1990

The effects of therapeutic touch on muscle tone

Nancy W. Post
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DOI: <https://doi.org/10.31979/etd.8t8z-avuk>
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The effects of therapeutic touch on muscle tone

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San Jose State University, 1990

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THE EFFECTS OF
THERAPEUTIC TOUCH
ON MUSCLE TONE

A Thesis
Presented to
The Faculty of the Department of Occupational Therapy
San Jose State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science

By
Nancy W. Post
May, 1990

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ABSTRACT

THE EFFECTS OF THERAPEUTIC TOUCH ON MUSCLE TONE

by Nancy W. Post

A pre-experimental, mixed factorial design was used to investigate whether Therapeutic Touch would significantly change muscle tone in 38 adult subjects. Subjects were faculty or students at San Jose State University, San Jose, California. Nine subjects were male and 18 were female. Subjects ranged in age from 19 to 46 years. Subjects were randomly assigned to receive Therapeutic Touch or a placebo. Subjects were unaware of their group assignments. A Cyborg (P303) electromyographic biofeedback instrument with data accumulator (Q 700) was used to monitor muscle activity. The frontalis muscle was targeted for observation. Hierarchical regression analysis with post-hoc specific means comparisons where main effects were found revealed no significant differences in change of muscle tone over the intervention span between the subjects receiving Therapeutic Touch and subjects receiving the placebo. All subjects experienced a significant decrease in muscle tone during the span of intervention.

ACKNOWLEDGEMENTS

I would like to thank Professor Guy McCormack for inviting me to work with him on this research project. I would like to acknowledge my gratitude to my thesis committee members, Professor Guy McCormack, Dr. Lela Llorens, and Professor Janet Downs for their valuable input. My thanks are extended to my husband, Campbell Hunter, for all his support and patience. Finally, I would like to thank Cathy Howard for allowing me to use her word processor and for coaching me in MultiMate.

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CHAPTER ONE

INTRODUCTION

Purpose

Therapeutic Touch, a modern derivative of the laying on of hands, is becoming increasingly widespread in use by members of the allied health professions. This modality is employed for a variety of reasons including pain and anxiety reduction as well as general healing purposes. A wealth of research on the efficacy of Therapeutic Touch lends variable support to its use. The mechanics and precise physiological effects of Therapeutic Touch remain unclear at this time. The purpose of this study was to isolate the physiological component of muscle tone for scrutiny in order to further clarify the corporal effects of Therapeutic Touch. This study was conducted to determine whether muscle tone can be significantly reduced through the use of Therapeutic Touch.

Statement of the Problem

Occupational therapists often treat people with neurological deficits which result in muscular hypertonicity or spasticity. A primary goal is to lower muscle tone. Hypertonus in a client interferes with occupational function and therefore the realization of therapeutic goals. Therapeutic Touch is a noninvasive technique derived from the centuries-old practice of the laying on of hands (Krieger, 1979). Recent studies have revealed Therapeutic Touch to be effective in reducing anxiety (Heidt, 1981; Quinn, 1982) and tension headache pain (Keller & Bzdek, 1986). A general physiological relaxation response induced by the application of Therapeutic Touch is believed to be responsible for the findings of these studies. Since reduced muscle tone is associated with physiological relaxation (Beary, Benson, & Klemchuk, 1974) it has been proposed here that Therapeutic Touch could be used successfully to specifically ameliorate excessive muscle tone. It is believed that occupational therapists could use Therapeutic Touch as a clinical precursor to traditional intervention for clients with excessive muscle tone (McCormack, 1987).

Questions

The questions asked in this study were:

1. Will there be significant differences in muscle tone between male and female subjects which could be attributed to changes found over the span of the intervention period?
2. Will there be significant differences in muscle tone between subjects receiving Therapeutic Touch treatment and subjects receiving placebo treatment which could be attributed to changes found over the span of the intervention period?
3. Will there be a two way interaction between gender and type of treatment that yields significant differences in subjects' muscle tone which could be attributed to changes found over the span of the intervention period?
4. Will the muscle tone of the entire group of subjects change significantly over the span of the intervention period?
5. Will males experience a significantly different change in muscle tone from females over the span of the intervention?
6. Will subjects receiving Therapeutic Touch

experience changes in muscle tone over the span of the intervention that are significantly different from the changes experienced by subjects receiving the placebo treatment?

7. Will there be a three way interaction between gender-type, treatment type, and span of intervention periods that yields significant differences in subjects' muscle tone?

Definitions

Conceptual

Frame of reference: A loosely organized set of theories which serves to orient or give particular meaning to one's outlook.

General physiologicl relaxation response: A simultaneous decrease in muscle tone, heart rate, respiratory rate, oxygen consumption, carbon dioxide elimination and arterial blood lactate accompanied by increases in alpha wave activity, galvanic skin responses and skeletal blood flow.

General systems theory: Constitutes a set of knowledge about the nature and dynamics of systems.

Holism: The belief that in nature entities such as humans and other complete organisms function as complete units that cannot be reduced to the sum of their parts.

Healing process: A natural physiological event that can be promoted or disrupted by belief systems and emotions.

Hypertonicity: An excess of muscle tone.

Laying on of hands: The placement of hands on an afflicted person. This is performed within a religious context with the intent to channel the power of the predominant deity of that religion for healing purposes.

Mechanistic: Refers to the tendency to see all phenomena as machine-like in their operation.

Monism: A metaphysical system in which reality is conceived as a unified whole.

Muscle tone: Normal tension or responsiveness to stimuli in a muscle.

Occupational function: The ability to carry out one's life roles.

Occupational therapist: One who is registered nationally to practice occupational therapy.

Occupational therapy: A holistic approach to rehabilitation using purposeful activities to achieve maximal independence of function throughout the life span.

Paradigm: The set of basic assumptions that underly a theory.

Placebo effect: Caused by giving a client a non-medicinal substance or non-therapeutic treatment without his or her knowledge that the treatment is not authentic. The placebo effect is demonstrative of the power of suggestion.

Reductionism: Refers to the methodological orientation which assumes that all phenomena, like machines can be studied by being taken apart and examining how the pieces fit together.

Spasticity: Increased tone or contractions of muscles causing stiff and awkward movements - the result of upper motor neuron lesion.

System: Refers to any set of interdependent variables.

Theory: The analysis of a set of facts and their relationship to each other.

Therapeutic Touch: The practice of directing life energies towards another person with the intention to help or heal.

Operational

Muscle tone: Degree of tension in the frontalis muscle as indicated by measures in millivolts of electrical activity within the muscle provided by the data accumulator (Q 700) of a Cyborg (P303) Electromyographic (EMG) biofeedback instrument.

Span of intervention: The three periods in which the treatment was applied.

Subject average median EMG scores: Obtained by adding the three median EMG scores of a given individual and then dividing the sum by the number of treatment periods (three).

Treatment period average EMG scores: Obtained by adding median EMG scores yielded for each subject in a treatment period and dividing the sum by the number of subjects.

Assumptions

It was assumed that no subjects possessed neuromuscular impairments that would confound the results

of this study. There was no formal screening for such deficits. Also assumed was that the placebo Therapeutic Touch intervention represented a true control. It was believed that removal of the conscious intention of directing healing life energies rendered the intervention impotent.

Limitations

Limitations identified for this study were:

1. The subjects were a convenience sample and not chosen randomly.
2. The subjects were presumably healthy. Some research has supported the hypothesis that Therapeutic Touch is most effective with people and other organisms that are in a sickened state (Quinn, 1988).
3. The environment available for the execution of this study could not be controlled for outside noises. According to the numerical readout on the data accumulator these sounds had an immediate effect on subject's muscle tone.
4. Therapeutic Touch is a modality that is inherently difficult to control for consistency and quality of application.

5. The results of this study cannot be generalized to a physically or neurologically impaired population.

Delimitation

This study was delimited to determining if Therapeutic Touch is effective in reducing muscle tone. It was not concerned with studying how this form of intervention works.

Significance of the Study

It is believed that presently all fields of science are undergoing a paradigmatic shift (Battista, 1977). Formerly, a mechanistic view of the universe was predominant in the sciences. Such a reductionistic paradigm is now being relinquished in favor of a set of assumptions more consistent with recent findings in quantum physics (Battista, 1977). These assumptions compose the holistic paradigm. A monistic view of reality held by the holistic paradigm causes it to be the underlying paradigm for General Systems Theory (Battista, 1977).

As science begins to adopt the concept of holism it becomes increasingly acceptable and even requisite for

practitioners in the health sciences to augment their repertoire of treatment modalities with holistic techniques. Therapeutic Touch may be considered a holistic technique because it is based on the belief that the human body is not only unified by streams of energy but also is a system open to the energies of the universe (Krieger, 1979).

The employment of holistic treatment techniques such as Therapeutic Touch by occupational therapists is especially appropriate because of the holistic view of man inherent to occupational theory. Occupational therapists may theoretically justify the use of holistic treatment techniques through the use of the Occupational Performance Frame of Reference since this frame of reference is structurally consistent with General Systems Theory. However, treatment techniques should be used not only because of theoretical consistency but also because their efficacy has been supported through controlled research.

This study was an attempt to determine the efficacy of Therapeutic Touch as well as to initiate a trend of observation of its effect on muscle tone. Should the practicability of Therapeutic Touch be established occupational therapists would have a valuable adjunctive method to use in their treatment of patients with excessive tone.

CHAPTER TWO

REVIEW OF THE LITERATURE

A review of occupational therapy literature published since 1970 to the present yielded no articles pertaining to Therapeutic Touch. Background information on Therapeutic Touch was obtained from books on the subject. Research data on Therapeutic Touch were garnered largely from professional nursing journals as well as journals concerned with parapsychology.

An explanation regarding the appropriateness of Therapeutic Touch as a modality for occupational therapists is the first section presented in this chapter. This section includes a review of General Systems Theory and the Occupational Performance Frame of Reference. The following section provides a general overview of the hypothesized mechanics of Therapeutic Touch.

Research on the effects of Therapeutic Touch on non-human subjects is critiqued in the next section of the literature review. The sections thereafter contain discussions of research involving Therapeutic Touch and

human subjects. Studies on Therapeutic Touch and blood hemoglobin levels, electroencephalographic, electromyographic, and electro-oculographic (EOG) measures, anxiety, stress, and pain are examined in these subsequent sections.

The Use of Therapeutic Touch by Occupational Therapists

In Chapter One it was suggested that all fields of science are presently shifting away from a mechanistic view of reality to espouse the monistic paradigm underlying General Systems Theory. Systems may be defined as "a set of parts coordinated to accomplish a set of goals" (Churchman, 1979, p. 29). General Systems Theory is organized around a view of the world as a hierarchical set of systems. All of these systems are interdependent. World systems cannot be understood individually until their relationships with each other and with the overall purpose of the whole they compose are considered.

The interdependency of systems occurs because all systems are felt to be open. Openness denotes a mutual exchange of influence between systems and their environment. Systems theory proposes man is best understood as an open system. Human beings exchange

information with their environment and act not only to survive but also because of intrinsically and extrinsically imposed goals and purposes.

Within a systems frame of reference man is delineated as a composition of subsystems. However, the purpose in life of every human being causes him to be more than just a sum of his parts. Occupational therapy may be described as a profession dedicated to assisting individuals realize their purpose despite the presence of physical or psychic disabilities. This realization of purpose can be equated with occupational performance. The concept of occupational performance is considered by many to be the "generic foundation" (American Occupational Therapy Association, in Pedretti, 1990, p. 2) upon which the practice of occupational therapy is based.

Occupational performance has been defined as "the individual's ability to accomplish the tasks required by his or her role and related to his or her developmental stage" (Di Joseph, in Pedretti, 1990, p. 1). Individuals have more than one role, examples of which are the student, sibling, friend, volunteer worker, and employee roles.

Within the formal Occupational Performance Frame of Reference role accomplishment involves the execution of performance skills (Pedretti, 1990). These skills are

self-care, work, education, and play and leisure time activities. Performance of all of these skills requires a variety of functions or "performance components" (Pedretti, 1990, p. 1). The performance components have been described to include sensory-integrative, motor, social, psychological, and cognitive functioning.

All components, skills, and roles directly or indirectly affect one another. Deficits in one or more performance components will negatively affect skills and thereby role performance. According to the Occupational Performance Frame of Reference, occupational therapists should be concerned with remediation of any such deficits but always with a view towards the larger goal of enhancing independent role performance.

This requirement that the purpose of the whole not be lost during work with the parts is what ultimately justifies the designation of Occupational Performance as a frame of reference consistent with General Systems Theory. The compatibility of these two theory bases is further supported by the recognition that role performance seems synonymous with purpose actualization. It is equally as important to note that the relation of performance skills to performance components is an example of a hierarchically organized set of systems.

The use of Therapeutic Touch may be justified by occupational therapists through the Occupational Performance Frame of Reference in that it is a holistic treatment technique that dynamically illustrates systems theory. An energy exchange is purported to take place between the client, practitioner, surrounding environment, and universe (Krieger, 1979).

The modality of Therapeutic Touch may be classified within the Occupational Performance Frame of Reference as an "adjunctive method" (Pedretti, 1990, p. 3). Adjunctive methods prepare the client for the performance of purposeful activities which are in turn the primary remedial tools of occupational therapists (Pedretti, 1990).

The Hypothesized Mechanics of Therapeutic Touch

Therapeutic Touch may be defined as the "art of interpersonal energy transfer for the purpose of healing" (Clark & Clark, 1984, p. 37). It is believed that illness is partially due to an internal imbalance of life energy (Krieger, 1979). Those who administer Therapeutic Touch are believed to achieve a meditative state that allows him or her to channel healing energy from the universe to the sick person (Krieger, 1979). The person who is unwell is

then able to rebalance his or her internal energy and begin a self-healing process. The energy is transferred through the hands of the practitioner to the personal energy field of the client. This energy field is purported to extend several inches above the client's body (Krieger, 1979). The channeling of energy is achieved intentionally by the healer. The rebalancing of internal energy and the self-healing process occur more or less unconsciously in the client.

The concept of life energy has been in existence for thousands of years. In India it was known as Prana, in China as Chi, and Japan as Ki (Krieger, 1979). It is now believed that this life energy may be related to the electrical charge that exists in the human body (McCormack, 1987). The transfer of electromagnetic energy between giver and receiver may in actuality be an exchange of positive and negative ions (McCormack, 1987). Research on Therapeutic Touch has focused primarily on whether or not it is effective. Statements on how or why this mode of intervention is effective are purely conjectural at this point in time.

Therapeutic Touch and Non-Human Subjects

The technique of Therapeutic Touch dates back to at least 3,000 B.C. (Grad, 1975). Subsequent to 250 A.D. though, "theological proscriptions" (Grad, 1965, p. 95) and later inconsistency with "accepted scientific methodology" (Krieger, 1976, p. 121) caused a substantial decline in its use. Therapeutic Touch first began to regain validity during the 1960's. The revival of scientific interest was due to some extremely well controlled studies conducted by Bernard Grad (1961, 1963). Grad (1961) believed that any study on Therapeutic Touch was in danger of bias due to the placebo effect. Therefore, he chose to conduct his studies using animals and plants for subjects so as to eliminate this potential for bias.

In Grad's first study (1961) 300 mice were superficially wounded on the back. After systematic measurement of the wounds each of the mice received random assignment to one of three groups. These groups consisted of one experimental group and two control groups. The experimental group was treated by a renowned healer, Oskar Estebany (Krieger, 1976). The experimental group received Therapeutic Touch as the treatment. One control group was treated with Therapeutic Touch by medical students who had

no prior training in this modality. The other control group received no treatment, but was transferred to treatment rooms in the same manner as the other two groups. This was done to control for the effects of being moved about in cages.

This study was double-blind in that all the mice were concealed in paper bags. In each treatment group half of the mice were in open paper bags and half were in closed paper bags. This was done to vary environmental conditions. Treatment was administered for the 20 days following the wounding.

Wound measurement began on the sixth day after wounding and was continued every second day for the duration of the treatment period. An analysis of variance was used to assess wound size differences. The significance level adopted was .05. On days 15 and 16 the experimental group in the open-bag condition exhibited wound sizes significantly smaller than those in the other conditions and groups. The differences in wound sizes between all groups were not significant at the conclusion of the experiment. Grad (1961) pooled the means of the open-bag and closed-bag conditions in the individual groups and plotted them on a graph representing treatment days 12 through 20. The experimental group consistently showed a

faster rate of healing than the other two groups. However, on days where the differences were not significant this may have been due to chance.

Perhaps more convincing than the results of his study with mice were the results of a study performed by Grad (1963) on plants. Pilot studies had revealed that Therapeutic Touch was most effective on plants that were "under some degree of inhibition" (Grad, 1975, p. 109). Therefore, for this experiment barley seeds were watered once at the beginning of the study with a one percent saline solution. The pilot studies also demonstrated that it was enough to have a healer pre-treat the water which would be administered to the experimental plants as opposed to having the healer treat the plants directly. Thus, the experiment was double-blind in that the healer, once again Oskar Estebany, did not know which seeds would receive water treated by him and which seeds would receive untreated tap water.

The experiment ran for 13 days. The dependent variables measured were the "number of plants per pot" "the mean height of plants per pot" and "the yield per pot, which was obtained from the total of all the heights of each plant in a given pot" (Grad, 1965, p. 110).

A t-test was used to analyze the data. The number of plants per pot was significantly greater in the experimental group only on one day. However, on days 8, 9, 11, 12 and 13 the experimental group was significantly higher and "yielded significantly more plant material" (Grad, 1965, p. 111) than the control group.

In a second experiment conducted on barley seeds, Grad's (1963) objective was to determine whether differences would emerge between two untreated control groups initially inhibited by the one percent saline solution. Conditions of the first plant experiment were replicated except that water treated with Therapeutic Touch was not administered. No statistically significant differences between the two groups for the aforementioned dependent variables were found in this experiment.

In a series of four experiments Grad (1964) attempted to replicate his first experiment with barley seeds (1963). However, water was treated with Therapeutic Touch in these experiments in a stoppered bottle. Water in the first plant experiment had been treated in an open container. The stoppered bottle was introduced to prevent contamination of the water by environmental agents. Since it is the belief of the proponents of Therapeutic Touch that it is the transfer of energy that produces the healing

effect Grad (1964) felt this same energy would have no difficulty crossing a glass barrier.

The results of these studies were less stable than those of the first plant experiment. Only occasionally were there significant differences between the experimental and control groups in plant number, mean plant height, and yield of plants. Graphed data revealed consistent differences in height and yield in favor of the experimental group for the duration of all four studies. These differences however, may have once again been due to chance.

The results of Grad's (1964) experiments were the impetus for a study by Smith (1972) on the effects of Therapeutic Touch on enzyme activity. Smith believed that since biochemical evidence suggested that specific enzyme activities are involved in cellular metabolism, illness may be due to a dysfunction in enzyme activity. Therefore, she reasoned that the healing effects of Therapeutic Touch should be profound at the enzymatic level.

In Smith's (1972) experiment, the activity of the enzyme trypsin was observed. Four solutions of this enzyme were used, two experimental and two controls. The experimental solutions were both treated by the same healer used in Grad's (1964) studies, Oskar Estebany. However,

one of the experimental solutions was exposed to ultra-violet light to induce a sick state before being treated by the healer. Nothing was done to one of the control solutions while the other was exposed to a high magnetic field. All treatments and exposures occurred once at the onset of the experiment. Observations of enzyme activity were made for five days.

Smith (1972) reported a similarity between the activity of both treated solutions to that exposed to the magnetic field. Smith did not account for the possible effects of the heat produced by the hands of the healer. Graphs were used to report means and standard deviations of the solutions' activity levels. Unfortunately, Smith used no statistical tests to determine the significance of her findings. Therefore, it is uncertain whether or not her results were simply due to chance.

Therapeutic Touch and Human Subjects

Blood Hemoglobin Levels

The first experiments on Therapeutic Touch using human beings as subjects were conducted by Krieger (1972, 1976), a registered nurse and professor at New York University. Her initial full scale experiment which was performed in

1972 following a promising pilot study was widely criticized and later admitted by Krieger to be methodologically flawed due to non-control of intervening variables (1975) and non-rigorous field measurements of the dependent variable (1976). Because of these methodological flaws the findings from the 1972 study may not be considered particularly valid. Therefore, Krieger's most definitive work is reported in a study executed in 1973 but formally published in 1976. In this experiment Krieger attempted to replicate the 1972 study but with the employment of sounder methodology.

The dependent variable Krieger chose to measure in both the 1972 and 1976 experiments was blood hemoglobin level. Krieger hypothesized that blood hemoglobin levels would increase following the administration of Therapeutic Touch. There has been some criticism of Krieger's rationale for the use of hemoglobin as a dependent variable. Krieger asserted that Grad in his plant experiments (1963, 1964) had found that the barley seeds which were treated with Therapeutic Touch yielded sprouts with "a greater net weight and significantly more chlorophyll content than the control group" (Krieger, 1976, p. 122). Krieger reasoned that hemoglobin was the agent that should be observed in human beings since it is

structurally similar or a homologue to chlorophyll.

It is difficult to ascertain how Krieger determined that increased chlorophyll content was found in Grad's (1963, 1974) experiments. Grad does not mention measuring for chlorophyll content. Grad did, however, report a greater yield of plants in the experimental groups. A larger amount of plant material could be considered to coincide with higher levels of chlorophyll (Clark & Clark, 1984). However, since specific measurements were not taken it cannot be assumed that there were significant differences between the groups in chlorophyll levels (Clark & Clark, 1984).

Krieger also based her choice of hemoglobin for the test object on Smith's (1972) findings. Hemoglobin biosynthesis and function is crucial to several enzymes (Krieger, 1976). Krieger (1976) stated that Smith's work suggested that enzymes were responsive to Therapeutic Touch. However, since Smith reported no tests for statistical significance Krieger's assumptions based on Smith's work may be questioned (Clark & Clark, 1984).

Krieger (1976) also asserts that the healing energy transferred during Therapeutic Touch may be associated with oxygen. Therefore, she proposed that another reason for using hemoglobin as a dependent variable was that it "is

one of the body's most sensitive indicators of oxygen uptake" (Krieger, 1976, p. 123). Clark and Clark (1984) pointed out that according to Selkurt (cited in Clark & Clark, 1984) hemoglobin is not "a measure of oxygen uptake, but a measure of oxygen capacity. . . . An appropriate measure of oxygen uptake is oxygen saturation of the blood" (p. 39).

This may be more quibbling with words than the discovery of a profound flaw in Krieger's reasoning. It is true that a measure of hemoglobin is not a direct measure of oxygen uptake. Nevertheless, oxygen saturation of hemoglobin in normal arterial blood is 97% (Guyton, 1982). If there is increased hemoglobin in blood there is probably increased oxygen saturation.

In Krieger's second experiment (1976), there were 46 subjects in the experimental group and 29 subjects in the control group. Krieger does not disclose the group assignment method.

Pretest hemoglobin values were measured for both groups. To measure hemoglobin, a reliable instrument was used (Gambino, cited in Krieger, 1976). However, the technicians taking the measurements were apparently aware which subjects were members of which group so the study was not blind.

A Fisher's t-test was used to determine if the pretest hemoglobin value means of the two groups were comparable. This test was also used to analyze the mean age of both groups. A chi-square was calculated on the proportion of sexes in the groups. No significant differences were found between the two groups on any of these variables. Nevertheless, random assignment of the subjects to the groups would have strengthened the methodology for ensuring intergroup similarity (Clark & Clark, 1984).

The experimental group was subjected to Therapeutic Touch administered by Oskar Estebany, the same healer used in Grad's (1961, 1963, 1964) and Smith's (1972) studies. The control group did not receive any form of treatment. Therefore, the placebo effect's influence on the experimental group was uncontrolled. Also, there was no formal control for subjects who practiced meditation of Yoga. Such practices could affect blood hemoglobin levels (Krieger, 1976). Chi-squares were used for analysis of these variables and no significant differences between the groups emerged.

Posttest measures of hemoglobin values were taken for both groups. The experimental group's posttest measures exceeded pretest levels with a significant difference beyond .001. The difference between control group pretest

and posttest hemoglobin values was not significant at the .001 level. However, closer analysis of the data revealed that the control group achieved a difference between pretest and posttest measures that was significant at less than .05 (Hurt, 1976). Krieger has thus been criticized for using inappropriate statistics (Hurt, 1976). A more accurate interpretation of her data could have been accomplished if she had used a repeated measures analysis of variance instead of multiple t-tests (Hurt, 1976).

Until 1975, research on Therapeutic Touch focused on the efficacy of people well-practiced in the healing technique. Krieger (1975) however, believed that the capacity to heal by the laying on of hands was inherent in all motivated, physically healthy human beings. Therefore, she conducted a study in 1975 using registered nurses who were taught by Krieger how to administer Therapeutic Touch.

Over 75 registered nurses volunteered for the study, however, only 32 "qualified for inclusion" (Krieger, 1975, p. 786). Krieger does not report the criteria for qualification.

Sixteen nurses were assigned to an experimental group and sixteen to a control group. Krieger makes no mention of how the nurses received their group assignment. The

nurses in the experimental group administered Therapeutic Touch to two hospital patients each. The nurses in the control group applied the touch required in simple nursing procedures to two patients each. Randomization was not employed in the process of choosing hospital patients for the study. Apparently, the choice was left to the nurses' discretion.

Pretest and posttest measures of the patients' hemoglobin values were taken. There was no control for medication or meditational practices that could effect hemoglobin levels. As in the 1976 study, statistical analysis was used to determine whether the two groups of patients were comparable in pretest mean hemoglobin levels, and proportion of age and sex. No significant differences were found between the two groups for any of these variables.

The difference between pretest and posttest mean hemoglobin levels for experimental group patients was significant at the .001 level. Krieger (1975) reported that there was no significant difference in control group pretest and posttest measures at this level. However, Krieger did not disclose the numerical values of any hemoglobin value measurements. It is possible that there was a change in the control group's mean hemoglobin values

that was significant at .05 and that once again inappropriate statistics were used.

Electroencephalographic, Electromyographic and
Electro-Occulographic Records

Krieger, Peper, and Ancoli reported a study in 1979 that was conducted to determine the physiological mechanisms underlying Therapeutic Touch. In this study electroencephalographic (EEG), electromyographic (EMG), and electro-occulographic (EOG) measures were taken from Krieger before, during, and after she administered Therapeutic Touch to two different patients. It was found that recordings of Krieger's EEG demonstrated consistently high, fast beta wave activity regardless of EMG levels. Krieger's EOG readings revealed that throughout the procedure her eyes were slightly open but there were no ocular movements. The investigators concluded from their data that Krieger achieved a state of deep concentration before, during, and after the administration of Therapeutic Touch.

In addition to EEG, EMG, and EOG records, measures of the two patient's temperatures and heartrates before, during, and after they received Therapeutic Touch were

taken. No significant changes were found throughout the experiment for any of these measures. Apparently the patients were in a highly relaxed state throughout the study as evidenced by an "abundance of large-amplitude alpha activity in both the eyes-open and eyes-closed states" (Krieger, Peper, & Ancoli, 1979, p. 661).

Unfortunately, none of the numerical values of measures taken during this study were reported. The credibility of this study was thereby limited.

Anxiety

In addition to its effects on wound healing (Grad, 1961), plant growth (Grad, 1963, 1964), enzyme activity (Smith, 1972), hemoglobin levels (Krieger, 1972, 1974, 1976), and physiological states (Krieger, Peper, & Ancoli, 1979), Therapeutic Touch has been studied for its effects on anxiety (Heidt, 1981). Heidt (1981) stated that the anxiety that often accompanies hospitalization interferes with rest necessary to facilitate healing. Heidt proposed that the relaxation response induced by Therapeutic Touch, as demonstrated by Krieger, Peper, and Ancoli's (1979) research, would lessen anxiety.

Ninety volunteer subjects were used in this study.

All were patients from a cardiovascular unit at a general hospital. The subjects were divided into three groups. The first group received Therapeutic Touch. The second group received the casual touch inherent in such activities as pulse taking. The third group received no form of touch. All forms of intervention were administered by the investigator, a registered nurse who had received training in Therapeutic Touch from Krieger. To measure anxiety The Self-Evaluation Questionnaire, STAI form x-1 by Spielberger, Gorsuch and Lushene (Heidt, 1988) was administered both before and after all interventions. Subject assignment to intervention groups was based on matching scores from the first administration of the questionnaire.

Appropriate use of statistics demonstrated that the difference between pretest and posttest means for the Therapeutic Touch group were highly significant at less than .001. An analysis of covariance revealed that this group's post treatment scores on anxiety were significantly lower than the post treatment scores of both the casual touch group and the no touch group.

Criticisms of this experiment were that no physiological index for change in anxiety was used and that control for the placebo effect was not included (Clark &

Clark, 1984). Certainly physiological demonstration of relaxation would have strengthened Heidt's claim that anxiety levels were reduced in the group that received Therapeutic Touch. Nevertheless, Heidt disclosed a substantial amount of information supporting the validity of the instrument used to measure anxiety. Had a placebo administration of Therapeutic Touch been included and its effect thereby controlled, this experiment could have been highly supportive of the efficacy of Therapeutic Touch.

A replication of Heidt's study conducted by Quinn (1982) introduced a control for the placebo effect for the first time in research exploring the effects of Therapeutic Touch on human subjects. As did Heidt, Quinn used cardiovascular patients as subjects. Quinn also used the same instrument as Heidt to measure pretest and posttest anxiety.

Quinn used only one control group and this group received a simulated version of Therapeutic Touch. For this control group the movements involved in Therapeutic Touch were performed but the meditative state hypothesized to be necessary for the energy transfer was not used. Instead, the practitioner mimicked the physical movements of Therapeutic Touch but mentally concentrated on

subtracting from 100 by sevens.

Another difference in Quinn's study from Heidt's experiment was that in Quinn's study no physical contact between healer and patient occurred in either the experimental or control group. Quinn reasoned that physical contact was not necessary during the administration of Therapeutic Touch because the human energy field is purported to extend beyond the body.

The results of this study were that the experimental group achieved a decrease in posttest to pretest scores of anxiety that was significantly greater at the .0005 level than that achieved by the control group. This study appears to rule out the placebo effect as a major contributor to the efficacy of Therapeutic Touch and to demonstrate that physical touch is not necessary for successful administration of this procedure.

A third study examining the effects of Therapeutic Touch on anxiety was conducted by Parkes in 1985 (Quinn, 1988). For her doctoral dissertation, Parkes investigated whether Therapeutic Touch would reduce anxiety in elderly, hospitalized patients.

A total of 60 subjects participated. All were between the ages of 65 and 93. Each subject was assigned to one of three treatment groups. One group received therapeutic

touch. Another group was given a placebo treatment identical to that used in the Quinn (1982) study. A third group received another form of sham treatment. In this new type of mock treatment the practitioner kept her hands closed and over the patient's shoulder area as opposed to hands open and over the solar plexus.

As did Heidt (1981) and Quinn (1982), Parkes (1985) used The A-State Self-Evaluation Questionnaire (Heidt, 1988) to measure anxiety. Subjects first filled out the questionnaire. They then received one of the three, above-described interventions. After the intervention the subjects again answered the questionnaire. An analysis of variance did not reveal any significant differences between the three groups following treatment.

Parkes (1985) suggested that the lack of experience by the Therapeutic Touch practitioner may have contributed to the lack of significant results. At the time of the experiment the practitioner had two years of experience in administering Therapeutic Touch. This level of experience appears to be less than that of many practitioners who participated in previous studies (Quinn, 1988).

Stress

A study that does not support the efficacy of Therapeutic Touch was conducted by Randolph (1984). This experiment involved the measurement of physiological reactions of two groups during exposure to stressful stimuli. An experimental group received Therapeutic Touch from registered nurses well trained and practiced in the procedure. A control group received a simulated version of Therapeutic Touch. Both groups received their intervention while watching a movie on circumcision rites practiced by an Aboriginal Australian tribe.

Measurements of all subjects' skin conductance levels, muscle tension, and skin temperatures were taken before and during the film. The experiment was double-blind in that neither subjects nor data collectors knew who belonged to which group.

No significant changes in any of the physiological responses were found between the two groups. Randolph (1984) proposed that at least three factors could have caused the non-significant results. The first is that formal administration of Therapeutic Touch involves a period of assessment where the hands are passed over the length of the subject's body (Krieger, 1979). This

procedure may contribute to the therapeutic effect and was eliminated from the study.

The second factor suggested by Randolph (1984) that could have contributed to the non-significant findings may have been the subjects' state of health. Grad (1965) found in pilot studies that statistically significant results were more easily obtained when subjects were ill. Subjects in Randolph's study were healthy.

The third factor that may have affected the results of this study was that the subjects' focus of attention in this investigation was directed away from the practitioner of Therapeutic Touch and towards an outside stimulus. The practice of Therapeutic Touch normally requires the subject's focus to be directed toward the practitioner.

Another study on the effects of Therapeutic Touch on stress was performed by Fedoruk in 1984 (Quinn, 1988). The subject group was composed of 17 premature neonates. Thirteen of the neonates breathed room air, three were ventilator dependent and one received continuous positive airway pressure.

Three treatment conditions were used. One form of treatment was Therapeutic Touch. The second type consisted of a mimicry of the movements involved in Therapeutic Touch. However, instead of attempting a transfer of

healing energy, the practitioner concentrated on subtracting out loud by sevens or fives from a number previously given to her. The third treatment condition was no treatment. All three interventions were given to each infant twice. Before each intervention was given to an individual infant the vital signs were taken by a nurse. This taking of the vital signs, a procedure common in the daily routine of these infants, was included as a stress producing stimulus.

Stress was measured in two ways, infant state and transcutaneous oxygen blood gas pressure (TcP02). The Assessment of Premature Infant Behaviour Scale (APIB) by Als, Lester, Tronick and Brazelton (Quinn, 1988) was used to measure infant state. This instrument was designed for premature infants able to survive on room air (Quinn, 1988). Infant state was measured before and ten minutes after each intervention. At 30 second intervals during the entire course of observation TcP02 was monitored.

A repeated measures analysis of variance was used to determine whether the types of interventions affected infants differently. Significant differences at the .05 level in the posttest scores of the APIB were reported by the investigator to exist between the three intervention groups. It was also noted by Fedoruk (1984) that infants

receiving the sham method of Therapeutic Touch experienced increased arousal. There were no interactions found between treatment type and Tcp02.

Fedoruk (1984) stated that her results support one of her initial hypotheses. She had hypothesized that the infants who received Therapeutic Touch would experience greater change from an aroused state to a more relaxed state than infants receiving the other two types of treatment. However, Quinn (1988) stated that from the data made available it is impossible to determine whether it is the reported increase in arousal of the infants who received the mock treatment or the reduced arousal of the infants treated with Therapeutic Touch that caused the significant differences in infant state scores.

Quinn (1988) questioned whether the mock Therapeutic Touch treatment used by Fedoruk (1984) was a true control. The treatment times of the Therapeutic Touch and the mock Therapeutic Touch interventions were unequal. Vocalizations also were present in the mock Therapeutic Touch but not used in the authentic intervention.

Quinn (1988) also doubted the appropriateness of testing for stress reduction reactions in neonates. She pointed out that to become aroused by environmental stressors is a normal, healthy response. Quinn indicated

that Therapeutic Touch might not be expected to suppress such a response.

It should be added that the subject sample used in this study was not homogeneous. Three of the premature infants were ventilator dependent and one on continuous airway pressure indicating perhaps a level of physiological instability and immaturity that would contribute to a highly irritable state. The instrument used to measure infant state was also perhaps inappropriate since it was designed for infants able to survive on room air.

Pain

The first study examining the effects of Therapeutic Touch on pain was conducted by Connell-Meehan (1985) for a doctoral dissertation (Quinn, 1988). She sought to discover whether Therapeutic Touch would mitigate the experience of acute pain in post-operative patients.

One hundred and eight post-operative patients received one of three randomly assigned treatments. These treatments were Therapeutic Touch, a sham version of Therapeutic Touch, and a standard treatment for pain reduction. For the mock Therapeutic Touch treatment the same physical movements used in Therapeutic Touch were

performed. However, instead of focusing on the patient with the attempt to help or heal the practitioner concentrated on mentally subtracting from 100 by sevens. The standard treatment was the provision of physician ordered intramuscular injections of pain reducing narcotics. Subjects before and after treatment filled out a Visual Analogue Scale and a Pain Intensity Descriptor Form (Quinn, 1988).

Multiple regression analysis and a subsequent comparison of means were used to analyze the data. No significant differences were found between the Therapeutic Touch and mock Therapeutic Touch groups. The standard treatment group was found to experience a reduction in pain significantly greater than that of the other two groups.

Meehan has suggested that if a less conservative test of statistical significance were used the pain reduction of the Therapeutic Touch group might well have been significantly greater than that of the placebo treatment group (Quinn, 1988). The mean effectiveness scores of these two groups revealed that the Therapeutic Touch group had lower scores on the pain scale than the mock Therapeutic Touch group. In addition, Meehan proposed that her treatment time of five minutes was perhaps much too short. Quinn (1988) stated that clinical practitioners

usually provide at least 15 minutes of Therapeutic Touch for pain relief. Quinn (1988) asserts "It is more than reasonable to assume that a longer treatment could have a greater effect" (p. 43).

The most recent study conducted on Therapeutic Touch examined the effect of this procedure on tension headache pain (Keller & Bzdek, 1986). The 60 subjects used in this study were volunteers. All had tension headaches that were diagnosed with a standardized protocol and a brief physical examination. None of the subjects took headache medication for at least four hours before participation in the study.

Subjects were randomly assigned to one of two groups. An experimental group received Therapeutic Touch. A control group received a sham version of this intervention. The practitioner in the control group performed the physical motions of Therapeutic Touch but concentrated on subtracting from 100 by sevens instead of directing healing energy toward the subject. Thus, the study incorporated control for the placebo effect. Subjects did not know to which group they were assigned. Both forms of intervention were administered by the researchers.

Uncontrolled were the subjects' meditational practices. Such practices could have an effect on

headache pain. Calculation of a Spearman correlation coefficient revealed that such a practice did not have an effect on the results. However, control of this variable would have been more effective in ensuring internal validity.

Headache pain was measured by three scales from the McGill-Melzack Pain Questionnaire which is a widely used, reliable instrument (Graham, Bond, Gerkovich, & Cook, cited in Keller & Bzdek, 1986). The questionnaire was filled out before and after the intervention and again four hours later. The investigators used the telephone to obtain the results from the participants and this could have introduced some bias into this study.

The results of this study were that the experimental group experienced a reduction of tension headache pain lasting for a four hour period that was significant at the .005 level. The experimental group's reduction in pain immediately following the intervention was significantly greater at the .005 level than that achieved by the control group. The difference in pain reduction between the two groups after four hours was significant at the .01 level but only after subjects who took pain medication during this period were eliminated from the data set. Fifteen subjects from the control group and five subjects from the

experimental group reported taking such medication.

Conclusion

Much of the research that has been conducted on Therapeutic Touch has had some methodological weakness. It may be premature to draw conclusions regarding the efficacy of this modality. Thus far, this procedure has received most attention from the nursing profession. However, the positive results demonstrated in the well designed studies concentrating on anxiety reduction (Heidt, 1981; Quinn, 1982) and pain relief (Keller & Bzdek, 1986) warrant more attention from occupational therapists and other allied health professionals.

CHAPTER THREE

DESIGN AND METHODOLOGY

Research Design

This study was pre-experimental in that it included manipulation and control, but lacked true randomization. The design was a 2 x 2 x 3 mixed factorial design. The factors were scores by male versus female subjects times experimental versus control group scores times treatment period one versus treatment period two versus treatment period three scores.

Setting

The study took place in the Central Classroom Building Room 209 at San Jose State University, San Jose, California. The room was darkened. A padded treatment table was provided on which individual subjects could lie in the supine position while being treated. The electromyographic biofeedback instrument with data

accumulator were placed on a table located near the head of the subject. Only subject participants and the two investigators were present in the room. There was no speaking during the interventions. However, sounds generated from outside the treatment room could not be eliminated.

Sample

The subjects were volunteers who were either faculty or students at San Jose State University. The subjects had no known muscular or neurological deficits. A total of 38 subjects participated in this study. Nine of the subjects were male and 29 were female. Subjects ranged in age from 19 to 46 years. The mean age of subjects was 27.2 years while the median was 23.5.

Procedure

Subjects were randomly assigned to an experimental group or a control group according to a table of random numbers. They were asked to read a description of the experiment and then sign a consent form. In both groups individual subjects were asked to lie supine on an

examination table. The room was darkened. The subject was then instructed to close his or her eyes and breathe normally.

The subjects in the experimental group received Therapeutic Touch from a San Jose State University faculty member who is experienced in the technique. The practitioner was also one of the two investigators conducting this study. That same investigator administered a sham version of Therapeutic Touch to members of the control group. Subjects were blind to which version of the intervention that they received.

The administration of Therapeutic Touch requires that the practitioner engage in a meditative process called "centering" (Krieger, 1979, p. 9) in order to clear the mind. The practitioner first performed this centering process and then proceeded to provide a subject with the Therapeutic Touch or the sham version. For the Therapeutic Touch intervention, the practitioner held his hands four to eight inches above the subject and moved them the entire length of the subject's body from head to foot. This was done to assess the subject's energy field to determine in which parts of the subject's body there might be constricted energy flow. The practitioner then mentally focused on helping or healing the subject while placing one

hand six to twelve inches above the subject's forehead and the other, the same distance from the subject's solar plexus. The practitioner's left hand was held over the subject's forehead and the right over the solar plexus.

The same movements were performed for the subjects of the control group but instead of concentrating on centering, helping, and healing, the practitioner focused on silently counting backward from 100.

The procedure for both groups involved four minutes of simply lying supine and breathing normally to establish as baseline, three minutes of intervention, and three minutes of again lying quietly and breathing normally. Thus, the entire experimental procedure totaled 10 minutes per subject, excluding the time necessary to connect the biofeedback leads to subjects and to the data collection device.

Instrumentation

A Cyborg (P303) electromyographic (EMG) biofeedback instrument with a data accumulator (Q 700) was used to monitor muscle activity in both groups. The target muscle was the frontalis muscle which is located in the forehead. This muscle was chosen not only because it is accessible

but because the tone of the frontalis muscle is considered indicative of general body relaxation (Wolf, 1979). Thermographic studies show it is also very responsive to states of emotions (Zajonic, 1986).

Procedure for Data Collection

A digital display provided quantitative data for both groups at 30 second intervals throughout the 10 minute experimental procedure. The second investigator collected the data. This investigator was not informed which subjects were members of the experimental group and which subjects were members of the control group.

Statistical Techniques

The data were composed of measures in millivolts (one millionth of a volt) of electrical activity in the frontalis muscle of each subject. These measures were obtained from the data accumulator of the EMG biofeedback instrument and were recorded at 30 second intervals throughout the 10 minute experimental procedure. A total of 20 measures were recorded for each subject. Because of the unequal number of 30 second intervals in the treatment

periods only the median EMG score from each period was used. Thus, three median EMG scores were obtained per subject for analysis. The median was chosen over the mean because it is not affected by skewness of extreme scores.

The design was a 2 x 2 x 3 mixed factorial repeated measures design (male versus female between subjects variance x experimental versus control group between subjects variance x period one versus period two versus period three within subjects variance). Hierarchical regression analysis was performed instead of an analysis of variance because of the unequal number of male, female, experimental, and control group subjects. Regression statistically corrects for the bias which could be created by unequal cell size. Regression analysis also yields the same F value as analysis of variance.

Specific means comparisons were performed to determine the direction in which significant differences occurred when main effects were found. The statistics were performed with a standard computer program package, Statistical Packages for Social and Behavioral Sciences.

Both between subjects and within subjects variance were analyzed. Between subjects variance was analyzed to determine whether any of the results obtained from the within subjects analysis were due to differences already

existing between the subjects. For the between subjects analysis, subject average median EMG scores were compared. These were obtained by first adding the three median EMG scores of each individual. The sum was then divided by the number of treatment periods (three) so that an average measure for the dependent variable of muscle tone was achieved for each subject. (See Table 1)

For the analysis of within subjects variance treatment period, average median EMG scores were compared. For each treatment period the median EMG scores of all subjects were totalled and then divided by the number of subjects in the group being considered. Thus, mean EMG scores were obtained for each of the three treatment periods. (See Table 2)

Table 1

Subject Average Median EMG Scores

T = Therapeutic Touch

S = Sham Treatment

M = Male

F = Female

Scores = Millivolts

Subject	Gender	Treatment Type	Average Median EMG Score
01	M	T	1.78
02	F	T	5.57
03	M	S	1.63
04	M	T	2.05
05	F	S	2.92
06	F	S	1.55
07	F	T	2.95
08	M	T	4.75
09	F	T	8.30
10	F	S	1.65
11	F	S	1.97
12	M	S	2.82
13	F	S	5.82
14	M	S	4.10
15	M	T	2.73
16	F	T	2.07
17	F	S	2.85
18	F	T	1.55
19	F	S	2.93
20	F	T	3.43
21	F	S	2.58
22	F	T	4.30
23	F	T	3.18
24	F	S	2.18
25	F	T	9.60
26	F	S	2.97
27	F	T	8.15
28	F	S	4.93
29	M	T	11.08
30	F	T	7.78
31	F	T	6.88
32	F	S	1.35
33	F	T	6.08
34	F	S	1.43
35	F	S	4.10
36	F	T	4.03
37	M	T	7.88
38	F	T	2.30

Table 2

Treatment Period Average Median EMG Scores

M = Male
 F = Female
 T = Therapeutic Touch
 S = Sham Treatment
 Scores = Milivolts

Treatment Period	Subject	Gender	Treatment Type	Average Median EMG Score
1	01	M	T	2.15
1	02	F	T	5.20
1	03	M	S	2.05
1	04	M	T	2.25
1	05	F	S	2.85
1	06	F	S	1.70
1	07	F	T	3.75
1	08	M	T	5.40
1	09	F	T	11.65
1	10	F	S	1.55
1	11	F	S	2.20
1	12	M	S	2.35
1	13	F	S	7.90
1	14	M	S	4.20
1	15	M	T	2.30
1	16	F	T	2.00
1	17	F	S	3.20
1	18	F	T	1.50
1	19	F	S	2.60
1	20	F	T	3.80
1	21	F	S	2.45
1	22	F	T	4.20
1	23	F	T	2.90
1	24	F	S	2.15
1	25	F	T	10.30
1	26	F	S	2.80
1	27	F	T	11.05
1	28	F	S	3.35
1	29	M	T	19.20
1	30	F	T	9.50
1	31	F	T	7.20
1	32	F	S	1.30
1	33	F	T	6.50
1	34	F	S	1.50

Continued . . .

Table 2 Continued

Treatment Period Average Median EMG Scores

Treatment Period	Subject	Gender	Treatment Type	Average Median EMG Score
1	35	F	S	4.60
1	36	F	T	5.30
1	37	M	T	8.25
1	38	F	T	2.75
2	01	M	T	2.05
2	02	F	T	5.60
2	03	M	S	1.45
2	04	M	T	1.80
2	05	F	S	2.80
2	06	F	S	1.50
2	07	F	T	2.95
2	08	M	T	4.45
2	09	F	T	7.25
2	10	F	S	1.60
2	11	F	S	2.00
2	12	M	S	2.40
2	13	F	S	5.45
2	14	M	S	4.15
2	15	M	T	3.05
2	16	F	T	2.10
2	17	F	S	2.40
2	18	F	T	1.65
2	19	F	S	3.00
2	20	F	T	3.15
2	21	F	S	2.70
2	22	F	T	4.40
2	23	F	T	3.05
2	24	F	S	2.20
2	25	F	T	10.30
2	26	F	S	3.20
2	27	F	T	7.40
2	28	F	S	4.80
2	29	M	T	8.20
2	30	F	T	6.95
2	31	F	T	7.10
2	32	F	S	1.40
2	33	F	T	6.10
2	34	F	S	1.40
2	35	F	S	4.00
2	36	F	T	2.85
2	37	M	T	6.75

Continued . . .

Table 2 Continued

Treatment Period Average Median EMG Scores

Treatment Period	Subject	Gender	Treatment Type	Average Median EMG Score
2	38	F	T	2.30
3	01	F	T	1.15
3	02	F	T	5.90
3	03	M	S	1.40
3	04	M	T	2.10
3	05	F	S	3.10
3	06	F	S	1.45
3	07	F	T	2.15
3	08	M	T	4.40
3	09	F	T	6.00
3	10	F	S	1.80
3	11	F	S	1.70
3	12	M	S	2.20
3	13	F	S	4.10
3	14	M	S	3.90
3	15	M	T	2.85
3	16	F	T	2.10
3	17	F	S	2.95
3	18	F	T	1.50
3	19	F	S	2.93
3	20	F	T	3.35
3	21	F	S	2.60
3	22	F	T	4.30
3	23	F	T	3.60
3	24	F	S	2.20
3	25	F	T	9.10
3	26	F	S	2.90
3	27	F	T	6.00
3	28	F	S	6.65
3	29	M	T	5.85
3	30	F	T	6.90
3	31	F	T	6.35
3	32	F	S	1.35
3	33	F	T	5.65
3	34	F	S	1.40
3	35	F	S	3.70
3	36	F	T	3.95
3	37	M	T	8.65
3	38	F	T	1.85

n = 38

CHAPTER FOUR

ANALYSIS OF DATA

Sample Characteristics

A total of 38 subjects participated in this study. Nine of the subjects were male and 29 were female. Subjects' ages ranged in years from 19 to 46. The mean age of subjects was 27.2 years while the median age was 23.5. Twenty-one subjects received the Therapeutic Touch intervention and 17 received the sham treatment.

Research Questions and Findings

Between Subjects Variance

Question 1: Will there be significant differences in muscle tone between male and female subjects which could be attributed to changes found over the span of the intervention?

The F value for gender was not significant. (See Table 3)

Question 2: Will there be significant differences in muscle tone between subjects receiving the Therapeutic Touch treatment and subjects receiving placebo treatment which could be attributed to changes found over the span of the intervention period?

Muscle tone as represented by subject average median EMG scores differed significantly between subjects who received Therapeutic Touch and those who received the sham treatment, $F(1, 36) = 4.53, p < 0.05$. A specific means comparison was performed which revealed the Therapeutic Touch group mean of 5.02 milivolts was higher than the sham treatment group's mean of 2.73 milivolts. (See Table 3)

Question 3: Will there be a two way interaction between gender and type of treatment that yields significant differences in subjects' muscle tone which could be attributed to changes found over the span of the intervention period?

No interaction between gender and treatment type was found. The F value for the gender x treatment types was not significant. (See Table 3)

Table 3

Between Subjects Variance

Source of Variance	CUM R2	R2 Change	(df)	F
Gender	.002	.002	(1,36)	.08
Treatment Type	.206	.204	(1,36)	4.58*
Gender x Treatment Type	.206	.204	(3,34)	2.93

n = 38

*p<.05

R2 = .206, 1-R2 = .794, R = 1.36

Standard Error of the Estimate = 2.36

CUM R2 = Cumulative Regression Squared

R2 Change = Regression Squared Change

R = Regression

(df) = Degrees of Freedom

F = F statistic for Analysis of Variance

Within Subjects Variance

Question 4: Will the muscle tone of the entire group of subjects change significantly over the span of the intervention period?

Muscle tone, as represented by treatment period, average median EMG scores changed significantly over the treatment levels, $F(2, 220) = 16.17, p < .05$. The trend was toward a decrease in scores. The pre-treatment group mean of 4.63 milivolts was significantly higher than the average of total scores for the entire group, that average being 4.04 milivolts (see Appendix for table of means and standard deviations). The treatment period group mean and the post-treatment group mean, 3.72 and 3.92 milivolts respectively did not differ significantly from the average of total scores for the entire group. (See Table 4)

Question 5: Will males experience a significantly different change in muscle tone from females over the span of the intervention period?

An interaction between gender and treatment period was found that yielded significant differences in muscle tone as represented by treatment period average median EMG scores. Muscle tone of males and females changed differently over the intervention span, $F(2, 224) = 9.65,$

Table 4

Within Subjects Variance

Source of Variance	CUM R2	R2 Change	R	(df)	F
Treatment Periods	.002	.022	.116	(2,220)	16.17*
Between Subjects Variance	.19	.168			
Gender x Treatment Periods	.203	.013	.068	(2,224)	9.65*
Treatment Type x Intervention Periods	.207	.004	.016	(2,224)	2.27
Gender x Treatment Type x Treatment Periods	.208	.001	.011	(6,220)	.51

n = 38

*p<.05

R = .208, 1-R = .792, R = .123

Standard Error of Estimate = 2.59

CUM R2 = Cumulative Regression Squared

R2 Change = Regression Squared Change

R = Regression

(df) = Degrees of Freedom

F = F statistic for Analysis of Variance

Note: The F statistic in the within subjects analysis has been corrected to use only the within subjects error term in its denominator.

$p < .05$. (See Table 4)

Question 6: Will subjects receiving Therapeutic Touch experience changes in muscle tone over the span of intervention that are significantly different from the changes experienced by subjects receiving the placebo intervention?

An interaction between type of treatment and treatment levels was not found. The F value was not significant. (See Table 4)

Question 7: Will there be a three way interaction between gender type, treatment type, and span of intervention that yields significant differences in subjects' muscle tone?

The F value for gender-type, treatment type, and span of intervention was not significant. No three way interactions yielding significant differences in muscle tone as represented by intervention period average median EMG scores were found. (See Table 4)

Summary

In summary, hierarchical regression analysis of the data produced in this study revealed some significant differences in muscle tone manifested by the various group

cells. Of the between subjects variance portion of the analysis, the experimental treatment group's average median muscle tone score of 5.02 milivolts was significantly higher than the sham treatment group's score of 2.73. The average median muscle tone scored for males and females did not differ significantly in muscle tone nor was an interaction between gender and treatment type found.

The within subjects portion of the analysis showed a significant change in muscle tone for all subjects over the span of intervention regardless of treatment type. A specific means comparison revealed that the trend was toward a decrease in scores. However, only the pre-treatment period average median score of 4.63 milivolts was significantly different from the 4.04 milivolt average of total median scores of the entire group.

Muscle tone of males and females changed differently over the span of intervention. There were no significant differences in change of muscle tone over the span of intervention between the Therapeutic Touch treatment subjects and the sham treatment group subjects. A three way interaction between gender, treatment type, and treatment periods was also not found.

CHAPTER 5

RESULTS AND DISCUSSION WITH IMPLICATIONS FOR THE PROFESSION

This study was performed to determine whether the holistic modality of Therapeutic Touch significantly reduces muscle tone. The tone of the frontalis muscle of a total of 38 subjects was measured over 30 second intervals during three treatment periods using a Cyborg (P303) EMG biofeedback instrument. The subjects who participated in this study had no known muscular or neurological deficits. Each subject was randomly assigned to either a group that received Therapeutic Touch or a group that received a sham treatment. The latter form of treatment was included in order to rule out the placebo effect. An unequal number of males and females participated in this study. The two treatment groups also contained an unequal number of subjects. Therefore, hierarchical regression was used to analyze the data. Furthermore, specific means comparisons were performed where main effects were found. A comprehensive description of the statistical analysis was presented in Chapter 4.

This chapter includes the results of the study, a discussion, implications for the occupational therapy profession, and suggestions for further research.

Results

Between Subjects Variance

Between subjects variance was analyzed to determine whether there were any differences between subjects that contributed to the results obtained from the analysis of within subjects variance. Analysis of between subjects variance considers differences between groups. In this study there were two ways to divide people into groups. One method of group classification was gender. The other group category was type of treatment received.

In the statistical analysis first considered was whether or not the males and females who participated in this experiment differed significantly from one another in muscle tone regardless of what type of treatment they received and regardless of what changes they manifested from one treatment period to the next. The males and females were not found to differ significantly in their average median EMG scores.

Whether or not the muscle tone of subjects who received Therapeutic Touch differed significantly from the subjects who received the sham treatment was next studied. Gender and changes over time were excluded from this part of the analysis. The Therapeutic Touch group and sham group subjects were found to differ significantly in muscle tone. Comparison of the two groups' average median EMG scores revealed that the Therapeutic Touch group subjects had significantly higher muscle tone than those subjects who received the sham treatment. That this was so throughout all the treatment periods was revealed by the within subjects variance portion of the statistical analysis and will be discussed in more detail under that heading in this chapter.

Finally, both group categorizations were examined in combination. Whether or not being male and a member of either the experimental or the control group resulted in significantly different muscle tone from being a female in either the experimental or control group was investigated. No significant differences in muscle tone were found between the four possible group designations.

Within Subjects Variance

The within subjects portion of the statistical analysis considered changes that occurred between the three treatment conditions, these being the pre-treatment, treatment, and post-treatment levels. Between subjects variance in its entirety was contained in the statistical equation determining within subjects variance. It was included only as a source of variance and does not require further discussion.

Whether or not all subjects, regardless of gender or treatment type received, experienced significant changes in muscle tone over the levels of treatment was first analyzed. All subjects were found to experience a significant decrease in muscle tone between the pre-treatment period and the treatment period. The difference experienced between the treatment and post-treatment periods by the group as a whole was not significant.

Males were found to experience changes over the levels of treatment that were significantly different from females. However, the changes manifested by subjects who received Therapeutic Touch were not significantly different from those who received the sham treatment. In other

words, the changes of the experimental and control group were the same across all treatment levels. Finally, no combination of gender and treatment type received manifested a significant difference from the group as a whole in change of muscle tone over treatment levels.

Discussion

Essentially, the main result of this study was a significant reduction of muscle tone for all subjects regardless of treatment type received. This muscle tone reduction occurred between the pre-treatment and treatment periods and was sustained throughout the post-treatment period. This finding was not consistent with those of previous studies largely because of lack of precedence.

To date, the only other research that has been performed on Therapeutic Touch and muscle tone was conducted by Krieger (1979) and Randolph (1984). Krieger reported that the two subjects participating in her study manifested no change in muscle tone during her administration of Therapeutic Touch. Randolph found no significant changes in muscle tone occurred in a group that received Therapeutic Touch and a group that received a placebo. Randolph also used a method of Therapeutic Touch

administration that substantially deviated from that employed in this study.

Supportive research on Therapeutic Touch with human subjects that includes physiological indices for change has thus far been scarce. According to Krieger, her studies on hemoglobin levels (1975, 1976) yielded positive findings. However, Krieger's methodology is weak and her reporting incomplete. Therefore, it may be best to view these studies as suggestive rather than definitive.

In Fedoruk's (1984) report of her study on Therapeutic Touch and neonates it was unclear whether or not changes in transcutaneous blood gas pressure (TcPO₂) occurred during the course of the experiment. Fedoruk stated that no significant differences in TcPO₂ were found between infants receiving Therapeutic Touch and infants receiving a placebo.

Data supportive of the efficacy of Therapeutic Touch have been obtained from the well designed studies of Quinn (1982) on anxiety reduction and Keller and Bzdek (1986) on pain relief. These studies measured psychic as opposed to physiological change. Therapeutic Touch, therefore, may be more effective in the modification of emotional rather than physical states.

The placebo used in the study presently under

discussion was close to being identical to that used in studies by Quinn (1982), Fedoruk (1984), Parkes (1985), Connell-Meehan (1985), and Keller and Bzdek (1986). In these studies the placebo provided was a physical simulation of Therapeutic Touch. Simple, mental arithmetic calculations were substituted for the meditative focus on helping or healing used in what is commonly believed to be authentic Therapeutic Touch.

What may be risky and what may have contributed to the lack of significant differences between the experimental and control groups in this study is the assumption that Therapeutic Touch is associated with conscious intentionality. In other words, the placebo provided in this and previous studies may not have been a placebo at all. Both groups in this study received identical physical ministrations and the same degree of proximity to the practitioner. Both groups experienced close to the same degree of change in muscle tone during the course of the experiment.

It is possible that Therapeutic Touch is a result of an interaction between the electromagnetic fields of the two people involved in the transaction. Universal healing energies may not be involved at all. It must be emphasized however, that the results of this study do not in and of

themselves lend credence to this supposition. Although muscle tone was significantly reduced in all subjects it is impossible to rule out the possible contributing effect that resting in a darkened room might have had as well as the subjects' knowledge that their muscle tone could possibly be lowered during the course of the experiment.

It is also possible that the lack of significant differences between the experimental and control group in this study were due to some flaws in the design. As mentioned earlier, the subjects who received Therapeutic Touch had significantly higher average median EMG scores than those who received the sham treatment. The indication is that there may have been sampling or measurement errors. The latter is less likely than the former since the same investigator recorded the data throughout the experiment and was unaware of group assignment while doing so.

If Therapeutic Touch is a process of channeling universal healing energies some contamination of subjects may have occurred. Administration of the two types of treatment was frequently juxtaposed. It is possible that once Therapeutic Touch is begun it is difficult to stop at will. Following the administration of Therapeutic Touch the investigator providing the intervention may still have

been a conduit for restorative forces even though he believed he was only offering a placebo.

In addition, it may be difficult to confine the effects of Therapeutic Touch to only one individual at a time. Subjects who were recipients of the sham treatment waited in the same room where others received Therapeutic Touch. It may be that the control group subjects were somehow exposed to forces intended for experimental group members only.

Another and possibly critical flaw in the design of this study may be that the subjects were presumably in normal to good health. Some researchers of Therapeutic Touch believe a less than optimal state of physical or mental health is necessary for Therapeutic Touch to effect change (Grad, 1975; Quinn, 1988).

Finally, the results of this study could again reinforce the existing evidence for the power of placebos. Each subject knew that there was a chance of receiving Therapeutic Touch, could have to some degree expected to experience relaxation, and therefore did.

The possible reasons discussed in this section for the results obtained in this study are purely conjectural. Since no differences in muscle tone change were found between subjects who received Therapeutic Touch and subjects who received the placebo it is impossible to state

with confidence the reason behind all subjects' significant reduction in muscle tone during the course of this experiment.

Conclusions

This is the third research study that has examined the effects of Therapeutic Touch on muscle tone.

Administration of both Therapeutic Touch and the placebo was modeled after the interventions provided in the research of Quinn (1982), Fedoruk (1984), Parkes (1985), Connell-Meehan (1985), and Keller and Bzdek (1986).

This study produced results that should cause practitioners to question the commonly held assumptions regarding the mechanics of Therapeutic Touch. Therapeutic Touch may have more to do with contact between the electromagnetic fields of the practitioner and client than with the conscious transfer of healing energies.

However, this study's results render it impossible to isolate the hypothetical effects of Therapeutic Touch from other more tangible contributing factors. Conclusions drawn from this study's results must be limited to the statement that lying supine in a darkened room for seven to ten minutes with the belief that one is receiving an intervention inducing somatic relaxation will reduce muscle tone.

Implications

This study was designed to determine the effectiveness of Therapeutic Touch as a modality for reducing muscle tone. Occupational therapists working in the physical disabilities sphere of practice frequently encounter clients with abnormally high tonus. Within the Occupational Performance Frame of Reference, muscle tone is one aspect of the motor functioning performance component. Abnormal tone adversely affects motor function which in turn negatively impacts the performance skills of self-care, work, play and leisure time activities. Deficits in performance skills cause overall occupational performance to be compromised.

Normalizing the client's muscle tone is thus often a prerequisite for the occupational therapist before working on purposeful and remedial activities within the realms of self-care, work, play, and leisure. Such normalization techniques are designated within the Occupational Performance Frame of Reference as adjunctive methods. Adjunctive methods are included in but do not alone constitute occupational therapy. Therefore, Therapeutic

Touch, if found to reduce muscle tone would be used as a preparation but not as a substitute for occupational therapy.

The results of this study do not support Therapeutic Touch to be in and of itself effective in reducing muscle tone. There was no significant difference between the changes in tone experienced by the experimental and control group subjects. Both groups did, however, experience a significant reduction in muscle tone over the course of the procedure.

This study has therefore provided occupational therapists and other allied health professionals with some useful information regarding tone reduction for subjects with no known neuromuscular deficits. Lying supine in a darkened room for at least seven minutes expecting to have one's muscle tone lowered through the intervention of a therapist does indeed produce such a decrease in normal subjects.

Reduced muscle tone is associated with relaxation (Beary, Benson, & Klemchuk, 1974) and relaxation is associated with anxiety reduction (Heidt, 1981; Quinn, 1982) and pain relief (Keller & Bzdek, 1986). Therefore, occupational therapists may wish to make use of the information provided by this study in the provision of

adjunctive methods when treating clients whose tension, anxiety, or pain interfere with occupational role performance.

Since the subject population had no known neurological deficits, occupational therapists will not yet be able to use the results of this study to justify the use of Therapeutic Touch as a method to reduce abnormal muscle tone. In addition, the results of this study do not support or refute the efficacy of Therapeutic Touch. Previous studies on Therapeutic Touch have yielded variable results. The occupational therapy profession should therefore be cautious about premature acceptance of Therapeutic Touch as a valid treatment technique.

Recommendations

Since it is possible that Therapeutic Touch did contribute to the significant decrease in muscle tone experienced by all subjects participating in this study it is recommended that research on the effects of Therapeutic Touch on muscle tone continue. It is recommended that future researchers employ a different type of sham intervention than that used in this study to control for the placebo effect. Greater physical distance between the

practitioner and subject is advised for the sham intervention.

In order to isolate the effects of Therapeutic Touch from the effects of resting in a darkened room it is suggested that a study be conducted where no intervention is provided. Subjects' muscle tone would be monitored while the subjects rested in the supine position in a darkened room. Significant or nonsignificant decreases in muscle tone would be enlightening.

It is proposed that future investigators have two rooms at their disposal in which to conduct their research. The experimental group would receive Therapeutic Touch in one room and the control group would receive a sham intervention in another. There would then be less of a chance of subject contamination from residual effects of one or the other forms of intervention. These rooms would not be interchangeable. Subjects should also be provided with a waiting room separate from the treatment rooms for the same reason.

In order to provide only the type of intervention intended it is recommended that subjects from different groups be treated on different days. Such a practice may preclude the necessity of having two different treatment rooms. However, it may be advantageous to have different

rooms for the different types of treatment since it is unknown how long residual effects of Therapeutic Touch may last if they do indeed exist.

Finally, for a study to be immediately applicable to the treatment of abnormal muscle tone it should be performed on subjects with documented upper motor neuron lesions. Subjects should be medically stable and unmedicated. The un-well baseline condition of these subjects might provide a greater index for change so that significant results would be achieved. Such a study, incorporating the design modifications provided in this section might provide further valuable information regarding Therapeutic Touch as an occupational therapy modality.

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Appendix
Means and Standard Deviations for Confirmation of
Statistical Computations

Group	Treatment Period	Mean	SD	N
Therapeutic Touch	1	6.05	4.37	21
Sham	1	2.87	1.58	17
All Subjects	1	4.63	3.74	38
Therapeutic Touch	2	4.52	2.81	21
Sham	2	2.74	1.36	17
All Subjects	2	3.72	2.12	38
Therapeutic Touch	3	4.74	2.39	21
Sham	3	2.90	1.28	17
All Subjects	3	3.92	2.16	38