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THE EFFECT OF ANXIETY ON STUDENT NURSES' PERFORMANCE
WHEN ADMINISTERING INTRAMUSCULAR OR SUBCUTANEOUS
INJECTIONS

By

Sandra L. Osborne

A THESIS

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ABSTRACT

THE EFFECT OF ANXIETY ON STUDENT NURSES' PERFORMANCE WHEN ADMINISTERING INTRAMUSCULAR OR SUBCUTANEOUS INJECTIONS

By

Sandra L. Osborne

The purpose of this study was to determine what the relationship was between levels of trait and state anxiety and performance when giving intramuscular or subcutaneous injections. It was a replication of a study by Megal, Wilken, and Volcek (1987).

In May, 1990, the STAI Form Y-2 was used to assess trait anxiety of 17 students at a community college in the Midwest. State anxiety was measured by using the STAI Form Y-1 immediately before: 1) laboratory performance examinations and 2) giving first injections to clients. Instructors completed Injection Skill Check Lists to measure performance.

Students reported high levels of anxiety. No significant relationships were found between anxiety and: 1) performance scores, 2) age, or 3) length of time between experiences. A significant difference between trait and state anxiety scores was found. No significant difference between instructors and state anxiety scores or performance scores were revealed.

This is dedicated to all nurse educators who facilitate the teaching-learning process by treating each student as an individual with unique learning needs.

Acknowledgements

I want to thank the chairperson of my committee, Dr. Emily Droste-Bielak, R.N., Ph.D. who spent many hours critiquing my endeavors and guiding me throughout the research process. Appreciation is also extended to Dr. Donna Larson, R.N. Ph.D. and Dr. Richard Paschke, Ph.D. who willingly shared their time and expertise with me.

Throughout this lengthy experience, several colleagues, friends, and family members have been supportive along the way. It seemed that whenever I began to falter, there was always someone to give a little push and get me back on track.

Finally, my deepest appreciation is extended to my husband, Ozzie, and children, Joshua, Jeffrey, Joseph, Jennifer, and Julia, who never lost faith in my ability to complete this project. A very special thank-you to Joshua, who climbed out of bed many nights to assist me with the computer and to Ozzie, who encouraged me throughout this endeavor.

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CHAPTER ONE

INTRODUCTION

In order for educators to prepare graduates who can perform competently as beginning practitioners, essential technical skills must be learned. Thirty-three nursing interventions were identified by the American Association of Colleges of Nursing (1986) as being essential for a graduate nurse to perform proficiently. Calculation of medication dosage and administration of medications were two of these skills. In a study by Sweeney, Regan, O'Malley, and Hedstrom (1980), 91 essential skills were identified by both nursing faculty and nursing service. Administration of an injection was one of these skills. Keiffer (1984) found that injections were rated in the top 25% of the most frequent/most important nursing skills by nurses in 16 metropolitan hospitals.

Anxiety is an emotional response within a person to real or imagined threats to one's security. It may be a destructive or motivating force, and it affects one's ability to learn. Optimal learning takes place when one is mildly anxious (Campbell, 1985) and decreases in the presence of high levels of anxiety (Spielberger, 1966).

Kleehammer, Hart, and Keck (1990) identified fear of making a mistake, first clinical experiences, a variety of clinical procedures, and being observed/evaluated by the faculty as causes of high levels of anxiety in student nurses. Howell and Swanson (1989) found a negative correlation between test anxiety and grade point average in their study that involved 56 female baccalaureate nursing students.

Because learning is decreased in the presence of high anxiety (Spielberger, 1966), it is necessary for the nurse educator to attempt to decrease the students' level of anxiety. The educator must identify high anxiety producing situations and intervene, thereby making it possible to increase learning.

The purpose of this study was to determine what the relationship was between nursing students' levels of trait and state anxiety and their performance while giving intramuscular or subcutaneous injections. Spielberger (1983) defined trait anxiety as one's anxiety proneness and state anxiety as one's emotional response to a potentially dangerous situation. Because there is little information in the nursing literature about the relationship between anxiety and the acquisition of psychomotor skills, the researcher chose to replicate the study done by Megal, Wilken, and Volcek (1987). In that study, the researchers examined the relationship between student nurses' performance while giving an injection for the first time in

a nursing skills laboratory and in the clinical area with their level of state and trait anxiety.

In the present study, trait anxiety was measured during class two weeks prior to the students' taking a performance examination on medication administration. State anxiety was measured immediately prior to the students' performance examination in a college classroom and again in the clinical area immediately before they gave their first injection to clients. Because both intramuscular and subcutaneous injections involve forcing a liquid via a needle and syringe into a client, these two types of injections were evaluated in the same manner. Subcutaneous and intramuscular sites varied based on the type of medication injected.

Additional data gathered and analyzed were: student age, student gender, instructor, medication to be given, route, and the number of practice trials. The length of time between the students' laboratory performance examination and their administration of an injection to a client in the hospital was also noted. Relationships between all of these variables were examined.

The results of this study add to the limited knowledge base related to the effect of anxiety on the performance of psychomotor skills in nursing. Appropriate interventions can subsequently be identified to facilitate student nurses' acquisition of essential technical skills, thus preparing them to function competently as beginning practitioners.

CHAPTER TWO

LITERATURE AND CONCEPTUAL FRAMEWORK

Review of Literature

Four studies were identified that examined the effect of anxiety on the performance of a particular task. These studies examined the relationship of anxiety with: 1) performing mathematic calculations, 2) test-taking, 3) clinical experiences, and 4) administering an intramuscular injection.

Fulton and O'Neill (1989) selected 160 first year nursing students and randomly assigned them to control and treatment groups. They then examined the effects of different teaching methods on anxiety and the students' ability to accurately calculate fractional drug doses. The instructors in the experimental group were given specific verbal and written instructions to follow when teaching the mathematics module. The instructors in the control group were told to continue as they had in the past. This involved having the students complete the module largely on their own.

The instrument used for this study was the Mathematics Anxiety Scale (MARS). Reliability and validity of this instrument have proven consistent over time (Suinn, Edie,

Nicoletti, & Soinelli, 1972). The internal consistency coefficient (coefficient alpha) was .97 ($N = 397$). The test-retest reliability coefficient, after a two week interval, was .78, significant at $p < .001$.

The results of this study showed no significant differences between the groups in their levels of math anxiety or arithmetic test scores. This could indicate that these students were independent achievers and learned the content regardless of the teacher or teaching method. The mean score on the MARS was lower ($M = 171$) in this study than in the original study ($M = 215$) when the instrument was developed. This could mean that female students had become less anxious about learning mathematics than they were 15 years ago when the instrument was developed. Because this study was confined to one college, the results may not be generalizable.

Howell and Swanson (1989) examined the influence of cognitive interference, self concept, study and test taking skills, and cumulative grade point average on test anxiety. Instruments used were: Saransons' Cognitive Interference Questionnaire, Browns' Effective Study Test, Saransons' Test Anxiety Scale, and Brookovers' Self Concept of Ability Scale.

Fifty-six females in a baccalaureate nursing program volunteered to take the above tests. The students were asked to complete three of the questionnaires two weeks before taking their third unit examination. Following the

examination they were asked to complete the Cognitive Interference Questionnaire as well as a questionnaire indicating their gender and grade point average.

Data were analyzed using Pearsons' Correlation Coefficient. Test anxiety was found to correlate negatively with academic self concept ($r = -.683$), $p < .001$ and grade point average ($r = -.490$), $p < .001$ and positively with cognitive interference ($r = .531$), $p < .001$. A multiple linear equation was computed to find the best prediction equation for test anxiety based on the independent variables acting jointly. The percentages of variation in test anxiety accounted for by these variables were: 1) self concept (47%), 2) cognitive interference (8%), and 3) grade point average (4%). Neither test taking skills nor study skills contributed to the variance of test anxiety as long as the other components remained constant.

Three possible limitations to the study were: 1) students may not accurately report their grade point average, 2) consciousness sampling during a test period may be more accurate than a retrospective cognitive interference measure such as the Cognitive Interference Questionnaire, and 3) all of the subjects were female.

Kleehammer, Hart, and Keck (1990) investigated anxiety producing situations for student nurses in the clinical area. Thirty-nine junior and 53 senior nursing students from a bachelor of science degree program were asked to complete a sixteen item assessment form that utilized a five

point Likert scale to indicate degrees of anxiety. Items included in the assessment tool were: 1) communication and procedural aspects of patient care, 2) interpersonal relationships with healthcare providers, and 3) interactions with faculty. An open-ended question which asked the students to identify the most anxiety producing aspect of their clinical experience was also included.

All data were collected in a classroom setting. A Cronbach alpha reliability coefficient was obtained to measure internal consistency ($\alpha = .82$). A factor analysis was completed to insure construct validity. The results suggested that all items on the assessment form measured one concept. Means, standard deviations, and percents for each item on the assessment form were analyzed. Analysis of variance were completed to determine if there were any differences within the junior and senior years based on class years as a control for the variable across years data collection. No significant differences were identified.

Data analysis of the assessment tool identified fear of making a mistake as causing the highest level of anxiety for these students. It also indicated high levels of anxiety associated with the students' first clinical experience on a given unit, a variety of clinical procedures, talking with physicians, being late, and being observed/evaluated by the faculty. Four major themes emerged from the content analysis of the open-ended question. These were: 1) negative interaction with the instructor, 2) nursing

procedures, 3) fear of making a mistake, and 4) the initial clinical experience.

Limitations of this study included restricted generalizability since the data were collected from one school of nursing. The assessment tool also lacked previous reliability and validity testing.

Megal et al. (1987) examined the relationship between student nurses' anxiety and their performance administering an injection for the first time. The Spielberger State-Trait Anxiety Inventory was used to determine the students' level of anxiety. An Injection Skill Check List was used to determine the accuracy of their performance when giving an injection.

Thirty-five students volunteered for the study. They were asked to complete the Trait Anxiety Inventory at the practice session. State Anxiety Inventories were then completed immediately prior to the return laboratory demonstration and prior to the administration of their first injection in the clinical area. Instructors completed the Injection Skill Check List following the return laboratory demonstration and the first injection in the clinical area.

Correlations were calculated between performance errors, age, and days between learning the skill and giving an injection in the clinical area. Correlations were also calculated between anxiety, age, and days between learning the skill and giving an injection in the clinical area. No significant relationships between variables were found. The

majority of these students did not indicate that they were experiencing a high level of anxiety at the time of final skill demonstration.

Threats to external validity in this study included the Hawthorne Effect, Novelty Effect, and Experimenter Effect. Threats to internal validity included history, maturation, and mortality. Test-retest reliability was also a concern since the state anxiety questionnaires were completed twice, at varying intervals, by each student. Because many items were marked as not applicable or omitted on the Injection Skill Check List, it may not have been an accurate measure of performance.

Despite the facts that teaching psychomotor skills is a vital part of nursing education and the ability to administer an injection has been identified as an essential skill for beginning nurses, little research has been done in this area. Although many components of learning a psychomotor skill have been identified as causing anxiety, minimal information was found on the relationship between anxiety and the performance of psychomotor skills.

For the above reasons, the researcher chose to replicate the study by Megal et al. (1987) using a revised Injection Skill Check List. An attempt was made to control internal and external variables by collecting the data in a shorter time period and by making the conditions under which the data were collected as similar as possible for every participant in the study.

Conceptual Framework

The conceptual framework of this study is based on three major concepts: anxiety, arousal, and the teaching-learning process. Of these concepts, anxiety is the primary focus and is discussed in relation to both arousal and the teaching-learning process. I. M. King's Human Process Model is incorporated into the discussion of the teaching-learning process.

Anxiety

Anxiety is defined as an "unpleasant emotional state or condition which is characterized by subjective feelings of tension, apprehension, and worry, and by activation or arousal of the autonomic nervous system" (Spielberger, 1966, p. 482). According to Lazarus and Averill (1972, p. 242), it's an emotional reaction that occurs in response to stress and continues until coping efforts are initiated to deal with the situation.

Historically, anxiety has been viewed as being responsible for neurotic disturbances and pathogenic defense mechanisms. Presently, both human failures and maladaptive functioning are blamed on anxiety. No other condition is as widely viewed as the root of human misery, adaptive failure, and positive accomplishment as anxiety (Lazurus, 1966). Conditions such as obesity, hypertension, colitis, asthma, pseudo-seizures, ulcers, stuttering, immunological deficiencies, and sexual inadequacies are believed to be

caused in part by chronic levels of excessive anxiety (Campbell, 1985).

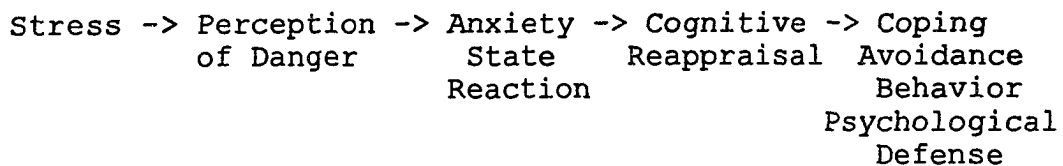
Anxiety is an emotional response within a person to either real or imagined threats to one's security. It's a feeling of dread that distracts one's mind. Although frequently viewed as being destructive, anxiety may be a motivating force that actually enhances one's development, by producing energy that can be directed in a positive way (Campbell, 1985).

The effects of anxiety on a person's ability to learn varies with the level of anxiety. Optimal learning takes place when one is mildly anxious. At this level of anxiety, problem solving abilities are enhanced. With moderate and severe levels of anxiety, one's ability to problem solve progressively lessens (Campbell, 1985). Researchers have found that students with high test anxiety have a higher academic failure rate than students of equal intelligence with low anxiety (Spielberger, 1966).

Spielberger (1983) defines anxiety as two related but different types. He refers to these as trait anxiety and state anxiety. Trait anxiety refers to relatively stable individual differences in anxiety proneness as a personality trait. State anxiety occurs whenever an individual perceives a situation as potentially dangerous or threatening to him.

In addition, Spielberger (1966) views anxiety as a process initiated by any stressor, either internal or

external. Once danger is perceived, it leads to an anxiety state reaction, followed by cognitive reappraisal, and terminated by coping, avoidance behaviors, or psychological defenses. This process is depicted by Spielberger (1966) in the following diagram.



Epstein (1972) identifies three basic types of anxiety. These are: primary overstimulation, cognitive incongruity, and response unavailability. Primary overstimulation refers to effects from the energetic component of stimulation. It is associated with frantic feelings of being overwhelmed by stimulation. Cognitive incongruity involves a mismatch between a cognitive model, or expectancy, and reality. It often leads to the third type of anxiety, response unavailability. This type covers all conditions in which aroused response tendencies can't be expressed. It may occur because the object producing the arousal is unknown, a waiting period is required before a response can be made, there is a conflict between opposing response tendencies, or the response that is recognized as necessary is not in one's repertory.

Because all three basic types of anxiety identified by Epstein (1972) produce a high state of diffuse arousal, they can be compared to Spielberger's state anxiety. Once arousal occurs, one must reappraise the situation and react to it. Coping, avoidance, and defense are potential responses according to Spielberger (1966).

Arousal

Arousal is a broader concept than anxiety in that arousal increases with any internal or external stimulation. Anxiety, on the other hand, may be viewed as a defense against arousal if it motivates one to avoid conditions that produce increased arousal (Epstein, 1972).

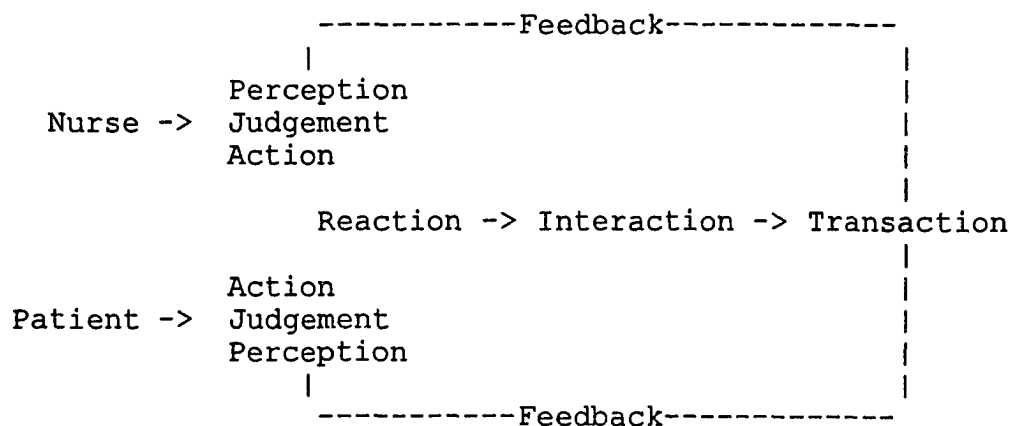
Arousal theory involves the functioning of the reticular activating system located in the brain stem just above the spinal cord and just below the thalamus and hypothalamus. The reticular activating system is involved in the processes of sleep, attention and motor behavior (Hergenhahn, 1988). Parameters that determine arousal level are: 1) intensity of stimulation, 2) rate of stimulation, 3) expectancy, 4) opportunity for motor discharge, and 5) preceding excitatory state of the organism (Epstein, 1972, p. 308).

Hebb (1955) theorized about the relationship between performance and the level of arousal. He found that a level of arousal neither too high nor too low is necessary for optimal cortical functioning, and therefore optimal performance. He later built on this theory and speculated

that different tasks have varying levels of arousal associated with their performance. A practiced skill may be performed well under a wide range of arousal levels whereas a highly skilled task may only be performed within a limited range of arousal.

Teaching-Learning Process

According to King (1981), nursing is a process of action, reaction, interaction, and transaction. In her theory of goal attainment, a major premise is that two people come together in a health care organization to help, or to be helped, to maintain a state of health that permits functioning in a variety of roles. This process occurs between individuals and groups in social systems. The goal is to achieve health or to adjust to health problems. This process is illustrated in the following diagram of King's Human Process Model (Daubenmire, 1973).



Because anxiety is an emotional reaction that occurs in response to stress and continues until coping efforts are initiated to deal with the situation (Lazarus and Averill, 1972), it impacts the perception, judgement, action, and reaction components of King's Human Process Model. These four components, while not directly observable, lead to the interaction phase in which two people identify goals and a means to attain them. A transaction occurs when mutually agreed upon goals are obtained (King, 1981).

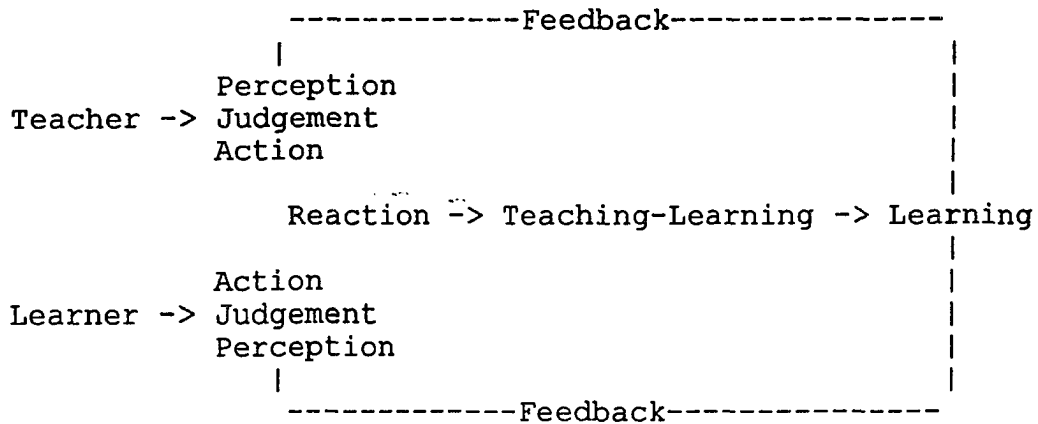
The goal of the teaching-learning process is a transaction between the teacher and the learner in which specific learning objectives are met through a planned sequence of events. These include selection of learning objectives, definition of content, identification of a teaching strategy, and evaluation of the outcome (Jones, 1982).

Both the teacher and the learner are open systems interacting with the environment (King, 1981). The learner enters this relationship with unique learning needs due to a variety of educational, work, and personal experiences. Each learner differs in his/her motivation, interest, and attitudes toward learning (Carpenito and Duespohl, 1985).

When learners engage in the teaching-learning process, they interact with many internal as well as external experiences that lead to changes in attitudes and behaviors. The teacher facilitates this process by helping learners to achieve goals through mutually agreed upon plans. Anxiety

impacts all components of the teaching learning process.

A revised diagram of King's Human Process Model, as related to the teaching-learning process, is as follows:



Summary

As a nurse educator, one is responsible for preparing student nurses to function competently in a constantly changing health care arena. As new graduates, they will be expected to perform a variety of psychomotor tasks.

Because of limited instructional time, optimal use must be made of all contact time with the student. Anxiety, as a defense against arousal, may hinder the learning process if it motivates one to avoid situations that produce increased arousal. Although it has been studied in relation to mathematic calculations, test-taking, and occupational stress, there is little information available concerning the relationship between anxiety and the development of a psychomotor skill.

Research Questions

1) What is the relationship between student nurses' performance scores and state anxiety immediately prior to giving intramuscular or subcutaneous injections during a laboratory performance examination?

2) What is the relationship between student nurses' performance scores and state anxiety immediately prior to giving intramuscular or subcutaneous injections for the first time to clients in the clinical area?

3) Is there a difference between student nurses' trait anxiety and state anxiety immediately prior to performing intramuscular or subcutaneous injections during a laboratory performance examination?

4) Is there a difference between student nurses' trait anxiety and state anxiety immediately prior to performing intramuscular or subcutaneous injections, for the first time, on clients in the clinical area?

5) What is the relationship between the student nurses' age or clinical instructor and their level of state anxiety immediately prior to giving intramuscular or subcutaneous injections during a laboratory performance examination?

6) What is the relationship between the student nurses' age or clinical instructor and their level of state anxiety immediately prior to giving intramuscular or subcutaneous injections, for the first time, to clients in the clinical area?

7) What is the relationship between the length of time from the laboratory performance examination to the clinical experience and the student nurses' state anxiety immediately prior to giving intramuscular or subcutaneous injections, for the first time, to clients in the clinical area?

Definitions

Client - any adult 18 years of age or older who is admitted to a medical-surgical unit in one of the three designated acute care facilities.

Clinical Area - a medical-surgical patient unit in any the three designated acute care facilities.

Intramuscular Injection - the forcing of a liquid, via a 1 - 2 inch needle and syringe, into the muscle of the upper arm, thigh, or buttocks.

Performance Score - a numerical score indicating the sum of correct and not applicable behaviors while giving an intramuscular or subcutaneous injection as measured on the Injection Skill Check List (Appendix A).

State Anxiety - the palpable reaction or process taking place within a person, at a given time and level of intensity, as measured on the STAI Form Y-1 (Spielberger, 1983).

Student Nurse - all persons enrolled in NUR 120, in a midwestern community college, for the first time who have no previous experience in giving an injection and who agree to participate in this study.

Subcutaneous Injection - the forcing of a liquid, via a 1/2 - 5/8 inch needle and syringe, into the fatty tissue beneath the skin of the upper arm, thigh, or abdomen.

Trait Anxiety - a personality characteristic that refers to the relatively stable individual differences in how one generally feels as measured on the STAI Form Y-2 (Spielberger, 1983).

CHAPTER THREE

METHODOLOGY

Design

A correlational design was used in this descriptive study to examine relationships and differences between several variables. Relationships were examined between student nurses' state anxiety and: 1) skill in administering injections, 2) age, 3) clinical instructor, and 4) the length of time from the laboratory performance examination to the clinical experience. State anxiety levels were measured using Spielberger's (1983) Self-Evaluation Questionnaire, STAI Form Y-1. Performance in administering an intramuscular or subcutaneous injection was evaluated using the Injection Skill Check List (Appendix A).

Other data collected included the students' gender and trait anxiety score. Differences between the student nurses' trait and state anxiety levels were also examined. Trait anxiety levels were measured using Spielberger's Self-Evaluation Questionnaire, STAI Form Y-2.

Information related to: 1) the number of times the student practiced prior to the laboratory performance examination and 2) the number of days between the laboratory

performance examination and the administration of an injection to a client in the hospital were also examined.

Setting

The settings for this study were a community college in the Midwest and three medical-surgical units at three area acute care hospitals.

The community college was a locally controlled public institution of higher education that offered comprehensive associate degree programs to 6,000 students per semester. It was accredited by the Commission on Institutions of Higher Education of the North Central Association of Colleges and Schools.

The community college had an "open door" policy and therefore accepted applications from everyone who wished to attend. Some programs (Honors, Nursing, and Respiratory Therapy) had additional admission requirements, however. Students were admitted to the nursing program twice a year with 30-40 students enrolled in each nursing course at any given time.

Traditionally, the student nurses' mean age was 33 years and 10-12% of the students were male. A high percentage of the students were female heads of households. Over 60% of the nursing students received some type of financial aid.

The community college's associate degree nursing program consisted of five nursing courses as well as several liberal arts and science courses. It was divided into two

levels which allowed students to enter the program based on previous nursing education. Level I consisted of three nursing courses, as well as a pharmacology and nutrition course. At the completion of these courses, along with three liberal arts courses and two biology courses, students were eligible to write the state board of nursing examination for practical nurses. Level II consisted of two additional nursing courses along with three liberal arts courses and one science course. Licensed practical nurses who completed the non-nursing requirements in Level I were allowed to enter the program at this point. Once the students completed the Level II requirements, they were eligible to write the state board of nursing examination for registered nurses.

The course in which the students were enrolled was the second nursing course in the program. It was a twelve credit hour course and was designed to provide the student with the theoretical and clinical background for facilitating man's adaptation to a variety of stressors. The identification and application of biopsychosocial nursing principles and processes in the nursing of individuals with well-defined adaptation problems was the focus of the course. Application of the assessment component of the nursing process and basic psychomotor skills were emphasized.

A nursing classroom was utilized for the laboratory performance examination rather than the nursing skills

laboratory because of a scheduling conflict. The same classroom was utilized by all of the students during their examination. It was divided into three stations each of which was monitored by a different nursing instructor. A variety of skills related to medication administration were assessed at each station. Simulation of either an intramuscular or subcutaneous injection was the final task at each station.

The students' clinical experience took place on a medical-surgical unit in one of three non-profit acute care hospitals, one of which was osteopathic. All three hospitals provided care to clients with a multitude of medical/surgical needs. The osteopathic hospital had an average daily census of 75 patients. In addition to two medical/surgical units, it had an obstetrics unit, pediatrics unit, and drug rehabilitation unit. One of the other hospitals had an average daily census of 100 patients. It had a drug rehabilitation unit and hemodialysis unit in addition to its three medical/surgical units. Cardiac surgery was also provided in this hospital. The third hospital had an average census of 130. In addition to its' four medical/surgical units, it had an obstetrics unit, pediatrics unit, and psychiatric unit. All three hospitals offered several wellness programs.

Sample

All students enrolled in NUR 120 for the first time, who had never given an injection, were asked to participate

in this study. Of the 26 students enrolled in the course, 20 met the criteria initially. Three students subsequently withdrew from the nursing class, however, and were therefore dropped from the study. This resulted in a sample of 17 nursing students.

Instruments

The Spielberger State-Trait Anxiety Inventory

State and trait anxiety were first introduced in 1961 by Cattell and Scheier. Spielberger elaborated on their findings in 1966, 1972, 1976, and 1979. A major revision of the STAI Form X was begun in 1979. This led to the present STAI-Form Y on which 30% of the items from Form X were replaced to provide a better balance between anxiety-present and anxiety-absent items (Spielberger, 1983).

The Spielberger State-Trait Anxiety Inventory included two separate self evaluation questionnaires. The S-Anxiety Scale (STAI Form Y-1) consisted of 20 statements related to how one feels at that moment. The T-Anxiety Scale (STAI Form Y-2) consisted of 20 statements related to how one generally feels. Each statement was rated by using a Likert scale from one (not at all) to four (very much so). Both the S-Anxiety and T-Anxiety scores had a potential range of 20 to 80 with the higher score indicating a higher level of anxiety.

More than 2,000 studies using the STAI have been documented in the literature since the STAI test manual was published. These include studies in medicine, dentistry,

education, psychology, and other social sciences. It has been used widely to assess clinical anxiety in medical, surgical, psychosomatic, and psychiatric patients. It has also been used to screen high school students, college students, and military recruits for anxiety problems as well in evaluating the immediate and long-term effects of psychotherapy, counseling, behavior modification, and drug treatment programs (Spielberger, 1983).

Internal consistency of Form Y of the STAI, using Cronbach's Alpha, was above .90 for samples of working adults, students, and military recruits with a median coefficient of .93 for state anxiety. Trait anxiety alpha coefficients had a median coefficient of .90 (Spielberger, 1983).

Injection Skill Check List

The original Injection Skill Check List was developed by Megal et al. (1987). This list was based on content found in nursing skills books. It consisted of 25 behaviors to be performed by students in either the nursing laboratory or the clinical setting. Students received a numerical score based on the number of accurate behaviors present when administering an injection. Verbal instruction in use of the original Injection Skill Check List was given to the nursing faculty by the investigators. Following a practice period, interrater reliability was assessed by having the faculty watch a video of an injection and complete the

Injection Skill Check List. One hundred percent agreement between faculty was attained.

After gathering input from the two instructors involved in teaching medication administration to the nursing students, the original Injection Skill Check List was adapted for use in this research study (Appendix A). In an attempt to clarify the desired behaviors, twelve items were either reworded (7), separated into two behaviors (3), or combined into one behavior (2). Two items were added to meet Universal Precaution standards. These were related to the use of aseptic technique and proper disposal of the needle and syringe. Other additions were made to adapt the check list to the policies of the associate degree nursing program as well as those of the clinical agencies. These included: 1) checks client allergies, 2) performs appropriate mathematical calculations, 3) adds 0.2 cc of air if the medication is greater than 1cc, 4) pulls curtain or closes door for privacy, 5) compares identification card with client's arm band, 6) aspirates as appropriate, and 7) washes hands before leaving the client's room. The revised Injection Skill Check List consisted of 33 behaviors to be assessed by the nursing instructor as correct, incorrect, omitted, or not applicable.

Verbal instruction in the use of this tool was provided by the researcher to the four nursing instructors who were involved in the data collection. Following this instruction, the researcher performed a simulated injection

in the skills laboratory and had the instructors complete the Injection Skill Check List based on the researcher's performance. The check lists were assessed and all variances evaluated. Because the scores were not within 90% of each other, the check list was reviewed with all of the instructors and the above procedure was repeated one week later. Interrater reliability was 100% at that time.

Procedure

Approval for the proposed study was obtained from 1) the Grand Valley State University Human Research Review Committee, 2) the nursing department Chairperson at the associate degree nursing program, and 3) the Dean of Faculty at the community college. Because this study did not involve a change in the delivery of patient care by the students, no formal approval was solicited from the three clinical agencies.

The study was explained to all of the NUR 120 students by the researcher on May 1, 1990 (Appendix B). Volunteers were solicited, and each student who agreed to participate was asked to complete a consent form (Appendix C). The Trait Anxiety Inventory (Spielberger, 1983) was then administered by the researcher to all of the students who met the criteria.

Instruction related to medication administration was given to all NUR 120 students by the regularly assigned faculty member. This was done via lecture, demonstration, and audio-visual aids. An explanation of all behaviors on

the check list was included in the presentation. All students received a copy of these criteria. Students were encouraged to participate and practice a variety of techniques during this class. An instructor was available throughout this session.

Following this class, students were required to sign up for a performance examination time. The laboratory performance examinations were all held in the same nursing classroom. The students were encouraged to practice administering medications in the skills laboratory whenever possible prior to completing the laboratory performance examination. They were asked to keep a record of the number of times they practiced and report it to the instructor at the time of the examination.

Immediately prior to completing the laboratory performance examination, each student was asked, by the instructor, to complete the State Anxiety Inventory (Spielberger, 1983). The instructor completed and scored the Injection Skills Check List (Appendix A) on each student as soon as he/she gave the injection. The date of the performance examination and the number of times the student reported practicing in the nursing skills laboratory was recorded on the Injection Skill Check List by the instructor.

The same procedure related to administering the State Anxiety Inventory (Spielberger, 1983) and completing the Injection Skills Check List (Appendix A) took place in the

clinical area. The State Anxiety Inventory was completed by the student immediately prior to giving his/her first injection to a client. The Injection Skills Check List was completed by the clinical instructor immediately after the student gave his/her first injection.

There were no expected risks to the student or to the client receiving the injection. Instruction related to medication administration was not changed from current practice. The use of the Injection Skill Check List only formalized what had been assessed in the past. The check list was completed on all of the students, even those who were not involved in the study.

There was no financial cost to the student who participated in this study. Minimal extra time was involved as students were expected to complete both of the anxiety inventories in six minutes (Spielberger, 1983). These forms were completed during either class or clinical time.

Confidentiality was maintained at all times by assigning each student a code number. The instructor put the students' name at the top of all forms. The name was then removed by the researcher and a code number applied thus making future identification of the participant difficult.

There were no risks for the student who was ineligible or who chose not to participate in the study. All students were advised that they could withdraw from the study at any

time. Neither participation in the study nor lack of participation in the study affected students' grades.

CHAPTER FOUR

RESULTS

Data Analysis

Data for this study were collected over a one month period from May 1, 1990 to June 5, 1990. The anxiety questionnaires and Injection Skill Check Lists were paired according to the student nurses' code numbers. Prior to data analysis, the instruments were hand scored by the researcher. Each item on the anxiety questionnaires was given a weighted score of one to four. The scoring weights for anxiety-present items were the same as the numbers on the questionnaires while the scoring weights for the anxiety-absent items were reversed. Total anxiety scores were obtained by adding the weighted scores for the twenty items on each questionnaire.

A total of 33 behaviors were marked as correct, incorrect, omitted, or not applicable on the Injection Skill Check Lists. Because responses recorded in the omitted column reflected expected behaviors that were forgotten, they were considered incorrect. Responses recorded in the not applicable column were considered correct to prevent penalizing the student for something that he/she was not expected to do. The performance scores were obtained by

adding the number of correct and not applicable behaviors. Each student's age and the number of times that an injection was practiced prior to the laboratory performance examination were recorded on the Injection Skill Check List. The number of days between the laboratory performance examination and the administration of an injection to a client in the clinical area was calculated and recorded by the researcher (Appendix D).

Generally, ratings based on a Likert scale are considered to be ordinal data. Because the scores from both the anxiety questionnaires and the Injection Skill Check Lists were summated, however, these were treated as interval level data. Pearson's correlation coefficient was calculated to determine relationships between: 1) trait anxiety scores, 2) state anxiety scores, 3) performance scores, 4) students' age, and 5) days between the laboratory performance examination and the clinical experience.

Paired T-test analysis was done to compare trait anxiety scores with state anxiety scores in both settings. Two-tailed t-test analysis was performed to compare the route of medication administration with 1) state anxiety scores and 2) performance scores.

One way ANOVA was calculated to assess any differences between the instructors and performance scores. It was also calculated to assess any differences between the instructors and students' state anxiety scores prior to the laboratory performance examination and the clinical experience.

All data analysis was done at Grand Valley State University using the Statistical Package for the Social Sciences (SPSS/PC+) software. To facilitate comparison between the present study and the study by Megal et al. (1987), confidence levels of $\alpha = .01$ were used.

Characteristics of the Subjects

Twenty-six student nurses were approached by the researcher. Of these 26 students, 20 met the criteria and agreed to participate in the study. Three students dropped the nursing class, however, and were therefore eliminated from the study.

Ninety-four percent ($n = 16$) of the sample was female while six percent ($n = 1$) was male. Ages ranged from 19 to 47 years with a mean age of 28.3 years and a standard deviation of 8.73. The students' trait anxiety scores ranged from 25 to 53 with a mean of 37.24 and a standard deviation of 8.95.

Research Question One

What is the relationship between student nurses' performance scores and state anxiety immediately prior to giving intramuscular or subcutaneous injections during a laboratory performance examination?

Immediately prior to giving injections during a laboratory performance examination, students' state anxiety scores ranged from 36-76 with a mean of 61.00. Performance scores ranged from 20-33 with a mean of 28.35. No significant correlation was noted between state anxiety

scores and performance scores in the nursing laboratory ($r = .1352$, $\alpha = .01$) (see Table 1).

Research Question Two

What is the relationship between student nurses' performance scores and state anxiety immediately prior to giving intramuscular or subcutaneous injections, for the first time, to clients in the clinical area?

The students' state anxiety scores ranged from 33-72 with a mean of 54.47 immediately prior to giving injections, for the first time, to clients in the clinical area. Performance examination scores ranged from 20-33 with a mean of 28.35. No significant correlation was noted between these two variables ($r = -.0353$, $\alpha = .01$) (see Table 1).

Table 1

Correlations Between Anxiety and Performance Scores

	Trait Anxiety	Lab State Anxiety	Clinical State Anxiety
Lab Performance	-.0973	.1352	
Clinical Performance	-.2536		-.0353
Trait Anxiety		.5582*	.3965

* significant at $\alpha = .01$.

Research Question Three

Is there a difference between student nurses' trait anxiety and state anxiety immediately prior to performing intramuscular or subcutaneous injections during a laboratory performance examination?

Paired t-test analysis showed a significant difference between trait anxiety scores and state anxiety scores prior to the laboratory performance examination ($t = -11.10$, $p < .01$) (see Table 2).

Research Question Four

Is there a difference between student nurses' trait anxiety and state anxiety immediately prior to performing intramuscular or subcutaneous injections, for the first time, on clients in the clinical area?

Paired t-test analysis showed a significant difference between trait anxiety scores and state anxiety scores prior to the clinical experience ($t = -6.14$, $p < .01$) (see Table 2).

Research Question Five

What is the relationship between the student nurses' age or clinical instructor and their level of state anxiety immediately prior to giving intramuscular or subcutaneous injections during a laboratory performance examination?

No significant correlation was found between the student's age and their state anxiety scores prior to the laboratory performance examination ($r = -.2769$, $\alpha = .01$).

Table 2

Paired T-Test Analysis of Trait and State Anxiety Scores

	Trait/ Laboratory	Trait/ Clinical
Mean Difference	-23.76	-17.24
Standard Deviation	8.82	11.57
Standard Error	2.14	2.81
t Value	-11.10*	-6.14*

* significant at $p < .01$, $df = 16$.

A total of four nursing instructors were involved in the collection of the state anxiety inventories and the scores on Injection Skill Check Lists. Instructors number one, two, and four collected data during the laboratory performance examination and instructors number two, three, and four collected data in the clinical areas.

One way ANOVA was calculated to assess any differences between the instructors and the state anxiety scores prior to the laboratory performance examination. State anxiety scores were grouped according to the instructor that completed the Injection Skill Check List in the nursing laboratory. Mean scores between and within groups were calculated and compared. No group was significantly different from the other ($F = .5057$, $p < .05$) (see Table 3).

Table 3

Analysis of Variance Between State Anxiety and Instructor

	DF	Mean Squares	F Ratio	p Value
<u>Lab State/Instructor</u>				
Between Groups	2	51.48	.5057	.6137
Within Groups	14	101.79		
<u>Clinical State/Instructor</u>				
Between Groups	2	165.99	1.25	.3165
Within Groups	14	132.73		

p < .05.

Research Question Six

What is the relationship between the student nurses' age or clinical instructor and their level of state anxiety immediately prior to giving intramuscular or subcutaneous injections, for the first time, to clients in the clinical area?

No significant correlation was found between the student's age and their state anxiety scores immediately prior to giving an injection to a client in the clinical area ($r = -.0446$, $\alpha = .01$).

One way ANOVA was calculated to assess any differences between the instructor and the state anxiety scores prior to

the clinical experience. State anxiety scores were grouped according to the instructor who completed the Injection Skill Check List in the clinical area. No group was significantly different from the other ($F = 1.25$, $p < .05$) (see Table 3).

Research Question Seven

What is the relationship between the length of time from the laboratory performance examination to the clinical experience and the student nurses' state anxiety immediately prior to giving intramuscular or subcutaneous injections, for the first time, to clients in the clinical area?

The length of time from the laboratory performance examination to the clinical experience ranged from 1 to 26 days with a mean of 4.7 and a standard deviation of 6.36. No significant correlation was determined between the length of time from the student's laboratory performance examination to their clinical experience and their level of state anxiety prior to the clinical experience ($r = -.0862$, $\alpha = .01$).

Other Findings

A total of four nursing instructors participated in this study. Three instructors collected data during the laboratory performance examination and three instructors supervised students in the clinical area. Two of the instructors collected data in both settings.

The route of medication administration was recorded on the Injection Skills Check List. Fifty-three percent ($n =$

9) of the medications were given by the intramuscular route and 47% (n = 8) of the medications were given by the subcutaneous route in both the nursing laboratory and clinical areas.

Seven different medications or combinations of medications were given in the clinical areas. These medications were: 1) Insulin, 2) Heparin, 3) Demerol, 4) Phenergan, 5) Demerol/Vistaril, 6) Pantapan/Vistaril, and 7) Demerol/Phenergan. Instructor, route, and medication percentages are listed in Table 4.

Table 4

Instructor, Route, and Medication Percentages

	Nursing Laboratory Percentage (n = 17)	Clinical Area Percentage (n = 17)
Instructor		
#1	35.3% (n = 6)	
#2	47.1% (n = 8)	35.3% (n = 6)
#3		23.5% (n = 4)
#4	17.6% (n = 3)	41.2% (n = 7)
Route		
Intramuscular	52.9% (n = 9)	52.9% (n = 9)
Subcutaneous	47.1% (n = 8)	47.1% (n = 8)
Medication		
Insulin		35.3% (n = 6)
Heparin		11.8% (n = 2)
Demerol		17.6% (n = 3)
Phenergan		5.9% (n = 1)
Demerol/Vistaril		17.6% (n = 3)
Pantapan/Vistaril		5.9% (n = 1)
Demerol/Phenergan		5.9% (n = 1)

The number of times a student practiced before the laboratory performance examination was recorded on the Injection Skills Check List. The students practiced giving an injection 1 to 25 times ($M = 7.7$).

Because the size of the needle and the injection site often vary between intramuscular and subcutaneous injections, a two-tailed t-test was done to assess any difference in state anxiety and/or performance scores due to the medication route. A significant difference was found between the medication route and the laboratory performance score ($t = -2.23$, $p < .05$) (see Table 5). Nine students made 57 errors giving intramuscular injections while eight students made 22 errors giving subcutaneous injections.

Table 5

Comparison of Medication Route with State Anxiety and Performance Scores

	DF	t-Value	p-Value
<u>Pooled Variance Estimates:</u>			
Route/Lab State	15	-.84	.416
Route/Clinical State	15	1.26	.227
Route/Lab Performance	15	-2.23	.041*
Route/Clinical Performance	15	-.92	.370
<u>Separate Variance Estimates:</u>			
Route/Lab State	12.39	-.87	.402
Route/Clinical State	9.90	1.21	.254
Route/Lab Performance	10.19	-2.15	.056
Route/Clinical Performance	13.12	-.91	.380

* $p < .05$.

Relationships between age and trait anxiety scores were also examined. A significant correlation ($r = -.6963$, $\alpha = .01$) was found.

The behaviors on the Injection Check Lists were examined to identify which behaviors were either done incorrectly or omitted most often. An item analysis was completed on the 33 behaviors identified on the Injection Skill Check Lists. Eleven behaviors were done incorrectly or omitted greater than 20% of the time in the: 1) laboratory (2), 2) clinical area (4), or 3) both (5). These behaviors are listed in Table 6.

Interrator reliability of the Injection Skill Check List was rechecked to identify any discrepancy in the scoring between instructors. An analysis of variance (ANOVA) revealed a significant difference between the clinical performance scores and the instructor ($p = .0253$, $\alpha = .05$) (see Table 7). When multiple range tests (Scheffe Procedure) were applied, however, no significant difference at $\alpha = .05$ was found. The lower end point of the confidence interval of Group 3 was 28.9088 and the upper end point of the confidence interval of Group 4 was 28.8999.

Table 6

Item Analysis of Incorrect or Omitted Behaviors (n = 17)

	Lab		Clinical	
	I n c o r r e c t	O m i t t e d	I n c o r r e c t	O m i t t e d
<u>Student Behaviors:</u>				
Checks medication book with medication on hand to be sure medication is correct as ordered	1	3	1	1
Checks client's allergies	0	7	0	5
Washes hands before preparing medication	0	7	0	8
Prepares medication vial, ampule, or tubex syringe using aseptic technique	4	0	1	0
Injects correct amount of air into vial	3	1	0	2
Adds 0.2 cc of air if medication is greater than 1 cc	1	3	1	5
Correctly identifies client by comparing I.D. card with client's arm band	1	4	0	3
Pulls curtain or closes door for privacy	0	0	0	7
Tells client when he/she will feel injection	0	12	0	9
Repositions client and opens curtains or door	0	0	0	7
Washes hands before leaving patient room	0	12	2	9

Table 7

Analysis of Variance Between Performance Scores and Instructor

	Degrees of Freedom	Mean Squares	F Ratio	p Value
<u>Lab Perf./Instructor</u>				
Between Groups	2	33.44	3.1005	.0768
Within Groups	14	10.79		
<u>Clin. Perf./Instructor</u>				
Between Groups	2	46.17	4.8398	.0253*
Within Groups	14	9.54		

* significant at $\alpha = .05$.

CHAPTER FIVE

DISCUSSION/LIMITATIONS/IMPLICATIONS

Discussion

The discussion focuses on the relationship between nursing students' level of trait and state anxiety with their performance scores when giving intramuscular or subcutaneous injections in laboratory and clinical settings. King's (1981) theory of goal attainment will be discussed in relation to the teaching-learning process. Because this was a replication of a study done by Megal et al. (1987), comparisons between the two studies will be made.

Relationships between trait anxiety, state anxiety, performance scores, age, days between experiences, and instructors will also be discussed. Comparisons between the subjects' trait and state anxiety scores will be made. Spielberger's (1983) findings related to trait and state anxiety scores will be used as a standard when discussing anxiety scores.

Trait and State Anxiety Scores

Trait anxiety was measured by having the subjects in both studies complete the STAI Form Y-2. Although the mean scores in both studies were consistent with Spielberger's (1983) findings related to college students, they were

lowest in the present study (see Appendix E). This could be due to differences in the subjects' ages. In the study by Megal et al. (1987) the subjects' ages ranged from 18 to 39 years with a mean of 24.7 years. The subjects in the present study were older ($M = 28.4$ years) with more life experiences. These results are consistent with Spielberger's (1983) findings concerning the inverse relationship between age and trait anxiety.

State anxiety was measured in both studies by having student nurses complete the STAI Form Y-1 immediately prior to giving injections in: 1) laboratory performance examinations and 2) clinical areas. In the present study, mean state anxiety scores were slightly higher than Spielberger's findings for high stress conditions prior to the laboratory examination and slightly lower prior to the clinical experience. Under high stress conditions, Spielberger, (1983) reported mean state anxiety scores of 54.99 for men and 60.51 for women. In the study by Megal et al. (1987), the mean state anxiety scores were slightly higher than Spielberger's findings related to low stress conditions prior to both the laboratory examination ($M = 42.94$) and the clinical experience ($M = 39.77$). According to Spielberger (1983), the mean state anxiety score, under low stress conditions, was 40.02 for men and 39.36 for women.

Mean state anxiety scores, prior to both experiences, were much greater in the present study than they were in the

study by Megal et al. (1987) (see Appendix E). This could be due to differences in teaching strategies in the two studies. In the present study, instruction related to medication administration was given one day in the classroom via lecture, demonstration, and audio visual aids. Following this highly structured class, the subjects were encouraged to practice in the laboratory. They were also required to sign up for the laboratory performance examination which was scheduled for the following week. There were three parts to this examination and the subjects were given approximately one hour to complete all parts of it.

The students involved in the study by Megal et al. (1987) were given a faculty prepared learning packet to study. They were also asked to review the procedure for administering an injection in their textbook and to view a videotape of the procedure. Following this independent study, the students practiced the skill with faculty supervision. When ready, they took the laboratory performance examination. Because this was a less structured learning situation the subjects had more control over the amount of time they needed to learn the procedure and the scheduling of the performance examination.

In both of these studies, the mean state anxiety scores in the laboratory and clinical area were higher than the mean trait anxiety scores (see Appendix E). Because trait anxiety refers to individual differences in anxiety-proneness, and state anxiety refers to the palpable reaction

taking place at a given time, one would expect state anxiety to be higher than trait anxiety in a stressful situation. The results of this study were consistent with Spielberger's (1983) study of military recruits ($N = 1964$), shortly after they began a rigorous training program, in which he found substantially higher state anxiety scores in men ($M = 44.05$) and women ($M = 47.01$) than trait anxiety scores in both men ($M = 37.64$) and women ($M = 40.03$).

In both nursing studies, mean state anxiety scores were higher prior to the laboratory performance examination than they were prior to the clinical experience (see Appendix E). This could have been due to the fact that the subjects were being evaluated for the second time when they administered the injections in the clinical area. They were therefore more familiar with the performance expectations and the instructors. Also, having already passed the laboratory performance examination, they may have been more confident in their ability to administer an injection correctly.

Although trait anxiety scores were higher in the study by Megal et al. (1987) than they were in the present study, no significant correlation between trait and state anxiety was validated in their study. In the present study, a positive correlation was found between the student nurses' trait anxiety and their state anxiety immediately prior to giving an injection during the laboratory performance examination ($r = .5582$, $\alpha = .01$). Spielberger (1983) found that state anxiety scores were almost the same as trait

anxiety scores when examined under neutral conditions. These findings were validated in the study by Megal et al. in which the subjects had state anxiety scores consistent with low levels of anxiety. Under stressful conditions, Spielberger (1983) found that state anxiety scores were higher than trait anxiety scores. State anxiety scores from the present study indicated that the subjects were under a great deal of stress, especially prior to the laboratory performance examination.

Performance Scores

Correct administration of an injection was measured using an Injection Skills Check List in both studies. Since correct administration of an injection was the desired transaction between the instructor and the student, the student was given immediate feedback related to attainment of this goal. Megal et al. (1987) assessed performance errors in their study whereas correct behaviors were assessed in the present study. To facilitate comparison between the two studies, performance errors were also calculated on data from the present study (Appendix E).

The Injection Skill Check List for the present study was eight items longer than the Injection Skill Check List used by Megal et al. (1987). In an attempt to clarify the procedural expectations, nine items were added, two were deleted, and several were reworded (7), divided into two behaviors (3), or combined into one behavior (2) on the present study (see Appendix A).

Because of all the revisions that were made on the Injection Skill Check List, it's difficult to determine if the difference in numbers of performance errors was due to an actual increase in errors or to changes that were made on the Injection Skill Check List. Between the two studies, 12 items were missed by 20% or more of the subjects (see Appendix F). Five of these 12 items were added to the original check list and therefore not assessed in the previous study. Five of these 12 items were reworded for the present study. Of these five items, 20% or more of the subjects in both groups missed three. One item was done incorrectly by 20% or more of the subjects in the present study and one was done incorrectly by 20% or more of the subjects in the original study. Two items, that were assessed in both studies, were missed by 20% or more of the subjects in the present study but not in the original study.

The item that was missed most often, in the combined studies, was telling the client when he/she would feel the injection. Although this is an appropriate nursing intervention, neglecting to do so will probably not result in serious injury to the client or nurse.

Preparing the medication using aseptic technique and correctly identifying the client were also missed more than 20% in both studies. Choosing an appropriate injection site was not done correctly by 12% of the subjects in the present study and by 51% of the subjects in the study by Megal et al. (1987) . Seventy-one percent of the subjects in the

current study neglected to check for allergies before administering the injection. Because these could cause serious injury to the client, they need to be discussed more thoroughly in the classroom and reinforced in the clinical area.

Many subjects, in both of the studies, neglected to wash their hands before preparing the medication. Greater than 50% of the subjects, in the present study, didn't wash their hands after giving the injection in either the laboratory or clinical settings. This could result in serious injury to either the client or the subject since many life threatening diseases are transmitted via body fluids. This too needs to be stressed in both the classroom and clinical areas. Further refinement of the Injection Skill Check List is needed to increase its reliability as an assessment tool.

Relationship of State Anxiety and Performance

Because learning is decreased in the presence of high anxiety (Spielberger, 1966), a significant negative relationship was anticipated between state anxiety scores and performance scores. However, no significant correlation was found in either study ($\alpha = .01$) (see Appendix G). This could be due to: 1) the recording of inaccurate performance scores by the instructor, 2) unintentional coaching by the instructor in an attempt to put an anxious student at ease, 3) limited sample size, or 4) improper data analysis. Although an analysis of correlation may not have been

appropriate when comparing U-shaped anxiety scores with linear performance scores, the small sample size prohibited more sophisticated data analysis.

Relationship of Trait Anxiety and Age

A significant negative correlation between the student nurses' trait anxiety and age was found in the present study. As the subject's age increased, their trait anxiety scores decreased. Spielberger (1983) examined the effect of age on trait and state anxiety. The results of his study also showed a negative correlation between trait anxiety and age. No significant correlation was reported in the study by Megal et al. (1987) (see Appendix H).

Relationship of Other Variables

No significant relationship was found between the student nurses' age and level of state anxiety in either study. Spielberger (1983) found an inverse relationship between age and state anxiety scores.

No relationship was found between the instructor and the students' level of state anxiety in the present study. No comparison is possible as this wasn't assessed in the study by Megal et al. (1987).

No significant relationship was found between the length of time from the laboratory performance examination to the clinical experience and the subjects' state anxiety scores, in either study, although the number of days between experiences were much greater in the study by Megal et al. (1987) ($M = 64.8$) than in the present study ($M = 4.7$) (see

Appendix H). Based on that data, perhaps faculty don't need to make finding students clinical experiences related to procedures practiced in a laboratory setting as rapidly as possible.

Other Findings

A variety of medications were given to clients in the clinical area in both the present study and the study by Megal et al. (1987). Although more medications were given intramuscularly than subcutaneously in both studies, their percentage distribution was less evenly divided in the study by Megal et al. (1987).

In the present study, a significant difference was found between the route of medication administration and the laboratory performance examination score. Of the 57 errors made when giving an intramuscular injection, 30 (53%) were related to the actual preparation or administration of the medication. When giving a subcutaneous injection, 11 (50%) of the errors made were related to the actual preparation or administration of the medication. Further study is needed to determine the significance of this finding.

In the present study, the number of practice trials before the laboratory performance examination was greater ($M = 7.71$) than the number of practices throughout the experience ($M = 3.69$) in the study by Megal, et al. (1987). No relationships between these means and the subjects' state anxiety scores or performance scores were analyzed in either study. To do so accurately, number of practices between the

laboratory examinations and the clinical experiences would also need to be analyzed in the present study.

Limitations

A major limitation to this study was the small sample size. According to Polit & Hungler, (1987), a sample size of at least 10 and preferably 20 to 30 subjects should be selected for each subdivision of data. Although twenty-six student nurses were approached by the researcher, only 20 of them met the criteria and agreed to participate in the study. Three students subsequently dropped the nursing class and were therefore eliminated from the study. Because of the small sample size, it may not be representative of the population. Also, smaller samples tend to produce less accurate data.

Because the STAI Form Y-1 was administered to the students twice and the time period between completing the two questionnaires varied between students, test-retest reliability was a concern. Spielberger (1983) tested for this on two groups of high school students. Because the median reliability coefficient for the State Anxiety Questionnaire was only 0.33, alpha coefficients were also calculated. The overall median alpha coefficient for the State Anxiety Questionnaire was .92 (Spielberger, 1983). A low median reliability coefficient had been anticipated because of the transitory nature of state anxiety. No data analysis related to this was done in this study.

Threats to external validity in this study included the Hawthorne Effect, Novelty Effect, and Experimenter Effect. An attempt was made to control these external variables by making the conditions under which the data were collected as similar as possible for every participant in the study. This was done by describing the study to all of the students in NUR 120 at the same time and by using the same Injection Skill Check List on all of the students.

An attempt to control the Hawthorne Effect was done by having all of the students in Nur 120 complete the laboratory performance examination. An instructor observed all of the students administering an injection in both settings and then completed the Injection Skill Check List on their performance.

An attempt was made to control the novelty effect by having the faculty teach medication administration as it had been taught in prior semesters. The researcher explained the Anxiety Questionnaires and the Injection Skill Check List to the students. The faculty were responsible for distributing and collecting the State Anxiety Questionnaires and recording the students' behaviors on the Injection Skill Check Lists. This was an additional responsibility for the instructors and could have made them more attentive to the students' performance.

Experimenter Effect may have caused the subjects to alter their performance due to characteristics of the researchers (Polit & Hungler, 1987). The researcher

attempted to control for this by giving the same directions to all of the instructors involved in the data collection and also by not being directly involved in most of the data collection. One instructor, involved in data collection in the clinical agency, did note that a particular subject was diaphoretic and had shakey hands. Surprisingly, this subjects' state anxiety score was only 33. The instructor felt that this subject may have rated the statements on the State Anxiety Questionnaire the way he/she believed he/she should feel rather than the way the subject was actually feeling at the moment.

Threats to internal validity in this study included the effect of history, maturation, and mortality. None of the instructors or the researcher were made aware of any extraordinary events in the students' lives or the community during the time that data was collected.

An attempt was made to control the effects from maturation by having the students administer an injection to a client in the clinical agency as soon as possible following their laboratory performance examination. All students did so within one month.

By ensuring student confidentiality and by completing the Injection Skill Check List on all of the students in NUR 120, advantages to dropping from the study were reduced.

Since all three of these threats to internal validity involved the passage of time, control was attempted by

completing the study in as short a time as possible, one month.

Implications/Recommendations/Conclusion

The goal of the teaching-learning process is for the learner to meet specific learning objectives through a planned sequence of events. Learning how to give an injection properly was the mutual goal of the subjects and instructors in both studies. Transaction of this goal was measured with the Injection Skills Check Lists. According to King (1981), a transaction occurs whenever mutually agreed upon goals are attained. This study supported King's theory of goal attainment (King, 1981).

This study has raised more questions about the relationship of anxiety to psychomotor skills than it has answered. Although no significant correlation was found between state anxiety and the correct administration of an injection, high levels of state anxiety, in both the laboratory and clinical area, were validated by the subjects. Mean performance scores were the same in both situations even though anxiety levels were significantly lower in the clinical area. This may have occurred because the subjects proved their ability to administer an injection correctly in the nursing laboratory and were therefore more confident doing so in the clinical area. Also, having completed the laboratory performance examination, they knew exactly what the expectations would be in the clinical area.

Several things could be done to improve this study. Increasing the sample size would improve the representativeness of the data collected and make it more generalizable. Using a video to teach medication administration as well as to explain the Injection Skill Check List would make it easier to replicate this study and would also decrease experimenter effect. Subtracting the number of not applicable items from the performance score of each subject and then calculating the actual percentage of correct responses would improve the accurateness of the total scores.

Implications for nursing education involve identifying anxiety producing situations and attempting to minimize them. Minimizing anxiety would improve interaction between the teacher and the learner thereby enhancing the teaching-learning process. It would enable students to become more involved in a variety of experiences including the practicing of many technical skills.

In order to minimize anxiety producing situations, a variety of teaching strategies need to be investigated. Each learner differs in motivation, interest, attitude, and anxiety related toward learning. Student nurses in this study had higher levels of state anxiety than the students did in the study by Megal et al. (1987). This may have been due to differences in the teaching/learning environment. Because of limited instructional time, optimal use must be made of all contact with the student.

Further investigation is needed in several areas. These include: 1) the identification of anxiety producing situations, 2) the effect of anxiety on the teaching-learning process, 3) the identification of anxiety-reducing interventions, and 4) the effect of anxiety-reducing interventions on the teaching-learning process. This study was limited to second semester nursing students. Additional investigation is needed at all levels of nursing education.

Professional nursing practice is based on knowledge, clinical and cognitive skills, and the individual's personal value system. Students enter college, from many diverse backgrounds, with a variety of learning needs. In order to function safely as beginning practitioners, nursing students must develop cognitive and clinical skills. It is the responsibility of nurse educators to facilitate the learning of these skills. Further study related to enhancing the teaching-learning process will ultimately enhance professional nursing.

APPENDICES

Appendix A

Injection Skill Check List

Student's Name _____
Code Number _____

Student's Age _____ Gender _____ Correct Behaviors _____
Instructor _____ Number of practice trials _____
Lab Test-out Date _____ Route _____

OR

Administration to Client Date _____ Instructor _____
Medication Given _____ Route _____

C	I	O	N
O	N	M	O
R	C	I	T
R	O	T	
E	R	T	A
C	R	E	P
T	R	D	P
	C		L
	T		.

Student Behaviors:

1. Checks medication book with medication on hand to be sure medication is correct as ordered					
*2. Checks client's allergies					
*3. Performs calculations as needed					
4. Washes hands before preparing medication					
+5. Selects appropriate size syringe					
+6. Selects appropriate size needle					
**7. Prepares medication vial, ampule, or tubex syringe using aseptic technique (Circle vial, ampule, or tubex)					

C	I	O	N
O	N	M	O
R	C	I	T
R	O	T	
E	R	T	A
C	R	E	P
T	R	D	P
	E		L
	C		.
	T		

Student Behaviors:

*8. Injects correct amount of air into via				
9. Withdraws correct amount of medication				
10. Removes air bubbles from syringe				
+11. Inspects appearance of medication in syringe				
+12. Determines that amount of medication in syringe is correct				
*13. Adds 0.2 cc of air if medication is greater than 1 cc				
**14. Recaps needle				
**15. Correctly identifies client by comparing ID card with client's arm band				
*16. Pulls curtain or closes door for privacy				
17. Assists client into appropriate position				
*18. Puts clean glove on non-dominant hand				
**19. Chooses appropriate site for administration of medication				
**20. Cleanses skin in a circular motion beginning at the injection site				
+21. Removes the needle cover				
22. Gently displaces or grasps tissue at injection site				

	C	I	O	N
	O	N	M	O
	R	C	I	T
	R	O	T	
	E	R	T	A
	C	R	E	P
	T	R	D	P
		C		L
		T		.
<u>Student Behaviors:</u>				
<u>**23. Tells client when he/she will feel injection</u>				
<u>*24. Inserts needle at appropriate angle</u>				
<u>*25. Aspirates as appropriate</u>				
<u>26. Injects medication slowly</u>				
<u>27. Removes needle quickly</u>				
<u>++28. Gently massages injection site with alcohol and assesses site</u>				
<u>**29. Repositions client and opens curtains or door</u>				
<u>++30. Disposes of used equipment without recapping needle</u>				
<u>*31. Washes hands before leaving patient room</u>				
<u>*32. Maintains aseptic technique throughout procedure</u>				
<u>33. Records medication given per hospital policy</u>				
<u>Totals:</u>				

Grand Total = 33 behaviors

- * new item (9)
- ** reworded item (7)
- + divided into two statements (6)
- ++ combined into one statement (2)

Appendix B

Verbatim Instructions

My name is Sandy Osborne and I'm a graduate student at Grand Valley State University. At this time, I'm working on a research project and would like to ask all of you who qualify to participate in this study. I am studying the effect of anxiety on student nurses' performance of psychomotor skills. It's essentially a replication of a study done in 1987 at the University of Nebraska College of Nursing.

The purpose of this study is to look at student nurses' anxiety level prior to completing the medication performance examination in the laboratory and again in the clinical setting immediately before giving their first injection to a patient. Following both the medication performance examination and the injection in the clinical area, the instructor will complete an Injection Skill Check List based on the student's performance giving the injection. This check list will be completed on all students whether or not they are participants in this study. You will be given a copy of this check list during the class presentation on medication administration.

In addition to this, all students in the study will be asked to complete a questionnaire related to their normal level of anxiety. This will be done today following the explanation of this study. It is estimated that each questionnaire will take about six minutes to complete.

Each of the questionnaires related to anxiety has directions at the top of the form. Please read them carefully before filling in the questionnaire. Essentially, you will be asked to blacken in a square that describes how you feel. The questionnaire today deals with how you generally feel. This is intended to measure your level of trait anxiety. The questionnaire that you will be asked to complete prior to testing out in the clinical laboratory and again in the clinical area deals with how you feel at that moment. This is intended to measure your level of state anxiety.

If you agree to participate in this study your confidentiality will be protected at all times. This will be done by the assignment of an individual code number that will be recorded on all of the forms by myself. Your course grade will not be affected in any way whether or not you choose to participate in this study. Also, if you agree to participate, you will be allowed to withdraw from the study at any time.

Let me show you a transparency of the Injection Skill Check List now so that you will know exactly what behaviors the instructor will be looking for. The instructor will

give you a copy of this during the class related to medication administration.

Do you have any questions at this time?

Here is an approval form that I need to have all of you sign that qualify and agree to participate. Only students who have never given an injection before will be allowed to participate. Let me read the approval form to you (See Appendix C).

Do you have any questions?

I would appreciate it very much if all of you that qualify agreed to participate. As I read to you from the approval form, it is hoped that data obtained from this study will contribute to the knowledge base related to the teaching/learning of psychomotor skills that are vital to nursing. If you agree to participate, please sign the approval form and return it to me.

For those of you who agree to participate, I'd like you to complete one of the anxiety questionnaires now. This is the one related to your trait anxiety. It should only take a few minutes to complete. I'll collect them all as soon as you've completed them.

Let me read you the directions for completing this form now.

"A number of statements which people have used to describe themselves are included on this questionnaire. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you

generally feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel."

Thank you for your help.

Prior to completing the STAI Form Y-1 in the laboratory and again in the clinical area, a NUR 120 faculty member will ask the student to read the following directions.

"A number of statements which people have used to describe themselves are included on this questionnaire. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel right now, that is, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best."

Appendix C

Approval Form

I, _____ agree to serve as a subject in the investigation examining the effect of anxiety on student nurses' performance of psychomotor skills under the supervision of Sandra L. Osborne, GVSU. This investigation will examine the relationship between student nurses' anxiety and their performance when giving an intramuscular or subcutaneous injection for the first time. The data collected in this study are expected to increase knowledge related to the teaching/learning of psychomotor skills vital to nursing.

I understand that I will be asked, by an instructor, to complete three questionnaires measuring anxiety. Each questionnaire will take about six minutes to complete. An instructor will then complete a skills check list after I give an injection during a performance examination in the nursing skills laboratory and for the first time to a client in the clinical area. This check list will be completed on all students whether or not they are a participant in this study.

I understand that these tests involve self evaluation of anxiety levels. There are no expected risks to myself or

the client receiving the injection. Confidentiality will be protected by coding the data so that identification of individual participants will not be possible. My course grade will not be affected in any way and I am free to withdraw from this investigation at any time.

I have read and fully understand the foregoing information.

Date:_____ Subject:_____
Witness:_____

Appendix D

Injection Skill Check Lists Results

Group							
Nursing Laboratory (n = 17)				Clinical Area (n = 17)			
Characteristic	Range	M	SD		Range	M	SD
Age	(19-47)	28.30	8.73				
Behaviors							
Correct	(10-28)	23.47	5.11		(20-32)	25.24	3.72
Incorrect	(0 - 6)	1.29	2.05		(0 - 5)	1.18	1.59
Omitted	(0 - 7)	3.35	2.29		(0 - 9)	3.47	2.94
Not Appl.	(1 - 7)	4.47	1.51		(0 - 7)	3.12	2.18
Perf. Score	(20-33)	28.35	3.69		(20-33)	28.35	3.75
# Practices	(01-25)	7.71	7.66				
Days Between					(01-26)	4.71	6.36

Appendix E

Present Study State Anxiety and Performance Scores Compared with the Findings of Megal et al. (1987)

	Mean	Range	SD
<u>Present Study (n = 17)</u>			
Trait Anxiety	37.235	25-53	8.948
State Anxiety			
Laboratory	61.000	36-76	9.772
Clinical	54.471	33-72	11.700
Performance Errors			
Laboratory	4.647	0-13	3.690
Clinical	4.647	0-13	3.757
<u>Megal et al. Study (n = 35)</u>			
Trait Anxiety	38.457	28-56	6.814
State Anxiety			
Laboratory	42.942	30-65	8.808
Clinical	39.714	27-60	8.237
Performance Errors			
Laboratory	1.543	0-5	1.268
Clinical	1.600	0-5	1.479

Appendix F

Performance Errors from Present Study and Study by Megal et al. (1987)

	Present Study (n = 17)		Study by Megal et al. (n = 35)	
Student Behaviors	L a b	C l i n i c a l	L a b	C l i n i c a l
Checks medication book with medication on hand to be sure medication is correct as ordered	4	2		
*Checks client's allergies	7	5		
Washes hands before preparing medication	7	8		5
**Prepares medication vial, ampule, or tubex syringe using aseptic technique	4	1	8	
*Injects correct amount of air into vial	4	2		
*Adds 0.2 cc of air if medication is > 1 cc	4	6		

Appendix F (con't)

Performance Errors from Present Study and Study by Megal et al. (1987)

	Present Study (n = 17)		Study by Megal, et al. (n = 35)	
Student Behaviors	L a b	C l i n i c a l	L a b	C l i n i c a l
**Correctly identifies client by comparing I.D. card with client's arm band	4	3	11	11
*Pulls curtain or closes door for privacy	0	7		
**Chooses appropriate site for administration of medication	0	2	12	6
**Tells client when he/she will feel injection	12	9		10
**Repositions client and opens curtains or door	0	7		
*Washes hands before leaving patient room	12	9		

* new item

** reworded item

Appendix G

Correlations of State Anxiety and Performance Scores from Present Study and Study by Megal et al. (1987)

	Present Study N = 17	Megal et al. Study N = 35
Laboratory Performance	.1352	.152
Clinical Performance	-.0353	.234

$\alpha = .01$

Appendix H

Correlations of Variables in the Present Study and the Study by Megal et al. (1987)

	Student Age	Days Between
<u>Present Study (n = 17)</u>		
Performance Errors		
Laboratory	.0366	
Clinical	.1655	.3994
Trait Anxiety	-.6963*	
State Anxiety		
Laboratory	-.2769	
Clinical	-.0446	-.0862
<u>Megal et al. (1987) (n = 35)</u> <u>(p > .05)</u>		
Performance Errors		
Laboratory	.028	
Clinical	.034	.019
Trait Anxiety	.183	
State Anxiety		
Laboratory	-.077	
Clinical	-.264	.125

*significant at $\alpha = .001$.

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