental in the development of nurse retention strategies.

**Purpose and Hypotheses**

The purpose of this study was to investigate how social workplace interactions, specifically invalidating interactions, impact a person's emotional state and subsequent rate of errors. The study employed experimental methods to identify some of the proximal social and emotional factors that provide the context for, and increase the risk of, errors. Nursing students were recruited as participants to investigate whether invalidating responses increase the commission of errors among nursing professionals.

The study had three research hypotheses: (a) it was expected that more errors would be committed after receiving invalidating feedback than after receiving validating feedback; (b) negative affect was expected to mediate the commission of errors; (c) participants with fewer

emotion regulation abilities were expected to commit more errors after invalidating feedback than participants without emotion regulation problems.

## Method

The study utilized a sample of nursing students to determine the relationship between validating and invalidating interactions, negative affects, and the commission of medication errors. Participants were given a variety of self-report measures that determined their level of psychological distress, ability to regulate emotions, and baseline levels of positive and negative affect. Participants completed a brief quiz of basic nursing-related questions as a stress-inducing task, after which participants were engaged in either a validating or invalidating interaction. Participants then completed a medication calculation and simulated medication administration task.

### Participants

Forty-one undergraduate students from the University of Nevada, Reno (UNR) and Truckee Meadows Community College (TMCC), who were admitted to a registered nursing degree program, were recruited for this study. Participants were required to be at least 18 years of age and able to speak and read English fluently. Participants were recruited through fliers and through information provided to nursing students by nursing faculty members. Participants were provided with a small monetary incentive. Eighty-one percent were females. Participants had completed an average of 17.6 credit hours of nursing courses at the time of their study participation.

### Procedure

**Randomization method.** Participants were randomly assigned to either a validating or invalidating condition prior to participation in the study and after giving informed consent.

Gender was used as a blocking factor and random assignment with a yoked design was used to ensure equal numbers of males and females in each condition. A computer-generated random number (even or odd) was used to assign the first female participant to the experimental condition. The next female was assigned to the other experimental condition. A subsequent random number determined the assignment of the third female participant and the fourth was automatically assigned to the other experimental condition, etc. The same procedure was used for males so that each condition contained equal numbers of males and females.

**Baseline Assessment.** Participants first completed pencil and paper self-report measures of emotion regulation skills, psychological distress, and current affect. Next, participants completed a timed quiz of nursing-related questions (See Appendix C). This quiz was meant to be a frustrating task and was designed such that it likely could not be completed within the allotted time. Participants also completed a brief questionnaire about their self-perceived competence in nursing at this time in their education (See Appendix B). The purpose of the competency evaluation and quiz was to give the investigator information that was used to provide either validating or invalidating feedback prior to a behavioral task.

**Validating or Invalidating Feedback.** After the quiz, participants were given feedback from the investigator regarding their accuracy on the quiz. The feedback included how their performance related to their self-evaluation of their competency. The experimenter elicited information for giving feedback through questions, such as “How is this going?” and “How do you feel about your performance on the quiz?”

Participants assigned to the validating condition were asked to describe their current emotional experience and their feelings and appraisal about how well they performed on the

quiz. Once the participant described his or her experience, the participant was exposed to validating feedback. The length of exposure to validating behaviors was approximately two minutes. Examples of validating comments included, “Taking a quiz with a short time period is a frustrating task,” “Most other participants have expressed the exact same feeling,” “Of course, almost everybody has that same experience…the test is designed to be stressful” and “I too would feel _____ if I were the one completing the task.” The validating condition also included regular eye contact, head nodding, and other non-verbal communication to convey listening and understanding.

Participants assigned to the invalidating condition followed the same procedure as those participants in the validating condition. However, participants in the invalidating condition were exposed to invalidating responses, including, “I don’t understand why you would feel _____.”, “There’s no need to get upset”, “Other people were frustrated but not as much as you seem to be,” “huh…most people don’t get so bent out of shape over this” and “It is surprising that you had difficulty with the quiz since you rated yourself _____ on the self-evaluation.” The invalidating condition also included the use of “pregnant” pauses and silence followed by an expression such as “… huh” without making much eye contact and thus conveying the disconnection of the experimenter.

**Post-feedback affect evaluation.** Following the validating or invalidating responses, participants were asked to complete the Positive and Negative Affect Scale (PANAS) in order to collect self-report data on changes in emotion content and intensity following exposure to one of the experimental conditions.

**Behavioral task.** Participants were given a hypothetical physician’s order for the administration of medication to be administered intramuscularly. The participant was first

required to calculate the correct dosage of the medication to administer. The participant was then directed to prepare the medication for administration. The participant's accuracy on the medication administration was assessed according to a checklist of a professionally accepted procedure for the administration of an intramuscular injection (See Appendix A). The task involved: 1) choosing the correct vial of simulated medicine (containing only water or benign powder), 2) preparing the required equipment (correct size of needle and syringe, dilution solution, alcohol swab), 3) prepare medication (dispense properly into syringe, mix with dilution fluid), 4) injection site preparation (using injection pad) and 5) proper administration of the intramuscular injection.

**Post-task affect evaluation.** Participants were asked to complete a third PANAS to assess level of positive and negative affect present after completion of task.

**Debriefing.** Participants were fully debriefed about the purpose of the study following completion of the post-experimental measures. During the debriefing, participants were informed that the purpose of the experiment was to investigate how error commission is affected by validating and invalidating responses during an interpersonal interaction. The concepts of validation and invalidation were briefly explained and a description of their use in the study was given. Participants also were informed of the difficulty of completing the first quiz in the allotted time. Participants were given ample time to ask any questions about the study or to make any comments about the study to the experimenter. Participants were given a copy of their consent form and small monetary compensation for their time.

## Measures

**Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983).** The BSI is a 53-item self-report symptom scale that measures general psychological distress. The Global

Severity Index (GSI), which is derived from the BSI, was used as a measure of psychological distress. The BSI is a shorter version of the SCL-90-R and is highly correlated to the SCL-90-R. Therefore, the BSI was used in consideration of the participants' time. The BSI has been found to have good reliability and validity.

**Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988).** The PANAS is a 20-item self-report measure that assesses an individual's perception of which emotions he or she is currently experiencing as well as how intensely these emotions are experienced. The PANAS assesses both positive and negative affective states and intensities. Reliability of the PANAS in a large non-clinical sample indicates strong internal consistency in both the positive affect scale (Cronbach's $\alpha = .89$) as well as the negative affect scale (Cronbach's $\alpha = .85$). The PANAS has good concurrent validity with measures of depression and anxiety (Crawford & Henry, 2004). The positive and negative affect scales of the PANAS were used to determine changes in the content of emotions as well as their intensities at three different points in time during the experiment.

**Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004).** The DERS is a 36-item, self-report measure of emotion regulation abilities, which includes six subscales. Specifically, it measures whether an individual has or lacks awareness of emotional responses, lacks clarity of emotional responses, lacks acceptance of emotional responses, has difficulty controlling impulsive behaviors when experiencing negative emotions, has limited access to effective emotion regulation strategies, and has difficulties engaging in goal-directed behaviors when experiencing negative emotions. The DERS contains six subscales measuring each of these individual aspects of emotion regulation. The DERS has been found to have high internal consistency, good test-retest reliability, and

adequate construct and predictive validity.

**Toronto Alexithymia Scale (TAS-20; Bagby, Parker, & Taylor, 1994).** The TAS-20 is a 20-item, self-report measure of alexithymia. Three subscales measure the different aspects of alexithymia, including difficulty describing emotions, difficulty identifying emotions, and the tendency to focus attention externally. The TAS-20 has been found to have adequate construct and good internal consistency.

**Mood and Anxiety Symptom Questionnaire - Anxious Arousal Scale (MASQ-AA; Watson, Weber, Assenheimer, et al., 1995).** The MASQ-AA is 17-item self-report measure of somatic symptoms of anxiety and hyperarousal. The scale has been found to have good discriminant validity.

**Task Accuracy (Medical Error) Measurement.** Participants were evaluated on several different aspects of the behavioral nursing task, including calculation of the correct dosage, accuracy of medication preparation, and accuracy of the administration of the medication. An error on any of the procedural steps, including an omission, counted as one error. The total number of errors was tallied for each participant and used as the dependent variable of task accuracy. Additionally, accuracy on the cognitive portion of the task (medication calculation) and the behavioral portion of the task (medication preparation and administration) was assessed separately as categorical dependent variables.

## Results

### Descriptive Statistics

**Distress.** Descriptive statistics are listed in Table 1. Psychological distress was measured by the Global Severity Index from the BSI. Twenty-seven percent were above the accepted clinical cutoff for distress of 0.78 on the GSI (Derogatis, 1993), indicating the majority of

participants were not significantly distressed. However, this is a higher rate of distress than would be expected in a non-distressed sample. This may reflect higher levels of distress among this sample of nursing students or that norms for a student population are a bit higher than for an ordinary adult population (the BSI does not have separate norms for university students).

**Emotion Regulation.** Emotion regulation was measured by the DERS. The mean score (see Table 1) was similar to the mean scores found by Gratz and Roemer (2004) in a sample of 356 undergraduates. A higher score indicates a greater amount of emotion dysregulation. Twelve percent of the subjects scored above one standard deviation above the mean, which is a similar percentage to another cross-sectional college student sample (Crook & Fruzzetti, 2010).

**Positive and Negative Affect.** Baseline mean scores for positive and negative affect were close to the normative means for a college student sample (See Table 1; Watson et al., 1988). No significant differences between groups were observed at baseline on positive affect, $t(39) = -0.21$, ns. There were also no significant differences between groups on negative affect, $t(39) = 1.04$, ns.

**Alexythimia.** Alexithymia was measured by the TAS-20. The clinical cut-off for the presence of alexithymia is 61, with a score of 52 to 60 indicating possible alexithymia. Five percent of the participants scored in the alexithymic range and ten percent scored in the possibly alexithmic range (See Table 1).

**MASQ – Anxious Arousal.** The MASQ-AA was used as a measure of the physiological arousal symptoms of anxiety. The normative mean of 516 college students is 27. Ninety percent of the participants scored at or below the normative mean (See Table 1).

**Adherence Check**

In order to evaluate objectively validating and invalidating feedback, the experimental procedure was videotaped so that the feedback could be rated by a coding team who was blind to which experimental condition the participant had been assigned. The Validating and Invalidating Behavior Coding Scale (VIBCS) is an observational rating scale used to measure levels of validating and invalidating behaviors between dyads. The VIBCS uses an ordinal rating scale ranging from 1 to 7 where one or both people interacting (in this study, only the experimenter will be rated) is given an overall rating for both validating and invalidating behaviors. Overall reliability and validity for this measure indicates good reliability between raters in general (Intraclass Correlation Coefficient = .74).

Ratings of validating and invalidating responses were used as an adherence check to ensure that participants in the validating condition received validating responses and participants in the invalidating condition received invalidating responses. Twenty-nine percent of the sample was coded by three raters who were blind to the experimental condition. Average ratings showed that the validating group received clearly validating feedback and the invalidating group received clearly invalidating feedback (See Table 2).

**Manipulation Check**

The study was based on the theory that validating or invalidating feedback would result in changed emotional arousal (maintaining, increasing or decreasing), which would in turn affect the commission of errors. Therefore, it was important to verify that the experimental manipulation worked as expected prior to testing the study hypotheses. Mid-way through data collection, analyses of covariance were performed to analyze whether positive and negative affect changed significantly after exposure to a validating and invalidating

interaction.

There was no significant difference in positive affect between the validating and invalidating conditions, $F(1,38) = 0.02$, ns. Negative affect was expected to change more than positive affect after receiving invalidating feedback. Again, however, there was no significant difference between groups on the change in negative affect between baseline measurement and the post-feedback measurement, $F(1,38) = 0.97$, ns. Specifically, the mean increase in negative affect in the validating group was 2.05 and the mean increase in the invalidating group was 1.95. Two previous studies conducted using the same experimental manipulation were successful in moving affect in the expected directions (Shenk & Fruzzetti, in press, Erikson & Fruzzetti, 2011). However, the experimental manipulation of affect with validating or invalidating feedback failed in the present study, despite the adherence check showing that the manipulation was performed as designed.

A reverse power analysis was performed and it was determined that running the remaining number of participants originally estimated would still be insufficient to detect a significant difference between groups. Therefore, the attention of the study turned to collecting additional data following changes in the manipulation and investigating possible explanations for the failure of the experimental manipulation. Because no changes in positive and negative affect were observed, the original hypotheses could not be evaluated[1]. The remainder of the results will describe attempts to understand why this manipulation failed, especially given its success in at least two prior studies.

[1] Due to the failure of the experimental manipulation, the statistical analysis of the difference in task accuracy (medical errors) between the validating and invalidating conditions was not reported in the results section. However, for informational purposes, a t-test was conducted which showed no significant differences between conditions on the number of errors committed ($t(39) = 0.36$, ns). Similarly, a logistic regression found no significant differences between conditions on the commission of a medication calculation error (OR = 0.93, ns).

**Possible Manipulation Failure Hypotheses**

**Comparison of sample characteristics.** The study sample was investigated for any significant differences from subjects in previous studies on the baseline measures (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011). Distress at baseline in this sample was not significantly different from the Shenk and Fruzzetti (in press) study for the validating group (t(48) = 1.36, ns) or the invalidating group (t(50) = 1.01, ns; See Table 3). Baseline positive affect was higher in this sample than in either of the other two studies. Compared to the Shenk and Fruzzetti (in press) study, positive affect in the validating group was not significantly higher ($t(16) = -0.24$, ns), but positive affect in the invalidating group was significantly higher ($t(50) = 2.72$, $p < 0.01$). Positive affect was not significantly different at baseline from the Erikson and Fruzzetti (2011) study in the validating condition ($t(83) = 1.16$, ns) or the invalidating condition ($t(84) = 1.76$, ns).

Baseline negative affect was not significantly higher than the Shenk and Fruzzetti (in press) study ($t(48) = 1.23$, ns) or the Erikson and Fruzzetti study ($t(83) = 1.06$, ns) in the validating group. Among participants in the invalidating condition, baseline negative affect was almost equivalent to the Shenk & Fruzzetti (in press) study ($t(50) = 0.06$, ns) and not significantly lower than the Erikson and Fruzzetti (2011) study ($t(84) = 1.38$, ns; See Table 3).

**Affect comparison at time 1 post-feedback.** Differences between this sample and the other two samples from previous studies (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011) on positive and negative affect, were compared at the point at which all samples had received exposure to a validating or invalidating response from the experimenter. Positive affect decreased a similar amount in the validating condition in the present study as it did in

the other two studies (See Figure 1). In the invalidating condition in the present study, positive affect decreased in a similar amount to the sample in the Shenk and Fruzzetti (in press) study and decreased less than in the sample in the Erikson and Fruzzetti (2011) study (See Figure 2). Negative affect increased less in the present study than the other two studies in the validating condition (See Figure 3). The change in negative affect in the invalidating group in the present study differed markedly from the other two studies, with the change in the other two studies being approximately three times greater than the negative affect change in this study (See Figure 4).

**Post Hoc Investigation**

**Procedure change.** Based on previous studies (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011), the experimental manipulation was expected to change affect significantly. In an effort to further investigate the failure of the experimental manipulation, a post hoc sample of 17 additional participants was collected. The greatest difference in this study's sample in comparison to the other two similar studies was the lack of increase in negative affect following invalidation. Therefore, the post hoc procedure did not randomize subjects into condition, but rather assigned all of these subjects into the invalidating condition in order to explore the findings in this condition.

It was hypothesized at this time that the experimental manipulation failed because the dosage of invalidation, or amount of exposure to invalidating feedback, was insufficient. Therefore, the study procedure was altered to add a second invalidating interaction. The initial stressful task of the basic nursing knowledge quiz was divided into two parts. Participants were given invalidating feedback on their quiz performance after completing the first half of the quiz and again after completing the second half. The PANAS was

administered after each incidence of feedback.

**Post hoc sample characteristics.** Descriptive statistics for the post-hoc sample, with comparisons to the original validating and invalidating groups in the present study, are listed in Table 4. In general, the post-hoc sample was similar to the original sample on measures of distress, emotion regulation, and alexithymia. Twenty-nine percent were above the accepted clinical cutoff for distress of 0.78 on the GSI (Derogatis, 1993), similar to the original sample. Distress was slightly lower overall in the post-hoc sample than in the original invalidating group, but this difference was not significant.

Baseline mean scores for positive affect were also slightly lower than the original invalidating group, but were not statistically different ($t(36) = 1.35$, ns). Baseline negative affect mean scores were similar to the original invalidating condition ($t(36) = 0.38$, ns; See Table 4). The post hoc sample was also similar to the two previous studies on baseline positive affect and lower than the previous samples on baseline negative affect (See Table 5). Statistically, the post hoc sample did not differ significantly from the Shenk & Fruzzetti (in press) study on positive affect ($t(46) = 0.38$, ns) or negative affect ($t(46) = 0.35$, ns). The post hoc sample also did not differ significantly from the Erikson and Fruzzetti (2011) on baseline positive affect ($t(80) = 0.19$, ns) or negative affect ($t(46) = 1.62$, ns).

**Affect changes in post hoc sample.** Positive affect decreased in the post hoc sample after both the first and second exposures to invalidating feedback to a greater degree than in the original invalidating group. An analysis of covariance was performed to compare the changes in positive affect after the first exposure to invalidation in both the post hoc sample and the original invalidating group. The difference in positive affect was not statistically significant, $F(1,38) = 3.24$, ns. A second analysis of covariance was performed to compare

two exposures of invalidating feedback in the post hoc sample to one exposure in the original sample and no significant differences were found ($F(1,38) = 2.34$, ns). The decrease in positive affect approached statistical significance when comparing the post hoc invalidating group to the original validating group, $F(1,37) = 2.70$, $p = 0.11$. Compared to the previous two studies (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011), positive affect changed similarly in reaction to invalidation (See Figure 5).

Negative affect in the post hoc sample increased more than in the original sample after the first exposure to invalidating feedback, but still increased to a lesser degree (even after two invalidating episodes) than in the previous two studies (See Figure 6). An analysis of covariance showed that the difference between the post-hoc sample and the original invalidating group was not statistically significant, $F(1,38) = 1.10$, ns. A within sample paired t-test showed that negative affect then decreased slightly, although not significantly, after the second exposure to invalidation ($t(16) = 1.16$, ns). Because negative affect went down rather than continuing up after the second exposure, the difference in negative affect between the post hoc sample (after two exposures to invalidation) and the original sample (after one exposure to invalidation) also did not differ significantly ($F(1,38) = 0.20$, ns). Unlike positive affect, an analysis of covariance did not find a significant increase in negative affect when comparing the post hoc invalidating sample to the original validating group, $F(1,37) = 0.61$, ns. Within sample paired t-tests were performed to determine if the second exposure of invalidation produced a significantly different level of affect change than one exposure. No significant differences were found for positive affect ($t(16) = -0.24$, ns) or negative affect (see previously stated results).

**Post-hoc survey.** Participants in the post hoc sample were asked several questions

during the debriefing process to gather qualitative data about their emotional reactions during the study. Participants were asked whether they noticed that the interaction was invalidating and whether they thought their emotions affected their task performance. The majority of the participants in the post hoc sample, eighty-two percent, reported that they noticed that the interaction was invalidating. Thirty-five percent of the post hoc sample reported that even if they noticed the invalidating nature of the interaction, they did not have an emotional response. These participants made statements such as “I did not take the interaction personally, so I disconnected from the interaction,” “I knew it was a study so that kept emotion from being affected,” “I am focused on school and goals and don’t let emotions get in the way,” “I have learned to separate and block out emotions,” and “I put my emotions aside.” (See Table 6). Among this subset of post hoc participants reporting no reaction to the invalidating interaction, the average increase in negative affect between baseline and after receiving the first invalidating interaction was 1.7 versus 5 points in the subset reporting that they were affected. The average score on the TAS-20 for this subset of participants was 43, which is well below the cutoff of 52 to indicate possible alexithymia.

Sixty-five percent of the post hoc sample verbally reported that they noticed an emotional reaction to the invalidating interaction. These participants made statements such as, “I noticed a lot of anxiety,” “It affected my ability to concentrate. I felt preoccupied,” and “It drove my emotions up.” (See Table 6). The average increase in negative affect between baseline and after receiving the first invalidating interaction was 5 points for this subset of post hoc participants versus only 1.7 points for participants who reported no effect from the invalidation.

Participants in the post-hoc sample were asked about their prior knowledge of the

study's procedures, including knowledge of the experimental manipulation. One hundred percent of participants reported that they had no prior knowledge of the experimental manipulation. Therefore, based on self-report there was no evidence of erosion of the blind.

## Discussion

The purpose of the study was to evaluate the effects of validating and invalidating social interactions on the commission of medical errors in nursing students. The study design was based on previous studies (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011), that showed that invalidating responses would elicit further increased negative affect and reduced positive affect in response to stress. For validating interactions, previous studies demonstrated that validating responses would help reduce negative and increase positive emotional reactions to stress. It was hypothesized that there would be a relationship between the level of negative affect in participants and the number of errors committed. Therefore, it was expected that the mechanism that would be responsible for a greater error rate would be emotional reactivity, in this case specifically a higher level of negative affect as a result of receiving invalidating feedback.

Unfortunately, there were no differences between experimental conditions in how participants responded affectively to the validating or invalidating feedback. Positive affect decreased in each experimental condition by about the same amount. However, positive affect decreased a similar amount in the other two comparison studies (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011) in the validating condition. It is likely that the process of engaging in the study procedures, which included a mental arithmetic task in the previous studies and a knowledge quiz in the present study, are responsible for the decrease in positive affect in the validating condition. In the invalidating condition, positive affect was not

expected to be impacted to the same degree as negative affect. As can be observed in Figure 2, positive affect decreased only slightly in response to invalidation. However, the response was similar to the level of response in the Shenk and Fruzzetti (in press) study and was not in and of itself the reason why the experimental manipulation was unsuccessful.

Most problematic for the current study was the fact that participants' negative affect increased only to the same degree in the invalidating condition as in the validating condition. In contrast, previous studies showed a significant differential response to invalidation (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011). The increase in negative affect in the current study appeared to have no relationship to the experimental manipulation.

In light of the absence of the expected differential emotional response, the experimental manipulation clearly failed. Affect, particularly negative affect, had to respond in the expected direction in order to evaluate whether error commission is affected by invalidating or validating interactions. The effect of stress and negative affect on error commission has already been well established (Fahrenkopf et al., 2008; West et al., 2006; Yerkes & Dodson, 1908), but the unique value of this study was to gain an understanding of how invalidating social interactions negatively impact the ability to perform cognitive and behavioral tasks. With an insufficient experimental manipulation this could not be evaluated. Therefore, the attention of the study turned to the investigation of possible explanations for the failure of the experimental manipulation. We will now consider several explanations.

**Characteristics of the Study Sample**

**Distress and emotion regulation.** Characteristics of the sample were explored to determine if the sample differed from those in previous studies on levels of psychological distress or emotion regulation abilities. One hypothesis about why this sample did not

respond as expected was that the participants' baseline level of distress might have been higher than other samples, resulting in a ceiling effect on negative affect. However, the majority of study participants were within the normal range for distress and emotion regulation at baseline. Additionally, this sample did not differ significantly on measures of distress and emotion regulation from the Shenk & Fruzzetti (in press) study. Therefore, it does not appear that the participants in this study were at an unusually high level of distress or emotional dysregulation. Thus, the possible explanation that affect did not respond because there was little room for an increase in negative affect was eliminated.

**Alexithymia.** Another possible explanation of the lack of emotional response to invalidation was that the participants were more alexithymic. However, the majority of the participants showed no differential indication of emotional numbing. Therefore, there was no evidence to support that the sample had difficulty responding to feedback because of feeling emotionally numb.

**Positive affect.** The level of positive affect in the sample at baseline was higher in both experimental conditions in the present study than in the previous studies (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011). Most notably, the level of positive affect in the invalidating group was statistically higher than in the Shenk & Fruzzetti (in press) study. It is possible that the higher level of positive emotions may have had an effect on the participants' perceptions of the experimental interaction such that their positive affect acted as a buffer against negative emotional reactivity to being invalidated. Previous research has shown that a higher level of positive affect predicts a person's perception of the general quality of social interactions (Berry & Hansen, 1996). In two related studies Berry & Hansen (1996) showed a consistent relationship between an individual's level of positive affect and their report of

social interactions being pleasant and enjoyable. In both studies the level of negative affect was not predictive of the quality of social interactions. These findings may provide some insight into why this sample did not report a decline in negative affect as a result of an invalidating social interaction. It is plausible that the participants' higher level of positive affect influenced the participants' experiences both of the knowledge quiz and of being invalidated, such that they did not experience either to be as stressful as did previous samples.

While baseline positive affect was higher in this study than in the previous comparison studies (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011), the mean PANAS positive affect score for the invalidating group (31.52) was almost identical to the normative mean of 31.31 (Crawford & Henry, 2004). Therefore, the level of positive affect in the participants of the present study is what one would expect in a non-clinical sample. The Shenk and Fruzzetti (in press) study, which had a significantly lower level of positive affect in the invalidating group than the present study, was also a non-clinical sample. It would be assumed that positive affect would be similar in both studies to the normative mean.

**Sample composition.** The present study sample and the comparison samples (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011) were similar in composition from the standpoint of being undergraduate students. However, the study samples differ on several demographic factors. The present study consisted of students majoring in nursing, versus the other two studies (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011) composed of students from multiple majors who were enrolled in psychology courses at the time of study participation. Students who select nursing as a career may have characteristics that differ from students in other majors. It is also worth considering that the nursing training process

may affect an individual's emotional reactivity and their response to invalidation. There appears to be a process of professional socialization into the nursing profession during which students confront the reality of the stressful nature of nursing work, fears about their ability to perform competently, and the ability to balance a caring stance with an ability to cope emotionally with the clinical and social situations encountered (Mackintosh, 2006). Nursing researchers have found that some nurses and nursing students acknowledge that an "emotional hardening" sometimes occurs as nurses adapt to the emotional demands of the profession (Price, 2008, Mckintosh, 2006). Therefore, it is possible that a nursing student sample may differ in emotional reactivity from other college student samples due to the process of adapting to the unique demands of nursing study and practice.

Another difference is that the majority of participants in the present study were from TMCC (98% in the original sample and 100% of the post hoc sample) rather than UNR. The Shenk and Fruzzetti (in press) study was composed exclusively of UNR students and the Erikson and Fruzzetti (2011) study sample was composed primarily of UNR students. There may be notable differences in the samples because of factors that influence the choice of attending one educational institution versus another, such as flexibility of scheduling, balancing work and family demands with school, and cost.

**Gender.** Finally, the number of males in the present study (20% male, 80% female in the validating condition and 19% male, 81% female in the invalidating condition) was lower than each of the comparison studies. The Erikson and Fruzzetti (2011) study had a slightly higher percentage of males (28% male, 72% female in the validating condition and 31% male and 69% female in the invalidating condition). The distribution of males and females was more equally weighted in the Shenk & Fruzzetti (in press) study (40% male, 60% female in the

validating condition and 45% male and 55% female in the invalidating condition). It is possible that the greater percentage of males in the Shenk & Fruzzetti (in press) study may be an explanation for the significant difference in baseline positive affect from the current study.

**Dosage Effect**

One of the most obvious differences between this study and previous similar studies (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011) was the number of validating or invalidating interactions (and therefore the number of actual validating or invalidating responses) included in the study protocol. That is, in prior studies there was a series of several validating or invalidating interactions, whereas in this study there was only one. Only one interaction was assumed to be sufficient, in part because the pattern of responding was clear in prior studies following the first invalidating vs. validating interaction (more interactions were assumed to be unnecessary, given an apparent ceiling effect for negative emotional arousal in prior studies). However, this assumption may not have been correct. Therefore, a post-hoc sample was collected to investigate whether a second invalidating interaction (one additional exposure to invalidating responses) would result in more of the expected change, particularly in negative affect.

The post hoc sample did not differ significantly from the original sample on measures of distress, emotion regulation, or alexithymia. The post hoc sample also did not differ significantly on baseline levels of positive and negative affect. Therefore, this post-hoc sample likely provided an adequate medium for investigating the effects of an additional "dose" of invalidation.

**Dosage effect on positive affect.** Positive affect was slightly, but not significantly, lower in the post hoc sample and was very similar to the baseline positive affect of the

comparison studies (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011). Positive affect responded to invalidation as hypothesized in the post hoc sample. The decline in positive affect was greatest after the first invalidating interaction and there was no further decline after the second exposure to invalidation. The initial decrease in positive affect was not a statistically significant decline, but did approach significance when compared to the original validating sample. Since the largest (and nearly significant) decline occurred after the first exposure to invalidation, the increased dose of invalidation cannot explain the difference in emotional outcomes from the original invalidating sample. A possible explanation could be that the lower level of baseline positive affect may have affected participants' perception of the interaction in the post hoc sample (Berry & Hansen, 1996). With a lower level of positive emotion, both the knowledge quiz and the invalidating interactions may have been experienced more negatively.

**Dosage effect on negative affect.** Negative affect did not change to a greater degree with two doses or episodes of invalidating responses. In the comparison studies, the greatest increase in negative affect occurred after the first exposure to invalidation with a slight *decrease* in negative affect after the second exposure. The same pattern of responding occurred in the post hoc sample, with the greatest increase in negative affect being after the initial exposure to invalidation. Interestingly, negative affect did increase to a greater degree in the post hoc sample than the original sample and, graphically, negative affect changed quite similarly to the comparison studies. However, the initial increase in negative affect did not increase as much as it did in the comparison studies. The post hoc sample's changes in negative affect did not increase in a statistically significant amount and did not differ significantly from the original validating group.

In summary, a greater dosage of invalidation did not produce an additional decline in positive affect or increase in negative affect. Similar to the previous comparison studies (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011), the first dosage of invalidation produced the greatest change in affect. Therefore, providing insufficient invalidating responses during the experimental procedures does not appear to be the reason for the failure of the experimental manipulation. Instead, the sample appears to have demonstrated a lower level of emotional reactivity to both validation and invalidation. Despite having a similar level of emotion regulation skills to the Shenk & Fruzzetti (in press) study, other factors previously discussed, such as gender distribution, unique characteristics of nursing majors, or emotional coping skills learned in the nursing training environment, may account for the lower affective response to validation and invalidation.

**Other Protocol Issues**

**Stressful task.** Another difference between this study and previous studies using a validating and invalidating experimental condition is that the other two studies utilized a frustrating mental arithmetic task as the stressing task about which to have the invalidating or validating interaction. In contrast, the present study utilized a 30-item quiz of nursing-related anatomy and physiology questions (see Appendix C). Mental arithmetic tasks have consistently been shown to be a stressor for most people (Linden, 2007; Mathias, Stanford & Houston, 2004). It is possible that the combination of the mental arithmetic task with invalidating feedback is a more potent experimental manipulation for the induction of negative affect than invalidation in combination with a timed knowledge quiz.

To assess the relative impact of these two stressors, a study could be conducted with subjects drawn from the same places (nursing students) and randomly assigned to receive

either the more standard mental arithmetic test or the nursing knowledge quiz. Additionally, it would be helpful to insert an additional measure of affect in between the quiz and the validating or invalidating interaction. An additional PANAS at this point in the protocol was not administered in the present study, but would have provided information about how stressful the knowledge quiz was to participants. Before utilizing a knowledge quiz as a core part an experimental stress manipulation in the future, a comparison of stressing tasks should be conducted as well as additional measures of affect to understand the differential impact of the stressful task on affect.

**Deception.** Deception was an important aspect of this study's design. Knowledge of the procedures would interfere in participants' abilities to respond genuinely to the validating or invalidating interaction. A possible explanation for the lack of the expected emotional response to invalidation was an erosion of the blind in which participants became aware before study participation of the intent of the study to elicit an emotional response through a specific type of interaction. A specific question was added to the debriefing section for the post hoc sample to inquire about whether the participant had advanced knowledge of the true intent of the study or knowledge of the study procedures. All participants (100%) in the post hoc sample denied any previous knowledge of the study procedures or intent. This suggests that the deception aspect of the study was not compromised, and therefore not responsible for the failed procedures.

**Post-Hoc Survey**

Based on qualitative data gathered during the debriefing section for the post hoc sample, over one third of participants reported that they were not emotionally affected by the invalidating interaction. Interestingly, the PANAS data was consistent with their verbal self

reports. The participants who stated that they were unaffected by the invalidation had a very small amount of increase (1.7 points out of 50 possible) in their negative emotion after the first invalidating interaction. However, the participants who verbally reported that they were affected by the invalidation had a much larger increase in negative affect (5.0 points), although the increase was not enough to be statistically significance for the post hoc sample.

The survey data do give additional insight into the study results. Thirty-five percent of the post hoc sample may be a substantial portion of participants who indicated that they did not experience a negative emotional reaction following invalidating feedback. The study results and verbal reports indicate that these participants modulated their emotional responses to cope with an aversive situation. Thus, the question arises as to why this sample of participants would react differently from the samples in the two previous studies (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011) particularly when the participants in the Shenk and Fruzzetti (in press) study also had normative levels of distress and emotion regulation skills. The DERS scores for the participants who reported an effect from the interaction, versus those who did not report an effect, was an insignificant difference of two points. Additionally, the mean DERS scores for both the post hoc sample and the original study sample did not differ significantly from the Shenk & Fruzzetti (in press) study, another cross-sectional non-clinical college student sample (Crook & Fruzzetti, 2010), or the established normative mean (Gratz and Roemer, 2004). Therefore, a greater level of emotional regulation skills is not likely to explain why this sample reacted differently from the participants in the two previous comparison studies (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011).

**Nursing student characteristics.** Bennett and Lowe (2008) conducted a study of 113 nurses, including nurses in training, to investigate the type of stressful work conditions they

encountered and their emotional responses to those events. Nurses cited that the majority of negative work events were the result of negative social interactions with other professionals or patients' family members. They found that the majority of nurses were able to cope well emotionally with these stressful situations, reported that they had a strong belief in their ability to cope emotionally with negative events, and were more likely to attribute the cause of the negative event to an external source rather than themselves (Bennett & Lowe, 2008). Evidence from this study suggests that individuals who are in the nursing profession, or are training to be a nurse, may have a high level of ability to cope with distressing events and control their emotional reactions even relatively early in their training. This may be a result of self-selection factors (among those who choose to go into nursing) or may result from training and preparation. Therefore, it may be possible that nursing students differed in their reactions to invalidation from a cross-section of college students due to the process of professional socialization into the demands of the nursing profession during training (MacKintosh, 2006).

One potential explanation of why a nursing student sample may react differently to invalidation than other cross-sectional college student samples may be due to habituation, at least in the short term, to a higher level of invalidation present in the nursing education environment. Several survey studies have been conducted to investigate problematic behaviors in the nursing education environment that create distress among nursing students and educators (Clark & Springer, 2007; Clark & Springer, 2010; Thomas, 2003). Clark and Springer (2007) identified behaviors defined as *uncivil* that occurred in both nursing students and educators. Faculty behaviors included criticality, belittling, taunting, and being cold and distant and student behaviors included sarcastic remarks, inattention, and making harassing

comments. These behaviors contain elements of invalidation. Uncivil behaviors in nursing education programs were perceived by a sample of 324 nursing students to be a moderate problem in 60% of participants and a serious problem in 9% of respondents. Indeed, creating a relatively difficult training environment could be an intentional (and even successful) way to "inoculate" students prior to working in very difficult professional environments. If invalidating behaviors are prevalent in their nursing education environment, participants may have had more experience with either coping or ignoring invalidating interactions. We have no measures of their training environment to evaluate this possibility.

However, it is important to remember that nursing students in the present sample actually reported slightly higher levels of positive affect. Thus, if their training environment was a difficult one, it also likely provided support and facilitated the development of coping skills. Otherwise, the present sample would presumably have displayed more negative affect and general distress than previous samples reported. Thus, it is possible that the current sample enjoys increased resilience. If this could be determined, then it would become important to determine whether this resilience is, 1) a pre-existing personality factor that facilitates self-selection into certain professions or training programs (that could also have less positive components, such as detachment or cynicism, or more consistently positive components, such as flexibility and hardiness), or 2) a set of coping skills that are learned well during nursing education (at least in the present samples). It is important to note that the nursing program at TMCC, from which the majority of the participants were drawn, implemented nursing student retention programs to provide academic assistance and support of psychological well-being. Participants may have learned skills by participating in these programs that helped them cope well with invalidation.

**Study Limitations**

For the purpose of studying the study's original hypotheses, the analog nature of the experiment, specifically using nursing students rather than professional nurses is a limitation. When evaluating medication administration and calculation errors, the use of professional nurses would prevent inexperience from being a contributing factor to error commission. Instead of the experimenter being a doctoral student in psychology, employing a member of the nursing faculty as the investigator may have been more ecologically valid and thus could have enhanced the study's design. Having an actual nursing supervisor in the feedback role may have lent an extra element of realism to the study scenario and made the feedback from the investigator more salient to the participant, thus inducing a greater emotional response.

The limitation of most concern to the original study design was the failure of the study procedure to induce affective change. Several potential explanations for this limitation were explored, such as insufficient dosage, erosion of the blind, an insufficiently stressful performance task (knowledge quiz) and baseline levels of emotion regulation and distress. A clear explanation for the experimental failure did not emerge, but the study did provide a background for the investigation of additional factors to consider when studying invalidating interactions.

**Future Directions**

The present study highlighted methodological challenges for studying the impact of validating and invalidating interactions with an experimental protocol. Understanding the interaction between the stressor task and invalidating feedback is vital in designing future studies investigating invalidation in a laboratory setting. The present study utilized a

knowledge quiz as a stressor task, while previous studies utilized a mental arithmetic task (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011). It would be interesting to alter the present study protocol to use a mental arithmetic task as the stressing task. Another interesting approach would be to randomly assign participants to a variety of stressor tasks before exposure to invalidation to determine the differential contributions of the stressor task and invalidation to changes in affect.

In order to distinguish the affective impact of the stressor task from invalidating feedback, it would be helpful to measure affect after the stressor task and prior to receiving invalidating feedback. The additional affect measurement would help to determine whether there is a significant interaction between the mental arithmetic task and invalidating interactions resulting in a greater affective response.

The survey data collected in the post-hoc sample was useful in understanding participants' affective responses. Future studies would likely benefit from a similar approach by asking open-ended questions after the conclusion of the study procedure. Answers to survey questions can be used to identify what emotion regulation strategies participants employed to cope with invalidation. Additionally, survey comments can be used to verify whether participants noticed emotional reactions and to check the consistency between survey responses and self-report measures.

Finally, the use of a distressed or emotionally dysregulated sample of nurses may be more useful for studying the impact of invalidation on workplace errors. Individuals who have good emotion regulation and coping skills are not as likely to be impacted by a brief invalidating social interaction as someone who has higher baseline of distress or who lacks average emotion regulation skills. There is evidence that most nurses and nurse trainees have

adequate skills to effectively cope with distressing social interactions (Berry & Lowe, 2008). The more useful issue to study may be the interaction between invalidation and distress and whether this interaction could effect error commission.

**Summary**

In conclusion, this study initially sought to understand the effects of negative affect resulting from invalidating social responses on medical error commission in nursing students. Unfortunately, the experimental manipulation did not have the expected effects on positive and negative affect. Without successful manipulation effects the original hypotheses could not be evaluated, and the focus turned instead to understanding the manipulation failure. Useful information was gleaned from an additional post hoc sample that was collected under a revised study protocol. Although previous studies (Shenk & Fruzzetti, in press; Erikson & Fruzzetti, 2011) have demonstrated that invalidating interactions have a statistically significant impact on negative affect, there is also utility in understanding other factors that influence affective responses within an experimental protocol using validating and invalidating feedback. Factors that may have influenced participants' affective responses, leading to the manipulation failure in the present study, include, 1) a higher level of baseline positive affect among subjects compared to those in previous studies; 2) the use of a stressful task that may have been less stressful than the protocols used in prior studies; 3) a lower dosage of experimental invalidation; and 4) social or cultural phenomena related to self-selection or training, perhaps specific to this study sample of nursing students. Just as the process of emotion regulation involves many contextual factors, a combination of factors may be required to elicit significant increase in negative affect, and future studies should evaluate these factors independently. Thus, this study may be useful in informing future

studies of some of the challenges and difficulties inherent in evaluating emotional responding in a laboratory setting.

## References

Agency for Healthcare Research and Quality (2003). *The effect of health care working conditions on patient safety.*

Bagby, R. M., Parker, J. D. A. & Taylor, G. J. (1994). The twenty-item Toronto Alexithymia Scale-I. Item selection and cross-validation of the factor structure. *Journal of Psychosomatic Research*, 38, 23-32.

Berry, D. S. & Hansen, J. S. (1996). Positive affect, negative affect, and social interaction. *Journal of Personality and Social Psychology, 71(4),* 796-809.

Beyea, S. C., Hicks, R. W., & Becker, S. C. (2003). Medical errors in the OR – a secondary analysis of Medmarx. *AORN Journal, 77,* 122-134.

Clark, C.M. & Springer, P.J. (2007). Incivility in nursing education: A descriptive study of definitions and prevalence. *Journal of Nursing Education, 46(1),* 7-14.

Clark, C.M. & Springer, P.J. (2010). Academic nurse leaders' roles in fostering a culture of civility in nursing education. *Journal of Nursing Education, 49(6),* 319-325.

Crawford, J. R., & Henry, J. D. (2004). The Positive and Negative Affect Schedule (PANAS): Construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 43*(3), 245-265.

Crook, W.M. & Fruzzetti, A.E. (2010). *Components of emotion regulation: Understanding the differential contributions of emotion regulation and distress tolerance to individual psychopathology.* Unpublished manuscript, University of Nevada, Reno.

Derogatis, L. R., & Melisaratos, N. (1983). The Brief Symptom Inventory: An introductory report. *Psychological Medicine, 13*(3), 595-605.

Dugan, J., Lauer, E., Bouquot, Z., Dutro, B. K., Smith, M., & Widmeyer, G. (1996). Stressful nurses: The effect on patient outcomes. *Journal of Nursing Care Quality, 10*(3), 46-58.

Erikson, K. M. & Fruzzetti, A. E. (2011). *Evaluating the effect of interpersonal responding on emotional sensitivity and reactivity in borderline personality disorder.* Unpublished manuscript, University of Nevada, Reno.

Fahrenkopf, A. M., Sectish, T. C., Barger, L. K., Sharek, P. J., Lewin, D., Chiang, V. W., et al. (2008). Rates of medication errors among depressed and burnt out residents: prospective cohort study. *BMJ, 336,* 488-491.

Fruzzetti, A. E., Crook, W. M., Lee, J. E., Murphy, K. R., & Worrall, J. M. (2008). Emotion Regulation. In *Cognitive Behavior Therapy: Applying empirically supported techniques in your practice* (pp. 152-159). New York: Wiley.

Fruzzetti, A. E. & Shenk, C. (2008) Fostering validating environments in families. *Social Work in Mental Health, 6(1),* 215-227.

Garrett, C. (2008). The effect of nurse staffing patterns on medical errors and nurse burnout. *Association of Operating Room Nurses, 11,* 1191-1200.

Gratz, K. L., & Roemer, L. (2004). Multidimensional Assessment of Emotion Regulation and Dysregulation: Development, Factor Structure, and Initial Validation of the Difficulties in Emotion Regulation Scale. *Journal of Psychopathology and Behavioral Assessment, 26*(1), 41-54.

Gross, J. J., Richards, J. E., & John, O. P. (2006). Emotion Regulation in Everyday Life. In *Emotion regulation in couples and families: Pathways to dysfunction and health* (pp. 13-35). Washington D.C., US: American Psychological Association.

HealthGrades. (2004). *HealthGrades Quality Study: Patient Safety in American Hospitals.*

HealthGrades. (2006, April). *HealthGrades Quality Study: Third Annual Patient Safety in American Hospitals Study.*

Institute of Medicine. (2000). *To Err Is Human: Building a Safer Health System.* Washington, D.C.: National Academy Press.

Institute of Medicine. (2006). *Preventing Medication Errors: Quality Chasm Series.* Washington, D.C.: National Academy Press.

Iverson, K., & Fruzzetti, A. E. (2008). *Validating and Invalidating Behaviors in Depressed and Non-depressed Couples.* Unpublished manuscript. University of Nevada, Reno.

Jones, J. W., Barge, B. N., Steffy, B. D., Fay, L. M., Kunz, L. K., & Wuebker, L. J. (1988). Stress and Medical Malpractice: Organizational Risk Assessment and Intervention. *Journal of Applied Psychology, 73*(4), 727-735.

Kramer, M., & Schmalenberg, C. (2004). Essentials of a Magnetic Work Environment: Part 1. *Nursing, 34*(6), 50-54.

Linden, W. (1991). What do arithmetic stress tests measure? Protocol variations and cardiovascular responses. *Psychophysiology, 28(1),* 91-102.

Linehan, M. M. (1993). *Cognitive-Behavioral Treatment of Borderline Personality Disorder.* New York, NY: Guilford Press.

Lu, H., While, A. E., & Barriball, K. L. (2005). Job satisfaction among nurses: a literature review. *International Journal of Nursing Studies, 42*, 211-227.

Mathias, C. W., Stanford, M. S., & Houston, R. J. (2004). The Physiological Experience of the Paced Auditory Serial Addition Task. *Archives of Clinical Neuropsychology, 19*(4), 543-554.

Mackintosh, C. (2006). Caring: The socialisation of pre-registration student nurses: A longitudinal qualitative descriptive study. *International Journal of Nursing Studies, 43,* 953-962.

McNutt, R. A., MD, Abrams, R., MD, & Aron, D. C. (2002). Patient Safety Efforts Should Focus on Medical Errors. *Journal of American Medical Association, 287*(15), 1997-2001.

Miller, M. R., Clark, J. S., & Lehmann, C. U. (2006). Computer-based medication error reporting: insights and implications. *Quality and Safety in Health Care, 15,* 208-213.

Pedroja, A. T. (2008). The Tipping Point: The Relationship Between Volume and Patient Harm. *American Journal of Medical Quality, 23*(5), 336-341.

Price, S. L. (2008). Becoming a nurse: a meta-study of professional socialization and career choice in nursing. *Journal of Advanced Nursing, 65(1),* 11-19.

Raju, T. N., Kecskes, S., Thornton, J. P., Perry, M., & Feldman, S. (1989). Medication errors in neonatal and paediatric intensive-care units. *Lancet, 2,* 374-376.

Reason, J. (2000). Human error: models and management. *BMJ, 320,* 768-770.

Roger, A. E., Hwang, W., Scott, L. D., Aiken, L. H., & Dinges, D. F. (2004). The working hours of hospital staff nurses and patient safety. *Health Affairs, 23(4),* 202-212.

Rosenstein, A. H., & O'Daniel, M. (2008). Managing disruptive physician behavior: Impact on staff relationships and patient care. *Neurology, 70,* 1564-1570.

Rothberg, M. B., Abraham, I., Lindenauer, P. K., & Rose, D. N. (2005). Improving Nurse-to-Patient Staffing Ratios as a Cost-Effective Safety Intervention. *Medical Care, 43*(8), 785-791.

Sayrs, J. H., & Fruzzetti, A. E. (2008). *Partner invalidating responses in couples: Impact on affect and self-behaviors.* Unpublished manuscript, University of Nevada, Reno.

Scott, L. D., Rogers, A. E., Hwang, W. T., & Zhang, Y. (2006). Effects of Critical Care Nurses' Work Hours on Vigilance and Patients' Safety. *American Journal of Critical Care, 15*(1), 30-37.

Shenk, C., & Fruzzetti, A. E. (in press). The impact of validating and invalidating responses on emotional reactivity. *Journal of Social and Clinical Psychology.*

Thomas, S.P. (2003). Handling anger in the teacher-student relationship. *Nursing Education Perspectives, 24(1),* 17-24.

Thorp, S. R., & Fruzzetti, A. E.. *Predicting Course of Disorder in Psychiatric Outpatients: The Impact of Validation and Invalidation by Cohabitating Partners.* Unpublished manuscript. University of Nevada, Reno.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality & Social Psychology, 54*(6), 1063-1070.

West, C. P., Huschka, M. M., Novotny, P. J., Sloan, J. A., Kolars, J. C., Habermann, T. M., et al. (2006). Association of perceived medical errors with resident distress and empathy. *Journal of American Medical Association, 296,* 1071-1078.

Yerkes, R. M. & Dodson, J. D. (1908) The relation of strength of stimulus to rapidity of habit-formation. *Journal of Comparative Neurology and Psychology, 18,*459-482.

## Tables

Table 1

*Descriptive Statistics (N=41)*

| Measure | Mean | Median | SD | Range |
|---|---|---|---|---|
| BSI | 0.68 | 0.57 | 0.54 | 0.02 – 2.57 |
| BSI – Validating Group | 0.73 | 0.59 | 0.48 | 0.25 – 2.10 |
| BSI – Invalidating Group | 0.64 | 0.48 | 0.59 | 0.02 – 2.57 |
| DERS | 70.98 | 71.00 | 18.21 | 44.00 – 134.00 |
| DERS – Validating Group | 71.95 | 67.50 | 20.62 | 46.00 – 134.00 |
| DERS – Invalidating Group | 70.05 | 73.00 | 16.03 | 44.00 – 94.00 |
| TAS | 41.41 | 41.00 | 9.38 | 26.00 – 65.00 |
| TAS – Validating Group | 41.45 | 41.00 | 9.73 | 26.00 – 65.00 |
| TAS – Invalidating Group | 41.38 | 40.00 | 9.28 | 27.00 – 65.00 |
| MASQ-AA | 21.56 | 19.00 | 6.42 | 17.00 – 45.00 |
| MASQ-AA – Validating Group | 21.55 | 19.50 | 6.55 | 17.00 – 45.00 |
| MASQ-AA – Invalidating Group | 21.57 | 19.00 | 6.45 | 17.00 – 43.00 |
| PANAS-P | 31.29 | 32.00 | 7.27 | 17.00 – 46.00 |
| PANAS-P – Validating Group | 31.05 | 32.00 | 6.68 | 19.00 – 42.00 |
| PANAS-P – Invalidating Group | 31.52 | 32.00 | 7.95 | 17.00 – 46.00 |
| PANAS-N | 14.56 | 13.00 | 6.27 | 10.00 – 45.00 |
| PANAS-N – Validating Group | 15.60 | 13.00 | 7.86 | 10.00 – 45.00 |
| PANAS-N – Invalidating Group | 13.57 | 12.00 | 4.24 | 10.00 – 25.00 |

Table 2

*Adherence Ratings*

| Experimental Group | Average Validation Rating | Average Invalidation Rating |
|---|---|---|
| Validated Group | 6.5 | 1.0 |
| Invalidated Group | 1.5 | 5.1 |

Table 3

*Comparison of Study Sample and Previous Study Samples at Baseline*

| Measure | Current Study Mean (SD) | Shenk & Fruzzetti Study Mean (SD) | Erikson & Fruzzetti Study Mean (SD) |
|---|---|---|---|
| BSI – Validating Group | 0.73 (0.48) | 0.56 (0.40) | -- |
| BSI – Invalidating Group | 0.64 (0.59) | 0.81 (0.60) | -- |
| DERS – Validating Group | 71.95 (20.62) | 68.33 (13.15) | -- |
| DERS – Invalidating Group | 70.05 (16.03) | 70.45 (13.43) | -- |
| PANAS-P – Validating Group | 31.05 (6.68) | 28.90 (7.81) | 28.80 (7.87) |
| PANAS-P – Invalidating Group | 31.52 (7.95) | 25.74 (7.20) | 28.26 (7.18) |
| PANAS-N – Validating Group | 15.60 (7.86) | 13.17 (6.08) | 14.22 (3.91) |
| PANAS-N – Invalidating Group | 13.57 (4.24) | 13.68 (7.07) | 15.34 (5.39) |

Current study validating group n = 20 and invalidating group n = 21. Shenk & Fruzzetti (In Press) validating group n = 30 and invalidating group n = 31. Erikson & Fruzzetti (2011) validating group n = 65 and invalidating group n = 65.

Table 4

*Post-hoc Sample Descriptive Statistics Compared to the Original Study Sample*

| Measure | Mean | Median | SD | Range |
|---|---|---|---|---|
| BSI – Post hoc, Invalidating Group | 0.55 | 0.34 | 0.42 | 0.06 – 1.42 |
| BSI – Original Sample Validating Group | 0.73 | 0.59 | 0.48 | 0.25 – 2.10 |
| BSI – Original Sample Invalidating Group | 0.64 | 0.48 | 0.59 | 0.02 – 2.57 |
| DERS – Post hoc, Invalidating Group | 67.53 | 61.00 | 18.63 | 47.00 – 106.00 |
| DERS – Original Sample Validating Group | 71.95 | 67.50 | 20.62 | 46.00 – 134.00 |
| DERS – Original Sample Invalidating Group | 70.05 | 73.00 | 16.03 | 44.00 – 94.00 |
| TAS – Post hoc, Invalidating Group | 42.65 | 41.00 | 8.18 | 31.00 – 64.00 |
| TAS – Original Sample Validating Group | 41.45 | 41.00 | 9.73 | 26.00 – 65.00 |
| TAS – Original Sample Invalidating Group | 41.38 | 40.00 | 9.28 | 27.00 – 65.00 |
| PANAS-P – Post hoc, Invalidating Group | 27.88 | 27.00 | 8.69 | 16.00 – 44.00 |
| PANAS-P - Original Sample Validating Group | 31.05 | 32.00 | 6.68 | 19.00 – 42.00 |
| PANAS-P – Original Sample Invalidating Group | 31.52 | 32.00 | 7.95 | 17.00 – 46.00 |
| PANAS-N – Post hoc, Invalidating Group | 13.00 | 11.00 | 4.92 | 10.00 – 29.00 |
| PANAS-N – Original Sample Validating Group | 15.60 | 13.00 | 7.86 | 10.00 – 45.00 |
| PANAS-N – Original Sample Invalidating Group | 13.57 | 12.00 | 4.24 | 10.00 – 25.00 |

Post hoc invalidating group n = 17. Original sample validating group n = 20. Original invalidating group n = 21.

Table 5

*Comparison of Affect from Post Hoc Sample and Previous Study Samples*

| Measure | Post Hoc Sample Mean (SD) | Original Sample Mean (SD) | Shenk & Fruzzetti Study Mean (SD) | Erikson & Fruzzetti Study Mean (SD) |
|---|---|---|---|---|
| PANAS-P – Invalidating Group | 27.88 (8.69) | 31.52 (7.95) | 25.74 (7.20) | 28.26 (7.18) |
| PANAS-N – Invalidating Group | 13.00 (4.92) | 13.57 (4.24) | 13.68 (7.07) | 15.34 (5.39) |

Table 6

*Survey Data from Post Hoc Sample*

| Participant | Noticed Emotional Reaction to Invalidation (Yes / No) | Comments |
|---|---|---|
| Participant 44 | Yes | “I noticed irritation but didn't affect task performance.” |
| Participant 45 | Yes | “It affected my ability to concentrate. I felt preoccupied.” |
| Participant 46 | Yes | “I noticed a lot of anxiety.” |
| Participant 47 | No | “It made me not want to involve myself. I didn't care. In a professional environment, I’ve encountered invalidation but it didn't become personal so I was able to disconnect from it. I did not take the interaction personally so I disconnected more from the interaction.” |
| Participant 48 | No | “I knew it was a study, so it kept emotion from being affected. This is not weighing on a grade. I am pretty accurate in reporting emotion but this didn't effect my emotion.” |
| Participant 49 | No | “[The interaction] didn't affect my task performance. I put my emotions aside. The interaction had little effect on my emotion and didn't really affect task performance.” |
| Participant 50 | Yes | “It [the interaction] increased nervousness. It felt similar to an instructor who taught by intimidation. The interaction made me super aware of making mistakes. I thought ‘What if I'm not smart enough?’” |
| Participant 51 | Yes | “Caused anxiety. I felt not as clear-minded.” |
| Participant 52 | No | “I noticed the interaction only slightly. I feel confident so it didn't affect my performance. The quiz was too fast to worry about.” |
| Participant 53 | Yes | “It drove my emotions up. I felt you [the investigator] seemed like a person in power and was stand-offish and judgmental. It did not affect task because the task was not a real life situation. I knew if I screwed up it wouldn't kill anyone. It would have affected my task performance if you had been an instructor.” |
| Participant 54 | Yes | “It caused negative emotions. Made me more nervous and |

| | | |
|---|---|---|
| | | had a direct influence.” |
| Participant 55 | Yes | “It made me anxious and nervous. I don't let invalidation bother me when encountered in a professional environment. The [study invalidation] affected task performance "a little" but mostly it was the math.” |
| Participant 56 | Yes | “It made me more anxious. It affected my task performance by making me less focused.” |
| Participant 57 | Yes | “The interaction made me feel less confident and afraid to do anything. It affected task performance because I couldn't focus, felt disorganized, more anxious.” |
| Participant 58 | Yes | “The interaction was awkward. It felt like you [investigator] were an instructor. I thought ‘maybe I shouldn't feel the way I do.’ It affected my task performance by making me feel more paranoid. I doubted myself …overthinking.” |
| Participant 59 | No | “I am focused on school and goals and don't let emotions get in the way. I completely forgot about the interaction since I had to do a medication task.” |
| Participant 60 | No | “I did not completely notice interaction. It affected task performance a little but I have learned to separate and block out emotions.” |

# Figures

Figure 1

*Comparison of PANAS-P in Validating Condition from Baseline to Time 1 Post-Feedback*

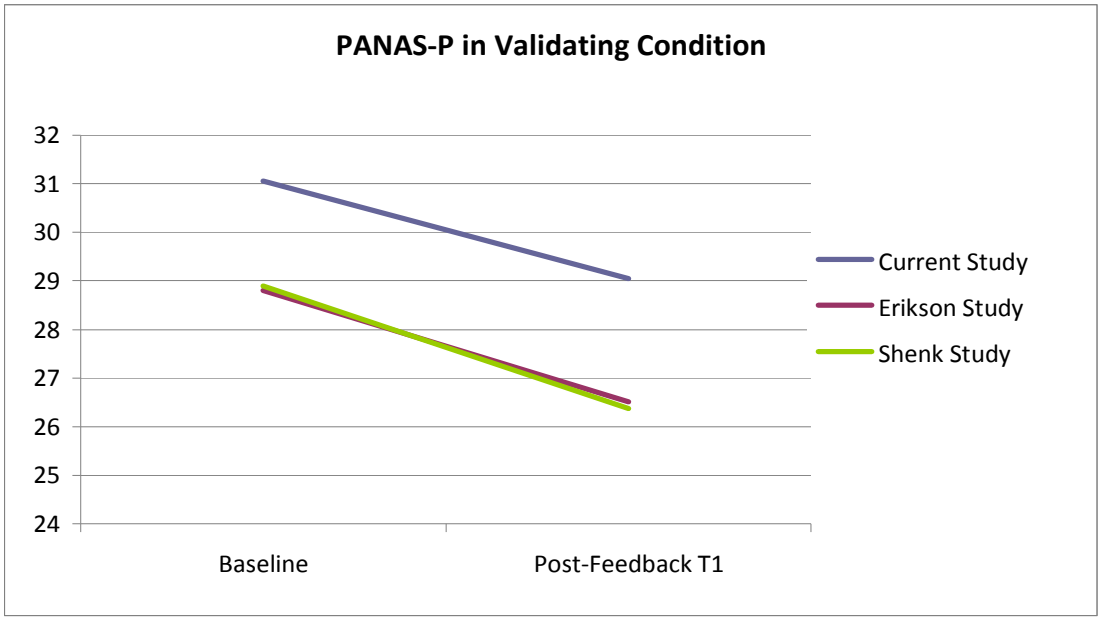


Figure 2

*Comparison of PANAS-P in Invalidating Condition from Baseline to Time 1 Post-Feedback*

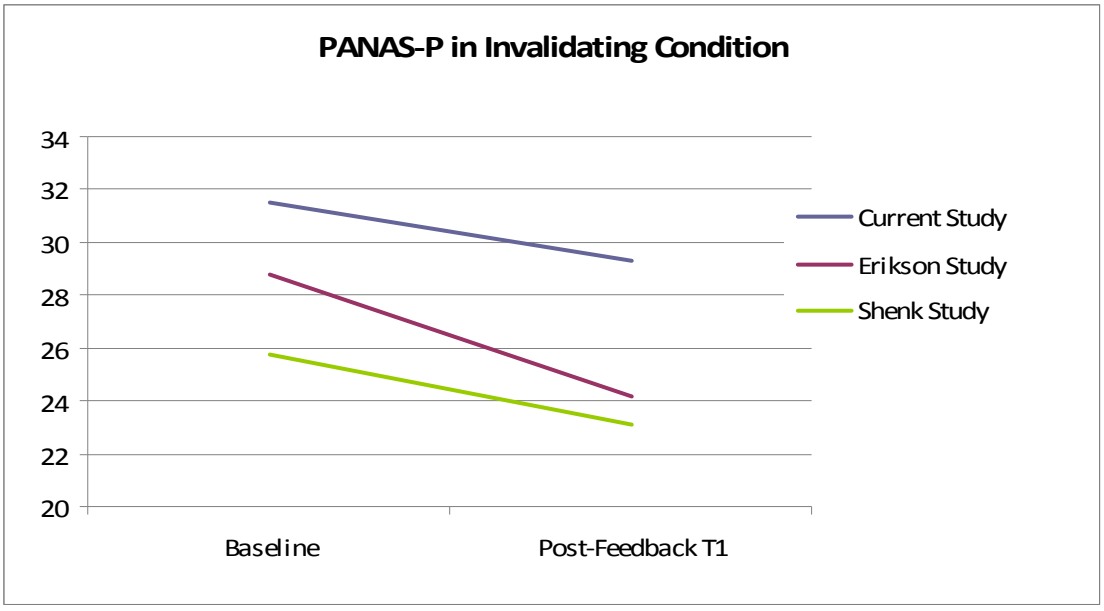


Figure 3

*Comparison of PANAS-N in Validating Condition from Baseline to Time 1 Post-Feedback*

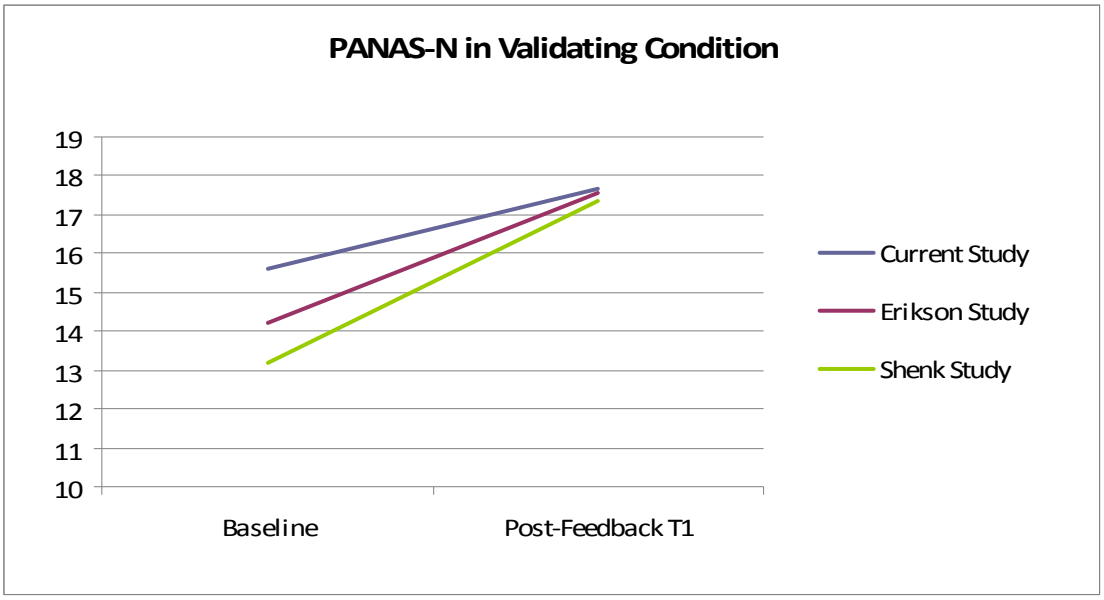


Figure 4

*Comparison of PANAS-N in Invalidating Condition from Baseline to Time 1 Post-Feedback*

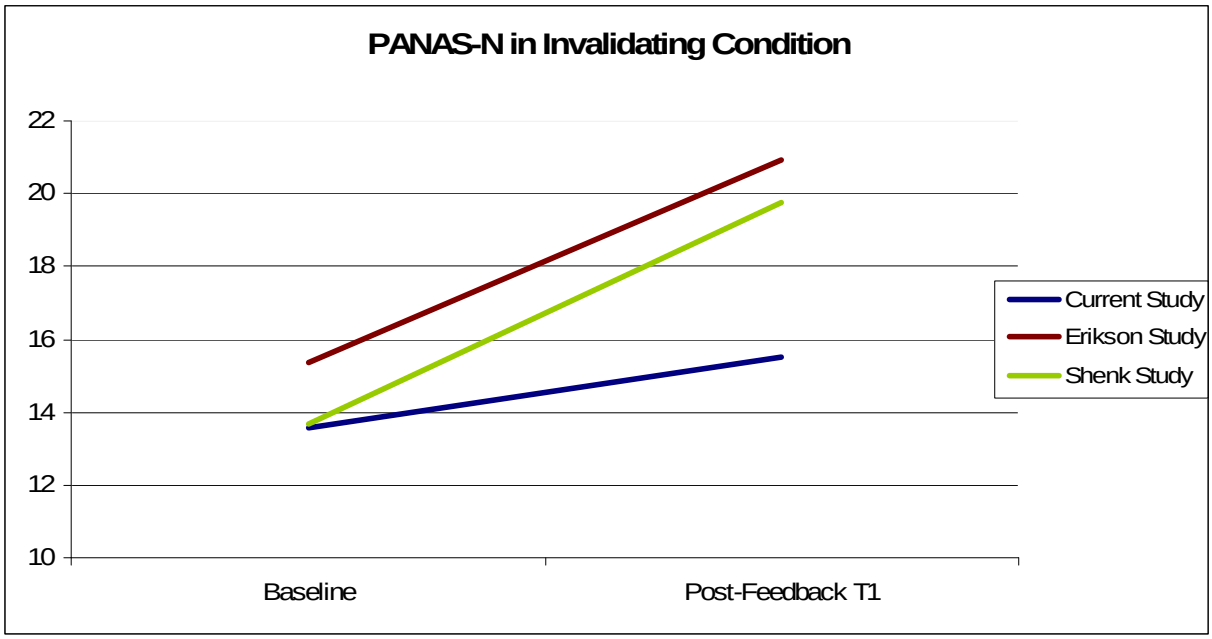


Figure 5

*Comparison of PANAS-P in Invalidating Condition from Baseline to Time 2 Post-Feedback*

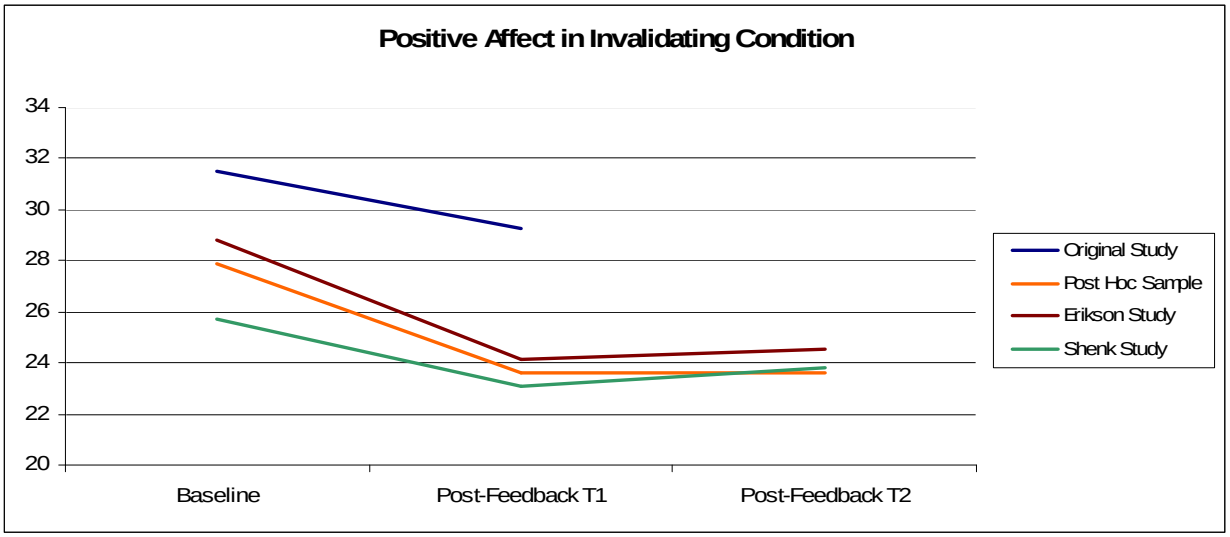
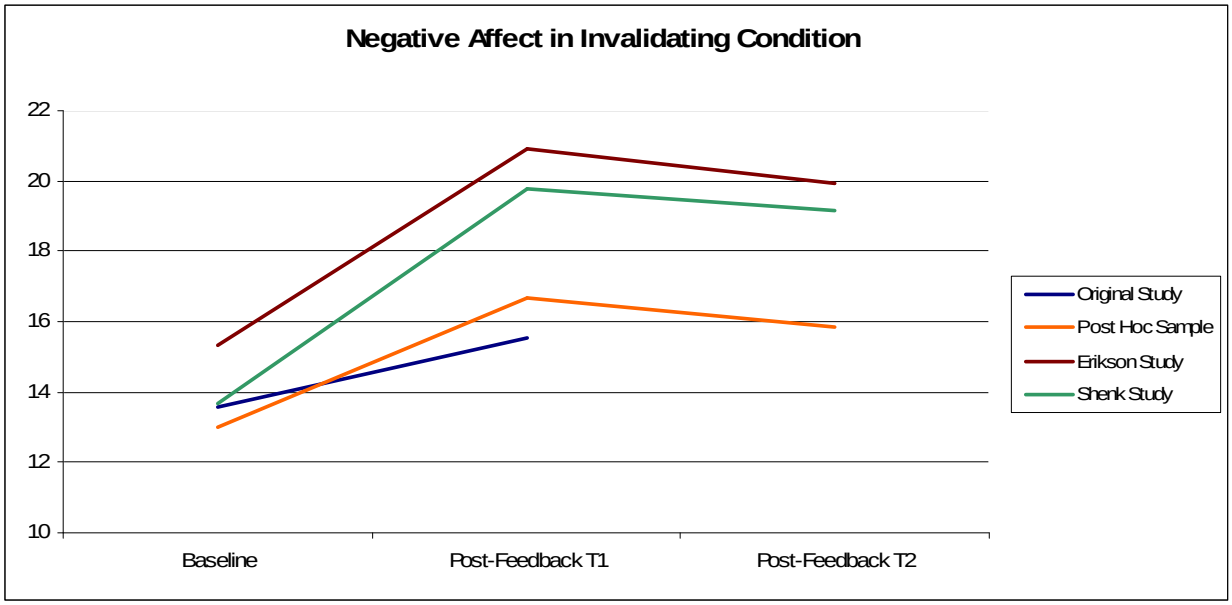


Figure 6

*Comparison of PANAS-N in Invalidating Condition from Baseline to Time 2 Post-Feedback*



## Appendix A

Medication Administration Checklist

1. Prepare needed equipment and supplies
    a. Proper-size syringe
    b. Proper-size needle
    c. Antiseptic swab
    d. Disposable gloves
    e. Medication vial

2. Remove protective cover from vial.

3. Rub the penetrable surface of the vial with an alcohol swab.

4. Put on gloves.

5. Draw up dilution fluid into the syringe.

6. Attach a needle to syringe and insert directly into the vial.

7. Inject dilution fluid into the vial. Do not withdraw the syringe or needle from the vial.

8. While holding the vial, syringe, and needle (still inserted in vial) in one hand, shake the vial vigorously to allow the dilution fluid and solid form medication to mix. Keep shaking the vial vigorously until all solid elements of the medication have been fully dissolved.

9. Withdraw the contents of the vial back into the syringe. Remove proper amount of medication from vial.

10. Remove the needle and syringe from the vial.

11. Remove the needle used for preparing the medication and attach a new sterile needle for delivery of the drug.

12. Check the drug vial and medication order again for correct drug and dosage requirements.

13. Dispose of the used needle and vial safely. Needle should be placed in a sharps container.

14. Explain procedure to patient. (Hypothetical patient will be wearing an injection pad on arm.)

15. Cleanse site with antiseptic swab.

16. Hold swab between 3$^{rd}$ and 4$^{th}$ fingers of nondominant hand.

17. Remove cap from needle by pulling straight off.

18. Hold syringe correctly between thumb and forefinger of dominant hand like a dart.

19. Position nondominant hand at proper anatomical landmarks and spread skin tightly. Inject needle at 90-degree angle into muscle. Use Z-track method if medication is irritating.

20. Grasp lower end of syringe barrel with nondominant hand. Move dominant hand to end of plunger. Avoid moving syringe while pulling back on syringe to aspirate drug.

21. Inject medication slowly.

22. Withdraw needle while applying alcohol swab gently above or over injection site.

23. Massage skin lightly.

24. Discard needle and syringe safely.

## Appendix B

Self-Assessment of Nursing Competency

1. How long have you been in nursing school?

2. How many credits of nursing course work have you completed?

3. What is your GPA in your nursing classes?

4. How would you rate your competency in performing basic nursing skills? (Circle one.)

| 1 | 2 | 3 |
|---|---|---|
| Below Average | Average | Above Average |

4. How would you rate your competency in medication administration skills? (Circle one.)

| 1 | 2 | 3 |
|---|---|---|
| Below Average | Average | Above Average |

## Appendix C

## Nursing Knowledge Quiz

**Write the letter for the correct answer beside the question.**

1. Which of the following are the two major parts of a typical cell?
   a. nucleus and nuclear membrane
   **b. nucleus and cytoplasm**
   c. protoplasm and cytoplasm
   d. cytoplasm and cell membrane

2. The most widespread and abundant tissue in the body is:
   a. epithelial tissue
   **b. connective tissue**
   c. muscle tissue
   d. nervous tissue

3. Red blood cells are derived from a cell known as a:
   **a. hemocytoblast**
   b. normoblast
   c. erythroblast
   d. erythrocyte

4. The absence of which of the following essential vitamins causes maturation failure in the process of erythropoiesis and results in a disease called pernicious anemia?
   a. folic acid
   b. ascorbic acid
   c. B6
   **d. B12**

5. Iron is absorbed almost entirely from the:
   a. large intestine
   **b. small intestine**
   c. liver
   d. bone marrow

6. The most abundant substance to diffuse through the cell membrane is:
   **a. water**
   b. proteins
   c. lipids
   d. carbohydrates

7. The microscopic functional unit of the kidneys, which consists of renal corpuscles and tubules, is the:
   a. Bowman's capsule
   b. cortex
   c. medulla
   **d. nephron**

8. Which of the following substances tends to increase blood pressure by constricting arterioles?
   a. antidiuretic hormone (ADH)
   b. adrenocortical hormone (ACTH)
   c. aldosterone
   **d. angiotensin**

9. Which of the following lymph nodes drains the nose, lips, and teeth?
   **a. submental and submaxillary groups**
   b. superficial cervical nodes
   c. supraclavicular nodes
   d. axillary nodes

10. The most effective evidence of pH control mechanism can be seen by the range of blood pH, which is normally:
   a. 7.00 – 7.90
   b. 7.50 – 7.75
   **c. 7.35 – 7.45**
   d. 7.25 – 7.28

11. Metabolic acidosis results from a:
   a. bicarbonate excess
   **b. bicarbonate deficit**
   c. carbonic acid excess
   d. carbonic acid deficit

12. The source of energy for muscle contraction is supplied by:
   a. creatine phosphate
   b. glucose
   c. ADP (adenosine diphosphate)
   **d. ATP (adenosine triphosphate)**

13. Muscles are important in:
   a. movement
   b. heat production
   c. posture
   **d. all of the above**

14. Which of the following groups of muscles move the shoulder?
a. trapezius, pectoralis major, and serratus anterior
**b. trapezius, pectoralis minor, and serratus anterior**
c. trapezius, pectoralis major, and deltoideus
d. latissimus dorsi, pectoralis minor, and serratus anterior

15. Which of the following muscles extends the lower arm?
a. biceps brachii
b. brachialis
c. brachioradialis
**d. triceps brachii**

16. Which of the following muscles or groups of muscles does NOT move the thigh?
a. iliopsoas
b. rectus femoris
c. gluteus
**d. sartorius**

17. The function of the muscles that are attached to hamstrings is to:
a. flex the thigh
b. adduct the leg
c. adduct and flex the leg
**d. flex the leg and extend the thigh**

18. The word meaning “toward the head of the body is:
a. inferior
**b. superior**
c. proximal
d. distal

19. Which of the following functions is performed by the bones?
a. protection
b. reservoir – calcium storage
c. hemopoiesis – red blood cells formation
**d. all of the above**

20. Bones come in long, short, and irregular shapes. Which of the following is an example of an irregular bone?
a. femur
b. carpus
c. scapula
**d. vertebrae**

21. The only bone that does NOT help form the cranium is the:
a) frontal bone
b) parietal bone
c) temporal bone
**d) maxillary bone**

22. How many vertebra make up the vertebral column, a flexible, segmented column?
a) 22
b) 24
**c) 26**
d) 30

23. The most abundant blood supply of the heart goes to the:
a) right atrium
b) left atrium
c) right ventricle
**d) left ventricle**

24. Which of the following is a vein of the head and neck?
a) internal carotid vein
b) external carotid vein
**c) internal jugular vein**
d) great saphenous vein

25. The period from the end of one heart contraction to the end of the next is called:
a) systole
b) diastole
**c) cardiac cycle**
d) all of the above

Taken from King, R. C. (1982). *Comprehensive Nursing Examination Review*. New York,

NY: Arco Publishing, Inc.