A STUDY OF THE EFFECTIVENESS OF
A RELAXATION TECHNIQUE IN LESSENING EXCESSIVE ANXIETY
OF SELECTED PSYCHIATRIC INPATIENTS

by

WINIFRED MARGARET MILLER
B.S.N., University of British Columbia, 1968

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE IN NURSING

in the
SCHOOL OF NURSING

We accept this thesis as conforming to
the required standard

THE UNIVERSITY OF BRITISH COLUMBIA
October, 1975
In presenting this thesis in partial fulfilment of the requirements for an advanced degree at the University of British Columbia, I agree that the Library shall make it freely available for reference and study. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by the Head of my Department or by his representatives. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.
ABSTRACT

A Study of the Effectiveness of
A Relaxation Technique in Lessening Excessive Anxiety
of Selected Psychiatric Inpatients

Excessive anxiety is a pervasive problem in our society and particularly among patients with psychiatric problems. Are there simple techniques which nurses can teach patients which will assist in ameliorating such anxiety?

An experimental study was conducted to investigate the effectiveness of a relaxation technique in relieving excessive anxiety. Thirty-six selected psychiatric inpatients were assigned at random to three groups. Subjects in Group 1 received individual relaxation training by means of a simple relaxation technique involving controlled breathing and muscle relaxation exercises. Group 2 subjects received individual placebo treatments on an equivalent schedule to Group 1. Subjects in Group 3 received the ordinary ward care and no special approach. Level of anxiety was measured by a physiological index (twenty-four hour urinary potassium excretion) and a psychological scale (IPAT Anxiety Scale Questionnaire). Both measures were tested at the beginning and end of the five day experimental period and changes in levels between groups compared statistically.

Non-parametric analyses were utilized because
of the lack of a normal distribution. The central tendencies of changes in the physiological and psychological indices measured for the three groups were analyzed by means of the Kruskal-Wallis One-Way Analysis of Variance. The null hypothesis was tested and the five percent ($p < .05$) level of significance was accepted. When the null hypothesis was untenable Mann-Whitney $U$ Tests (one-tailed) were done to determine individual differences between groups.

Group 1: "Relaxation" subjects were found to exhibit significantly greater declines in IPAT Anxiety Scale Questionnaire scores as compared with Group 3: "Control". No other statistically significant difference was found between individual groups. Inspection of IPAT scores and urinary potassium values suggests, however, that there is a marked difference in individual response, both physiologically and psychologically to the "Relaxation" and "Placebo" approaches. The lack of consistency between the findings for the urinary potassium excretion measure and Anxiety Scale Questionnaire scores arises, perhaps, from the fact that the Anxiety Scale is an index of multiple factors while urinary potassium excretion is a unitary physiological factor.

On the basis of the findings in this study the technique described is deemed to be an effective method for nurses (or others) to employ as a means for relieving excessive anxiety. A number of recommendations for further
study were made including the need to test other "high stress" populations, for example, patients in burn units or prior to cardiac surgery, and the need to identify which individual patients are most likely to respond favourably to the relaxation training. The use of a multifactorial index, such as urinary electrolyte excretion profiles, as a more accurate overall measure of physiological stress is suggested.
# TABLE OF CONTENTS

ABSTRACT.................................................................................................................. ii  
LIST OF TABLES........................................................................................................... ix  
LIST OF FIGURES....................................................................................................... xi  
ACKNOWLEDGEMENTS............................................................................................... xii

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. INTRODUCTION.................................................................1</td>
<td></td>
</tr>
<tr>
<td>Statement of the Problem.................................................1</td>
<td></td>
</tr>
<tr>
<td>Significance of the Problem............................................2</td>
<td></td>
</tr>
<tr>
<td>2. REVIEW OF THE LITERATURE.................................6</td>
<td></td>
</tr>
<tr>
<td>Concepts of Anxiety.....................................................6</td>
<td></td>
</tr>
<tr>
<td>Psychoanalytic Concepts of Anxiety.........................6</td>
<td></td>
</tr>
<tr>
<td>Learning Theories of Anxiety.................................8</td>
<td></td>
</tr>
<tr>
<td>Anxiety-trait and Anxiety-state.........................9</td>
<td></td>
</tr>
<tr>
<td>Physiological and Biochemical</td>
<td></td>
</tr>
<tr>
<td>Aspects of Anxiety........................................10</td>
<td></td>
</tr>
<tr>
<td>Manifestations of Anxiety.................................15</td>
<td></td>
</tr>
<tr>
<td>Physiological Manifestations of</td>
<td></td>
</tr>
<tr>
<td>Anxiety..........................................................15</td>
<td></td>
</tr>
<tr>
<td>Psychomotor Manifestations of Anxiety...............16</td>
<td></td>
</tr>
<tr>
<td>Affective Manifestations of Anxiety...........17</td>
<td></td>
</tr>
</tbody>
</table>
Chapter | Page
--- | ---
Cognitive Manifestations of Anxiety | 18
Social Manifestations of Anxiety | 19
A Model For Anxiety | 20
Biopsychosocial Stimuli | 20
Psychobiological Programme | 22
Perceived Threat or Challenge | 22
Anxiety Response | 23
Defense Mechanisms | 24
Interacting Variables | 25
Definition of Anxiety | 26
Psychophysiological Relaxation | 27
Meditation | 27
Progressive Relaxation | 29
Reciprocal Inhibition and Systematic Desensitization | 30
Autogenic Training | 31
Therapeutic Use of Relaxation Techniques | 32

3. DESIGN AND METHODOLOGY | 37
Overview of the Study Design | 37
Definition of Terms | 37
Assumptions | 38
The Independent Variable: A Relaxation Technique | 38
The Dependent Variables | 39
Urinary Potassium | 40
IPAT Anxiety Scale Questionnaire | 42
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting of the Study</td>
<td>43</td>
</tr>
<tr>
<td>The Sample</td>
<td>44</td>
</tr>
<tr>
<td>Treatment and Control Methods</td>
<td>47</td>
</tr>
<tr>
<td>Group 1: &quot;Relaxation&quot;</td>
<td>49</td>
</tr>
<tr>
<td>Group 2: &quot;Placebo&quot;</td>
<td>50</td>
</tr>
<tr>
<td>Group 3: &quot;Control&quot;</td>
<td>51</td>
</tr>
<tr>
<td>Specific Objectives of the Study</td>
<td>51</td>
</tr>
<tr>
<td>Hypotheses</td>
<td>52</td>
</tr>
<tr>
<td>Analysis of Data</td>
<td>52</td>
</tr>
</tbody>
</table>

4. FINDINGS OF THE STUDY | 57 |
| The Urine Potassium Measure | 57 |
| Group 1: "Relaxation" | 61 |
| Group 2: "Placebo" | 61 |
| Group 3: "Control" | 61 |
| Comparison of Groups: Urinary Potassium Excretion Levels | 62 |

| The IPAT Anxiety Scale Questionnaire | 64 |
| Group 1: "Relaxation" | 64 |
| Group 2: "Placebo" | 67 |
| Group 3: "Control" | 67 |
| Comparison of Groups: IPAT Anxiety Scale Questionnaire Scores | 67 |

5. DISCUSSION, LIMITATIONS, RECOMMENDATIONS | 75 |
<p>| Interpretation of the Findings | 75 |
| Limitations of the Study | 78 |
| Sample Size and Selection | 78 |</p>
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncontrolled Extraneous Stimuli</td>
<td>78</td>
</tr>
<tr>
<td>Incomplete Placebo Effect</td>
<td>79</td>
</tr>
<tr>
<td>Urine Potassium Measure</td>
<td>79</td>
</tr>
<tr>
<td>Recommendations for Further Study</td>
<td>79</td>
</tr>
<tr>
<td>Summary</td>
<td>80</td>
</tr>
</tbody>
</table>

BIBLIOGRAPHY...............................................82

APPENDICES

A. Text of Relaxation Technique Tape..............91
B. Anxiety Study: Experiment Schedule............94
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-1</td>
<td>Changes in 24 Hour Urinary Potassium Excretion Between Day 1 and Day 5 for Subjects in Group 1: &quot;Relaxation&quot;</td>
<td>58</td>
</tr>
<tr>
<td>4-2</td>
<td>Changes in 24 Hour Urinary Potassium Excretion Between Day 1 and Day 5 for Subjects in Group 2: &quot;Placebo&quot;</td>
<td>59</td>
</tr>
<tr>
<td>4-3</td>
<td>Changes in 24 Hour Urinary Potassium Excretion Between Day 1 and Day 5 for Subjects in Group 3: &quot;Control&quot;</td>
<td>60</td>
</tr>
<tr>
<td>4-4</td>
<td>Kruskal-Wallis One-Way Analysis of Variance by Ranks of Changes in Urine Potassium Excretion in Milliequivalents of Groups Receiving &quot;Relaxation,&quot; &quot;Placebo&quot; and &quot;Control&quot; Treatments</td>
<td>63</td>
</tr>
<tr>
<td>4-5</td>
<td>Changes in IPAT Anxiety Scale Questionnaire Scores Between Day 1 and Day 5 for Subjects in Group 1: &quot;Relaxation&quot;</td>
<td>65</td>
</tr>
<tr>
<td>4-6</td>
<td>Changes in IPAT Anxiety Scale Questionnaire Scores Between Day 1 and Day 5 for Subjects in Group 2: &quot;Placebo&quot;</td>
<td>66</td>
</tr>
<tr>
<td>4-7</td>
<td>Changes in IPAT Anxiety Scale Questionnaire Scores Between Day 1 and Day 5 for Subjects in Group 3: &quot;Control&quot;</td>
<td>68</td>
</tr>
<tr>
<td>4-8</td>
<td>Kruskal-Wallis One-Way Analysis of Variance by Ranks of Changes in IPAT Anxiety Scale Questionnaire Scores of Groups Receiving &quot;Relaxation,&quot; &quot;Placebo&quot; and &quot;Control&quot; Treatments</td>
<td>70</td>
</tr>
<tr>
<td>4-9</td>
<td>Mann-Whitney U Test for Differences in Change in IPAT Anxiety Scale Questionnaire Scores Between Group 1: &quot;Relaxation&quot; and Group 2: &quot;Placebo&quot; Treatment (N=24)</td>
<td>71</td>
</tr>
</tbody>
</table>
Table 4-10  Mann-Whitney $U$ Test for Differences in Change in IPAT Anxiety Scale Questionnaire Scores Between Group 1: "Relaxation" and Group 3: "Control" (N=24) .............................................. 72

Table 4-11  Mann-Whitney $U$ Test for Differences in Change in IPAT Anxiety Scale Questionnaire Scores Between Group 2: "Placebo" and Group 3: "Control" (N=24) .............................................. 73
LIST OF FIGURES

Figure | Page
-------|-----
1      | A Model for Anxiety (Adapted from Levi's Model for Psychosocially Mediated Disease) | 21
ACKNOWLEDGEMENTS

The candidate expresses gratitude to a number of individuals who provided helpful assistance in the conduct of this investigation.

Appreciation is extended to Barbara Herrick McGuire, Chairman of the Thesis Committee, and to Helen Elfert and Mona June Horrocks who functioned as Committee members. These persons gave much wise counsel and encouragement.

Appreciation is expressed to the two Directors of Nursing for their willing co-operation in permitting access to the hospital facilities necessary.

Appreciation is also expressed to the patients, nurses and physicians, in the hospital units where the study was conducted, for their help and interest.

Gratitude is extended to the six student nurses who served, with diligence and enthusiasm, as research assistants.

Finally, thanks are due to Wendy Beltramo-Krafft for her dedicated labours in typing the manuscript.
Chapter 1

INTRODUCTION

Statement of the Problem

The discomfort of anxiety has troubled men since ancient times. Our own era has been called "The Age of Anxiety" and literature, art and music give testimony to the pervasiveness of this phenomenon. A certain degree of anxiety is useful, and indeed essential, to alert the individual so that adaptive responses are mobilized to meet actual or potential threats.\(^1\) Excessive anxiety, however, is debilitating because considerable amounts of energy are dissipated and the life forces of the individual can be diminished and disorganized.

Because illness poses a threat to the integrity of patients and their families, nurses encounter anxious people constantly while working in hospitals or in the community. For example, consider the person awaiting open heart surgery, the family of a severely burned child or the person who has been informed that he has an inoperable carcinoma. Consider particularly patients coming to acute care

\(^1\)Judd Marmor, "Anxiety and Worry as Aspects of Normal Behaviour," California Medicine, XCVII (October, 1972), 212-15.
psychiatric units. "One of the major difficulties of most, if not all, psychiatric patients is anxiety," writes Hilde-gard Peplau. ²

How can nurses help patients with excessive anxiety? Are there physical methods of relieving anxiety which will supplement interpersonal techniques which are used?

The purpose of this investigation is to examine the effectiveness of a physical relaxation technique in lessening the anxiety of selected patients in two acute care psychiatric settings.

Significance of the Problem

Anxiety is implicated both in the development of, and as a concomitant of, physical and mental illness. The problem of excessive anxiety permeates the field of health care.

...physicians are coming to realize that emotional reactions are of primary significance not only in functional but also in organic disorders such as essential hypertension, coronary heart disease, peptic ulcer and hyperthyroidism. ³


Anxiety is the dynamic center of neuroses.\(^4\)

...we know that psychosocial stimuli cause physiological changes which in turn could lead to precursors and disease.\(^5\)

Further, psychosocial stimuli may also influence health by impeding recovery and aggravating disability, whatever the etiology of the primary disease. Such a psychosocially induced response may be rooted - e.g. in an intense anxiety over the disease or the situation...\(^6\)

Illness and hospitalization frequently are attended by feelings of helplessness, isolation and insecurity. These feelings engender anxiety. Wooldridge, Skipper and Leonard view relief of situational anxiety as an important area of responsibility for nursing.\(^7\)

Anxiety interferes with man's basic need for relaxation so that alleviation of excessive anxiety is significant at all levels of health care, from care of the sick to promotion of high level wellness. Dunn states:


\(^6\)Ibid., p.20.

The need of the mind for balance and relaxation as an integral part of its power to solve problems is paralleled by the need of the body for balance and relaxation as an integral part of the way it maintains its energy organization.  

Since anxiety interferes with the individual's ability to meet his basic needs and since the nurse is society's professional nurturer, methods of control of anxiety lie within her province of responsibility. Nurses use comfort measures (e.g. the backrub) and interpersonal techniques such as those proposed by Peplau and others to modify and control anxiety.  

However, excessive anxiety remains a major problem which is most commonly dealt with, when recognized, by the use of tranquillizers and sedatives. Chemical relief of anxiety not only poses the threat of psychological or physiological dependency but also can interfere with normal sleep patterns by disrupting the ratio of time spent in the various phases of


10 Peplau, op.cit.


sleep.

Do nurses unknowingly disrupt the night cycles of their patients by giving all too freely the compromising sleeping pill rather than intervening to promote sleep by talking with the patient to relieve anxiety or by using therapeutic, physical measures?¹³

Physical methods are, for the most part, under emphasized by nurses as methods of relieving anxiety and promoting relaxation. Comfort measures such as the backrub are assumed to be helpful, but the results of the scant testing which has been done are inconclusive.¹⁴

Nursing science encompasses a small body of knowledge at the present time. Clearly there is a need for the further development of scientific nursing methods in the area of anxiety control to supplement those methods already developed.

---


¹⁴Kaufman, op.cit.
Chapter 2

REVIEW OF THE LITERATURE

Concepts of Anxiety

The literature dealing with the subject of anxiety is overwhelming. There exist a multiplicity of descriptions and definitions of anxiety. The nature and manifestations of anxiety have been explored by philosophers, novelists, psychologists, physiologists, psychiatrists and others. In this section some pertinent concepts of anxiety will be reviewed and a model of anxiety presented.

Psychoanalytic concepts of anxiety. Freud defines primal and secondary anxiety.\(^1\) Primal anxiety is that state of tension arising from the infant's experience of helplessness in resolving libidinal privation. Secondary or 'signal' anxiety is a derivative of primal anxiety. Certain stimuli associated with the original traumatic situation can now trigger the anxiety response to alert the individual to internal or external threat. Thus the threat of trauma can be anticipated and defensive action taken. The individual learns mental defense mechanisms which he uses as a means of

---

coping with anxiety. These mental defenses, as defined by Freud, are for the most part subconscious, non-specific, and automatic so that their usefulness has limitations. If an individual's use of defense mechanisms is inappropriate or the mechanisms are inadequate to cope with a given traumatic situation, the situation will be unresolved and anxiety will increase. If the situation is prolonged or the threat of trauma is massive the ego can be overwhelmed and emotional illness results. Freud believed that anxiety is a key influence in the emotional development of the individual.

Arthur Schmale deals with the genesis of affective differentiation. He postulates stages of awareness and correlative affects. Anxiety, according to Schmale, is the undifferentiated, primal prototype from which the full range of affects are derived, and reflects psychic awareness of discomfort or disturbance of biological equilibrium during the earliest stage - awareness of the newborn.

Interpersonal Concepts of Anxiety. Harry Stack Sullivan, like Freud, regarded anxiety as a crucial factor

---


3 Ibid.

in the development of personality. He maintained that anxiety arises when an individual's security is threatened in the context of an interpersonal relationship. He conceived personality as a system whose chief energy expenditure is directed to the relief of tension. Further, he indicated that high anxiety is associated with lack of efficiency in meeting physiological needs, disturbed interpersonal relationships and disorganized thinking.

**Learning Theories of Anxiety.** Learning theorists regard drive reduction as an important element in the learning process. Drives may arise from primary needs such as hunger or from secondary needs such as the need for anxiety reduction. Mowrer has developed a considerable body of theory demonstrating the relationship of anxiety to learning.

...anxiety is a learned response occurring to 'signals' (conditioned stimuli). Anxiety is thus basically anticipatory in nature, and has great biological utility in that it adaptively motivates living organisms to deal with (prepare for, or flee from) traumatic events in advance of their actual occurrence.  

Mowrer posits anxiety as an activating agent, and reduction of anxiety as a reinforcing agent in learning, "...reduction of anxiety may serve powerfully to reinforce

---


behaviour that brings about ... a state of 'relief' or 'security'.

Anxiety-trait and Anxiety-state. Cattell and Scheier differentiate between anxiety as a personality trait and anxiety as an emotional state. Anxiety trait refers to anxiety proneness in an individual and is relatively stable over time. It arises from a combination of the genetic attributes and the cumulative learning of the individual. Anxiety state is the degree of anxiety experienced by the individual at any given time. Cattell by factor analysis has identified sources and personality components in anxiety which are trait factors. These are, a) lack of development of integrated self-sentiment; b) ego weakness; c) suspiciousness and paranoid insecurity; d) guilt proneness; e) tension, id pressure, frustration level.

Johnson and Spielberger define the two very different constructs succinctly as follows:

7 Mowrer, op. cit.


An organismic state (A-state) is characterized by subjective consciously perceived feelings of apprehension and tension together with activation of the autonomic nervous system. As a personality trait, anxiety (A-trait) refers to the degree to which individuals are disposed to manifest A-state in response to various forms of stress.10

Physiological and Biochemical Aspects of Anxiety.

Psychosocial concepts of anxiety all involve the individual's response to perception of actual or potential threats to his security. A number of physiological theories are relevant to the concept of anxiety since they are concerned with the physiological responses of organisms when challenged to adapt. Cannon investigated the role of the thalamus and hypothalamus in integrating autonomic activity and noted the importance of the sympathetic-adrenal system in maintaining homeostasis.11 He describes the fear-anger response to threat as a natural defense of the organism. He noted the physical manifestations of the response activated by the sympathetic-adrenal system - increased pulse rate, increased arterial pressure, sugar released from reserves in the liver, adrenalin secreted by the adrenal medulla, etc.

Selye proposes a non-specific theory of stress


as a General Adaptation Syndrome to non-specific stressors. The G.A.S. is a phylogenetically old defense preparing the organism to meet challenge by fight or flight, through activation of a neuroendocrine response which involves brain, nerves, pituitary, thyroid, adrenals, liver, kidney, blood vessels, connective tissue, white blood cells. In contradistinction to the non-specific theory both Lacey and Malmo and their associates have demonstrated some evidence of individual differences in response and suggest that patterns of autonomic reactivity are inherited.

The evidence of multifocal physiological and biochemical response to anxiety-provoking stimuli is manifold. The expression "up-tight" reflects the common association of increased muscle tension and anxiety. Jacobson


13 Ibid.


defines anxiety in terms of tension and says that smooth and striated muscle tension patterns mark the emotional reaction in which virtually the whole organism participates. Ferris N. Pitts lists the following somatic symptoms of anxiety neurosis in a study of 60 patients - palpitations, breathlessness, chest pain, sighing, dizziness, faintness, headache, paresthesias, weakness, trembling, shakiness, etc.

While somatic symptoms are manifestations of overactivity of the autonomic system it must be recognized that these symptoms will vary with the balance of sympathetic and parasympathetic subsystems and according to the level and duration of anxiety. For example the person in panic may exhibit pallor while the person at a lesser level of anxiety may exhibit flushing. Similarly acutely anxious individuals have dry mouths while individuals with chronic anxiety may exhibit excessive salivation. Mahl suggests that acute anxiety is associated with sympathetic dominance and chronic anxiety is accompanied by parasympathetic dominance.


19 G.F. Mahl, "Relationship Between Acute and Chronic Fear and the Gastric Acidity and Blood Sugar Levels in Macaca Mulatta Monkeys," Psychosomatic Medicine, XIV (May-June, 1952), 182-210.
As Cannon theorized, anxiety response is associated with activation of sympathoadrenomedullary and adreno-cortical systems. Stimulation of the sympathetic adrenal system leads to a marked increase in adrenalin and nor-adrenalin in the blood. Increased catecholamine excretion in individuals in anxiety evoking situations has been demonstrated in numerous studies.\textsuperscript{20, 21, 22} Urinary excretion of catecholamines reflects their release in a consistent way. These and other pertinent findings have been reviewed and summarized elsewhere.\textsuperscript{23, 24} Clinical and laboratory studies have also shown increases in adrenal cortical activity with stress induced by psychosocial stimuli such as:

\begin{itemize}
  \item J. Mendelson et al., "Catecholamine Excretion and Behaviour During Sensory Deprivation," \textit{Archives of General Psychiatry}, II (January, 1960), 37.
\end{itemize}
as hospital admission and psychiatric interviews.\textsuperscript{25,26,27,28} Conversely reduction in stressful stimuli or provision of soothing stimuli has been accompanied by decrease in adrenal cortical activity.\textsuperscript{29,30} Rubin and Mandell reviewed manifestation of medullary stimulation associated with anxiety.\textsuperscript{31} Mason has reviewed research into the pituitary-adrenal and the pituitary-thyroid systems activation in response to stressful

\textsuperscript{25} Gregory Pincus and Hudson Hoagland, Adrenal Cortical Responses to Stress in Normal Men and in those with Personality Disorders,\textsuperscript{27} American Journal of Psychiatry, CVI (February - March, 1950), 641-50.

\textsuperscript{26} J.W. Mason et al., "Corticosteroid Responses to Hospital Admission," Archives of General Psychiatry, XIII (January, 1959), 1-8.

\textsuperscript{27} H. Persky et al., "Effect of Two Psychological Stresses on Adrenocortical Function," Archives of Neurology, LXXXIII (February, 1959), 219.


\textsuperscript{29} J.H. Handlon et al., "Psychosocial Factors Lowering Plasma 17-hydroxycorticosteriod Excretion During Stressful Life Experiences in Man," Psychosomatic Medicine, XXIV (November - December, 1962), 535-42.

\textsuperscript{30} Frances L. Pride, "An Adrenal Stress Index as a Criterion Measure for Nursing," Nursing Research, XVII (July - August, 1968), 292-303.

experiences. 32, 33, 34

Manifestations of Anxiety

From the foregoing and from a multitude of other articles and books by authors from a variety of disciplines one can conceptualize anxiety as a behaviour involving the organism as a whole and all the subsystems of the organism. Anxiety is thus manifest in terms of physiological, psychomotor, affective, cognitive and social behaviour.

Physiological Manifestations of Anxiety. Many studies have been cited dealing with Physiological-biochemical manifestations of stress in the previous section. As mentioned responses vary with the duration and intensity of stress and according to the organism's individual patterns of responses.

Physiological manifestations of anxiety can include increased muscle tension, increased pulse rate, hyperventilation, dilated pupils, dry mouth, flushing or paling, sweating (particularly palmar), frequency of, or involuntary, 


micturition and defecation, and increased gastric secretion.\textsuperscript{35,36,37}

Other physiological manifestations, which also reflect autonomic activation are increased level of serum and urinary corticosteriods and catecholamines, increased urinary excretion of potassium and decreased secretion of sodium, increased erythrocyte sedimentation rate, and increase in plasma lipids.\textsuperscript{38} Electroencephalogram studies show less alpha activity in persons suffering anxiety states as compared to normal subjects.\textsuperscript{39}

**Psychomotor Manifestations of Anxiety.** The automatic defense of the fearful, anxious individual against perceived threat is the preparation for the "fight or flight" response, which is most easily observed in the psychomotor system. Unresolved excessive muscle tension is shown in

\textsuperscript{35}Wm. J. Turner, Glossaries for use with the Overall and Gorham Brief Psychiatric Rating Scale, Psychopharmacology Service Centre (Bethesda, Maryland: National Institute of Mental Health, 1963).


\textsuperscript{37}Ferris N. Pitts, "The Biochemistry of Anxiety," Scientific American, CCXX (February, 1969), 69-75.

\textsuperscript{38}Froberg, op.cit.

random, restless movements; muscular incoordination; pacing; squirming; trembling or shaking; and facial tics. Rapid, higher pitched, sometimes stuttering speech marks the vocal patterns of the anxious individual. Individuals in the panic state may physically harm themselves or attack others. If psychomotor responses are further disorganized the person may "freeze". The overvigilant and over-aroused state of excessive anxiety tends to cause the person to over-react to stimuli with a resultant "jumpiness" and exaggerated tendency to startle.

**Affective Manifestations of Anxiety.** Perhaps the best descriptions of the affective manifestations of anxiety are to be found in fiction and philosophic essays. In Kafka's *The Castle* shapeless, dreadful forces threaten the individual and fill him with anxiety. Kierkegaard, as other existential writers, considers anxiety as an inescapable aspect of the human condition. In *The Concept of Dread* Kierkegaard explores the extreme anxiety of the individual, finite and fallible, facing the freedom to choose

---

40 Buss, op.cit.

41 Turner, op.cit.

and having to accept responsibility for his decisions.\textsuperscript{43}

Affective manifestations run the gamut from uneasiness through fear, dread, horror and terror according to the level of anxiety experienced.\textsuperscript{44} The higher the level of anxiety the more immediate the fear. The person in panic is in terror of his imminent death or disfigurement or complete loss of control. Lesser fears include fear of failure, fear of loss of a significant person, fear of making a fool of oneself, etc. Fear may often be unfocussed and be present as a general feeling of tension and apprehension. In excessive anxiety the level of fear is disproportionate to the degree of threat. Phobias are an extreme example of unrealistic, disproportionate fear.

Cognitive Manifestations of Anxiety. Peplau has categorized cognitive aspects as related to degree of anxiety.\textsuperscript{45} Mild anxiety increases the individual's awareness and alerts his attention. As anxiety increases in intensity the perceptual field is reduced so that focus is on a detail or scattered details. The person manifests selective inattention sometimes to the point of dissociation in


\textsuperscript{44}Turner, op.cit.

panic states. Learning is efficient in mild anxiety but is disrupted as anxiety increases. The individual is distractible and forgetful. Recent memory is most impaired.

Thought content may be concerned with death, mutilation, destruction, disaster, illness, pain, rejection, humiliation, failure. The individual may believe that he is going crazy when anxiety is severe. Nightmares are not uncommon. 46

Social Manifestations of Anxiety. Harry Stack Sullivan has described the maladaptive interpersonal manifestations of anxiety. 47 Once again these vary according to the level and chronicity of the response. Perhaps the most common aspect however, is the tendency to withdraw from social intercourse which reflects the flight aspect of response to perception of threat. Another important aspect is overdependency on others because of feelings of insecurity, inadequacy and fear of failure. This overdependency results in difficulty with peer relationships and with authority relationships.

Differences in cross-cultural levels of anxiety have been demonstrated. 48 Factor analysis of cultures with

46 Buss, loc. cit.

47 Sullivan, loc. cit.

comparatively high anxiety levels of the populace revealed the following characteristics:

1. Low standard of living.
2. Lack of emphasis on education.
3. Lack of political and social emancipation.
4. Centralized authoritarian structure.

Of the countries studied the anxiety level from higher to lower was as follows - India, China, Japan, Norway, U.S.A.

A Model for Anxiety.

While a model is a simplification of reality it can assist in demonstrating a complicated concept in an organized fashion and in showing antecedents and consequences. A model can also clarify the choice of interventions to prevent or modify disorder and the choice of indices to measure the success of the intervention. The model shown in Figure 1 is derived from the foregoing concepts and manifestations of anxiety and is an adaptation of a model for psychosocially mediated disease developed by Levi. 49

Biopsychosocial Stimuli. These stimuli may arise from the inner or outer environment of the individual and include electrolyte imbalance, pain, sensory deprivation or overload, emotionally charged situations, inner conflict, etc.

Figure 1. A Model for Anxiety (Adapted from Levi's model for psychosocially mediated disease).*

Any of these stimuli may become a "stressor" in Selye's terminology. In fact, any bio-psychosocial change can act as a stressor insofar as it challenges the individual to adapt and is thus a potential threat to homeostasis.

**Psychobiological Programme.** Each individual has a potential to react in patterned sequences which are determined by genetic factors and "learned" factors induced by earlier environmental influences. "Learned" in this sense means all forms of changed behaviour from sub-cellular to organismic. While overall patterns may be non-specific, these patterns may be modified in each individual so that patterns are both phylogenetic and ontogenetic. Selye's theory of the General Adaptation Syndrome describe the organism's general response to non-specific stressors. Lacey and associates show instances of idiosyncratic organization of response in several studies.

**Perceived Threat or Challenge.** The interaction of certain stimuli with the psychobiological programme of an individual results in the perception (which may be con-

---

50 Selye, op.cit. p.64  
51 Ibid.  
52 Ibid.  
54 Lacey and VanLehn, op.cit.
scious or subconscious) of threat or challenge to the status quo. These threats may be conceived as biological or psychosocial and may be in the form of unmet needs, danger signals, conflict, threat of loss, or even the challenge of change. Perception of threat or challenge may be realistic or unrealistic depending upon the psychobiological programme and some of the interacting variables which will be described later. Thus anxiety-trait is a personality factor which augments the propensity to perceive threats in any given situation.

Anxiety Response. Anxiety response is the equivalent of anxiety state as defined by Cattell in psychological terms. It is a multifaceted behavior with physiological, psychomotor, affective, cognitive and social components. The individual is alerted to meet the perceived threat or challenge. The cerebral cortex is activated via the reticular activating system. The autonomic nervous system is activated as the organism prepares for fight or flight. Blood vessels in muscles dilate and general muscle tone increases. As Lader notes the increased level of activation is intended to enable the organism to react appropriately to threat. However, excessive activation becomes disorganizing and maladaptive.


56 Ibid, p.16.
Individual differences in total pattern of response are exhibited. Some persons show predominance of response in one or several response systems, i.e. - one person may react primarily in the psychomotor and cognitive systems while another person might show predominance in the somatic system (with gastro intestinal, genito urinary, respiratory or cardiovascular complaint).\textsuperscript{57} Affective responses were not evaluated in the research cited.

**Defense Mechanisms.** The alerted anxious individual responds to perceived threat by the use of various defense mechanisms both physical and mental. These may be automatic, or conscious and deliberate. All can be conceived of in terms of fight or flight - of confronting the threat or of avoiding the issue. Psychological defenses against threat include the classic Freudian mental defense mechanisms, which are forms of flight by denial of reality, in terms of repression, suppression, substitution, sublimation, projection, rationalization, etc., as well as the fight equivalent of conscious problem solving or working through the threat.

Habituation is a physiological defense mechanism which the organism uses to adapt to successive identical

stimuli by progressively diminished response. Neurological and biochemical processes of adaptation are largely dependent upon the psychobiological programme of the individual.

Interacting Variables. Interacting variables are intrinsic and extrinsic factors which influence (i.e. alter the action) of all other parts of the model. These variables tend to promote, or diminish, or prevent anxiety. As Levi notes there is some difficulty in demarking parts of his model, so in the present adapted model there is such marked interaction between parts that demarcation is exceedingly difficult. Consequently some of the variables could also be considered as stimuli or as forms of defense. Extrinsic factors can be physical, psychosocial, or sociocultural. Heat, noise, sensory deprivation and overcrowding are examples of physical factors predisposing to increase anxiety. Morris and Jones research disclosed cultural factors associated with high levels of anxiety. Sociocultural factors influence the psychobiological programme in determining what stimuli

61 Morris and Jones, op.cit.
are perceived as threats or challenges. Sociocultural re-
sources also assist individuals in coping with anxiety.
Group support, rituals, religions and philosophical beliefs
and practises, health care, education, and recreation are
general areas of such resources. Teaching the relaxation
technique investigated in this study is a specific example
of a nursing intervention as an interacting variable which
may modify anxiety.

Intrinsic variables arise from the immediate physical
and psychological status of the individual. Is he concentrat-
ing or relaxed? Is he tired, angry, depressed, optimistic?
Is his serum lactate elevated from exercise? Diet, drugs,
alcohol, age, sex, pregnancy, presence or absence of disease
are all intrinsic variables influencing all parts of the model.

**Definition of Anxiety.** From examination of the
model a definition of anxiety can now be proposed.

Definition: Anxiety is a total organismic response
to perceived threat or challenge arising from psycho-bio-
social stimuli impinging upon the psychobiological programme
of the individual and influenced by intrinsic and extrinsic
interacting variables. The response is characterized by
cortical and autonomic activation and subjective feelings of
physical and psychological tension. Anxiety is adaptive in
alerting the individual to the presence of a problem. However,
anxiety which remains unresolved, or inadequately resolved, is
physiologically and psychologically disorganizing and thus
maladaptive.

**Psychophysiologic Relaxation Techniques**

A review of the literature to examine the use of psychophysiologic methods to control anxiety and to promote relaxation and composure reveals that these methods have been used in both Eastern and Western cultures for centuries. Eastern disciplines such as Yoga and Zen teach methods of breath control, physical exercises and mental concentration leading to meditation and contemplation. These practises induce serenity, a state diametrically opposite to the alert, aroused state of anxiety. "The Yogi," say Marques-Riviere, "works on the sympathetic nervous system." 62

Western practises of psychophysiologic techniques which lead to composure and serenity have occurred within the framework of religious beliefs and more recently in medical and psychological clinical practise, as well as in the introduction and popularization of eastern meditation techniques to the general public.

**Meditation.** Mystics in most religious systems have employed meditation as a means to an altered state of consciousness. Christianity, Judaism and Islam have records of

branches with well developed practises of meditation. Transcendental meditation, an Indian Yoga technique popularized in the West by Maharishi Mahesh Yogi is widely practised by members of the general public.

The basic elements of Transcendental Meditation are outlined by Wallace and Benson.

The practitioner sits in a comfortable position with eyes closed. By a systematic method that he has been taught, he perceives a "suitable" sound or thought. Without attempting to concentrate specifically on this cue he allows his mind to experience it freely, and his thinking, as the practitioners themselves report, rises to a "finer and more creative level in an easy and natural manner."Physiological aspects of meditation have been investigated and are now well documented. Demonstrated physiological responses include reduction in oxygen consumption and carbon dioxide elimination, reduction in rate and volume of respiration, decrease in blood lactate level, slowing of heartbeat, increase in galvanic skin response,

---


and intensification of slow alpha waves in the electroencephalogram pattern. The authors suggest that this hypometabolic pattern, representing quiescence of the sympathetic nervous system, is the counterpart of the "defense alarm" or "fight-or-flight" reaction described by Walter Cannon.

**Progressive Relaxation.** One of the foremost proponents of relaxation therapy for anxiety reactions and for disease with psychosomatic implications is Edmund Jacobson. He has developed a scheme of Progressive Relaxation based largely on learning theory and systems theory. The subject first learns to recognize tension in specific muscles and subsequently learns to relax those muscles at will. Jacobson tests the effectiveness by electrical measurements of the degree of muscle tension. He documents a number of case histories of patients suffer-

---

67 Wallace and Benson, op.cit.


70 Edmund Jacobson, "Electrical Measurements Concerning Muscular Contractions (tonus) and the Cultivation of Relaxation in Man - Relaxation Times of Individuals," *American Journal of Physiology*, CVIII (September, 1934), 573-80.
ing from such conditions as colitis, pyloric ulcer, post coronary infarction, early essential hypertension, anxiety and insomnia, etc., whom he has treated successfully by Progressive Relaxation methods of tension control.\(^{71}\)

**Reciprocal Inhibition and Systematic Desensitization.**

Joseph Wolpe has extended Jacobson's theory of Progressive Relaxation to a theory of Reciprocal Inhibition.\(^{72}\) Neurotic anxiety can be inhibited by antagonistic physiological responses. Relaxation can be used to desensitize anxiety-evoking stimuli reactions. In other words, one can not be both anxious and relaxed at the same time. Wolpe has evaluated the results of Reciprocal Inhibition therapy by measuring symptomatic improvement and by Willoughby questionnaire scores (a test for neuroticism, i.e. persistent unadaptive anxiety reaction). Of a total of 210 patients, 82 (39.0%) were rated "Apparently Cured," 106 (50.5%) were "much Improved," while 7 (3.3%) remained "Unimproved."\(^{73}\)

Systematic Desensitization is a behaviour modification therapy using principles of Reciprocal Inhibition. A heirarchy or anxiety evoking stimuli is constructed and the subject is then conditioned to control anxiety by re-

---

\(^{71}\) Jacobson, op.cit.


\(^{73}\) Ibid.
laxation while confronting the least anxiety provoking stimuli in the hierarchy. The process is systematically repeated moving up the scale item by item until the most anxiety provoking stimuli can be tolerated.

**Autogenic Training.** Autogenic Training is a relaxation technique based on six psychophysiologic exercises devised by a German neurologist H. Shutz and derived from Walter Hess' theory of a "trophotrophic response."\(^7^4\) Hess defines this response as arising in the hypothalamus and resulting in a general decrease in sympathetic nervous system activity.\(^7^5\) Walter Luthe, who developed Autogenic Training as a medical therapy describes it as "... a self induced modification of corticodiencephalic interrelationships."\(^7^6\) The exercises are practised in a quiet non-stimulating environment with the subject lying down with his eyes closed. An attitude of "Passive concentration" is believed necessary, as in meditation. Luthe found that Autogenic Training resulted in decreased respiratory rate, heart rate and muscle tension; and increased skin resistance and alpha wave activity.\(^7^7\)


\(^7^6\)Luthe, op.cit. p.11.

\(^7^7\)Ibid.
Therapeutic Use of Relaxation Techniques. The methods described above, and modifications of these methods have been used in various treatment settings - particularly in psychiatry and obstetrics. Relaxation therapy has also been used in the treatment of pulmonary tuberculosis, hypertension, headaches, and asthma.

In obstetrics the work of Grantly Dick Read and Fernand Lamaze is well known. Their methods of natural childbirth employ breathing and relaxation techniques to ease childbirth. A.A. Earn has developed a therapy which he calls Mental Concentration:

...a psychological skill in which the imagination and suggestion strengthen motivation and performance for desired goals. This skill is used by the student to produce a state of heightened awareness and purpose. First, he learns self-relaxation and then self-conditioning.

He states that this method has been effective in helping individuals achieve relaxation and sees its usefulness including "relief of stress of illness and improvement in mental health."81

H. Proffitt, a nurse at a psychiatric clinic in

---


81 Ibid, p. 538.
Birmingham, England, has developed a method of relaxation therapy which he carries out with groups of patients.\textsuperscript{82} The procedure consists of teaching the patients to recognize muscular tension and the use of suggestion that they will relax. Muscles are relaxed in sequence (i.e. from head to feet). Questionnaires were filled out by 50 patients to determine their views on relaxation therapy. 41 patients believed that the relaxation method had been of benefit, 5 thought it had been of no benefit and 4 were uncertain whether they had been helped or not. No objective assessment of benefit was made.

Johnson and Speilberger measured the effects of relaxation training (based on Jacobson's and Wolpe's methods) on anxiety-state which they define:

As an organismic state..., anxiety is characterized by subjective consciously perceived feelings of apprehensions and tension, together with activation of the autonomic nervous system.\textsuperscript{83}

They report that anxiety-state measures declined significantly in response to relaxation training procedures. Their criteria for measurement of anxiety-state were systolic blood pressure, heart rate, and a modified Zuckerman Affect Adjective Checklist.

\textsuperscript{82}C.D. Neal and H. Proffitt, "Relaxation Therapy," Nursing Mirror, CXXII (6 May, 1966), 114-16.

Crouch investigated the effectiveness of relaxation training (based on Jacobson's and Wolpe's methods) with hospitalized psychiatric patients in terms of changes in maladaptive behaviour. He used tape-recorded directions to teach the technique to subjects. The relative effectiveness of two schedules of relaxation training, one being a fixed schedule and the other a patient demand schedule, were tested. The fixed schedule group showed significant lowering of anxiety level as measured by the Revised Taylor Manifest Anxiety Scale.

Aitkens and Henrichs describe a study done at University of Missouri Medical Centre to evaluate the effectiveness of systematic relaxation as a technique to reduce post-operative psychiatric complications in open heart surgery patients. They conclude:

Less post-operative psychiatric complications were found in the group trained in relaxation techniques; however, differences were also noted between the groups on several surgical stress factors. Thus, the effects of systematic relaxation on post-operative psychiatric complications were not clearly defined, but the present findings were seen as encouraging.

Budzynski and Stojva taught subjects deep muscle

---


relaxation by biofeedback techniques using an instrument which provided immediate analog information feedback regarding level of muscle tension. After five sessions subjects receiving analog feedback achieved deeper levels of muscle relaxation than those receiving either no feedback or irrelevant feedback.

The review of the literature yielded a variety of examples of psychophysiologic measures for relieving anxiety by promoting relaxation, ranging from the esoteric practises of mystical religious sects to current western therapeutic methods such as "Reciprocal Inhibition" and biofeedback techniques. Many of these methods have been evaluated, using physiological and psychological indices, and found to be effective. However, only one example (Aitken and Henrichs) could be found of objective assessment of a nursing intervention to promote relaxation.

Some methods are time consuming both in the amount of time required to learn the technique and in the amount of time required for their practise. Progressive Relaxation, Reciprocal Inhibition and Autogenic Training require time and dedication of both teacher and learner. Transcendental Meditation is taught only by special trainers.

and under the auspices of the Society. The use of biofeedback techniques to teach deep muscle relaxation is markedly efficient in terms of time but requires instrumentation to deliver the biofeedback information.

To be practical for nurses to use in a variety of settings a relaxation technique would need to be teachable to clients of a wide range in physical and mental abilities, and in age span. Since severe anxiety is accompanied by lack of concentration and a narrowing of the perceptual field, the technique must be simple and straightforward. Simple Yoga controlled breathing techniques and a modified form of Progressive Relaxation involving systematic tensing and relaxing of muscles meet these criteria.
Chapter 3

DESIGN AND METHODOLOGY

Overview of the Study Design

The general aim of the study is to evaluate the effectiveness of a physical relaxation technique in decreasing anxiety in a patient population assumed to experience excessive anxiety. The independent variable is a simple eclectic technique designed to be taught by nurses. The dependent variables measure both physiological and psychological parameters of anxiety.

Definition of Terms.

(i) Anxiety: An organismic response to perceived threat characterized by autonomic and cerebrospinal excitation as well as subjective feelings of apprehension and tension.¹

(ii) Relaxation: An organismic response to perceived comfort, security, or removal of threat, characterized by decreased sympathetic and cerebrospinal excitation as well as subjective feelings of composure and diminution

¹Anxiety, by this definition, is the equivalent of anxiety state, as described by Cattell, and by Johnson and Speilberger. Their studies are outlined in the previous chapter.
of tension.

(iii) **Relaxation Technique**: A systematic psychophysiologic method of controlled breathing followed by relaxing of muscle groups, sequentially, in head, arms, trunk and legs.

**Assumptions**.

(i) Most patients admitted to psychiatric units suffer excessive anxiety.

(ii) Excessive anxiety is maladaptive.

(iii) Relief of excessive anxiety is, in part, the nurse's responsibility.

(iv) Nursing methods which promote relaxation can be taught to patients.

**The Independent Variable: A Relaxation Technique**

The review of the literature showed that most physical relaxation methods consist primarily of modifications of Jacobson's system of Progressive Relaxation and sometimes include breathing control based on Yoga methods. Accordingly the technique used in this study employs elements of Progressive Relaxation and breathing control. The instructions were tape-recorded in order to standardize the teaching of the technique for experimental purposes. The technique is taught in a quiet environment so that distracting stimuli are minimal.
The subject is first directed in six timed cycles of slow, smoothly regulated deep breathing. One cycle consists of approximately equal timed phases of inspiration, holding, and expiration. The subject is instructed to inspire by relaxing the abdominal muscles so that the diaphragm falls and air is drawn into the lungs as they expand. Conversely, expiration is accomplished by drawing in (contracting) the abdominal muscles so that the diaphragm rises and air is pushed out of the lungs. The initial breathing exercise serves to shift the subject's thought from diffuse thinking to focusing his attention on physical process.

Muscle groups are then tensed and relaxed in sequence moving from head, arms, trunk, legs, to feet. The subject is instructed to tense a muscle or groups of muscles, recognize the tension, and then to relax the muscle(s) as completely as possible. The instructions were tape-recorded in a soothing yet compelling voice. There was no attempt to avoid the use of suggestion. The text of the recorded tape is included in Appendix A.

The Dependent Variables

Since anxiety is a total organismic response and manifestations of anxiety are expressed in terms of physiological and psychological behaviour it is appropriate to measure levels of anxiety by both physiological and psychological indices. There are, however, many difficulties in choosing indices of anxiety to test. As Levi notes, neither
the subjective experiences of the individual nor the basic neuro-endocrine processes are accessible to direct measurement. While a general response to perceived threat is well established in the review of the literature, there is also established evidence of some degree of physiological and psychological individuality of response. Furthermore, in the model for anxiety presented in this study and from pertinent research there are many interacting variables which influence the course of events from the initial interaction of biopsychosocial stimuli and biopsychological programme to the manifestations of the anxiety response and the physical and psychological defenses induced.

**Urinary Potassium.** Indirect physiological and biochemical indices of stress include increases in muscle tension and pulse rate; decreases in alpha wave electroencephalogram activity, galvanic skin response and circulating eosinophils; increases in serum nonesterified fatty acids; and increased catecholamine and adrenocorticoid excretion. A variety of difficulties are attendant on their use as measures of stress or anxiety. Some require expensive instrumentation or complicated laboratory procedures. Many are anxiety provoking, e.g. blood tests. Others are

---

strongly affected by extraneous variables.\textsuperscript{3}

Urinary potassium excretion as an index avoids many of these difficulties. Adrenal cortical response varies according to stress and urinary potassium excretion, in turn, is closely tied to adrenal cortical activity.\textsuperscript{4,5,6} L. Frances Pride describes a number of characteristics of urinary potassium which favour its use as a measure of autonomic activation.\textsuperscript{7} These include: (a) It is not affected by serum potassium levels; (b) It is not markedly affected by caloric restriction; (c) It is not markedly affected by posture and activity; (d) Potassium is stable in solution so that urine specimens do not require special treatment.

\textsuperscript{3}M.H. Lader and Lorna Wing, \textit{Physiological Measures, Sedative Drugs, Morbid Anxiety}, (London: Oxford University, 1966).


\textsuperscript{7}L. Frances Pride, "An Adrenal Stress Index as a Criterion Measure for Nursing," \textit{Nursing Research}, XVII (July-August, 1968), 299.
A 24 hour measure reflects the general level of anxiety for that period whereas measures such as galvanic skin response, heart rate and blood tests represent levels at brief moments in time and are further complicated in some cases by circadian rhythms (blood and urine 17 hydroxy-corticosteriods, sodium, potassium, etc., exhibit diurnal curves). 8

All urine potassium testing for the study was carried out by the Clinical Chemistry Division of the general hospital laboratory. Measurements of 24 hour urinary potassium excretion in millequivalents were made by the standard method of flame photometry using an Instrumentation Laboratories Model 143 Flame Photometer.

**IPAT Anxiety Scale Questionnaire.** This measure is an easily administered, widely used 40 item questionnaire. 9 It is applicable to all but the lowest educational levels and is appropriate for subjects from 14 or 15 years and up. When the subject is directed to answer the questions according to how he feels "right-now" the scale measures anxiety-state. It is claimed to be sensitive to changes in anxiety levels due to psychotherapy, medication, change in situation, change in situation,

8 Doe et al., op.cit.

etc.\textsuperscript{10} The scale has a high degree of validity and reliability. Construct ("internal") validity is estimated at $+ .85$ to $+ .90$. Clinical judgements of anxiety and diagnostic classification of patients show strong correlation with IPAT Anxiety Scale results to provide high "external" validity. Reliability of the test is reported as highly satisfactory. Dependability - reliability coefficient for test - retest at one week interval was $+ .93$.\textsuperscript{11}

**Setting of the Study.**

Three units (with a total of 60 beds) in a university health science center hospital and a 41 bed unit in a large urban general hospital provided the settings for the study which took place in 1971-72. These settings offer acute care for adult psychiatric patients and offer a similar range of treatment modalities. Both are teaching hospitals with students from a variety of disciplines - medicine, nursing, social work, rehabilitation medicine, etc. The general hospital has patients admitted under the service of private psychiatrists, while the health science center


\textsuperscript{11}R.B. Cattell, "Formulae and Table for Obtaining Validities and Reliabilities of Extended Factor Scales," *Educational and Psychological Measurement*, XVII (Fall, 1957), 491-98.
patients are treated exclusively by psychiatric residents and medical students under the supervision of their clinical directors. Since both hospitals are tertiary care referral centers, patients may come from anywhere in the Province of British Columbia but are mostly from the metropolitan Vancouver area.

The Sample

The sample was selected from patients admitted to the adult psychiatric in-patient services described above. Criteria for selection were based upon (i) ethical considerations, (ii) certain physiological conditions which affect urinary potassium excretion, (iii) psychosocial conditions affecting stress, and (iv) conditions affecting the teachability of the relaxation method. These criteria are:

(a) Consent of the patient's physician.

(b) Informed consult of the patient as defined by the Ad Hoc Committee on Rights of Human Subjects.\(^{12}\)

(c) 65 years of age or less. Adrenocortical activity is reported to be lessened in men over 65 years of age.

(d) Absence of the following conditions, (as evidenced by the medical history) all of which affect

\(^{12}\)General Statement of the Ad Hoc Committee on Rights of Human Subjects, University of British Columbia School of Nursing, November 18, 1971.

(e) Not menstruating when urine specimens taken. Menstrual blood could contaminate specimens.

(f) No change in psychotropic medications (sedatives, tranquilizers, antidepressants) during the time of the study procedure and for three days previously. These drugs have marked effects on autonomic nervous system function.¹³

(g) Hospitalized for three days or more, at time of selection, to exclude the variable of admission anxiety.¹⁴,¹⁵

(h) English speaking.

(i) In contact with reality as indicated by medical history, nurse's notes and diagnosis (i.e. diagnosis other than psychosis).


The physiological criteria are drawn from the previously cited investigation by Pride, of the effect of an interpersonal nursing approach in relieving stress, in which she employed urinary potassium levels as a criterion measure.16

The total sample of 36 subjects was drawn from consecutive admissions to the psychiatric units described, who met the above criteria for selection. Subjects who dropped out of the study because they were found later not to meet the criteria or because they failed to collect the urine specimens as directed, were replaced in each case by the next subject to be selected.

The ages of the subjects ranged from 21 to 64 years with an average of $43 \pm 11.60$ years (mean ± one standard deviation). There were 25 females and 11 males. Evidence that subjects met the criteria was derived from medical records and patient interview by the chief investigator. Twelve subjects were assigned to each of three groups by randomized block design.17 Individuals in Group 1 ("Relaxation") received training in the relaxation technique. Individuals in Group 2 ("Placebo") received equivalent nursing time devoted to a placebo procedure. Group 3

16 Pride, op. cit.

("Control") individuals received the usual ward care but no special approach. The term "Group" denotes subjects receiving a specific treatment, but not that subjects received the specific treatment in a group. All treatments were administered individually.

**Treatment and Control Methods**

The design schedule of 24 hour urine tests, anxiety scale questionnaire tests and administration of relaxation training or relaxation placebo is shown in Appendix B. The 24 hour urine specimens were collected in a standard manner, i.e. the subject voided and discarded urine at 0800 hours on the first morning and collected all subsequent voiding up to and including a final voiding at 0800 hours on the following morning.

Subjects were all introduced to the study by the principal investigator who explained that she was a graduate nursing student working on a master's thesis. Each subject received the same general explanation: "I am conducting a study to measure changes in stress over a five day period of hospitalization." Added to this sentence for individuals in the "Relaxation" group was the statement, "...in which you would receive a relaxation training programme." For individuals in the "Placebo" group the sentence was completed, "...in which you would have regular relaxation periods." The general explanation continues: "It will in-
volve collecting a 24 hour urine specimen on the first day and again on the final day, as well as answering a brief questionnaire on the same two days. Would you consider taking part in the study? If you decide to do so you have the option of discontinuing participation at any time. Are there any questions you would like to ask?" Subjects were also informed that the results of the tests would be explained to them after the final results were received.

Six assistants as well as the principal investigator participated in individual supervision of the "Relaxation" and "Placebo" treatment sessions, and in administering the Anxiety Scale Questionnaire. The assistants were senior undergraduate student nurses from the general hospital school of nursing and the university school of nursing. Assistants received a full explanation of the study and a session of Relaxation Technique training before taking part. They also received instruction regarding the use of the Anxiety Scale Questionnaire.

The experimental schedule began on Monday mornings at 0800 hours and concluded on Saturday mornings at 0800 hours. Each subject in the study collected a first 24 hour urine sample from 0800 hours on Day 1, until 0800 hours on Day 2 and a second sample from 0800 hours on Day 5 to 0800 hours on Day 6. Each subject completed an Anxiety Scale Questionnaire on the Day 1 evening and repeated this test on Friday (Day 5) evening.
Ward nurses were not informed regarding the group to which individual subjects belonged and were requested to refer the subjects to the investigator or her assistants if they had further questions about the study.

The "Relaxation" and "Placebo" treatment sessions were conducted in the patient's own room if he was in a single room, or in a treatment room, or by asking the other patients to remain out of the room if the subject was in a semi-private room and no other room was available when needed. The general hospital had an acute shortage of space which required these less than ideal conditions.

Group 1: "Relaxation". Each subject in this group received the following additional information: "A nurse, either one of my assistants or myself, sits with you while you follow tape-recorded instructions for a simple relaxation technique. The technique consists of controlled breathing and systematic muscle relaxation. You control your breathing by following the timing as directed on the tape-recording for six complete cycles - a cycle consists of breathing in, holding it, and breathing out. Following this you tense muscles, recognize the tension and then relax as fully as possible, moving in sequence from muscle groups in the head and neck to arms, trunk, legs and finally feet. You lie on a bed to do the relaxation exercises which take about twelve minutes per session. The sessions are held three times a day - morning, afternoon and evening - for
four days. They are timed so that they don't interfere with your regular treatment programme. I will arrange to have a quiet room where you will not be interrupted.

Subjects in Group 1 received "Relaxation" Technique training sessions morning, afternoon and evening on Days 2, 3, 4 and 5. The subject was told to wear loose clothes and to remove his shoes for each session. The room was slightly darkened and a "Do Not Disturb" sign was placed on the door. The subject was instructed to lay on his back with his eyes closed and as comfortably as possible. Prior to the initial session he was also instructed to relax his abdominal muscles while breathing in and to contract these muscles while breathing out and to breathe smoothly and evenly. It was stressed that it was unimportant how "well" the subject performed the exercises. The nurse sitting with the patient also followed the taped instructions. The nurse spoke only briefly with the patient before and after the sessions except for clarifications (if requested) of the relaxation training procedure.

Group 2: "Placebo". Subjects in the "Placebo" group also received additional information regarding their treatment schedule. "A nurse, either one of my assistants or myself, sits with you while you relax as deeply as you are able. You lie on a bed for the relaxation period of twelve minutes. You have three relaxation periods a day - morning, afternoon and evening - for four days. They are
timed so that they don't interfere with your regular treatment programme. I will arrange to have a quiet room where you will not be disturbed."

Subjects in Group 2 received "Placebo Treatment with the same scheduling and under the same conditions as the subjects in Group 1 received relaxation training, but without any instruction other than to lie quietly and relax. The nurse sitting with the patient also relaxed as much as possible and informed the patient when the twelve minutes period had passed.

**Group 3: "Control".** Subjects in the "Control" group received both the standard 24 hour urine tests and Anxiety Scale Questionnaire test on Day 1 and Day 5. They received no treatment other than the usual treatment on the unit. They were seen by the investigator or her assistant only during the request for participation in this study, explanation of the collection procedure for the urine specimens and administration of the Anxiety Scale Questionnaires.

**Specific Objectives of the Study**

(i) To test the effectiveness of the "Relaxation" Technique by investigating changes in level of autonomic activation as reflected by urinary potassium excretion.

(ii) To test the effectiveness of the "Relaxation" Technique by investigating changes in behavioural level
of anxiety as reflected by IPAT Anxiety Scale Questionnaire Scores.

Hypotheses

(1) There will be no significant difference in changes in 24 hour urinary potassium excretion in milli-equivalents between groups receiving "Relaxation" treatment, "Placebo" treatment and "Control" treatment.

(2) There will be no significant difference in changes in IPAT Anxiety Scale Questionnaire scores between groups receiving "Relaxation" treatment, "Placebo" treatment and "Control" treatment.

Analysis of Data

Tabulations were made of urinary potassium excretion in milli-equivalents on Day 1 and Day 5 for subjects in each group, and changes in amount noted. Similarly, IPAT Anxiety Questionnaire Scale scores on Day 1 and Day 5 for subjects in each group, and changes in scores, were tabulated.

Inspection of the distribution of scores revealed that the groups have markedly unequal variances therefore nonparametric tests of the hypotheses were made. The Kruskal-Wallace One-Way Analysis of Variance tests the null hypothesis, that "k" independent samples have been drawn
from the same population in regard to averages. The variable measured must have a continuous distribution and be, at least, an ordinal measurement. The Kruskal-Wallis method is termed the most efficient non-parametric test for "k" independent samples with a power-efficiency of 95.5 percent as compared with the most powerful parametric test, the "F" test.\textsuperscript{18}

All measures in all samples are ranked together with the smallest score ranked as 1, the second smallest as 2 and so on. The sum of the ranks for measures in each sample is then computed. The formula for the Kruskal-Wallis test is:

\[
H = \frac{12}{N (N + 1)} \sum_{j=1}^{k} \frac{R_j^2}{n_j} - 3 (N + 1)
\]

- \(k\) = number of samples (treatments)
- \(n_j\) = number of cases in \(j^{th}\) sample
- \(N = \sum n_j\), the number of cases in all combined samples
- \(R_j\) = sum of ranks in \(j^{th}\) sample
- \(\sum_{j=1}^{k}\) directs one to sum over the \(k\) samples

Statistically, ranks are expected to be distributed randomly between the groups if the null hypothesis is true. For samples larger than 5 the chi-square approximation to the sampling distribution of \( H \) is adequate and these tables were used for the purpose of the present study.\(^1^9\) Changes in amount of potassium excreted in twenty-four hours and changes in IPAT Anxiety Scale Questionnaire scores on Day 5 as compared with Day 1 were rank ordered for subjects in all three groups being tested. The size of \( H \) computed was compared with the "Table of Critical Values of Chi Square" to discover whether significant differences in average amounts or scores, for the two measures, existed between the three groups. When \( H \) was found to be less than the tabled value at the five percent (\( p \geq 0.05 \)) level of significance the differences between the groups was regarded as lacking statistical significance and the null hypothesis was accepted.

When the null hypothesis was rejected comparisons were then made between two groups at a time to discover what differences exist. Once again a nonparametric test was employed to avoid the restrictive requirement of normality and homogeneity of variance associated with the "t" test. The Mann-Whitney \( U \) Test is described as a powerful and useful test of whether two samples are signif-

\(^1^9\)Segal, op.cit. p.249.
Scores for both groups are ranked together in the same manner as for the Kruskal-Wallis test and, similarly, the sum of the ranks for each group computed. The test can be one-tailed and assert that one group has higher scores than the other, or two-tailed and assert only that there will be a difference in scores. The one-tailed test was applied in this study.

\( U \) refers to the number of times that a score (or amount) in one group is higher than a score in another group. The formula for the Mann-Whitney \( U \) Test is as follows:

\[
U = n_1 n_2 + \frac{n_1 (n_1 + 1)}{2} - R_1 \text{ (or } R_2 \text{)}
\]

where

- \( n_1 \) = group presumed to have higher scores
- \( n_2 \) = group presumed to have lower scores
- \( R_1 \) = sum of ranks assigned to \( n_1 \) group
- \( R_2 \) = sum of ranks assigned to \( n_2 \) group

The formula as used here applies to samples of equal size. \( R_1 \) or \( R_2 \) is used according to which gives the smaller value of \( U \). Statistically, ranks are expected to be distributed randomly between the two groups if the null hypothesis is true. If the distribution differs beyond


\[21\] Ibid, p. 278.
certain limits of chance for the size of the sample we can then assume that there is a significant difference in scores between the two groups.

Changes in amount of potassium excreted in twenty-four hours, and changes in IPAT Anxiety Questionnaire scores, on Day 5 as compared with Day 1 were rank ordered for subjects in the two groups being tested. The size of $U$ computed was compared with tables of "Critical Values of $U$ in the Mann Whitney Test" to discover whether significant differences in scores or amounts between groups existed for these two measures. For the purpose of this study when the observed value of $U$ was equal to, or larger than, the five percent ($p < 0.05$) level the null hypothesis was rejected.

---

Chapter 4

FINDINGS OF THE STUDY

The findings of the study will be presented and discussed individually in terms of the two independent variables tested, firstly, urinary potassium excretion and, secondly, IPAT Anxiety Scale Questionnaire Scores.

The Urine Potassium Measure

The normal range of values stated for urinary potassium excretion in a twenty-four hour period varies somewhat from text to text. White, Handler and Smith give an average value "for the American population living on an ordinary diet" as 35 to 50 millequivalents.\(^1\) The mean values for each of the three groups in the study on both Day 1 and Day 5 are somewhat above this norm. Tables 4-1, 4-2 and 4-3 show twenty-four hour urinary potassium excretion in millequivalents for subjects in each group on Day 1 and Day 5 and also changes in amounts excreted on Day 5 as compared with Day 1. Mean values for each measure

TABLE 4-1

Changes in 24 Hour Urinary Potassium Excretion Between Day 1 and Day 5 for Subjects in Group 1: "Relaxation"

<table>
<thead>
<tr>
<th>Subject</th>
<th>Day 1 meq K</th>
<th>Day 2 meq K</th>
<th>Change meq K</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>51</td>
<td>57</td>
<td>+ 6</td>
</tr>
<tr>
<td>2</td>
<td>79</td>
<td>74</td>
<td>- 5</td>
</tr>
<tr>
<td>3</td>
<td>60</td>
<td>57</td>
<td>- 3</td>
</tr>
<tr>
<td>4</td>
<td>102</td>
<td>113</td>
<td>+ 11</td>
</tr>
<tr>
<td>5</td>
<td>43</td>
<td>54</td>
<td>+ 11</td>
</tr>
<tr>
<td>6</td>
<td>62</td>
<td>47</td>
<td>- 15</td>
</tr>
<tr>
<td>7</td>
<td>41</td>
<td>27</td>
<td>- 14</td>
</tr>
<tr>
<td>8</td>
<td>67</td>
<td>47</td>
<td>- 20</td>
</tr>
<tr>
<td>9</td>
<td>84</td>
<td>72</td>
<td>- 12</td>
</tr>
<tr>
<td>10</td>
<td>75</td>
<td>37</td>
<td>- 38</td>
</tr>
<tr>
<td>11</td>
<td>33</td>
<td>24</td>
<td>- 9</td>
</tr>
<tr>
<td>12</td>
<td>107</td>
<td>84</td>
<td>- 23</td>
</tr>
</tbody>
</table>

ΣX: 804 693 -111
N: 12 12 12
X̄: 67.00 57.75 -9.25

Range: 107 to 33 113 to 24 +11 to -38
### TABLE 4-2

Changes in 24 Hour Urinary Potassium Excretion Between Day 1 and Day 5 for Subjects in Group 2: "Placebo"

<table>
<thead>
<tr>
<th>Subject</th>
<th>Day 1 meq K</th>
<th>Day 2 meq K</th>
<th>Change meq K</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>103</td>
<td>140</td>
<td>+ 37</td>
</tr>
<tr>
<td>14</td>
<td>93</td>
<td>109</td>
<td>+ 16</td>
</tr>
<tr>
<td>15</td>
<td>147</td>
<td>60</td>
<td>- 87</td>
</tr>
<tr>
<td>16</td>
<td>87</td>
<td>23</td>
<td>- 64</td>
</tr>
<tr>
<td>17</td>
<td>18</td>
<td>17</td>
<td>- 1</td>
</tr>
<tr>
<td>18</td>
<td>129</td>
<td>93</td>
<td>- 36</td>
</tr>
<tr>
<td>19</td>
<td>39</td>
<td>25</td>
<td>- 14</td>
</tr>
<tr>
<td>20</td>
<td>32</td>
<td>49</td>
<td>+ 17</td>
</tr>
<tr>
<td>21</td>
<td>37</td>
<td>43</td>
<td>+ 6</td>
</tr>
<tr>
<td>22</td>
<td>36</td>
<td>41</td>
<td>+ 5</td>
</tr>
<tr>
<td>23</td>
<td>70</td>
<td>78</td>
<td>+ 8</td>
</tr>
<tr>
<td>24</td>
<td>79</td>
<td>73</td>
<td>- 6</td>
</tr>
</tbody>
</table>

**ΣX**: 870 751 -119

**N**: 12 12 12

**X**: 72.50 62.58 9.92

Range: 147 to 18 140 to 17 +37 to -87
<table>
<thead>
<tr>
<th>Subject</th>
<th>Day 1 meq K</th>
<th>Day 5 meq K</th>
<th>Change meq K</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>55</td>
<td>32</td>
<td>-23</td>
</tr>
<tr>
<td>26</td>
<td>53</td>
<td>28</td>
<td>-25</td>
</tr>
<tr>
<td>27</td>
<td>22</td>
<td>34</td>
<td>+12</td>
</tr>
<tr>
<td>28</td>
<td>39</td>
<td>76&quot;</td>
<td>+37</td>
</tr>
<tr>
<td>29</td>
<td>88</td>
<td>146</td>
<td>+58</td>
</tr>
<tr>
<td>30</td>
<td>53</td>
<td>64</td>
<td>+11</td>
</tr>
<tr>
<td>31</td>
<td>55</td>
<td>45</td>
<td>-10</td>
</tr>
<tr>
<td>32</td>
<td>54</td>
<td>61</td>
<td>+7</td>
</tr>
<tr>
<td>33</td>
<td>92</td>
<td>70</td>
<td>-22</td>
</tr>
<tr>
<td>34</td>
<td>82</td>
<td>88</td>
<td>+6</td>
</tr>
<tr>
<td>35</td>
<td>60</td>
<td>29</td>
<td>-31</td>
</tr>
<tr>
<td>36</td>
<td>42</td>
<td>64</td>
<td>+22</td>
</tr>
</tbody>
</table>

\[ \sum X: \quad 695 \quad 737 \quad +42 \]

\[ N: \quad 12 \quad 12 \quad 12 \]

\[ \bar{X}: \quad 57.92 \quad 61.42 \quad +3.50 \]

Range: 92 to 22, 146 to 28, +58 to -31
have been computed.

Group 1: "Relaxation". Values in this group ranged from 107 to 33 millequivalents with a mean of 67 millequivalents. On Day 5 the values varied from 113 to 24 millequivalents and showed a mean of 57.75 millequivalents. Changes in level of urinary potassium excretion for twenty-four hours ranged between +11 and -38 millequivalents, the mean value being -9.25. Nine subjects showed a decrease in potassium excretion while three subjects showed an increase.

Group 2: "Placebo". Subjects in this group demonstrated wider ranges of values on Day 1 and on Day 5 as well as higher mean millequivalents of urinary potassium excretion as compared with Group 1 (see Table 4.2). The range of change for subjects receiving the "Placebo" treatment was from +37 to -87. The mean change, -9.92 was fractionally higher than that of Group 1. Six subjects had higher levels of potassium excretion on Day 5 and six had lower levels.

Group 3: "Control". The "Control" group had the smallest range of millequivalents of potassium excreted and the lowest mean value (57.9) of all groups on Day 1. This group, unlike the other groups, showed an increase in mean millequivalents of potassium excreted on Day 5 as compared with Day 1. Seven subjects showed increased levels
of potassium excretion while five subjects had decreased levels.

Comparison of Groups: Urinary Potassium Excretion Levels. The first hypothesis to be tested asserts that there will be no significant difference in changes in 24 hour urinary potassium excretion in millequivalents between groups. Table 4-4 shows the statistical comparison using the Kruskal-Wallis One-Way Analysis of Variance by Ranks. The changes in 24 hour urinary potassium excretion in millequivalents on Day 5 as compared with Day 1 are given for 36 subjects belonging to the three groups - "Relaxation," "Placebo" and "Control." The amounts of change have been ranked in a single series as required by the test. The sums of ranks within each group is shown and the value of "H" is computed. The value of "H" required to reject the null hypothesis at the 0.05 level of probability is 5.99 or greater according to the Table of Critical Values of Chi Square.\(^2\) Since the observed value of "H" is 1.4474 the null hypothesis is accepted. Differences between the groups can be explained on the basis of chance variations alone.

### TABLE 4-4

Kruskal-Wallis One-Way Analysis of Variance by Ranks of Changes in Urinary Potassium Excretion in Millequivalents of Groups Receiving "Relaxation," "Placebo" and "Control" Treatments

<table>
<thead>
<tr>
<th>&quot;Relaxation&quot;</th>
<th>Rank Among N=36</th>
<th>&quot;Placebo&quot;</th>
<th>Rank Among N=36</th>
<th>&quot;Control&quot;</th>
<th>Rank Among N=36</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 6</td>
<td>23</td>
<td>+ 37</td>
<td>34.5</td>
<td>- 23</td>
<td>7.5</td>
</tr>
<tr>
<td>- 5</td>
<td>18</td>
<td>+ 16</td>
<td>31</td>
<td>- 25</td>
<td>6</td>
</tr>
<tr>
<td>- 3</td>
<td>19</td>
<td>- 87</td>
<td>1</td>
<td>+ 12</td>
<td>30</td>
</tr>
<tr>
<td>+ 11</td>
<td>28</td>
<td>- 64</td>
<td>2</td>
<td>+ 37</td>
<td>34.5</td>
</tr>
<tr>
<td>+ 11</td>
<td>28</td>
<td>- 1</td>
<td>20</td>
<td>+ 58</td>
<td>36</td>
</tr>
<tr>
<td>- 15</td>
<td>11</td>
<td>- 36</td>
<td>4</td>
<td>+ 11</td>
<td>28</td>
</tr>
<tr>
<td>- 14</td>
<td>12.5</td>
<td>- 14</td>
<td>12.5</td>
<td>- 10</td>
<td>15</td>
</tr>
<tr>
<td>- 20</td>
<td>10</td>
<td>+ 17</td>
<td>32</td>
<td>- 7</td>
<td>25</td>
</tr>
<tr>
<td>- 12</td>
<td>14</td>
<td>+ 6</td>
<td>23</td>
<td>- 22</td>
<td>9</td>
</tr>
<tr>
<td>- 38</td>
<td>3</td>
<td>+ 5</td>
<td>21</td>
<td>+ 6</td>
<td>23</td>
</tr>
<tr>
<td>- 9</td>
<td>16</td>
<td>+ 8</td>
<td>26</td>
<td>- 31</td>
<td>5</td>
</tr>
<tr>
<td>- 23</td>
<td>7.5</td>
<td>- 6</td>
<td>17</td>
<td>+ 22</td>
<td>33</td>
</tr>
</tbody>
</table>

\[
R_1 = 190.0 \quad R_2 = 224.0 \quad R_3 = 252.0
\]

\[
H = \frac{12}{N(N+1)} \sum_{j=1}^{k} \frac{R_j^2}{n_j} - 3(N+1)
\]

\[
= \frac{12}{36(37)} \left( \frac{190^2}{12} + \frac{224^2}{12} + \frac{252^2}{12} \right) - 3(37)
\]

\[
= 1.4474 \quad p > 0.05
\]
The IPAT Anxiety Scale Questionnaire

The raw scores of Anxiety Scale Questionnaires were used. Scores can range from 0 to 80 on the Questionnaire. The raw score mean for the general population is 27.1. The mean scores for all three groups in the study, both on Day 1 and Day 5 are considerably above the norm. (The subjects were, of course, selected from a population defined as suffering from excessive anxiety.) All mean scores were above the eighty-ninth percentile. Tables 4-5, 4-6 and 4-7 show Anxiety Scale Questionnaire scores for subjects in each group on Day 1 and Day 5, as well as changes in scores on Day 5 as compared with Day 1.

Group 1: "Relaxation". Subjects in Group 1 showed a mean score of 50 on the Anxiety Scale before receiving relaxation training. This represents a mean score above the ninety-sixth percentile for the general population as demonstrated in a table for conversion of total anxiety raw scores to percentiles. The mean score for the group on Day 5, after four days of relaxation training, fell to 45.5 (eighty-ninth percentile). The range for Day 1 extended from 72 to 32 and for Day 5 from 69 to 22. Changes ranged from +4 to -15 with a mean change of -4.5. Three

---

4 Ibid.
### TABLE 4-5

Changes in IPAT Anxiety Scale Questionnaire Scores Between Day 1 and Day 5 for Subjects in Group 1: "Experimental"

<table>
<thead>
<tr>
<th>Subject</th>
<th>Day 1 IPAT Score</th>
<th>Day 2 IPAT Score</th>
<th>Change IPAT Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>48</td>
<td>49</td>
<td>+ 1</td>
</tr>
<tr>
<td>2</td>
<td>40</td>
<td>44</td>
<td>+ 4</td>
</tr>
<tr>
<td>3</td>
<td>32</td>
<td>28</td>
<td>- 4</td>
</tr>
<tr>
<td>4</td>
<td>66</td>
<td>51</td>
<td>- 15</td>
</tr>
<tr>
<td>5</td>
<td>48</td>
<td>42</td>
<td>- 6</td>
</tr>
<tr>
<td>6</td>
<td>37</td>
<td>22</td>
<td>- 15</td>
</tr>
<tr>
<td>7</td>
<td>53</td>
<td>42</td>
<td>- 11</td>
</tr>
<tr>
<td>8</td>
<td>46</td>
<td>42</td>
<td>- 4</td>
</tr>
<tr>
<td>9</td>
<td>39</td>
<td>42</td>
<td>+ 3</td>
</tr>
<tr>
<td>10</td>
<td>72</td>
<td>69</td>
<td>- 3</td>
</tr>
<tr>
<td>11</td>
<td>60</td>
<td>56</td>
<td>- 4</td>
</tr>
<tr>
<td>12</td>
<td>59</td>
<td>59</td>
<td>0</td>
</tr>
</tbody>
</table>

\[
\Sigma X: \quad 600 \quad 546 \quad - 54
\]

\[
N: \quad 12 \quad 12 \quad 7 \quad 12
\]

\[
\bar{X}: \quad 50 \quad 45.5 \quad - 4.5
\]

Range: 72 to 32 69 to 22 +4 to -15
<table>
<thead>
<tr>
<th>Subject</th>
<th>Day 1 IPAT Score</th>
<th>Day 2 IPAT Score</th>
<th>Change IPAT Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>61</td>
<td>61</td>
<td>0</td>
</tr>
<tr>
<td>14</td>
<td>68</td>
<td>60</td>
<td>-8</td>
</tr>
<tr>
<td>15</td>
<td>50</td>
<td>51</td>
<td>+1</td>
</tr>
<tr>
<td>16</td>
<td>56</td>
<td>43</td>
<td>-13</td>
</tr>
<tr>
<td>17</td>
<td>54</td>
<td>60</td>
<td>+6</td>
</tr>
<tr>
<td>18</td>
<td>41</td>
<td>55</td>
<td>+14</td>
</tr>
<tr>
<td>19</td>
<td>36</td>
<td>40</td>
<td>+4</td>
</tr>
<tr>
<td>20</td>
<td>54</td>
<td>56</td>
<td>+2</td>
</tr>
<tr>
<td>21</td>
<td>62</td>
<td>44</td>
<td>-18</td>
</tr>
<tr>
<td>22</td>
<td>32</td>
<td>30</td>
<td>-2</td>
</tr>
<tr>
<td>23</td>
<td>56</td>
<td>32</td>
<td>-24</td>
</tr>
<tr>
<td>24</td>
<td>37</td>
<td>39</td>
<td>+2</td>
</tr>
</tbody>
</table>

\[ \sum X: \quad 607 \quad 571 \quad -36 \]

\[ N: \quad 12 \quad 12 \quad 12 \]

\[ \bar{X}: \quad 50.58 \quad 47.58 \quad -3 \]

Range: 68 to 32  61 to 30  +14 to -24
individuals showed increased scores, eight showed decreased scores while one individual maintained the same score. Group 1 scores on Day 1 and Day 5, and changes in score are found in Table 4-5.

Group 2: "Placebo". Group 2 scores as shown in Table 4-8 reveal a range of 68 to 32 with a mean value of 50.58 before receiving the "Placebo" treatment approach and a range of 61 to 30 on Day 5, with the mean value having dropped to 47.58. The range of changes in score after receiving the "Placebo" treatment approach was +14 to -24 with a mean change of -3. Six subjects exhibited increased scores, five showed decreased scores and one subject showed no change.

Group 3: "Control". Group 3 mean score of 45.58 for Day 1 was lower than equivalent scores for the other two groups. Also unlike the "Relaxation" or "Placebo" treatment groups, the "Control" group mean score for Day 5 showed an increase. The mean increase was +2.5 while the range of change was from +7 to -5. Only three subjects showed decreased scores while nine subjects displayed increased scores.

Comparison of Groups: IPAT Anxiety Scale Questionnaire Scores. Hypothesis 2 states that there will be no significant difference in changes in level of IPAT Anxiety Scale Questionnaire scores between groups. Table
<table>
<thead>
<tr>
<th>Subject</th>
<th>Day 1 IPAT Score</th>
<th>Day 2 IPAT Score</th>
<th>Change IPAT Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>56</td>
<td>51</td>
<td>- 5</td>
</tr>
<tr>
<td>26</td>
<td>45</td>
<td>47</td>
<td>+ 2</td>
</tr>
<tr>
<td>27</td>
<td>39</td>
<td>38</td>
<td>- 1</td>
</tr>
<tr>
<td>28</td>
<td>30</td>
<td>36</td>
<td>+ 6</td>
</tr>
<tr>
<td>29</td>
<td>61</td>
<td>65</td>
<td>+ 4</td>
</tr>
<tr>
<td>30</td>
<td>42</td>
<td>41</td>
<td>- 1</td>
</tr>
<tr>
<td>31</td>
<td>57</td>
<td>60</td>
<td>+ 3</td>
</tr>
<tr>
<td>32</td>
<td>28</td>
<td>30</td>
<td>+ 2</td>
</tr>
<tr>
<td>33</td>
<td>48</td>
<td>55</td>
<td>+ 7</td>
</tr>
<tr>
<td>34</td>
<td>30</td>
<td>35</td>
<td>+ 5</td>
</tr>
<tr>
<td>35</td>
<td>57</td>
<td>62</td>
<td>+ 5</td>
</tr>
<tr>
<td>36</td>
<td>54</td>
<td>59</td>
<td>+ 5</td>
</tr>
</tbody>
</table>

Σ X: 547 579 + 32
N: 12 12 12
X̄: 45.58 48.25 + 2.67

Range: 61 to 28 65 to 30 +7 to -5
4-8 displays the Kruskal-Wallis One-Way Analysis of Variance by Ranks of the three groups. "H" is computed to be 7.8227. The appropriate table discloses that if \( H \geq 7.82 \) with \( df = k - 1 = 7 \) the probability of occurrence of the null hypothesis is less than 0.02. Therefore, we reject \( H \) and conclude that there is a significant difference between groups in changes in IPAT scores. Since the Kruskal-Wallis technique shows only the overall comparison between groups, further testing between groups was carried out to compare the results shown by individual groups. The Mann Whitney \( U \) Test was employed for this purpose. The one-tailed test was used, where the hypothesis to be tested asserts the difference in scores will be directional, i.e. that one of the groups will have higher scores.

Table 4-9 shows the findings when Group 1 and Group 2 are compared. The hypothesis tested states that there will be no significantly greater decline in IPAT Anxiety Scale Questionnaire scores for subjects who received the "Relaxation" treatment as compared with subjects who received the "Placebo" treatment. The \( U \) value of 57.5 exceeds a probability of 0.05 that differences occurred by chance alone. Therefore the null hypothesis is tenable and hypothesis (i) is rejected.

The second hypothesis tested asserts that there will be a significantly greater decline in IPAT Anxiety
TABLE 4-8
Kruskal-Wallis One-Way Analysis of Variance by Ranks of Changes in IPAT Anxiety Scale Questionnaire Scores of Groups Receiving "Relaxation," "Placebo" and "Control" Treatments

<table>
<thead>
<tr>
<th>&quot;Relaxation&quot; Change in Score</th>
<th>Rank Among N=36</th>
<th>&quot;Placebo&quot; Change in Score</th>
<th>Rank Among N=36</th>
<th>&quot;Control&quot; Change in Score</th>
<th>Rank Among N=36</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 1</td>
<td>19.5</td>
<td>0</td>
<td>17.5</td>
<td>- 5</td>
<td>9</td>
</tr>
<tr>
<td>+ 4</td>
<td>28</td>
<td>- 8</td>
<td>7</td>
<td>+ 2</td>
<td>22.5</td>
</tr>
<tr>
<td>- 4</td>
<td>11</td>
<td>+ 1</td>
<td>19.5</td>
<td>- 1</td>
<td>15.5</td>
</tr>
<tr>
<td>- 15</td>
<td>3.5</td>
<td>- 13</td>
<td>5</td>
<td>+ 6</td>
<td>33.5</td>
</tr>
<tr>
<td>- 6</td>
<td>8</td>
<td>+ 6</td>
<td>33.5</td>
<td>+ 4</td>
<td>28</td>
</tr>
<tr>
<td>- 15</td>
<td>3.5</td>
<td>+ 14</td>
<td>36</td>
<td>- 1</td>
<td>15.5</td>
</tr>
<tr>
<td>- 11</td>
<td>6</td>
<td>+ 4</td>
<td>28</td>
<td>+ 3</td>
<td>25.5</td>
</tr>
<tr>
<td>- 4</td>
<td>11</td>
<td>+ 2</td>
<td>22.5</td>
<td>+ 2</td>
<td>22.5</td>
</tr>
<tr>
<td>+ 3</td>
<td>25.5</td>
<td>- 18</td>
<td>2</td>
<td>+ 7</td>
<td>35</td>
</tr>
<tr>
<td>- 3</td>
<td>13</td>
<td>- 2</td>
<td>14</td>
<td>+ 5</td>
<td>31</td>
</tr>
<tr>
<td>- 4</td>
<td>11</td>
<td>- 24</td>
<td>1</td>
<td>+ 5</td>
<td>31</td>
</tr>
<tr>
<td>0</td>
<td>17.5</td>
<td>+ 2</td>
<td>22.5</td>
<td>+ 5</td>
<td>31</td>
</tr>
</tbody>
</table>

\[ R_1 = 157.5 \]
\[ R_2 = 208.5 \]
\[ R_3 = 300 \]

\[ H = \frac{12}{N(N+1)} \sum_{j=1}^{k} \frac{R_j}{n_j} - \frac{3}{2}(N+1) \]
\[ = \frac{12}{36(37)} \left( \frac{157.5^2}{12} + \frac{208.5^2}{12} + \frac{300^2}{12} \right) - \frac{3}{2}(37) \]
\[ = 7.8227 \]
\[ p < 0.02 \]
TABLE 4-9

Mann-Whitney U Test For Differences in Change in IPAT Anxiety Scale Questionnaire Scores Between Group 1: "Relaxation" and Group 2: "Placebo" (N = 24)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Change in Score</th>
<th>Rank Among N=24</th>
<th>Subject</th>
<th>Change in Score</th>
<th>Rank Among N=24</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+ 1</td>
<td>16.5</td>
<td>13</td>
<td>- 0</td>
<td>14.5</td>
</tr>
<tr>
<td>2</td>
<td>+ 4</td>
<td>21.5</td>
<td>14</td>
<td>- 8</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>- 4</td>
<td>10</td>
<td>15</td>
<td>+ 1</td>
<td>16.5</td>
</tr>
<tr>
<td>4</td>
<td>- 15</td>
<td>3.5</td>
<td>16</td>
<td>- 13</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>- 6</td>
<td>8</td>
<td>17</td>
<td>+ 6</td>
<td>23</td>
</tr>
<tr>
<td>6</td>
<td>- 15</td>
<td>3.5</td>
<td>18</td>
<td>+ 14</td>
<td>24</td>
</tr>
<tr>
<td>7</td>
<td>- 11</td>
<td>6</td>
<td>19</td>
<td>+ 4</td>
<td>21.5</td>
</tr>
<tr>
<td>8</td>
<td>- 4</td>
<td>10</td>
<td>20</td>
<td>+ 2</td>
<td>18.5</td>
</tr>
<tr>
<td>9</td>
<td>+ 3</td>
<td>20</td>
<td>21</td>
<td>- 18</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>- 3</td>
<td>12</td>
<td>22</td>
<td>- 2</td>
<td>13</td>
</tr>
<tr>
<td>11</td>
<td>- 4</td>
<td>10</td>
<td>23</td>
<td>- 24</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>14.5</td>
<td>24</td>
<td>+ 2</td>
<td>18.5</td>
</tr>
</tbody>
</table>

\[ \Sigma = R_1 = 135.5 \]
\[ \Sigma = R_2 = 164.5 \]

\[ U = n_1 n_2 + \frac{n_1 (n_1 + 1)}{2} - R_2 \]

\[ U = 144 + 78 - 164.5 = 55 \]

\[ p > 0.05 \text{ (one-tailed)} \]
TABLE 4-10

Mann-Whitney \( U \) Test for Differences in Change in IPAT Anxiety Scale Questionnaire Scores Between Group 1: "Relaxation" and Group 3: "Control" 
\( (N = 24) \)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Change in Score</th>
<th>Rank Among N=24</th>
<th>Subject</th>
<th>Change in Score</th>
<th>Rank Among N=24</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+ 1</td>
<td>13</td>
<td>25</td>
<td>- 5</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>+ 4</td>
<td>18.5</td>
<td>26</td>
<td>+ 2</td>
<td>14.5</td>
</tr>
<tr>
<td>3</td>
<td>- 4</td>
<td>7</td>
<td>27</td>
<td>- 1</td>
<td>10.5</td>
</tr>
<tr>
<td>4</td>
<td>- 15</td>
<td>1.5</td>
<td>28</td>
<td>+ 6</td>
<td>23</td>
</tr>
<tr>
<td>5</td>
<td>- 6</td>
<td>4</td>
<td>29</td>
<td>+ 4</td>
<td>18.5</td>
</tr>
<tr>
<td>6</td>
<td>- 15</td>
<td>1.5</td>
<td>30</td>
<td>- 1</td>
<td>10.5</td>
</tr>
<tr>
<td>7</td>
<td>- 11</td>
<td>3</td>
<td>31</td>
<td>+ 3</td>
<td>16.5</td>
</tr>
<tr>
<td>8</td>
<td>- 4</td>
<td>7</td>
<td>32</td>
<td>+ 2</td>
<td>14.5</td>
</tr>
<tr>
<td>9</td>
<td>+ 3</td>
<td>16.5</td>
<td>33</td>
<td>+ 7</td>
<td>24</td>
</tr>
<tr>
<td>10</td>
<td>- 3</td>
<td>9</td>
<td>34</td>
<td>+ 5</td>
<td>21</td>
</tr>
<tr>
<td>11</td>
<td>- 4</td>
<td>7</td>
<td>35</td>
<td>+ 5</td>
<td>21</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>12</td>
<td>36</td>
<td>+ 5</td>
<td>21</td>
</tr>
</tbody>
</table>

\[ \Sigma = R_1 = \frac{1}{2} n_1 (n_1 + 1) \]

\[ \Sigma = R_2 = \frac{1}{2} n_2 (n_2 + 1) \]

\[ U = \frac{n_1 n_2 + n_1 (n_1 + 1) - R_2}{2} \]

\[ U = 144 + 78 - 200 = 22 \]

\[ p > 0.001 < 0.01 \text{ (one-tailed)} \]
TABLE 4-11
Mann-Whitney \( U \) Test for Differences in Change in IPAT Anxiety Scale Questionnaire Scores Between Group 2: "Placebo" and Group 3: "Control" (\( N = 24 \))

<table>
<thead>
<tr>
<th>Subject</th>
<th>Change in Score</th>
<th>Rank Among N=24</th>
<th>Subject</th>
<th>Change in Score</th>
<th>Rank Among N=24</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>0</td>
<td>9</td>
<td>25</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>14</td>
<td>-8</td>
<td>4</td>
<td>26</td>
<td>+2</td>
<td>12.5</td>
</tr>
<tr>
<td>15</td>
<td>+1</td>
<td>10</td>
<td>27</td>
<td>-1</td>
<td>7.5</td>
</tr>
<tr>
<td>16</td>
<td>-13</td>
<td>3</td>
<td>28</td>
<td>+6</td>
<td>21.5</td>
</tr>
<tr>
<td>17</td>
<td>+6</td>
<td>21.5</td>
<td>29</td>
<td>+4</td>
<td>16.5</td>
</tr>
<tr>
<td>18</td>
<td>+14</td>
<td>24</td>
<td>30</td>
<td>-1</td>
<td>7.5</td>
</tr>
<tr>
<td>19</td>
<td>+4</td>
<td>16.5</td>
<td>31</td>
<td>+3</td>
<td>15</td>
</tr>
<tr>
<td>20</td>
<td>+2</td>
<td>12.5</td>
<td>32</td>
<td>+2</td>
<td>12.5</td>
</tr>
<tr>
<td>21</td>
<td>-18</td>
<td>2</td>
<td>33</td>
<td>+7</td>
<td>23</td>
</tr>
<tr>
<td>22</td>
<td>-2</td>
<td>6</td>
<td>34</td>
<td>+5</td>
<td>19</td>
</tr>
<tr>
<td>23</td>
<td>-24</td>
<td>1</td>
<td>35</td>
<td>+5</td>
<td>19</td>
</tr>
<tr>
<td>24</td>
<td>+2</td>
<td>12.5</td>
<td>36</td>
<td>+5</td>
<td>19</td>
</tr>
</tbody>
</table>

\[
\sum = R_1 = 122 \\
\sum = R_2 = 178 \\
U = \frac{n_1 n_2 + n_1 (n_1 + 1)}{2} - R_2 \\
U = 144 + 78 - 178 = 44 \\
p > 0.05 \text{ (one-tailed)}
\]
Scale Questionnaire scores for subjects who receive "Relaxation" treatment as compared with subjects who receive "Control" treatment. Table 4-10 displays the comparison of changes in Anxiety Scale scores of Group 1: "Relaxation" and Group 3: "Control". The $U$ measure of 22 has a probability of less than one percent of having happened by chance. The null hypothesis can be rejected and hypothesis (ii) accepted.

Mann-Whitney $U$ Test for differences between Group 2 and Group 3 is shown in Table 4-11. Hypothesis (iii) can be stated as follows: there will be a significantly greater decline in IPAT Anxiety Scale Questionnaire scores for subjects who receive "Placebo" treatment as compared with subjects who receive "Control" treatment. The Mann-Whitney $U$ Test for differences displays a probability greater than 5 percent that the differences can be explained on the basis of change. The null hypothesis is supported and hypothesis (iii) was rejected.

A discussion of these finding and of implications arising from the findings is given in the following chapter.
Chapter 5

DISCUSSION, LIMITATIONS, RECOMMENDATIONS

Interpretation of Findings

The goal of this study was to investigate the effectiveness of a relaxation technique in relieving excessive anxiety. A physiological (biochemical) and a psychological (affective) index were monitored, on the first and last days of the experimental period, as measures of level of anxiety. As measured by the IPAT Anxiety Scale Questionnaire there was a significant overall reduction in level of anxiety for subjects in Group 1 "Relaxation" in comparison with Group 3 "Control." Group 2 "Placebo" showed no significant difference from Group 1 or Group 3 when changes in Anxiety Scale scores were compared statistically.

The twenty-four hour urinary potassium excretion measure did not demonstrate significant differences in changes in level between the three groups although inspection shows similar trends in values between the three groups for both the physiological and the psychological measure. The mean changes in anxiety scale scores and urinary potassium excretion were as follows:
<table>
<thead>
<tr>
<th>GROUP</th>
<th>IPAT</th>
<th>URINE K</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-4.5</td>
<td>-9.25</td>
</tr>
<tr>
<td>2</td>
<td>-3.0</td>
<td>-9.92</td>
</tr>
<tr>
<td>3</td>
<td>+2.5</td>
<td>-3.50</td>
</tr>
</tbody>
</table>

Inspection of direction of individual scores in each group are suggestive also:

<table>
<thead>
<tr>
<th>IPAT SCORES</th>
<th>URINE K EXCRETION</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP</td>
<td>↑</td>
</tr>
<tr>
<td>-------</td>
<td>---</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>

Individual patient profiles show a wide range of difference in response. Some subjects in each group show increased scores or values indicative of increased anxiety or stress while other subjects showed decreases. Individuals may show an increase in one parameter and a decrease in the other.

The combined results for each group are:

Group 1: one subject increased in both
        six subjects decreased in both

Group 2: one subject increased in both
        one subject decreased in both

Group 3: five subjects increased in both
        one subject decreased in both

Once again inspection of scores and values suggests a greater
reduction in anxiety for Group 1 subjects.

Evidently some subjects are more responsive to the effects of the relaxation technique than others. The reasons for this difference in response are not clearly evident. Further studies are needed to identify the characteristics of subjects who would receive most benefit from relaxation training. Perhaps muscle relaxation is not entirely synonymous with relief of anxiety. Is there a difference in effectiveness of the technique for subjects with acute anxiety as compared with chronic anxiety? Probably there are differences in ability and desire in learning to follow the directions for relaxation. There was no measure made of whether or how much subjects relaxed. Would feedback have assisted the subjects to relax more effectively?

The effects of relaxation training could have been submerged by other factors. There are a multitude of extraneous variables in a clinical setting which might induce stress - the emotional climate of the psychiatric unit, the social situation of the subject, physical factors such as noise and dietary factors such as caffeine.

Another question posed by the results of the study is why the anxiety scale questionnaire demonstrated a difference between Group 1 and Group 3 while the urinary potassium measure did not? The answer may be derived from the fact that the Anxiety Scale measures a composite of all factors basic to anxiety while the urinary potassium measure is a
unitary factor and an indirect measure of stress. Stress might more accurately be measured by a multifactorial approach, i.e. overall urinary electrolyte excretion patterns.

Both the physiological and the psychological measure reveal a tendency to increasing stress or anxiety over the five day period for members of the "Control" group. Is this typical during the early weeks of hospitalization for this population? Studies with other patient populations have shown that "admission anxiety" has subsided by the end of the first week.

Limitations of the Study

Sample Size and Selection. This study involved a small sample of a special population. Generalizations cannot be made beyond this population (i.e. non-psychotic inpatients in acute care settings). Furthermore, the size and selection of the sample led to the use of nonparametric statistical analysis which lacks the power of parametric analysis.

Uncontrolled Extraneous Stimuli. Many extraneous variables were difficult or impossible to control. These include both physiological and psychological stimuli. Medi-

cations were constant for individual subjects but were not controlled across groups by matching subjects. Physiological stimuli such as tobacco or caffeine intake, as well as dietary intake, were not controlled. Noise, temperature and other physical stimuli vary from time to time. The emotional climate of psychiatric units also changes markedly with the passage of time. A variety of physicians and nurses provided the regular care for the subjects so that care was far from standardized.

Incomplete Placebo Effect. The "Placebo" treatment used may have provided an incomplete measure of the Hawthorne effect. Subjects in the "Placebo" group received equivalent nursing time and environmental control but the procedure for the "Relaxation" group involved a "machine" approach, the tape-recorder. Tapes were used to standardize instruction.

Urine Potassium Measure. There was not complete assurance that the twenty-four hour urine specimens were indeed complete. Subjects were responsible for collecting their own specimens.

Recommendations for Further Study

In view of the findings of this investigation the following recommendations for further study are made.

1. Subsequent studies using a larger sample should be carried out to support or reject the findings in
this investigation.

2. Use of multifactorial stress indices such as urinary electrolyte excretion profiles should be instituted as more accurate overall measures of physiological stress.

3. The Relaxation Technique should be tested with patients in other "high stress" areas or situations, for example, burn units, prior to cardiac surgery, patients with rheumatoid arthritis, cardiac rehabilitation patients, etc.

4. Studies should be conducted to identify which patients are most likely to respond favourably to the relaxation training.

5. Tape-recorded instructions of the Relaxation Technique should be compared for effectiveness with "live" instruction.

6. The Relaxation Technique should be tested for effectiveness using different schedules and numbers of treatments.

Summary

An experimental study was conducted to investigate the effectiveness of a Relaxation Technique in relieving excessive anxiety. Thirty-six non-psychotic, psychiatric inpatients were assigned at random to three groups. Subjects in Group 1 received individual relaxation training by means of a simple relaxation technique involving controlled breathing and muscle relaxation exercises. Group 2 subjects received individual placebo treatments on an equivalent
schedule to Group 1. Subjects in Group 3 received the ordinary ward care and no special approach. Level of anxiety was measured by a physiological index (twenty-four hour urinary potassium excretion) and a psychological scale (IPAT Anxiety Scale Questionnaire). Both measures were tested at the beginning and end of the five day experimental period and changes in levels between groups compared statistically.

Group 1 subjects were found to exhibit significantly greater declines in IPAT Anxiety Scale Questionnaire scores as compared with Group 3 subjects. No other statistically significant difference was found between groups. Inspection of individual IPAT scores and urine potassium values suggests however, that there is a marked difference in individual response, both physiologically and psychologically, to the "Relaxation" and the "Placebo" approach. The lack of consistency between the two measures (i.e. the change of urinary potassium excretion levels for Group 1 was not found to be significantly different from Group 3) may be explained by the fact that the Anxiety Scale Questionnaire is a multifactorial index while the urine potassium value measures only one physiological aspect of anxiety.
BIBLIOGRAPHY


Cattell, R.B. "Formulae and Table for Obtaining Validities and Reliabilities of Extended Factor Scales," *Educational and Psychological Measurement*, XVII (Fall, 1957), 491-98.


University of British Columbia School of Nursing. "General Statement of the Ad Hoc Committee on Rights of Human Subjects," Vancouver, British Columbia, November 18, 1971. (Mimeographed.)


APPENDICES
APPENDIX A

TEXT OF RELAXATION TECHNIQUE TAPE

Breathe in ... breathe in ... breathe in.
Hold it ... hold it ... hold it.
Breathe out ... breathe out ... breathe out.\(^1\)
Now, the muscle tensing and relaxing.
Wrinkle your forehead ... feel the tension ...
let it go ... loose and relaxed ... loose and relaxed ...
as loose as you can.

Close you eyes tightly ... feel the tension ...
let them go ... loose and relaxed ... loose and easy ...
easy and relaxed.

Open your mouth wide ... feel the tension ...
let it go ... loose and relaxed ... loose and relaxed ...
really relaxed.

Bend your head forwards ... feel the tension ...
... let it go ... loose and relaxed ... loose and relaxed ...
... really relaxed.

Bend your head forwards ... feel the tension ...
... let it go ... loose and relaxed ... loose and relaxed ...
as relaxed as you can.

Lift your shoulders up to your ears ... feel'

\(^1\)Repeat from beginning five times.
the tension ... let them go ... loose and relaxed ...
loose and heavy ... heavy and relaxed.

Clench your right fist ... feel the tension ...
let it go ... loose and relaxed ... loose and easy ...
easy and relaxed.

Tighten your right forearm ... feel the tension ...
let it go ... loose and relaxed ... loose and relaxed ...
really relaxed.

Tighten your right upper arm ... feel the tension ...
let it go ... loose and relaxed ... loose and heavy ...
heavy and relaxed.

Tighten your left forearm ... feel the tension ...
let it go ... loose and relaxed ... loose and relaxed ...
really relaxed.

Tighten your left upper arm ... feel the tension ...
let it go ... loose and relaxed ... loose and heavy ...
heavy and relaxed.

Tighten your chest muscles ... feel the tension ...
let them go ... loose and relaxed ... loose and relaxed ...
as loose as you can.

Tighten your abdominal muscles ... feel the tension ...
let them go ... loose and relaxed ... loose and easy ...
easy ... easy and relaxed.

Tighten your buttocks ... feel the tension ...
let them go ... loose and relaxed ... loose and relaxed
... really relaxed.

Tighten your right thigh muscles ... feel the tension ... let them go ... loose and relaxed ... loose and heavy ... heavy and relaxed.

Tighten your right calf muscles ... feel the tension ... let them go ... loose and relaxed ... loose and relaxed ... as loose as you can.

Point your right toes away from your head ... feel the tension ... let them go ... loose and relaxed ... loose and easy ... easy and relaxed.

Point your right toes toward your head ... feel the tension in your calf ... let them go ... loose and relaxed ... loose and relaxed ... really relaxed.

Tighten your left thigh muscles ... let them go ... loose and relaxed ... loose and heavy ... heavy and relaxed.

Tighten your left calf muscles ... feel the tension ... let them go ... loose and relaxed ... loose and relaxed ... as loose as you can.

Point your left toes away from your head ... feel the tension ... let them go ... loose and relaxed ... loose and easy ... easy and relaxed.

Point your left toes toward your head ... feel the tension in your calf ... let them go ... loose and relaxed ... loose and relaxed ... really relaxed.

Lie relaxed all over for a few minutes.
APPENDIX B

ANXIETY STUDY: EXPERIMENT SCHEDULE

DAY 1
0800 hours start 24 hour Urinary Potassium Excretion Test
2100 hours IPAT Anxiety Scale Questionnaire
Medications:

DAY 2
0800 hours complete 24 hour Urinary Potassium Excretion Test
1000 hours 1400 hours 2000 hours: Relaxation Training
1000 hours 1400 hours 2000 hours: Placebo Treatment
Medications: 2000 hours: No Treatment

DAY 3
1000 hours 1400 hours 2000 hours: Relaxation Training
1000 hours 1400 hours 2000 hours: Placebo Treatment
Medications: 2000 hours: No Treatment

DAY 4
1000 hours 1400 hours 2000 hours: Relaxation Training
1000 hours 1400 hours 2000 hours: Placebo Treatment
Medications: 2000 hours: No Treatment

DAY 5
0800 hours start 24 hour Urinary Potassium Excretion Test
1000 hours 1400 hours 2000 hours: Relaxation Training
1000 hours 1400 hours 2000 hours: Placebo Treatment
2000 hours: No Treatment

DAY 6
0800 hours complete 24 hour Urinary Potassium Excretion Test