

EFFECTS OF A SELECTED STRESS REDUCTION
EXERCISE ON ABILITY TO RELAX IN
PRESCHOOL CHILDREN

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CHAPTER I

INTRODUCTION

The purpose of this study was to examine the effects of a selected stress reduction exercise on the ability to relax in preschool children. According to Selye (1980, p. 2), stress is "the nonspecific response of the body to any demand made upon it." Selye explained that there are specific responses made by our bodies. When exposed to heat, we begin to perspire to cool the body. When we run, there is increased demand on the muscles and cardiovascular system, which causes the heart to beat faster and the blood pressure to rise, which dilates the vessels and causes increased blood flow to the muscles. One thing all these responses have in common is that they also make an increased demand on the body to readjust. The demand to readjust is nonspecific but requires adaptation to the problem. This demand is an attempt to re-establish balance. The demand is independent of the activity which initiated the increased body functioning. This nonspecific demand to readjust is the essence of stress. A stressor is any agent which has the ability to produce stress. Anything which causes a change in lifestyle or interrupts the life situation may be a stressor. These events can be both positive or negative as perceived by the individual.

The severity of stress is gauged by the amount of disruption experienced by the individual when he or she fails to cope with an adjustive demand. This severity is dependent on three characteristics: intensity and duration of the adjustive demand, the coping style and endurance of

the individual, and the external resources or support systems available to assist the individual. Philosophical and psychological variables may play an important role in the way in which people cope with stressors. The characteristics of the individual's coping style are of particular importance because psychological intervention techniques may alter the way in which he or she reacts to stressful situations and may thereby lengthen his or her endurance.

Research indicated that stress plays a significant role in causing a variety of physical problems (Brooks & Richardson, 1980; Duckitt & Broll, 1983; Friedman & Rosenman, 1974). In addition to physical illness, there are several psychological problems which have strong associations to stress. Phobias, anxiety, and depression have all been linked to stress. Helplessness, which will be discussed more fully elsewhere in this study, is a prime factor in research discussing susceptibility to disease (Guile, 1982; Hammer, 1984; Seligman, 1975). These authors stated that stress weakens the immunological system.

It has been suggested that such stress reactions, while being partly determined by the physiological characteristics of the individual, may also be influenced by personality variables (Seligman, 1975). Since the 1920's, there have been attempts to find intervention techniques for helping people cope with stress. Jacobson's (1938) progressive relaxation method suggested that relaxation training was a potentially effective therapeutic procedure for alleviating various forms of tension and anxiety, which are the result of ineffective coping with stress. Wolpe (1958) modified Jacobson's technique and integrated it into his therapeutic method of systematic desensitization. Recent research has studied the use of various relaxation techniques with children. Instructional tapes using fantasy, imagery, visualization, and relaxation suggestions

have been shown to produce a reduction in physiological tension (lower blood pressure, warm hands, relaxed frontalis muscles, etc.), as measured by biofeedback equipment (Braud, Lupin, & Braud, 1974; Denkowski, Denkowski, & Omizo, 1984; Lupin, 1977; Schandler & Gringe, 1976; Wagner et al., 1974). While there has been no research with subjects as young as four years of age using the stress reduction tapes, Lupin (1981) suggested that four-year-old children can respond adequately to such tapes.

Certain types of music have also been shown to have a relaxing effect. The mood-altering effects of music have given rise to the therapeutic use of music in music therapy programs with preschool children (Young, 1976).

Purpose of the Study

The current study was an attempt to determine how a selected relaxation technique (a "slow relax" exercise audio tape) and a placebo (relaxing music audio tape) would affect the ability of preschool children to relax. Mankind has evolved with a physiology that has enabled the individual to survive in a world that is filled with things and situations that could end his/her existence. A reaction to stressors which can cause very predictable physiological illness is stress. While it has been well known that individuals react physically to these threats to existence in several different ways, it has only been recently that the psychological aspects have been explored.

Systematic investigation of such psychological involvement has included an examination of the effects of stress and coping style. This past research has centered on adults. Recent research does not include studies with subjects as young as those proposed for this research. The present investigation is of significance in that such research questions,

focused on the early childhood population, may give direction in preventive intervention.

The literature suggested that disease resistance may be dependent on how well one copes with stress. It could be, therefore, theoretically possible to identify those events which impact on an individual's control beliefs and to introduce the most useful of those (i.e., relaxation instruction, parenting style) in a controlled fashion so as to prepare the individual against the most harmful results of reaction to stress (Janis, 1982; Seligman, 1969, 1975).

Research Questions

The following research questions were considered for this study:

1. Are there significant differences between the measures of ability to relax during experimental treatment of children who listen to taped relaxation instruction and of children who listen to taped relaxing preschool children's music?

2. Upon completion of the experimental treatment, are there significant differences among the measures of ability to relax of children randomly assigned to three groups:

- (a) those who listen to taped relaxation instruction,
- (b) those who listen to relaxing preschool children's music, and
- (c) those who do not listen to tapes?

Summary

This chapter introduced the purpose of the current research and gave documentation concerning the viability of conducting research in this area. In addition, the research questions considered for the study were stated.

CHAPTER II

REVIEW OF LITERATURE

This chapter focuses on the review of theoretical and research literature most pertinent to the present investigation. The theoretical literature and empirical studies in this review are discussed under subject-specific headings within two broad areas of concern: stress and the response to stress, and stress reduction interventions.

Stress and the Stress Response

Because it is the introduction of stress to the individual which sets in motion the occurrences which are the discussion of this investigation, it is necessary to discuss stress and its agent, the stressor, and the individual's responses to stressors. To the general public, stress and stressors are tied up in a package and are arbitrarily interpreted as though they were interchangeable terms. In this interpretive process, the concept of stress is almost always viewed in a qualitative manner which is negative in nature. Stress is seen as "bad." Research has defined stress and stressors, not in terms of prior positive or negative qualities, but in terms of impact on the individual. This may include any event (negative, positive, or neutral) regarding inherent emotional content. Even the general public is moving in this direction with the awareness that a "good" event such as running or jogging can act as a stressor. The responses to stress are cognitive and physiological

in nature and may in fact be dependent upon the delicate and complex interplay of mind and body.

Stressors

According to Selye (1956), stressors may include such entities as joy, disaster, illness, a puncture wound, shock, sexual contact, etc. It may be specific therapies to disease such as bloodletting, shock therapy, injection of drugs, exorcism, and exercise. All of these factors cause wear and tear on the bodily system and demand a return to balance. It can be a sum or cluster of factors which act upon the body. These agents are called stressors because of their ability to produce stress. Stressors are the agents; stress is the condition. Reaction is the body's response to stress (Selye, 1956). Recently, the study of continuing life events has reinforced the notion that anything which causes a change in lifestyle or interrupts the life situation may be viewed as a stressor: birth, death, loss, storms, parties, taxes, a new job, marriage, divorce, and getting a puppy, to name a few. The effect may be small, but it may be enough to cause the body to wish to regain homeostasis or a balance of processes and regulation (Dohrenwend & Dohrenwend, 1979; Holmes & Masuda, 1974; Rahe, 1974; Woodcock, 1981). In fact, Holmes and Rahe (1967) have constructed a scale to measure life events (The Social Readjustment Rating Scale, SRRS), which, in use as a research instrument, has demonstrated that stress may be cumulative in its effects (Dohrenwend & Dohrenwend, 1979; Holmes & Masuda, 1974). The higher the score on the scale, the greater the probability of future illness being reported.

Natural disasters as uncontrollable events have been researched in regard to stressors and their impact recorded. Seligman (1975) has found that helplessness may result in reaction to such a stressor, simply

because of the uncontrollability factor. He felt that if an individual experiences a perception of control, it mediates the stress response and may reduce the stressful quality of the event. A failed expectation of mastery may cause release of hormones which cause a chain of physiological events to occur (Seligman, 1975; Levine, Weinberg, & Ursin, 1978). Both Selye (1956) and Seligman (1975) pointed out that the occurrence of a second possible stressor when the organism is dealing with the effects of the first may cause the organism to succumb.

Selye (1956, 1980b) pointed out that there may in fact be quality features of stress. "Eustress" is stress which is judged pleasant by the organism or is curative in nature. On the other hand, "distress" would be that stress which is judged unpleasant or disease-producing.

In discussing the stress reaction, Selye (1956) pointed out that it occurs in three parts. First, there is the direct action of the stressor on the body; next, the internal response which stimulates tissue defense. And finally, there is the internal response which stimulates tissue-surrender but inhibiting defense. Resistance depends on a balance of these three parts.

Appraisal, Self-Efficacy, and Expectations

When an event occurs in the life situation of an individual, the manner in which the person reacts to this intrusion will influence and dictate the course of events which follow. Reaction to life intrusion is initially dependent upon the person's interpretation or rather the appraisal of the situation. Appraisals and past experiences lead to feelings of self-efficacy and to expectations about outcomes. Past experiences include perception of control. The first expectancy situation is simply based on a tendency characteristic of one's perception to

interpret intrusions as stressful. Some individuals tend to be less inclined to make the stress interpretation and this is induced, in part, by their optimism. The second decision and appraisal point is that which will be more directly discussed in this section. When a stressor is interpreted as stress by the individual and the "fight or flight" stress reaction (Cannon, 1929; Henry & Ely, 1980) has been set in motion, then serious appraisal is undertaken which evaluates the nature, not only of the stressor but also the outcome potentials. The first appraisal which follows the initial stressor is described by Coyne and Lazarus (1980) as the judgment of situations by the significance for one's well-being. The judgment may be that the event is irrelevant or benign positive or stressful.

In the second appraisal situation, it is clear that many factors are considered. There is a judgment about ability to control (Engel, 1968; Janis, 1982; Pines, 1984; Seligman, 1973; Ursin, 1978). There is a judgment about possible mastery (Bootzin & Max, 1980; Gilbert & Mangelsdorff, 1979). There is an appraisal of danger (Janis, 1982; Lazarus, 1969a; Mandler & Watson, 1972; Ursin, 1978). There is an appraisal of resources available to the individual (Anderson, 1977; Autonovsky, 1974; 1977; Janis, 1982; Kobasa & Puccetti, 1983). And there is the interpretation of the situation as a threat or challenge (Kobasa & Puccetti, 1983).

It has been found by Seligman (1973) that some depressed patients tend to appraise stressful situations as uncontrollable. It was also found that depression occurs because of a learned belief in the independence of response and outcome (Seligman, 1975). People in this state of depression tend to view stressful situations as insurmountable barriers. The cognitive set is "I'm licked," and the struggling ceases. Fear is usually the emotion surrounding the appraisal situation and it gives way

to depression. In the opposite situation, self-efficacy is based not only on the quality of the experience, but also on the perceived ability to control events (Seligman, 1975). Externally motivated, dependent people view stress reaction and events as threats to their personal well-being and have a tendency to give up due to lack of perceived control (Engle, 1968). The subject may physiologically match current stress with past memories of stress and form an expectancy. This is the situation which may lead to Fight or Flight when expectancies are not met as in an uncontrollable situation such as natural disaster (Mandler & Watson, 1972). Failure to feel mastery or self-efficacy may lead to conditions which heighten susceptibility to disease. Thus, it is not the effects of the external situation which determines the effect of stressors on health, but rather the person's interpretation of them (Ursin, 1978). This interpretation can alter our appraisal mechanism regarding our ability to cope (Engel, 1968).

Efficacy expectations are beliefs that one can successfully execute the behavior required to produce the outcome. These expectations are derived from four types of information: (1) performance feedback from prior experiences (the most important); (2) vicarious experiences; (3) verbal persuasion; and (4) autonomic arousal (Bootzin & Max, 1980). Lazarus (1969b) reported that a history of successes and positive beliefs about fate contribute to a sense of security and reduce the effects of stress. It has been found that giving verbal information about potential for control and realistic information about the stress situation helps the appraisal of the situation and leads to coping. It tends to reduce uncertainty about the situation. The information should consist of two types of statements: that the person will be able to cope with the situation and that the situation may be resolved unsuccessfully. Giving

these statements along with realistic information about the situation will give a mixture of pleasant with unpleasant (Janis, 1982). In this same vein, experiments with signaled stress with humans and rats have shown that signals (information) about impending pain allows the person or animal to apparently formulate a plan for coping with the pain (Mandler & Watson, 1972; Guile, 1982).

An assessment of one's ability to deal with a stress situation may be based on what Antonovsky (1974, p. 245) called "resistance resources." These resources consist of homeostatic flexibility, which is the ability to accept alternatives in social roles, social values, and/or personal behavior; our ties to concrete others; and our community ties (tradition, history, involvement, and status). In addition, some individuals tend to possess a quality of hardiness which can color their perceptions in the appraisal mechanism. For these individuals, challenge is the judgment, and actions progress accordingly (Kobasa & Puccetti, 1983).

Fight or Flight Reaction to Perceived Status

This particular explanation of the bodily response to perceived stress was originally formulated by Cannon (1929) to explain the physiological activity of the stress response. It appears to be an interplay of cognition and prior experience of a cognitive and physiological nature, plus individual propensity. This theory is intimately tied with the idea of homeostasis. Homeostasis is the effort of the physiological system to actively maintain a level of functioning within the limits of tolerance of the system in face of ever-changing situations. It is the adaptational effort of the body to stay in balance (Everly & Rosenfeld, 1981). According to Selye (1956), it is characteristic of organisms to maintain the constancy of their internal milieu in the face of changes in

their surroundings. It is, according to Cannon (1929), the staying power of the body. To fail to restore homeostasis is to face death. The neuro-endocrine response is part of the maintenance of homeostasis. The "fight or flight" response is thought to be a mobilization of the body's adrenal medulla to prepare for muscular activity in response to a perceived threat. This mechanism allows the organization to either fight or run away from the stressor. Respiration, pulse, and perspiration increase are some of the bodily manifestations of this response. This response seems to be amenable to some type of coping action by the organism, which is, in turn, based upon expectations and appraisals of the stress situation. The hormones are norepinephrin and epinephrin. The action through the adrenal medulla produces a generalized impact on the system. This particular response is seen as emanating from the sympathetic nervous system (Gray, 1971). This response has been tied in research to the behavior of controlling dominant animals. Social roles, locus of control, and past experiences with stress affect the responses one makes to stress (Henry & Ely, 1980). Research with monkeys has supported the notion of different physiological responses and coping patterns. Studies of the squirrel monkey, which is seen as a gregarious, dominant type of creature, have indicated that its reaction to stress is indeed of the sympathetic variety (Shiner, 1980; "Monkeys Show Two Types of Stress Responses," 1984).

General Adaptation Syndrome

The stress response identified as general adaptation syndrome was formulated by Selye (1956) at the same time that Cannon (1929) was proposing the fight or flight response. It also has physiological implications for the body. Whereas fight or flight seem to be preceded,

accompanied, and followed by cognitive mediating, the general adaptation syndrome tends to follow a cognitive decision which fails to reduce the action of the stressor on the organism and which, in fact, instigates the operation of the General Adaptation Syndrome. First, the Syndrome will be described and then contrasted with Fight or Flight behavior.

The general adaptation syndrome is a tri-phasic response to stress. Actually, it is in response to chronic stress or a failure to deal successfully with stress, as mentioned earlier. This syndrome is marked by the first stage which is the alarm reaction. This reaction represents a generalized somatic shock or call to arms of the body's defense mechanisms. During this phase, the endocrine system responds with activation of the three endocrine axes. The primary emphasis seems to be on the adrenal cortical area. As this reaction depletes body resources, the next stage, that of resistance, occurs, whereby a dramatic reduction in alarm reaction processes arises, and the body is resupplied with the depleted stores. Localized somatic resistance is high during this phase. This is the body's attempt to maintain homeostasis in the presence of the stressor which initiated the alarm reaction. Should the stressor persist, eventually the adaptive energy will become depleted. At this point, the body enters its final phase, the stage of exhaustion. Here the body once again triggers a generalized somatic alarm. Adaptive energy is depleted and irreversible signs of alarm severely deplete any resistance. Death may follow (Selye, 1956). The syndrome is named "general" because it is produced only by agents that have a general effect upon large portions of the body; "adaptive" because it stimulates defense and thereby helps toughen the body to hardship; "syndrome" because its signs are coordinated and partly dependent on each other. Various derangements in the secretion of adaptive hormones in the resistance stage

lead to diseases of adaptation. These are diseases not caused by any pathogen such as insomnia or headache (Selye, 1969). All stressors have different specific effects, but their nonspecific effects are the same: they all elicit the general adaptation syndrome. The body continues to resist in the general adaptation syndrome until the body is worn out. Cortisols released in the resistance stage resist the inflammatory agent or stressor and thus weaken the body defenses against disease.

In the fight or flight situation, messages about the situation are sent to the adrenal medulla, which causes the hormones to be released. In the general adaptation syndrome alarm reaction, the message travels to the adrenal cortex, which triggers the resistance stage. The alarm reaction is similar to the fight or flight reaction in that sympathetic activity sets off the message to the adrenals; only in the fight or flight reaction in that sympathetic activity sets off the message to the adrenals; only in the fight or flight it is to the medulla while in the alarm stage it is to the cortex, which releases cortisols to fight inflammatory agents (the stressors). Cortisols suppress the immune system. General adaptation syndrome may have impact on specific organs.

In the alarm stage, the body has been under stress for awhile and it is now mobilized again, which makes resistance low, so the demand for return to normal is great. This is the trigger for the resistance stage (Gray, 1971). The full cycle of the general adaptation syndrome may be the life cycle with exhaustion representing old age.

Autonomic Nervous System

Because the autonomic system is involved in the stress reaction, a discussion of this system is included. The autonomic nervous system is part of the peripheral nervous system of the body. It innervates all

internal organs, some glands, small blood vessels, and hair follicles. It is further divided into the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS). The SNS consists of a network of nerves which depart from the spinal cord in the middle portions, while the PNS nerves join the central nervous system above and below the SNS, at the brain stem, and in the tail area. These two systems often work antagonistically; that is, most of the visceral organs are innervated by both systems, but the results often are different. SNS speeds the heart up, the PNS slows it down, but SNS slows peristalsis, whereas the PNS speeds it up. The SNS is different because of chains of ganglia, and stimulation of one SNS center will result in widespread change all over the body. The PNS does not have connections to separate nerve fibers, so only one organ may be stimulated. The SNS has a "shotgun" effect; the PNS has a "rifle" effect. Thus, activation of the SNS involves whole body, mass action. The interaction of SNS/PNS creates regulation of the internal milieu: homeostasis. The SNS functions to break down stored supplies and increase metabolism. These functions are referred to as "catabolic." The PNS functions to restore supplies and slows the metabolism. This is referred to as "anabolic." It has been found that most people tend to respond with both in concert with a tendency to respond with one system more often in times of stress (Lazarus, 1969a).

Coping Process

The concept of coping has always been intimately tied to the question of locus of control (Lefcourt, 1976). Internally controlled persons tend to be more effective copers in times that require some type of responding. Stress and coping have likewise been seen as related (Lazarus, 1969b).

Coping implies a doing of something. Noncoping also exists and in this paper is represented as apathy and inaction. Coping is the action we take, either actually or psychologically, in the resolution of the stress response. Our environment is one in which life events continually present us with opportunities for stress reactions. If we do not resolve stress, it is likely that we will drop into the general adaptation syndrome and be debilitated or succumb. Coping is the manner in which individuals deal with continual assaults on the body and psyche. The success or failure of a coping behavior can be evaluated in at least two ways. The first involves the making of a judgment as to whether the coping behavior allows the individual to carry out certain personally or socially defined goals. Next, the judgment allows the individual to tolerate the stress situation without disruptive anxiety or depression regardless of whether the behavior is socially acceptable. The second evaluates changes in internal states and can be monitored through the use of biofeedback equipment. Both inappropriate and acceptable coping mechanisms can effect these internal changes (Levine, Weinberg, & Ursin, 1978).

Coping involves problem-solving efforts made by an individual when the demands he or she faces are highly relevant to his or her welfare: a situation of considerable promise or jeopardy. In order for coping to occur, these demands must tax the person's adaptive resources. Coping occurs when a person masters a stressful situation and reduces the effect of the stressor. As mentioned earlier, even inappropriate coping will alter the individual's evaluation of the situation and reduce stress.

When a stressor is appraised as a challenge, coping occurs. This is a productive stress approach and may produce tissue and hormone response patterns. A person's past experiences of mastery will lead to an

appraisal of ability to cope, or to feel challenged (Coyne & Lazarus, 1980).

Coping is effort, both action-oriented and intrapsychic, to manage. This can be interpreted as meaning to reduce, master, tolerate, or minimize environmental and internal demand and conflicts which tax or exceed a person's resources. In the Coyne-Lazarus (1980) approach, coping serves two purposes which are: alteration of the ongoing person environment relationship and control of stressful emotions. Coping is seen as the intervening variable between stress onset and illness (Coyne & Lazarus, 1980). A person's responses and the environment's reactions to that response are reciprocal and shape one another, either negatively or positively for coping.

It is believed that the degree of isolation that a person feels may have impact on that person's perceptions of personal control. Externally controlled individuals tend to feel victimized and feel helpless many times in adversity; consequently, coping may be inadequate or may not occur in this group (Lazarus, 1969b).

Internally controlled individuals tend to cope better and feel that outcomes are dependent on their responses. Internals not only cope more and better, they achieve better outcomes. Internals also tend to be more task-centered in their coping than externals, who tend to respond to problem-solving with emotion. Internals focus on altering the situation; externals tend to operate on making themselves feel better ("wound-licking"). Task-centered coping is based on an appraisal of personal control and potential mastery; less control perception results in emotion-centered responding (Krauss, 1980; Parkes, 1984).

Lazarus (1969b) described two main classes of coping behaviors:

1. Direct action in which the person may evade or attack but will

make a behavior which will change the situation. Indirect action may be actual but may be only a tendency, since to carry it out might prove to be socially unacceptable or unlawful. Coping impulses are aroused in a tendency and this colors the reaction to stress.

2. Indirect action or defensive forms which involve avoidance or adoption of defense mechanisms to cope. Direct action involves two further subactions: (a) preparing against harm, which is taking active steps to eliminate or reduce the threat by addressing oneself directly to the threatening circumstances. Usually a search precedes the action in order to learn what is to be faced so as to select adequate alternatives (search is a form of direct action since it reduces the actual danger or threat value); (b) attack on the agent of harm, which involves aggression or assertion. While physiological changes may enhance this coping behavior, learning modifies it. The aggression may be covert, overt, physical, or verbal; the option shaped by social constraints. Indirect action also involves two substrategies: (a) avoidance of harm, which may involve leaving the stressor behind or removing oneself from the situation; (b) defensive action against harm which involves the adoption of some psychological defense mechanism which allows the individual to deny, repress, displace, or rationalize a threat.

Finally, there is the state of noncoping, which is marked by an absence of perceived alternatives and perceived control and thus, the person becomes apathetic and inactive; helplessness is the result. Depression is the affect (Seligman, 1975).

It has been found in animal studies that signaled stress tends to reduce the harmful effects of stress (Guile, 1982). Likewise, researchers have found that giving realistic instructions which describe the stress situation and which call attention to coping potential tend to

enhance coping. People who seem to cope best receive unambiguous warnings (Janis, 1982). People who are so warned tend to take precautions in the belief that their welfare might be personally affected. Janis (1982) advised giving two types of coping information to people who may be about to cope with stress, especially of the uncontrollable variety. The first type would be a plan for action: any exercises, nutritional considerations and alterations, relaxation clues, and suggestions for postures to prevent excessive pain. The other type should involve cognitive coping suggestions such as attention diversion, optimistic self-talk, and relaxing imagery. These instructions and suggestions function like a signal in animal stress situations to allow the individual to make preparatory gestures. Coping gives a greater sense of personal control. Giving instructions increases personal involvement in dealing with stress; it says "You're in control." Information should tell the real risks, should allow the person to think the outcome can be successful and that there is adequate time to prepare by searching for an alternative.

In monkey studies it was found that determinants of coping may be established as early as the first few months of life. It is believed that the response to weaning may predict future coping by these animals. Coping in these studies deals with the Autonomic Nervous System responses the monkeys exhibited. The adequate copers were dominant and demonstrated SNS responses, while the subordinate monkeys responded with the withdrawn PNS responses. Dominants had more social exploratory experiences and mastery of the environment, while these activities in the subordinates had been more restricted (Shiner, 1980; "Monkeys Show Two Types of Stress Responses," 1984).

Helplessness

Helplessness is an existential state described by Seligman (1969, 1973, 1974, 1975) to refer to the apathy and inaction induced by learning that outcome and response are independent of one another. Helplessness represents the state which leads an organism to enter into the general adaptation syndrome in reaction to chronic stress. It follows apathy, which is the noncoping behavior of the person who perceives a stressor as a threat and feels no personal control.

Seligman (1975) reported that uncontrollability creates helplessness. Uncontrollability is the person's perceived lack of ability to master situations or control outcomes. This belief is learned from experiences with uncontrollable events, either positive or negative. After the person learns helplessness, he or she no longer attempts to control situations. A person who is told that he or she is helpless may experience feelings of lack of control. Conversely, a person who is told that he or she can control outcomes may be able to cut down on helplessness feelings. Helplessness tends to generalize to other situations. The affect accompanying helplessness is depression, and Seligman (1973) compared somatic and psychological reactions to depression and helplessness; they are very similar. Externals become helpless more easily than internals, since a lack of perception of control is a feature of the external locus of control mechanism. An individual who has learned helplessness has trouble unlearning it or in learning that outcome and response are dependent on one another. Natural disaster is a type of uncontrollable stressor which induces helplessness in its victims. Seligman (1975) reported that this helplessness lasts for about 24 hours following the disaster and then, if no further stressor occurs, the helplessness lifts.

However, if another stressor occurs, the helplessness is indefinite in duration. Since the belief of lack of control is what causes the helplessness, then it is the expectation of lack of control that is crucial in its development.

Ulcers occur in helpless animals (Guile, 1982; Guile & McCutcheon, 1982; Seligman, 1975), which seems to be due to the inability of the animals to control stressors. Maternal deprivation, crowding, and isolation can cause helplessness, but it is largely the main effect of the expectation of inability to influence outcomes that induces helplessness (Baum & Gatchel, 1981).

Helplessness makes us more vulnerable to pathogens because helplessness results from apathy or the lack of ability to cope and is accompanied by responses of the PNS. Lefcourt (1976) and Levine, Weinberg, and Ursin, (1978) pointed out that poor coping occurs with helplessness, since it is hard to learn to escape aversive events after learning helplessness.

This is a simple concept which has a major impact on human behavior. It can be used to explain many maladaptive behaviors seen in man.

Resistance and Susceptibility to Disease

Several researchers have documented the fact that while genetic predisposition and exposure to pathogens may influence susceptibility or resistance to disease, it is the individual's reaction to stress that plays a major role (Depue, Monroe, & Shackman, 1979; Hammer, 1984; Seligman, 1975; Woodcock, 1981).

It is not the fact that stress occurs that causes susceptibility but rather the person's response in the situation. Life events occur continuously without obvious ill effects on many people. Apparently, such

psychological factors as loss of control, poor health practices because of a lack of faith in self-efficacy, and a change of habits, diet, activity level, and loss of social supports impact on the resistance of the individual (Engel, 1968; Hinkle, 1974; Holmes & Masuda, 1974).

One aspect of social support which is involved in the resistance of disease is the reliance of a person on another in times of stress in terms of the supporting person's control factors. Apparently, having a person available who is internally controlled enough to be seen as a good decision-maker and problem solver and one who makes affirmative actions towards resolution of crisis is almost as effective in warding off the most harmful actions of stress as if the afflicted person was the problem solver himself. The main sources of such supports are from family and from the work place (Kobasa & Puccetti, 1983). However, one study mentions a hospital situation in which weaker, less assertive patients were placed in a room with patients who were more assertive, though both were equally ill or well. Assertive patients were instructed to call for the nurse if the other patient needed one or to aid the other patient in fulfilling needs of other sorts indirectly by making the endeavor to get help. Less assertive patients improved much quicker than a control group of nonassertive patients who were left to their own resources (Lazarus, 1969a).

Another concept which has arisen in the literature in regard to the matter of resistance to illness through effective handling of stress is that of coherence. It is believed that a person has a feeling of coherence, and through this feels that he or she is well acquainted with his or her internal milieu and the external world. If he or she has a firm belief that things will turn out, if not perfectly, at least as well as can be expected, then he or she has a greater ability to cope. This

belief can alleviate the most harmful features of stress (Kobasa & Pucetti, 1983). To know oneself and to know one's world is to be able to predict outcomes. To be able to predict outcomes, as has been seen, lends a sense of personal control.

Selye (1956), in his formulation of the general adaptation syndrome, addressed himself directly to the formation of resistance and disease in terms of stress involvement. He saw disease as the outcome of the failure of homeostasis. Disease, for Selye, was more than affliction--it was the body attempting to maintain the homeostatic balance of tissues despite the damage continued exposure to stress created. General resistance means the ability to remain healthy or at least alive during intense stress assault caused nonspecifically by a variety of agents. He pointed out that diseases of adaptation occur from the stage of exhaustion of the general adaptation syndrome. Manifestations of disease are dependent on the three-stage stress reaction (direct effect of stressor on body, internal tissue defense, internal tissue surrender) mentioned in an earlier section. In addition, the level of development of the three-part reaction, as well as the duration and repetition of the stressor, where it occurs, and how intense the whole reaction is have impact on the ability to resist.

The balance of the body regulatory functions is mentioned numerous times in connection with resistance to disease. This is homeostasis. The balance is clearly endangered by stressors, but as seen earlier, is mediated by psychosocial factors (Depue, Monroe, & Shackman, 1979; Engel, 1968; Minter & Kimball, 1980). Depue, Monroe, and Shackman (1979) mentioned that genetic factors may interact with the psychosocial, but that one factor may dispose to several different diseases; conversely, several factors may predispose to one disease.

Helplessness is the one behavioral state that seems to be mentioned most when discussing the tendency to become ill in times of continued stress (Engel, 1968; Guile, 1982; Hammer, 1984; Hinkle, 1974; Seligman, 1969, 1973, 1974, 1975; Shiner, 1980). A lack of past experiences of mastery can leave people feeling that they cannot do anything to turn the tide of adversity; thus, stress becomes chronic and the body suffers tremendous wear and tear, weakening the immunological system and raising susceptibility levels. Often, "giving up" results in a more serious and debilitating illness factor than if one continues to persevere. Well-meaning friends and relatives who advise, "Go ahead, just give in and let yourself be sick," may be enhancing the helplessness factor.

Engel (1968) pointed out that the process of "giving up" is a crucial element in the development of psychosomatic illness. Receiving support for fighting the helplessness, as in the case of psychotherapy, serves the same purpose, apparently, as giving instructions. Helpless people who are being seen for psychotherapy show less physical ailments, even after only one therapy session, than nontherapy helpless people.

As mentioned earlier, helplessness and depression show similar symptoms, many of which are physiological in nature and are, in fact, illness manifestations such as ulcers (Seligman, 1973). The hundreds of experiments with rats in uncontrollable shock situations reinforce the idea of development of ulcers due to the helplessness factor.

Hammer (1984), in reporting new research on the use of mind and attitude altering exercises in controlling or even healing disease factors, discussed the fact that such exercises are designed to give control of a person's health to the person him or herself. It is involving the person in the responsibility of making him or herself well. The concept of taking control of one's body and life arises over and over again in

Hammer's article. Hammer felt that the immune system is the key; if it can be suppressed, as in the general adaptation syndrome, then it can be enhanced. Everly and Rosenfeld (1981) pointed out that the immunosuppressive features of stress reactions. Seligman (1975) discussed the role of helplessness in reducing immunity to disease and mentioned that depression tends to elicit the same immunosuppressive effect. He cited a study concerning 26 Eastman Kodak workers who were suffering from depression and who were exposed to a second stressor. All succumbed. This supported Selye's (1956) contention that if a second stressor occurred during the general adaptation syndrome, which is itself a reaction to chronic stress, then the organism is likely to die. Monkeys have been manipulated in research to study coping and health effects ("Monkeys Show Two Types of Stress Responses," 1984). In addition, monkeys' natural coping styles have been studied in the prior study and also in that of Shiner (1980). It was found that the Titi monkey, who is a socially restricted, territorial, monogamous creature, is likely to respond to stressors in a withdrawn, apathetic behavior which is reminiscent of the helplessness behavior of Seligman's (1975) dogs. This particular monkey group is also more susceptible to breakdown of the immune system. The manipulated monkey experiments showed that the isolation and the breaking down of normal social interaction patterns tended to cause helplessness in the Titi monkey as did introducing them to new unfamiliar environments. Their behaviors were parasympathetic responses to the stress of change, and as has been noted, the PNS type of responding is a feature of the general adaptation syndrome. The Titi monkeys often succumbed to gastrointestinal disorders and pneumonia. The other type of monkeys studied, Squirrel monkeys, responded with a sympathetic response and

tended to cope with stress better. Disorders among this latter group usually included a general systemic disorder such as hypertension.

Helplessness is clearly present in the elderly, who often become depressed, apathetic, and withdrawn. It has been noted that death in the elderly or depressed person often follows a special event such as a birthday. This is in keeping with the second stressor theory of Selye (1956). Old age may be a disease of adaptation and is a response to repeated stress and wear and tear on the body. Special events are classified as stressful situations (Holmes & Rahe, 1967); hence, the second stressor on an individual already in the stage of exhaustion.

Helplessness is viewed as the loss of control, and thus loss, as in bereavement, may bring on a state of helplessness. Since people who become helpless and other mammals such as rats and dogs who become helpless are more prone to becoming ill, then it is believed that a significant loss in the life of a person can bring on greater susceptibility. In fact, susceptibility may lead to death in some cases (Minter & Kimball, 1980). Bereaved widows visit doctors more times than usual the first year after the deaths of their spouses and have more hospital admissions.

Loss or other changes in human relationships can have impact on the health of an individual. This is particularly true for those who appear to have predisposing genetic and psychological factors. Hinkle (1974) discussed the impact of relationship change. Initially, he pointed out that some people are more at risk for disease than others, due to the previously mentioned factors. Those at risk have more days of disability, more kinds of illness, involving more organ systems. These are attributable to a larger range of events and include major and life-endangering ailments, as well as minor and passing episodes. The

patterns created in at-risk people last over an extended period of time. Hinkle's research indicated that the longer a person stayed healthy, the healthier that person became. And the reverse is true for those who ail. Some of the diseases are results of other diseases. Obesity, for example, is very likely instrumental in the development of diabetes. Every illness has more than one cause. Hinkle (1974) felt that people with predisposing factors for susceptibility are likely to become ill when change of a significant nature occurs in their lives. Usually, change affects our relationships, and changes in relationships will alter lifestyle, and ultimately may be second stressors. For example, a person divorces, which is a stressor; the person then engages in the dating game and remarries--second stressors. Or, the divorced person may stay up later, not cook as much for him or herself, be more lonely--these could all be second stressors. Stress seems to have a cumulative effect on the health of an individual. As scores on the SRRS (Holmes & Rahe, 1967) increase, as mentioned earlier, illness reports increase. Heart disorders, fractures, ulcers, and minor health responses such as cuts, scrapes, and bruises increase in high life change times. Research with the scale has pointed up the cumulative effects of stress. Life change does not speak to the specificity of disease; rather, it is tied to onset, causation, and severity (Duckitt & Broll, 1983).

One statement that should be made here is that it is important to differentiate between illness reports and actual illness. It seems that many people do not recognize their physiological states and fail to perceive illness and thus do not report it when it is actually there. Likewise, some people report perceived illness when there may be no actual illness. Often, stress may be the ticket to being allowed to report illness (Minter & Kimball, 1980). However, documentation exists to tie

life changes to the onset of specific disease which cannot be ignored, such as cancer and heart disease. Usually, these are reported in response to a cumulative effect of stress. The World Health Organization has recognized this and compiled a list of illnesses which are identified with stress reaction (Greenberg & Valletutti, 1980). Life stress in the family has been reported with the onset of leukemia in children (Holmes & Masuda, 1974).

One personality type has been identified as more susceptible to stress-related illness: type A personality (Friedman & Rosenman, 1974). The type A personality is time-driven, hostile, suspicious, competitive, and a poor copier. This individual tends to alienate possible social supports, which are so important to coping and health. Heart disease is a feature of this personality. Type A is apparently more vulnerable to helplessness (Henry & Ely, 1980).

Historically, in times of national stress such as economic depression, war, overpopulation, and hunger, when major readjustments are needed and mass dislocation occurs, disease and death reports abound. Plague and scurvy in times of need are common. The death rate in Native Americans following reservation confinement was astronomical. Disease, such as gout, dropsy, and obesity, occurs in times of plenty also (Wolff, 1953). Current treatments which are used for stress-related ailments or as preventatives are relaxation, meditation, and biofeedback (Culligan & Sedlacek, 1976; Everly & Rosenfeld, 1981).

Stress Reduction Interventions

The concept of coping has been considered in an earlier discussion in this paper, particularly focusing on Lazarus' study (1969b). This present section will discuss the direct action and indirect action coping

responses in terms of specific stress reduction interventions reflecting these two main classes of coping.

The stress reduction interventions representing both direct and indirect action involve taking control of one's behavior. The direct action interventions tend to involve an emphasis on cognitive control which leads ultimately to physiological modification. The indirect action interventions are focused on physiological control initially (Stoyva & Anderson, 1982).

Direct action interventions which will be dealt with here are assertiveness training, self-statements (self-talk), and imagery. Indirect action interventions to be discussed are progressive relaxation, autogenic training, meditation (Zen and transcendental), biofeedback (EMG frontalis control), and systematic desensitization.

Progressive Relaxation

To the layman, relaxation can mean anything that is not included in our definition of work. It can mean playing, watching television, going on a vacation, and a whole variety of leisure activities. On the other hand, tension is usually referred to as anything that has a negative connotation. From a scientific point of view, relaxation refers to the lengthening of skeletal muscle fibers and tension refers to the shortening of those fibers.

Progressive relaxation is a specific relaxation procedure introduced by Jacobson (1938) to demonstrate the mind-muscle relationship with medicine. Over the years, through applied research methods, Jacobson has systematically documented the effects of imagination, awareness, and other mental processes on muscles (Brown, 1977).

The basic procedure in progressive relaxation allows an individual to compare the tension state against the relaxation state. In order to introduce the individual to the sensation of relaxation, he or she is first asked to tense a set of muscles as hard as possible and then to allow these same muscles to relax. A particular muscle set is tensed only three or less times during a 15 minute period. During the time period, the individual is to discriminate internally the difference between the tension situation and the relaxation of that tension. The procedure is a leisurely paced situation which may extend over a period of weeks in which the individual progressively tenses and relaxes all of the muscle sets of the body, spending perhaps two weeks on each set. The original Jacobson (1938) exercises have been modified and combined with other techniques such as systematic desensitization and EMG feedback (Braud, 1978; Rachman, 1968).

Relaxation training does not conclude when the individual leaves the treatment situation. Daily practice is emphasized and certain cognitive cues may be given to the subject to aid in the use of the relaxation behavior (Stoyva & Anderson, 1982). Progressive relaxation, along with the other indirect action interventions has at its base the concept of passive attention, a subtle nonstriving state. Some recent research on central nervous system functioning suggests that progressive relaxation and other indirect interventions rely less on messages sent from the relaxed muscle proprioceptors to the CNS than on the absence of effort signals from the CNS to the muscles (Stoyva & Anderson, 1982).

Progressive relaxation, along with other coping procedures is, as mentioned earlier, a control mechanism. In this case, a taking control of the autonomic nervous system or the involuntary system which was thought to be impossible only a few years ago (Pelletier, 1977).

One recent application of progressive relaxation involved the pairing of this procedure with frontal EMG biofeedback in the treatment of hyperactive children (Braud, 1978). Both intervention procedures resulted in a significant reduction of muscle tension, hyperactivity, distractibility, irritability, impulsivity, explosiveness, aggressiveness, and emotionality in the children so exposed.

Shapiro and Lehrer (1980) compared the psychophysiological effects of progressive relaxation and autogenic training on normal subjects. The results indicated that both interventions are helpful in reducing general levels of psychopathological symptoms such as anxiety and depression.

Staples, Coursey, and Smith (1975) suggested that tape-recorded instructions in progressive relaxation may produce greater decreases in frontalis EMG activity than tape-recorded instructions in autogenic training.

Autogenic Training

Autogenic training is a deep relaxation technique developed in 1932 by Schultz (cited in Schultz & Luthe, 1959) which produces results not unlike meditation when practiced diligently (Pelletier, 1977). Through the use of autosuggestion, the individual engages in a series of relaxation exercises designed to move him or her to a stage of deep relaxation, at which point the ultimate strived-for level is an altered state of consciousness marked by a high degree of autonomic control. Sitting in a comfortable position, the individual is first instructed to imagine and silently repeat feelings of heaviness in a series of bodily parts, beginning with the most active. The next stage involves imagining warmth in various bodily areas, and finally, imagining one's forehead to be cool. When this series is mastered, autogenic meditation is introduced which

involves the formulation of visualization experiences wherein the individual is instructed to focus mentally on certain objects or concepts over an extended period of time. Thus, at this stage autogenic training is similar to meditation such as those which involve the use of a mantra for focus (Luthe, 1969).

Autogenic training requires a great deal of persistence on the part of the patient or subject because of the length of the initial training procedure (Brown, 1977). In a study reported by Luthe (1969), it was observed that cortisol levels decreased in long-term autogenic trainees after they practiced 20 minutes of passive attention to heaviness and warmth exercises. Brown (1980), in evaluating the literature on autogenic training, reported that the main demonstrated effect of the training was a tendency to decrease muscle proprioceptive information. This information, which activates cortical alerting activity when decreased, thus reducing the alerting action on lower muscle control relays. This manifests itself in twitching and jerking of the extremities during training, a spontaneous release of the cortical activation effect.

Some researchers, notably Benson (1975), have proposed that all relaxation techniques produce a generalized relaxation response rather than contributing unique features. Shapiro and Lehrer (1980), as reported earlier in this paper, compared the specific effects of progressive relaxation and autogenic training and found evidence both for a generalized relaxation response and for unique and specific effects of autogenic training, namely the feelings of heaviness and warmth.

Budzynski and Peffer (1980) proposed that autogenic training involves awareness of and control over autonomic responses which are associated with a decrease in sympathetic dominance. Further, they reported that it is intended to produce an anti-stress physiological pattern.

It has been reported that long-term practice of autogenic and other deep relaxation techniques may result in a state of lowered limbic and hypothalamic activity, which results in a less anxious attitude or "anti-stress" disposition in the practitioner (Everly & Rosenfeld, 1981). In addition, the same researchers reported results from a perusal of the literature on autogenic and other relaxation techniques which reflect shifts in the personality dynamics of individuals who practice these techniques over a continuing period of time. The major shifts involve a movement toward an internal locus of control, as well as increased self-esteem.

Meditation

Meditation is generally thought of as a form of relaxation training. Meditation is not one single intervention strategy. Rather, there are numerous approaches to the meditative experience. The two which are most usually connected with discussions of relaxation and which will be considered here are Zen and transcendental meditation (Hirai, 1974; Benson, 1975).

Western culture sees the term "meditation" as synonymous with an act of reflecting or pondering. This implies an active doing of some cognitive endeavor. Eastern thought envisions meditation as a passive volition toward enlightenment, an altered state of consciousness (Everly & Rosenfeld, 1981). Pelletier (1977) viewed meditation as an experiential exercise involving attention and concentration. The individual practices meditation to move toward a state called "satori" or "transcendental awareness." The two basic avenues by which this is achieved is by restriction or focusing of attention on an object of meditation or a mantra as in transcendental meditation. By this means, the individual achieves

the opening up of attention during which time he or she is undistractedly receptive to external and internal stimuli as in Zen meditation. It is termed as a mastery over attention in which the individual suspends his or her ordinary cognitive processing so as to allow direct perception of stimuli (Naranjo & Ornstein, 1971).

Attention and concentration are important components of meditation and the ability to deal with these behaviors over an extended period of time is critical in the process. Pelletier (1977) pointed out that the attitudinal component of meditation may be heavily involved in the success or failure of meditation as an intervention. He pointed out the element of choice to meditate which indicates a commitment on the part of the individual surrounding the practice of meditation.

Zen meditation (or "zazen") became widespread in Japan in the eleventh and twelfth centuries A.D., while transcendental meditation, a westernized form of Hindu tradition, was brought to the United States in the 1960's by Maharishi Mahesh Yogi (Everly & Rosenfeld, 1981). The explicit neurophysiology of meditation has been investigated but results have been inconclusive. However, there is some support for a shift in hemispheric dominance during meditation from left dominant to right dominant (Pagano & Frumkin, 1977).

Shapiro (1978) delineated five steps in the attainment of awareness in meditation. These steps include difficulty in breathing, wandering mind, relaxation, detached observation, and higher state of consciousness. The process is discussed by Stoyva and Anderson (1982, p. 751) as a "trying not to try." The final step in Shapiro's discussion incorporates all of the previous steps in greater intensity. The nature of that step is reflected in a peace of mind, a feeling of oneness with the

universe, and is accompanied by an alteration in temporal/spatial relationships and an enhanced sense of reality.

In investigating the research concerning the efficacy of meditation in clinical applications, Everly and Rosenfeld (1981) reported that meditation applications of the mantra-type have been found useful as therapeutic interventions in the stress-related ailments of anxiety and anxiety neuroses, phobias, alcoholism, and other substance abuse, and hypertension. In addition, it was found to increase and enhance positive mental health.

Hirai (1974) found that Zen practitioners produce a predictable series of EEG changes as they move into the meditative state: appearance of alpha with eyes open; increase in alpha amplitude and decrease in alpha frequency; and finally, the appearance of a theta response.

Transcendental meditation calls for two, 15-minute meditation periods a day. The individual is instructed to find a darkened, comfortable, quiet setting and to get into a comfortable, seated position with the spine, head, and neck in a vertical line. Breathing instructions are given and then the individual is instructed in the use of the om or the mantra during the breathing out phase. The mantra use gradually fades out. The final stage is a reawakening stage (Brown, 1977; Everly & Rosenfeld, 1981).

Zen meditation was introduced to the United States by the works of Alan Watts and D. T. Suzuki (cited in Pelletier, 1977). It is also called sitting meditation. The individual assumes a pose not unlike the transcendental meditation pose, although one may assume the cross-legged Lotus position and is instructed to breathe naturally through the nose. The individual should simply allow thoughts to flow uninterruptedly, with

the eyes unfocused and partially open. The individual is to experience completely, the here and now (Pelletier, 1977).

Those who practice meditation tend to sense a feeling of personal control. Meditation is seen as a way to mitigate responses to stressful situations.

Systematic Desensitization

The intervention strategy systematic desensitization was developed by Wolpe (1958). Based on the concept of reciprocal inhibition, it has been used to enable individuals to deal with stressful situations through the induction of a state of relaxation. Wolpe observed that three states of being have an inhibitory effect on stress reactivity: relaxation, assertion, and sexual arousal. These three states are physiologically the opposite of tension and anxiety. If one is able to achieve a state of relaxation in the presence of threatening stimuli, then stress reactivity is reduced. Wolpe chose to make use of the relaxation response in his treatment situation.

In actual practice, the individual is gradually or rather systematically exposed to a series of ascending anxiety-arousing situations. Prior to and during the systematic exposure, deep relaxation is induced and maintained. In the process, the individual learns to react with a response other than anxiety when faced with particular stressful situations. He or she is made less sensitive, or rather desensitized (Spiegler, 1983). This particular treatment mode is used to deal with phobias many times.

Initially, the individual is taught a response which is incompatible to anxiety, usually deep muscle relaxation. Then, the individual is asked to specify all the possible situations and instances which carry

negative or stressful connotations concerning the anxiety-producing object or activity or idea. These specific situations are then ranked in a hierarchical fashion from least anxiety-producing to most anxiety-producing. At this point, following inducement of relaxation, the individual experiences a series of visualization experiences, beginning with the least anxiety-producing situation and ending with the most anxiety-producing situation. The individual is requested to imagine each of the specific situations over a period of training sessions. Home practice between sessions is encouraged (Wolpe, 1958). It is clearly important that the individual be capable of visualizing and/or imagining vividly in order to make use of such a technique.

Children and others who have difficulty inducing deep muscle relaxation may have systematic desensitization coupled with Emotive Imagery, which involves using thoughts of pleasant experiences in place of relaxation (Wolpe & Lazarus, 1966). It is possible to employ systematic desensitization through the use of recorded instruction on tape or with handwritten instructions to the individual (Spiegler, 1983).

Studies on which components of the systematic desensitization are the most useful have reported that desensitization, with or without relaxation training, can be equally effective (Miller & Nawas, 1970). Others have found that the most important feature of the procedure seems to be the fact that individuals are exposed to stress-provoking situations (in imagination or in actuality) without the actual experiencing of any negative consequences.

The total number of sessions required to desensitize the individual to the anxiety-producing situation is dependent on the intensity of the felt anxiety, the number of different anxiety-producing situations requiring that many different hierarchies, and as mentioned earlier, the

ability of the individual to develop skill in relaxation and to be able to visualize and experience the situations (Suinn & Deffenbacher, 1980). The same writers reported results of several research studies concerning desensitization, looking at several different facets of the procedure such as its value in treating homosexuality, anorexia, compulsions, and auditory hallucinations, as well as the coupling of the procedure with such approaches as audiotapes. The findings were largely positive as to its efficaciousness.

Biofeedback

The information on biofeedback may be traced to early conditioning experiments such as those of Pavlov and Thorndike (cited in Everly & Rosenfeld, 1981). It has since been found that it is possible for an individual to gain control of certain functions of the Autonomic Nervous System (ANS). This is accomplished through learning to recognize certain physiological states within oneself, such as blood pressure level. In the recent past, researchers have attempted to provide this knowledge electronically through the use of especially designed equipment which detects changes in various ANS markers and graphically or auditorially depicts this information to the subject. Stoyva (1979) applied the capabilities to the process of relaxation through the use of the electromyographic biofeedback procedure which measures muscle tension.

Electromyographic (EMG) biofeedback detects electrical impulses through the use of special metal sensors attached to the skin with conducting jelly. The impulses are sent by the contractions of striated muscles. The subject of the EMG procedure, as mentioned previously, is apprised of the subtle states of muscular contractions by some display device such as a light array or a sound. The procedure may be used over

any striated muscle area available to skin or needle sensors. These areas may include the frontalis muscle of the head, wrist to wrist for upper body, and ankle to ankle for lower body. The latter two represent more generalized tension readings, while frontalis is a more subtle measure that, nonetheless, acts as an indicator of striate muscle activity elsewhere in the body. Budzynski (1979) reported measurement of frontalis activity can serve as an indicator of generalized activity of the sympathetic nervous system.

The notion that striate muscle activity is indicative of a stress response was first noted by Jacobson (1938), who enlarged upon this in 1970 by reporting a drop in the facial and laryngeal striate musculature during resting states. Brown (1980) reported that muscle tension levels detected by EMG biofeedback represent unfelt muscle tension; in other words, tension of which the subject is largely unaware.

Carlson (1977, 1979) reported on a series of research studies involving the concept of locus of control and EMG biofeedback training. He found that internals tend to be capable of reduction of tension in the EMG procedure faster than the external subjects. A further finding was that externals tended to shift markedly toward the internal direction on measures of locus of control following the EMG biofeedback training procedures.

Kimmel and McCauley (1979) found that decreased frontalis muscle activity during EMG feedback was accompanied by general somatic relaxation and a decrease in oculomotor activity. This finding was supported by Stoyva (1979), but the concept of the subject's mental set was discussed in the latter study. Stoyva found that if generalized relaxation occurs, it may occur automatically. He also reported that it can be made

to occur through instructions to the subject or through simultaneous muscle group training on several sets of muscles.

Stoyva and Anderson (1982) has suggested that muscle relaxation as measured by EMG frontalis levels affects the CNS in such a way as to prevent the occurrence of any generalized activation pattern such as the defense-alarm response. The inference is made that extensive muscle relaxation is closely associated with lowered cortical arousal.

EMG biofeedback has been successfully used in the retraining of skeletal muscles in cases of hemiplegia and also in the treatment of subvocal speech. In both of these situations, motivation to engage in and belief in the efficacy of the procedure seemed to be the key to success (Spiegler, 1983).

Beech, Burns, and Sheffield (1982) reported that EMG biofeedback to the frontalis area can result in changes in emotional states, and also generalization across a number of physiological parameters in subjects with high levels of tension. These reports suggesting emotional state interaction are supported by Stoyva and Anderson (1982), who suggested that the strongest similarity between many procedures involving muscle relaxation is the emphasis on passive attention, which is the opposite of the striving effort. In fact, recent evidence supports the notion that the CNS sends an absence of effort signal during deep muscle relaxation. Some researchers have questioned whether or not the reduction in general arousal induced in the biofeedback laboratory can be transferred to real-life situations (Passchier & Helm-Hylkena, 1981).

The findings of Carlson (1977, 1979), mentioned earlier in this discussion, reported the tendency of externals to shift to a more internal locus of control following EMG biofeedback. Stern and Berrenberg (1977) had the same results in their study of locus and EMG biofeedback.

However, they reported that the shift was mediated by subjects attributing their reduction in muscle tension more to personal effort than to properties of the task. One report found that it was possible to predict biofeedback relaxation response by measuring certain personality attributes in advance (Ford, 1985). Ford's study reported significant results in prediction from such measurement at the .01 level of confidence. The measures used were those of levels of interpersonal stress, personal control style, and self-image. The successful patients in this study were those who showed low levels of interpersonal life stress and a belief in their ability to control events in their lives.

In terms of the impact on health states, Peavey, Lawlis, and Goven (1985) reported that biofeedback-induced relaxation tended to decrease tension-anxiety and to increase overall coping. This same study further studied the phagocytic capacity (the white blood cell immune response to infection) in the subjects treated with biofeedback. While white blood cell quantity remained unchanged, the quality of the white blood cells was significantly enhanced and enriched.

Denkowski, Denkowski, and Omizo (1984) reported that locus of control was the only accurate predictor of success in EMG training in hyperactive male children. EMG biofeedback appears to demonstrate a number of capabilities for stress reduction. First, it is a device to bring about such a reduction. Second, the research seems to support the idea that it has the capacity to make use of certain sets, but also to change those sets. Finally, EMG biofeedback to the frontalis may be seen as a measure of muscle relaxation.

Thus far, only those stress reduction techniques considered to be indirect action interventions have been discussed in this chapter. As mentioned earlier, direct action techniques include those which involve

some direct cognitive intervention on the part of the subject which leads ultimately to a change in the physiological state. The three which are to be discussed are assertion training, self-statements (self-talk), and imagery.

Assertion Training

In order to discuss assertion training, the concept of assertiveness must be clarified. When a person engages in assertive behavior, that person acts in such a way as to assure that his or her legitimate rights are not attenuated and also to be sure that those things to which he or she is entitled are secured (Spiegler, 1983). Cameron and Meichenbaum (1982) added the further concept that effective assertion is practiced in such a manner so as to minimize unpleasant responses from outside observers or events. But the idea that assertion is always adaptable or appropriate is not shared by all researchers (Spiegler, 1983).

Assertion and aggression are seen by many in the lay public as analogous behaviors, and one who behaves in an overtly or covertly aggressive manner may be labeled as an assertive person. The means by which one's rights are secured differentiates the two concepts. True assertion is acting forcefully to gain rights, but without violating another's rights in doing so. Aggression, on the other hand, reaches the same goal, but it may be at the expense of others.

Spiegler (1983) has noted that a lack of assertion on an individual's part usually is maintained by one of three situations or a combination of them. It is important to analyze under which conditions the person is operating in order to know how to proceed in the assertion training with that individual. It is, of course, a case-by-case decision. The three situations are as follows:

1. The person may have a skill deficit in that he or she does not know how to act assertively.
2. The person may have a motivational deficit; that is, he or she receives no payoff for behaving assertively.
3. The person may have a discrimination deficit, a lack of awareness about when it is appropriate to behave in an assertive manner.

The basic procedure involves the therapist or trainer and client discussing the situation which calls for assertive behavior. The therapist then models the assertive behavior for the client. This modeling is often accompanied by verbal instructions describing various attributes the client should attend to in imitating the therapist's behavior. These attributes may include body stance, tone of voice, word emphasis, and selection of time and place for the behavior. Then the client is asked to imitate the therapist's demonstration. It need not be an exact replica; rather, it is important that the client's personal style be reflected in his or her rendition. The therapist gives feedback to the client and provides reinforcement for successively more assertive responses. This sequence of steps is continued until the client is able, in role-playing instances, to demonstrate the appropriate assertive behaviors. Homework assignments are given and discussed in subsequent sessions. As in desensitization procedures, the therapist deals with the least threatening situations first. When the client demonstrates clear knowledge of how and when he or she should be assertive, the therapist reinforces him or her for appropriate behaviors. It is important for the therapist to role-play situations where the outcome is not favorable, in order to prepare the client for that eventuality in natural settings. Outside reinforcement will be intermittent due to the realities of life circumstances. The sense of self-efficacy in dealing successfully in an

assertive manner enhances and reinforces this coping mode (Bandura, 1977). It is important that the therapist help the client to recognize maladaptive patterns which may be cues for situations in which assertion will not be appropriate, so as to minimize relapses (Cameron & Meichenbaum, 1982).

The foregoing description of assertion training involves the use of live modeling by the therapist. Two variations on assertion training are termed "symbolic modeling." One such variation involves the use of tape-recorded assertion situations in which the client hears an assertive interaction. The client is then asked to engage in covert behavior rehearsal in which the client practices his or her own response in his or her mind to the tape-presented situation (Prince, 1975).

Covert modeling is the other variation (Kazdin, 1974). This technique involves exposing the client to modeling sequences in his or her imagination. The client is asked to imagine a therapist-described scene involving a character with the same sex, age, etc. as him or herself. The scene must involve a description of situations in which the behavior is appropriate, a description of the model doing the assertions, and a description of the positive consequences for the appropriate behavior.

Stoyva and Anderson (1982) described the use of assertiveness training to correct an inability to express emotions which is seen in patients who tend to internalize stress. Along with learning to assert one's rights, the patient is taught to express the appropriate affect. Stoyva and Anderson reported that the most promising form of this appears to be in the area of teaching the individual new ways of handling anger reactions.

Brooks and Richardson (1980) employed assertiveness training and emotional skills training in a program to reduce anxiety in the subjects

and, in doing so, to reduce duodenal ulcer occurrence. These methods were used in concert with self-talk and progressive relaxation. The treatment group showed reduced levels of anxiety and a dramatic lowering of the recurrence rate of ulcers.

Self-Statements/Self-Talk

Self-statements or self-talk is a stress management technique designed by Meichenbaum (1977) based on his observations that the statements we make to ourselves not only accompany behavior, but may guide it. When faced with a stress situation, individuals tend to either silently or audibly give themselves certain instructions or verbalize certain thoughts. The basic aim is to identify negative self-statements and to eliminate them, replacing them with statements which are designed to enhance the individual's ability to cope or react.

Self-talk involves not only the replacement of negative with positive statements, but also cognitive modeling. The model verbalizes adaptive or coping thoughts and cognitive behavior rehearsal in which the individual mentally practices a behavior, such as thinking about an upcoming social conversation.

Meichenbaum (1977) further responded that these inner and outer verbalizations to oneself can become involuntary and automatic and many times are accompanied by mental pictorial representations. This is particularly true in the case of maladaptive self-statements. Consequently, the process of reshaping these verbalizations and cognitions has the further aim of making the individual actively aware of the maladaptive thoughts and statements so as to be able to intercept and reshape them. The process of rational-emotive therapy focuses on the restructuring of maladaptive statements (Ellis, 1970).

Greenberg (1983) described the use of self-talk in the reduction of test anxiety in a college setting. The basic thrust was to help the student to identify the actual risks in the situation and verbalize statements pointing out the actual risks while combining these with encouraging statements about the student's ability to deal with the risks. The use of self-statements to reduce anxiety and enhance creative thinking skills in college students is also reported by Meichenbaum (1975). In this study, students were taught to be aware of counter-creativity self-statements and to substitute creativity-enhancing statements. The trainer modeled creativity-enhancing self-statements which the students were asked to imitate and rehearse. The trainer further modeled self-reinforcement statements and self-instructions the students could use to avoid frustration. The statements were individualized for each student. The training resulted in greater scores for originality and flexibility on tests of divergent thinking.

Self-statements have been employed in treating impulsive behavior in children (Spiegler, 1983). A model performed a task for the children while verbalizing the sequence of the adaptive strategy. The technique used in this instance sought to define the problem to be solved by the children, to focus attention on the task and guide their responses, and to teach them to engage in self-reinforcing statements.

Self-talk is used many times in combination with other techniques such as autogenic training (Schultz & Luthe, 1959). One of the initial steps involves the use of self-suggestions related to sensations of relaxation. The originator of self-statements, Meichenbaum (1977) combined this technique with the use of imagery in what he described as stress inoculation. This concept, combining these two, involves a feeling of

control gained from rehearsing adaptive images and a change in the inner dialogue accompanying the adaptive images (Achterberg, 1985).

Imagery

The basic concept of imagery is best described as a thought process which invokes and uses the senses. As a stress-reduction technique, the basic procedure involves the visualizing or imaging of scenes directed towards some purpose such as reducing blood pressure or anxiety (Singer, 1975). There are several variations of the use of imagery and several interpretations of exactly what is occurring during the procedure.

One variation couples imagery with meditation and involves a series of steps beginning with rolling the eyes inward and upward, moving to the visualization of one color, visualizing the colors making patterns, visualizing objects, visualizing abstract ideas, and finally, emotions and people. The procedure is similar to autogenic training (Greenberg, 1983).

Stoyva and Anderson (1982) described a form of imagery called guided waking imagery, in which the individual is asked to visualize a series of scenes with a variety of content. This content is later examined by the therapist for signs of conflict or interpersonal problems.

Cautela (1980) described the use of imagery in covert sensitization. This variation is based on the assumption that mental images can be modified by the same reinforcement principles that modify overt behaviors. The individual images engaging in some behavior that he or she wishes to change, such as smoking. Then the individual imagines an intensely aversive event, such as vomiting uncontrollably. The notion here is that in the future the individual will pair the behavior of smoking with the aversive event of vomiting. Conversely, a behavior the

individual wishes to cultivate may be enhanced by imagining the behavior and then following that image with one in which he or she is rewarded. However, this procedure is most often used to change unwanted behaviors.

A variant on the above technique is covert behavior rehearsal in which the individual systematically visualizes the desired correct behavior (Mahoney, 1974). Many athletes employ this procedure during training.

Meichenbaum (1977) discussed imagery as a coping technique and along with Singer (1975) provided the most detailed discussions of this as a stress-reduction procedure. Meichenbaum pointed out that the individual gains a sense of personal control through the rehearsal of the mental images. Singer discussed the idea that the usefulness of imagery lies in the individual's ability to discriminate fantasy processes, to learn and rehearse alternative responses to stress situations, and finally, in a reduction of fear responses to the stress situations.

Wolpe (1958) employed imagery in the process of systematic desensitization. He used a set of instructions to evoke the desired image in the individual. Wolpe felt the emotional response to the imagined event was similar to the response felt in the actual situation.

Investigating some of Wolpe's (1958) contentions concerning emotional response to image, Lang (1979) attempted to describe the process of imagery. He found that one way in which to measure imagery therapy is through measuring the physiological structure of imagined scenes. Lang rejected the notion that images are analogs of reality, and pointed out that the brain may store images from reality, but not in raw identical "photographic" form. Rather, the observer and the observer's point of view interpret what is stored. Therefore, what is stored for visualizing is a description of the scene, not a raw observation, thus acknowledging

the ability of images to evoke emotional responses. Lang proposed that the aim of therapy using imagery should be to reorganize the image unit in such a way as to modify the affective dimension of the response. Furthermore, Lang pointed out that nonverbal external stimuli may be used to evoke images as effectively as verbal instructions.

The impact of imagery procedures on stress-related disorders has been well-documented. Hammer (1984) reported on the use of imagery in the treatment of cancer, imagining the carcinoma to be shrinking and finally disappearing. In a review of stress reduction techniques, Lehrer and Woolfolk (1984) reported the use of imagery techniques to expand the arterial system in hypertensives. The technique resulted in greater reductions of diastolic pressure than did general relaxation imagery.

Stoyva and Anderson (1982) reported the findings of an older clinical study in which patients with peptic ulcers were instructed to think about pleasant images whenever faced with anxiety-producing situations. In a three-year follow-up, those who were so instructed maintained their treatment gains in 9 out of 10 cases.

One treatment program combined imagery with therapeutic touch in dealing with cancer patients. The patients were asked to listen to audiotaped recordings that gave them instructions to relax and go for a mental journey through their bodies. They were then asked to draw pictures of their diseases as they imagined them and were asked to imagine how they might get rid of the disease. This technique was found to facilitate communication with caregivers and also to enhance healing (Achterberg, 1985).

The ability to visualize is, of course, central to this procedure. Apparently, not all individuals can produce visualizations. Ability to produce images was found to be critical in learning biofeedback

techniques (Achterberg, 1985). Individuals who experience images very intensively are said to be eidetics and experience these images in a holographic manner. These individuals apparently have acute sensory recollections surrounding the image (Achterberg, 1985). Pribram (1971) discussed the importance of the individual's belief in the ability of the imagination to change physical health. He felt that the image helps to explain behavior and language function.

Driscoll (1975) reported the results of a study which combined physical exertion (running in place) with positive imagery to produce marked reductions in anxiety. Exertion alone did not produce such marked results.

Imagery has been combined with progressive relaxation and autogenic training in various training programs which deal with stress reduction (Brown, 1980; Sutterley, 1981).

Music

"Music has charms to soothe the savage breast, to soften rocks, and bend the knotted oak" (Congreve, 1923, p. 185). It has been well known that music enhances mood production, as well as being able to provide the impetus for mood change. Goldstein (1980) found the first objective evidence that music creates changes that can be associated with endorphin production. The usual way that music has been used with mood change or control is to distract individuals from aversive aspects of illness or treatment, especially as used with dental patients. Music therapy has emphasized the role of music as a control for pain. In a study on music-assisted labor with expectant mothers music was used to try to cue rhythmic breathing (Hanswer, Larson, & O'Connell, 1983). In addition, the music was used to focus attention during labor to reduce pain as well

as anxiety due to the hospital environment. All those exposed to the music emitted fewer pain responses than those in the control group. The same general procedures were used with 6- to 15-year-old hospitalized children. McDonnell (1983) used music to lessen anxiety and to aid adaptation of the children to the hospital setting.

Several studies have used music in association with other relaxation techniques. Walker and Diment (1979) used baroque chamber music to deepen hypnosis. The subjects were highly or moderately hypnotizable and the music aided in Sensory Imagery. Using music with biofeedback, Scartelli (1982) found that the addition of sedative music nearly doubled the relaxation ability of his subjects. The spastic cerebral palsied adults in the study showed a 32.5% decrease in muscle tension with EMG alone and a 65% decrease with EMG and music. Music, progressive muscle relaxation, and a combination of both were used in a study by Kibler and Rider (1983). College students in that study were measured with finger temperature response before and after one of the three treatment procedures. All three groups evidenced significant increased in finger temperature. There were no significant differences among the three treatments, but the mean of the combination group was higher.

Summary

A review of the literature has revealed that the information in the areas of stress and stress responses ranged from supposition to clinically derived data. Research in health-related issues in stress studies appeared to be increasingly tied to findings from the behavioral sciences concerning the individual's interpretation of the stress situation.

Stress reduction interventions ranged from those of remote origin to more recent techniques using biofeedback and other methods utilizing

electronic features such as taped instructions for relaxation. The studies presented were selected to give a demonstration of the wide array of interventions which currently exist.

CHAPTER III

METHODOLOGY

Introduction

The purpose of this chapter is to describe the research methods and procedures utilized in this investigation. Included is a description of the subjects, equipment, materials, treatment procedures, hypotheses, and the statistical procedures used to analyze the data.

Subjects

Subjects for this study were preschool children from ages 4 years 0 months through 4 years 11 months. These children came from Cherokee, Adair, and Mayes Counties in eastern Oklahoma. These counties are economically poor and are rural in nature with a few small cities. The ethnic population of the area is 79% Caucasian, 20% Native American, and 1% Black. These children were included in the study following contact with several proprietary daycare centers, Cookson Hills and WA-RO-MA Headstarts, and the Cherokee County Health Department Parent-Child-Enrichment Program. Either personal contact with the parents by staff of the above programs, or letters, were sent to parents asking permission to release the names of their children to the researcher for this investigation. As children were authorized by the parent to participate in the study, the children were randomly assigned to either the treatment, placebo, or control group. No systematic attempt was made to control for economic,

cultural, and ethnic characteristics of the children. There were involved in the study, however, children representing a varied economic background, and all of the major racial and cultural groups.

Equipment

Autogen 1100 EMB biofeedback equipment was used to obtain an objective measure of the child's ability to relax. This equipment is recognized as adequate to measure the EMG levels of the frontalis muscles and gave numbers representing the level of relaxation of the frontalis muscles. The Autogen 1100 provides a visual display of EMG activity in integral average microvolts, selectable over five scales (0.05-.1uv, 0.15-10uv, 0.5-10uv, 50-1000uv). For this research, the 0.5-10uv scale was used for relaxation measures. An electrode impedance test was performed on each subject to ensure adequate electrode attachment. Because of the age of the children involved in the study, a headband was used to hold the electrodes in place. This elastic headband was secured around the forehead by a velcro fastener.

The Autogen 5100 Digital Integrator/Wave Form Analyzer was attached to the Autogen 1100 to obtain absolute values of EMG levels. The 5100 was set to obtain measures every 30 seconds and gave an average of the EMG activity during that 30-second interval. The reading was taken by the indicator every tenth (.1) of a second, and the average was reported every 30 seconds. The accuracy of the Autogen 5100 Digital Integrator/Wave Form Analyzer is .3%, which meets the standards set by the physiology field for publication for clinical and research data (Autogenic Systems, 1980). The biofeedback operator was an assistant professor of psychology and taught biofeedback courses at a local university and was therefore judged to be competent as an operator of biofeedback equipment.

A cassette tape player was used with some of the children. The children listened to either a slow relax instruction audio tape or a relaxing music tape, and were evaluated in settings which were familiar to preschool children.

Materials

One relaxation procedure was an audio cassette tape of slow relax instruction from the Family Relaxation and Self-Control Program (Lupin, 1981). The author indicated that since each tape in the 12-tape series has verbal instructions recorded on the tape, the tapes could be used successfully without further written directions. The program is divided into the following six phases:

Phase 1--Parent Preparation. Consists of directing the parents on their own progressive relaxation.

Phase 2--Basic Relaxation Exercises. Teaches children progressive relaxation techniques.

Phase 3--Slow Relax Exercise. Instructs children on proper breathing techniques for relaxation.

Phase 4--Fantasy Stories. The remainder of the tapes in the program are of various fantasy stories designed to help children cope with different problems of childhood.

Phase 5--Ongoing Use of the Program. Continued use of the program when the children become tense or upset.

Phase 6--Relaxation in Day-to-Day Situations. Use of the verbal cues "relax" or "take a deep breath" when children become aggressive, act out, or become upset.

To use the entire program would have required at least six weeks through Phase 4. Due to practical considerations and the amount of time

requested of the children, this investigation bypassed the first two phases and used the slow relax tape (Phase 3) for a one-time presentation to some of the children (Appendix A).

An audio cassette tape of relaxing music from the record "Quiet Time" (Lucky, 1980) was used with some of the children participating in the study. This tape contained four different musical selections (Appendix B), which were determined to be relaxing by a committee of Child Development Specialists certified by the Oklahoma State Merit Board and was of the same duration as the slow relax tape.

Standard white typing paper and crayons were used for all children. These materials were used to provide a controlled break before the final relaxation measures were recorded.

Procedure

Parents and/or guardians were mailed or given a letter which included a request to have their children participate in the research (Appendix C). If the parents/guardians responded, they were asked to read and sign a consent form which informed them of the exact nature of the study and the measures to be obtained from their children. This informed consent also included a contract which the parents/guardians read and signed, giving consent for their children to participate in the research (Appendix D).

Using the completely randomized design as the experimental research design, the 96 children were randomly assigned to one of three groups of 32 children each. Evaluation sessions were conducted at three different locations. One test site was in a preschool classroom at a local church, one in a room at a community building housing headstart classes, and a third in a room within a headstart program. The parents/guardians

accompanied their child to the examination room in the local church. The parent/guardian and the child were verbally informed of the procedures to be followed and permission was obtained from the child to proceed. The children evaluated at the community building and the Headstart class were not accompanied by their parents/guardians. The researcher went to the class and the teacher asked the child to go with the researcher to the examination room. As in the case of parent/guardian and child, the child was verbally informed of the procedures and permission was asked to proceed. Next, the biofeedback discs were attached to the forehead and held by an elasticized headband with a velcro fastener. The child was asked to "sit as still as you can and try to relax" and baseline relaxation data was obtained over a three-minute period, with measures being taken at 30 second intervals (Appendix E) (Autogenic Systems, 1980; Ficklin, 1986).

Following the baseline measures, children assigned to the experimental treatment group listened to the slow relax instruction tape. This tape required 9 minutes and 45 seconds to complete and the biofeedback operator took measures during the last three minutes of the tape at 30-second intervals. After listening to the tape, the child was given paper and crayons and was allowed to draw and/or color. Finally, the child was again asked to "sit as still as you can and try to relax," and biofeedback measures were again taken at 30-second intervals for another three-minute period.

Children randomly assigned to the placebo group listened to relaxing music after the initial baseline data was recorded. This tape was of the same time length as the relaxation instruction tape. The biofeedback operator recorded measures during the last three minutes of the tape at 30-second intervals. The child was also allowed three minutes to draw

and/or color with crayons on white paper. The child was then asked to "sit as still as you can and try to relax," and biofeedback measures were taken at 30 second intervals for three minutes.

Children assigned to the control group were given paper and crayons after the baseline measures and were allowed to draw and/or color for three minutes. They were then asked to "sit as still as you can and try to relax," and biofeedback measures were recorded every 30 seconds for three minutes.

All measures were recorded in individual testing sessions. Present in the session were the researcher, the biofeedback operator, the child, and the parent/guardian, if accompanying his or her child.

Hypotheses

The .05 level of confidence was established as necessary to reject the following null hypotheses:

Hypothesis I. There are no significant differences between the measures of ability to relax during experimental treatment of children who listen to taped relaxation instruction and of children who listen to relaxing music.

Hypothesis II. Upon completion of the experimental treatments, there are no significant differences between the measures of ability to relax of children who listen to taped relaxation instruction or taped relaxing music and of children not listening to tapes.

For Hypothesis I, the independent samples t test was used to compare the mean scores of the measures of ability of children to relax during treatment for the two slow relax treatment group and the relaxing music placebo group (Kirk, 1968). For Hypothesis II, a one-way analysis of variance was used to compare the mean scores of the measures of ability

to relax of children assigned to the treatment group, the placebo group, or the control group (Kirk, 1968).

In determining the level of adequate power for this research, a sample of 96 children was selected which, at the .05 level of confidence, yields an estimated probability of rejecting a false hypothesis at the .95 level when the effect size is assumed to be .50 (Cohen, 1977).

Summary

This chapter contains general demographic information about the subjects and the geographic area from which they were selected. Included also was a description of the equipment and materials used to obtain measures of relaxation. The procedures outlined the testing situation, instructions to the children, and generally provided the structure under which this investigation operated. This chapter also presented the hypotheses, the statistics used for each hypothesis, and the estimated power of the statistical analysis assumed sample size. The treatment effect size was postulated at the level of a medium effect size.

CHAPTER IV

RESULTS OF THE STUDY

Introduction

In this chapter, the results of the current study are reported as they relate to each of the null hypotheses. The .05 level of significance was used to test the hypotheses. The data generated by the children were analyzed using the SPSS program for statistical procedures available through the Statistical Package for the Social Sciences, Inc. (Nie et al., 1975).

Hypotheses

Hypothesis I. There are no significant differences between the measures of ability to relax during treatment of children who listen to taped relaxation instruction and of children who listen to relaxing music.

This hypothesis was tested by calculating an independent samples t statistic between the measures of ability to relax for children in the experimental treatment group and the placebo group, immediately following the audio tape presentation. As indicated in Table 1, the mean of the relaxation measures collected in the relaxation instruction condition ($\bar{X}=4.47$) was only slightly higher than in the relaxing music condition ($\bar{X}=4.01$). This difference was not statistically significant ($t=-0.83$,

df = 62, $p > .05$) for the two conditions. Thus, the statistical analysis leads to nonrejection of this null hypothesis.

Table 1

t-Test for Relaxation During Relaxation Instruction and Relaxing Music

Treatment Condition	n	\bar{X}	S	df	t
Relaxation Instruction	32	4.47	2.21	62	-0.83
Relaxing Music	32	4.01	2.21		

The t-test as a parametric procedure is considered to be a powerful statistic. As indicated by Fagley (1985), the power of the t-test, when analyzed for the current research, appears to have been greatly reduced due to the very low actual treatment effect of .01.

Hypothesis II. There are no significant differences between the measures of ability to relax of children who listen to taped relaxation instruction or taped relaxing music and of children who did not listen to tapes.

To investigate this hypothesis, a one-way analysis of variance was performed to compare the effect of the experimental treatment, placebo, and control conditions on measures of ability to relax. Table 2 reports the \bar{X} and S for each of the three groups. Based on the statistical analysis of this data (Table 3), the resulting $F(2,93) = .085$, $p > .95$ indicates that there was not a significant difference among the means. These

results imply that listening to taped relaxation instruction or relaxing music was no different in affecting the ability to relax of preschool children under the conditions of this study than was not listening to tapes. Thus, the statistical analysis leads to nonrejection of this null hypothesis.

Table 2

Means and Standard Deviations for Relaxation Instruction,
Relaxing Music, and Control Conditions

Condition	\bar{X}	S
Relaxation Instruction	3.54	2.17
Relaxing Music	3.71	1.97
Control	3.54	1.94

Table 3

ANOVA Summary Table of Relaxation Measures for Relaxation
Instruction, Relaxing Music, and Control Conditions

Source	df	SS	MS	F Ratio
Between Groups	2	.655	.327	.085
Within Groups	93	357.166	3.841	
Total	95	357.822		

While the ANOVA is a powerful statistic, its power in this study was reduced to a power no greater than .10. Again, the treatment effects were much lower than expected.

Post hoc findings analyzing data using a correlated samples t-test revealed significance of coloring (controlled break) to baseline measures, measures taken during treatment, measures taken during the placebo procedure, and final relax measures. These findings were significant at the .001 level of confidence (Table 4, Appendix F).

Summary

This chapter has included statements of the null hypotheses investigated in this study. A summary of the statistical findings is as follows: Using an independent samples t-test, no statistically significant differences were found for measures of ability to relax for children while listening to taped relaxation instructions and children listening to taped relaxing music. Results from a one-way ANOVA indicated that no statistically significant differences were found for measures of ability to relax for children listening to or not listening to taped relaxation instruction or relaxing music.

Due to the very low treatment effects for both hypotheses, the statistical procedures lacked the power to detect a significant difference at an alpha of .05. The researcher had predicted a medium effect size, which is a typical effect size to predict in most psychological research.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

The purpose of this chapter is to summarize the findings of the current study in order to arrive at the appropriate conclusions as indicated by the data. Furthermore, this concluding chapter seeks to point out areas fruitful for further study.

Summary

This study was designed to empirically investigate the effects of a selected stress reduction exercise on the ability to relax in preschool children. The present investigation involved 96 children of the ages ranging from 4 years 0 months through 4 years 11 months. Each child was randomly assigned to one of three groups: an experimental treatment group, a placebo group, and a control group. These children were attending proprietary daycare centers, Headstart classes, and/or the Child Enrichment Program of the Cherokee County Health Department/Guidance Clinic.

The treatment condition used an audio taped stress reduction exercise from the Family Relaxation and Self-Control Program. The placebo condition used an audio tape of relaxing music. Each of the tapes was 9 minutes and 45 seconds in duration. The procedures for all three groups could be completed within 30 minutes.

The following null hypotheses were tested using an alpha of .05:

Hypothesis I. There are no significant differences between the measures of ability to relax during treatment of children who listen to taped relaxation instruction and of children who listen to relaxing music.

Hypothesis II. There are no significant differences between the measures of ability to relax of children who listen to taped relaxation instruction or taped relaxing music and of children not listening to tapes.

An independent samples t-test was applied to the measures obtained during treatment of the treatment group and the placebo group. The resulting statistic indicated no significant difference ($p > .05$) between the effects of the treatment and placebo conditions on the ability of children to relax. Therefore, Hypothesis I was not rejected.

A one-way ANOVA was calculated using the measures of ability to relax obtained after the controlled break of coloring. The calculated F statistic was not significant ($p > .05$). Therefore, Hypothesis II was not rejected.

Conclusions

While it has been postulated that relaxation instruction has the ability to reduce stress as measured by tension in the frontalis muscles, the results of this study failed to substantiate that the instruction was any more effective than relaxing music or no instruction or music. Of interest to the investigator was the way the children responded to the controlled break.

The design of this study was to allow for a controlled break of three minutes for coloring before the final relaxation measures were

taken. The examiner assumed that the increased motor activity would increase the amount of tension in the frontalis muscles and thus, any differences in the final relaxation measures would reflect relaxation skills learned from the treatment condition. Originally, no measures were to be recorded during this time; however, since the child still had the biofeedback equipment attached, continuous measures were taken for the control, treatment, and placebo groups. The children were given a blank sheet of white typing paper and crayons. Measures taken during this three minute time period were reduced, showing greater relaxation for all but six children in the study. This reduction in levels from the baseline data occurred regardless of the group to which the children were randomly assigned. There was also a great reduction for measures taken from the children who had just finished listening to the audio tapes. While not a part of this research, analyzing this data using a dependent t-test revealed significance of coloring to baseline measures, treatment measures, placebo measures, and to final relax measures at the .001 level of confidence.

This unexpected data may have resulted from the exercise of coloring which provided the child with a familiar, structured, motor activity. Also, coloring allowed the child to position his or herself differently by dropping the head to look at the paper, thus allowing the mouth to drop open slightly and the neck muscles to relax. The biofeedback equipment is very sensitive while measuring the frontalis muscles to both the relaxed jaw from a slightly opened mouth and to the relaxation of the neck muscles. In each case, the equipment measured greater relaxation.

It is difficult to draw conclusions concerning the reason for the nonsignificant effect of the treatment procedures on the children's ability to relax, other than the low effect size and low power of the

statistics for this study, as reported in Chapter IV. There was a general trend for final measures to be lower than the baseline measures, although the difference was not statistically significant. This difference may have been due to the individual or combined effects of being more comfortable in the testing situation and more used to the biofeedback equipment, as well as a generalization of the relaxed state following the coloring during the controlled break. One might conclude, however, that according to the results of this study, the treatment, placebo, and control procedures are statistically equivalent in assisting preschool children to relax.

One reason for this apparent equivalence may be a result of the limitations placed by this study on the exposure to the relaxation instruction condition. The relaxation instruction was one tape from a 12-tape series designed to be used with children and their parents. Because of the time required of the children and the young age of the children, it was decided that a one-time exposure to the treatment tapes would be used. A multiexposure to the tapes, as suggested by the originator of the relaxation instruction tape, may have allowed the children to follow more adequately the instructions given on the tape.

Although the present investigation failed to demonstrate that taped relaxation instruction or relaxing music could reduce stress as measured by reduction of tension in the frontalis muscles, the data did show a movement toward this relaxation. This movement, however, was nonsignificant when compared with the control condition.

Recommendations for Future Research

Based on the findings and conclusions of this research, the following research recommendations were made:

1. This study should be replicated using the multiexposure format suggested by the originator of the taped relaxation program. The parents should be taught how to use the tape and demonstrate effectiveness. Then the parent can present the taped material three times a week for two weeks prior to the evaluation.

2. This study could be conducted using slightly older children (five- and six-year-olds) to assess at what age children may respond more productively to this more cognitive approach to relaxation.

3. Future researchers could design into the study a structured, familiar, motor activity (i.e., coloring, finger painting, putting simple puzzles together) as a treatment condition for relaxation rather than as a controlled break.

4. Research leading to the development of an objective, less intrusive measure of relaxation than biofeedback could benefit future researchers in working with young children in the area of stress and relaxation.

5. Teaching parents to use relaxation techniques themselves and then to act as teachers for their children can serve as an experimental condition for future research.

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APPENDIXES

APPENDIX A

CHILDREN'S SLOW RELAX EXERCISE

Today, you are going to learn to breathe correctly and relax in a different way so you can take one deep breath and be completely relaxed. To begin the exercise, get completely comfortable in your chair. You may wish to let your hands lie easily in your lap. Be sure your feet can touch the floor as you sit comfortably. You may close your eyes easily, not too tight, and then follow the directions I shall give you. To learn to breathe correctly, think of your lungs as though they were balloons. First of all, let all of the air out of your lungs. Then let your tummy rise slightly as though it were a balloon being filled with air. Of course, the air is not really in your tummy, but it may feel that way. Now, let your ribs expand and while still inhaling, fill your upper chest with air. Hold it for a second; now let go by first pulling your tummy in and begin to let the air go out slowly. Then let the air out of your middle and upper chest.

Good. Now I want you to practice breathing correctly three times. Inhale first by expanding your tummy, now your ribs, and then the upper chest. Hold it. Good. Now exhale, first tummy, then ribs, then the upper chest. Very good. Now you may do it two more times by yourself. It is very simple when you follow the directions.

Now that you know how to breathe correctly, you are going to learn to relax by taking one deep breath and letting go. Do you remember the tight feeling we call tension? Today, instead of tightening all your muscles to make them tense, you will relax each completely. As you relax more and more, your arms and legs may tingle just a little bit or you may have a warm, pleasant feeling.

Now imagine that all the tension in your fingers is flowing out at your finger tips, leaving your hands feeling very loose and very relaxed. Let your hands lie loosely in your lap. Think about your forehead and

the area right between your eyes. Imagine that all the wrinkles are being smoothed away by an invisible eraser. All the muscles in the forehead are letting go and becoming softer and softer. Send a message to the little muscles in your scalp to turn loose and let go. Think about the muscles around your eyes, letting go more and more.

Take a deep breath and allow the feelings of relaxation to spread down into your cheeks and around your nose. Think about your tongue. Feel all the muscles in your tongue letting go. Let your mouth drop open just slightly. As you do so, all the tightness will leave your jaws and you will feel even more relaxed. Now take a deep breath and let it all go.

Think about your ears and let all those muscles relax. Let's start at your ears and go down into your jaws. Now slowly tilt your head toward your right shoulder. It is very important that you don't force your head. Slowly and easily roll your head down to the front. Be careful not to let it drop too quickly. Now roll your head up to the left shoulder very slowly and very gently. Now roll your head to the back so your head is tilted back and your chin is pointed up. Move your head again in a circle and see how slowly and easily you can do it. Now visualize the muscles in the back of your neck letting go. Feel the relaxation down into your shoulders, arms, and hands.

Take a deep breath and let it all go completely. Allow those relaxed feelings to spread into your chest. Visualize your stomach and back muscles letting go all of the tightness, feeling very loose, very easy. Enjoy the good feeling you have when your stomach muscles are completely relaxed. Let those relaxed feelings flow down into your legs. Let go of all the tension in the back of your knees, into the calves of your legs, and on down into your feet. Feel your ankles and each toe relaxing more

and more. Any remaining tension flows out the bottoms of your feet and each toe.

You should feel very calm and peaceful. Later, when you are working or playing, check to see how tight you may be holding your muscles. If you are finding yourself holding muscles tight, you will be able to take one deep breath and visualize all tension leaving your body. It can leave through your fingers and toes, leaving you feeling peaceful and calm and relaxed all over. You can even do this sitting up or, if you are in bed, you can do this to help you fall asleep more easily. It is especially important to do this when you become upset or when you are frightened. Pulling your shoulders so tight as you take a deep breath and then letting them go when you breathe out will also help you to relax. Remember, when you take a deep breath, let go all the tension as you exhale. Let's practice it again for a few more moments.

APPENDIX B

RELAXING MUSIC - "QUIET TIME"

RELAXING MUSIC - "QUIET TIME"

Side 1

TOYLAND	Victor Herbert*
EVENING FAIR	Claude Debussy*
PRELUDE IN C	J. S. Bach*
RAINBOWS	H. C. Lucky*
PRELUDE IN B MINOR	Frederic Chopin
ALL THROUGH THE NIGHT	Traditional English

Side 2

LULLABY	Johannes Brahms
MOONLIGHT SONATA	Ludwig Van Beethoven
PRELUDE IN E MINOR	Frederic Chopin
AFTER A DREAM	Gabriel Faure
TOYLAND	Victor Herbert

*Selection used on audio tape

APPENDIX C
CORRESPONDENCE

Dear Parents/Guardians:

Stress is a condition which can cause physical and emotional problems. It is the number one health problem today.

One way to deal with stress is through relaxation. People can learn how to relax, and thus reduce complications from stress. Mr. Jim Reese is doing some research which is looking at ways four-year-old children can learn to deal with stress. This research requires the four-year-old to do some activities while their ability to relax is being recorded on biofeedback equipment.

If you would like your child to participate in this research, you will need to sign below, giving us permission to contact Mr. Reese about your child. One parent or guardian will be needed to assist your child during the study, which will take about 20 minutes. Mr. Reese will also ask that you sign a form for him which informs you about the study.

Signature

Relationship

Date

Address

Phone Number

Child's Birthday

APPENDIX D

INFORMED CONSENT FORM

INFORMED CONSENT

DESCRIPTION, PROCEDURES AND CONFIDENTIALITY

This research is being conducted to try to find some answers about how we can help our children to be happier, healthier children and adults. It is studying the effects of a relaxation program on ability to relax.

Your child, if she/he participates in the program, will have biofeedback equipment used to measure relaxation. This equipment will be placed on the forehead and will measure muscle tension. During this time, your child will either listen to an audio-tape of music and color, an audio-tape of relaxation talk and color, or just color. If any of these procedures are more relaxing than the others and your child did not have that procedure, your child can have that procedure after the study, at your request.

You will have all results of the program explained to you after the research is finished. The research is being directed by Mr. Jim Reese. Mr. Reese is a doctoral student at Oklahoma State University and this is part of his studies at O.S.U.

Mr. Reese has lived in Tahlequah for the past seventeen years and he has worked with preschool children in Headstart classes and has taught day-care workers about child development.

All information about the results of this study will be kept confidential. The data, but no names, will be included in a paper to be presented to professors at O.S.U.

Your signature indicates that you have read and understood the above information concerning the confidentially of information from this study and that you have read and understood the description of the way your child will be measured, and that you give your consent for these activities. You may withdraw your child from this study at anytime.

----- Child's Name	----- Date of Birth	----- Date
----- Signature	----- Relationship	
----- Address	----- Phone	

APPENDIX E

SUBJECT DATA SHEET

SUBJECT DATA SHEET

Name _____

Grp _____

Baseline	Trt.	Coloring	Relax (Post)
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APPENDIX F

t-TESTS FOR CORRELATED SAMPLES

Table 4
t-Tests for Correlated Samples

	Coloring	df	t
<u>Baseline</u>			
$\bar{X}=4.24$	$\bar{X}=2.54$		
SD=2.16	SD=1.78	95	9.10*
N=96	N=96		
<u>Post Relax</u>			
$\bar{X}=3.60$	$\bar{X}=2.54$		
SD=1.94	SD=1.78	95	8.23*
N=96	N=96		
<u>Slow Relax Tape</u>			
$\bar{X}=4.47$	$\bar{X}=2.78$		
SD=2.21	SD=2.04	31	5.65*
N=32	N=32		
<u>Placebo Tape</u>			
$\bar{X}=4.01$	$\bar{X}=2.46$		
SD=2.21	SD=1.57	31	4.96**
N=32	N=32		

*p < .001

**p = .001

VITA

James Thomas Reese

Candidate for the Degree of

Doctor of Philosophy

Thesis: EFFECTS OF A SELECTED STRESS REDUCTION EXERCISE ON ABILITY TO RELAX IN PRESCHOOL CHILDREN

Major Field: Applied Behavioral Studies

Biographical:

Personal Data: Born in Oklahoma City, Oklahoma, October 26, 1939, son of Mr. and Mrs. J. A. Reese.

Education: Graduated from Central High School, Oklahoma City, in May, 1957; received Bachelor of Arts degree in Psychology from the University of Oklahoma in May, 1962; received Master of Science degree in Clinical Psychology from the University of Oklahoma in July, 1965; completed requirements for Doctor of Philosophy degree at Oklahoma State University in May, 1987.

Professional Experience: Staff Psychologist and Assistant Administrator, Muskogee Guidance Center, Muskogee, Oklahoma, April, 1966 to March, 1968; Psychologist for the Indian Nations Foundation and the Bureau of Indian Affairs, Sequoyah Indian Boarding School, Tahlequah, Oklahoma, March, 1968 to July, 1969; Psychologist-Coordinator, Cherokee County Guidance Center, Tahlequah, Oklahoma, July, 1969 to March, 1985; Regional Guidance Center Coordinator for Cherokee, Mayes, Delaware, and Adair Counties of Oklahoma, March, 1985 to present; regional and national Headstart Consultant, 1973 to present.