

THE EFFECT OF SITUATIONAL PLAY ACTIVITY ON THE  
STRESS LEVELS IN CHILDREN

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BY  
SANDRA K. KREBS, B.S.N.

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## DEDICATION

In dedication to my mother, Luella Krebs, and my father, Leo Krebs, for their love and support throughout my entire educational endeavor. Unfortunately, due to the untimely death of my father, he will not experience this dream that would have been as equally important to him as it is to mother and me.

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CHAPTER I  
INTRODUCTION

Children's fears, stresses, and anxieties of hospitalization, pain, surgery, and death have received considerable attention in the nursing literature. Researchers have suggested that fears and anxieties of children change with age and perceptual development. There is support that fears become better articulated, more varied, and more realistic as children move from the 1st to the 12th year of life. In general, studies reviewed by Miller in 1979 found that between the ages of 7 to 12 years, children become less afraid of the dark, supernatural (ghosts and spooks), and animals and more afraid of bodily injury, death, school, and injury or death of relatives.

According to Chinn (1979), when school-age children are exposed to environmental stimuli that interfere with their physical, social, inner learning, and thought competencies, they experience stress and possibly distress. With bodily injury being a major fear for the child, the threat of intrusive type medical, surgical, and dental procedures done by physicians, dentists, nurses, and other medical personnel place the child in a stressful situation requiring some form of response or coping mechanism.

The stress theory of Hans Selye (1950) is helpful in understanding the dynamics of a stimulus in a stressful situation and the responses of the body to that stimulus. Stressors are agents or situations that produce stress-- which is a nonspecific response (biochemical) of the body to the demands made upon it. This biochemical body response explains why different stressors may cause the same type of reaction in an individual (Selye, 1956). Coping mechanisms to the stressor also give rise to a variety of responses and may be pleasant or unpleasant, helpful or harmful. Harmful, unpleasant, or disagreeable responses are labeled by Selye (1974) as distress. Desirable responses are labeled as adaptive responses and can assist with the development of appropriate approaches that can be utilized with the child prior to potentially stressful situations.

Therefore, the major challenge confronting the pediatric nurse is to facilitate adaptive responses of children to stressful situations. Since play is the most natural and available means of communication for the child, play experiences should assist him in coping constructively with the realities and stressors in life. Barton (1962) suggested that by focusing the child's play upon expected medical procedures, the child can cope with and overcome the barricades of the stressful situation. Since it is the

nurse's responsibility to inform and support patients in regard to medical treatments, it seems obvious that play would be the most effective means of communication for the nurse to utilize with the child.

Green (1974) described two types of play techniques. The first technique, play therapy, is used by the psychiatrist with the child who is emotionally disturbed, neurotic, or psychotic. The goal of play therapy is to enhance the child's insight into his own behavior and feelings. The second technique is therapeutic play and can be used by the professional nurse with any child and in any situation. The goal of therapeutic play is to give the nurse insight into the child's needs and feelings without trying to explain the child's activities to him. Therapeutic play may be of two types (Barton, 1962), that is, play may be spontaneous (free) leaving all the initiative to the child or it may be situational (controlled). In situational play, the nurse familiar with the elements which are stressful to the child can set up toys or suggest a specific scene in order to provide the opportunity for the child to work out his temporary and specific stressful feelings. Since the school-age child tends to incorporate his play activity into real life situations, situational play activity could readily be assimilated into an age-appropriate educational program to prepare him for dental treatments.

Methods for measuring the body's response to stress have been developed. These measurements are based on knowledge of the effect of situational stress (transitional anxiety) on the sympathetic branch of the autonomic nervous system (Selye, 1974). Physical indicators reflect widespread belief that stress or transitory anxiety always involves concomitant physiological activity (Lore, 1966). One of the physical indicators found to measure autonomic nervous system activity has been that of sweat gland activity. This activity can be measured directly by recording palmer skin conductance (Ferreira & Winter, 1963; Lore, 1966; Rees, 1973; Silverman & Powell, 1944).

With the aid of Selye's (1974) stress theory, ways of measuring the physiological effects of stress in children by means of the Palmer Sweat Print Test can be used to evaluate nursing interventions such as play activities. The activities may be aimed at facilitating adaptive responses of children to stressful situations such as dental treatments within a clinical setting.

#### Statement of the Problem

The following question was examined in this study:  
Will situational play activity initiated by the nurse prior to dental treatment procedures in the clinical setting alter

the level of stress which the child experiences immediately before the treatment procedure?

#### Justification of the Problem

Researchers in the social and behavioral sciences have been concerned with the humanization of child care services since 1943 (Johnson, 1972). Historically, early researchers were concerned with the effects of illness or hospitalization on the child or the family and child emotionally (Blom, 1958; Erickson, 1958b; Prugh, Staub, Sands, Kirschbaum, & Linehan, 1953; Vernon, Foley, & Shulman, 1967).

As early as 1953, Prugh et al. indicated that a lack of adequate psychological preparation of the child and parents supported the need for more widespread educational measures designed to meet the needs of the ill child. In 1958, Blom investigated children's reactions to illness and treatment procedures along with the impact upon the family. He found that most children had difficulty distinguishing suffering from the illness and the treatment done for cure. Both the illness and treatment procedures created feelings of guilt and were perceived by the child as punishment for wrong doing and bad thoughts. He also discovered that parents frequently viewed illness of the child as punishment for their own misdeeds and failures. He proposed that the crucial aspect for emotional adjustment of the child was

preparation for a procedure, which included a balance of negative and supportive feelings conveyed to the child by the parents. Faced with the situation of illness, the child could then grow emotionally by learning to master the stressful events.

In 1967, Vernon et al. published a comprehensive review of 200 books and journal articles dealing with theories and data related to the psychological effects of illness on the child. Only six of the studies reviewed indicated some form of clinical experiment where preparation was given to children or their parents along with an attempt to determine if the communication had a positive outcome. Methodological limitations of these studies allowed only tentative conclusions about the positive effects of the psychological preparation.

To summarize the literature prior to 1965, researchers found that illness created a series of real, imagined, or potentially stressful threats for the child. The exact nature of the threats depended upon such factors as:

(1) age and developmental level of the child; (2) previous experience of the child with similar threats; (3) amount and type of relevant information possessed by the child; (4) amount and type of support by parents. The stressful threats were classified into five categories of needs:

(1) bodily injury in the form of discomfort, pain,

mutilation, or death; (2) separation from parents and absence of trusted adults; (3) fear of the unknown and the possibility of surprise; (4) uncertainty about limits and expected "acceptable" behavior; and (5) relative loss of control, autonomy, and competence.

In 1975, a 10 year review of past medical, nursing, psychiatric, and psychological literature by Visintainer and Wolfer revealed only two further experimental investigations on the effects of psychological preparation and special supportive care procedures on children's stress reactions and adjustment to illness and hospitalization. Mahaffey (1965) concentrated preparation and supportive efforts on mothers rather than children who were having minor surgery. Skipper and Leonard (1968) included data regarding the stress effects of illness resulting in physiological changes, as well as social and psychological reactions. Once again, the provision of information and emotional support was directed toward the mother in order to reduce the child's stress responses.

During this same period of time, 1965 to 1975, nurses were noted to hold a much more active role in the involvement and publication of investigations. However, only a few books and journal articles were published on the incorporation of play therapy and therapeutic play practices in

nursing care of children (Barton, 1962; Erickson, 1958a; Jolly, 1968; Petrillo, 1968; Wu, 1965). The only investigational study related to play techniques was by Erickson (1958a).

To summarize the literature between the years of 1965 to 1975, research reflected few practices of psychological preparation of the child that had been tested systematically for their effectiveness. Much of the underlying theory appeared to remain obscure or superficial as noted in the literature prior to that time. Jolly (1968) stated the following:

Insufficient attention is being paid to one field, namely, the emotional outlet available to children through play. Play is vital in a child's development, helping him to deal with the stresses of life and providing a safety-valve for fears and anxieties which might otherwise become overwhelming. Since play is essential in ordinary life, it is all the more important in the abnormal setting of the hospital. (p. 1268)

In the middle 1970s, there evolved a proliferation of information written on play, play therapy, and play techniques. Play had been identified as the main means of communication for the child (Green, 1974). In general, the literature supported the viewpoint that children use play as a tool to express themselves, to experiment, and to learn about the environment. Play is the natural world of children and is an effective method of providing concrete information to the child (Knudson, 1975). Play is a tool

for learning and helps children cope with stress-- especially in a clinical type atmosphere. Nurses have a specific responsibility to diminish their patients' apprehensions through play (Welch, 1977).

A multitude of publications have appeared on play with interventions to use with children of different developmental levels (David, 1973; Gohsman & Yunck, 1979; Green, 1974; Luciano & Shumsky, 1975; Welch, 1977). Unfortunately, only a few professionals have analyzed and publicized the different methods of interventions such as puppet therapy (Cassell & Paul, 1967), play interviews (Erickson, 1958a), and filmed modeling (Melamed & Siegel, 1975), and the effects of play techniques on the stress and anxiety levels of the child. Most studies have analyzed methods of measuring stress in terms of social and psychological reactions, both of which are difficult to measure in the child. A few studies were found that measured stress in the child in terms of physiological reactions or a combination of psychological and physiological responses (Diebenow, 1977; Johnson, 1972; Johnson, Kirchoff, & Endress, 1975; Rosenberg & Katcher, 1976; Shapiro, 1975), but the effects of play interventions on stress or anxiety levels of the child in terms of physiological responses are yet to be identified in research publications.

In summary, the reactions of children to illness, hospitalization, and medical, surgical, and dental experiences are well documented in the literature. The major factors that affect those reactions include the child's past experiences to stressful situations, the child's perception based on his current developmental level, and the parent-child relationship. Play is the main means of communication for the child and appears to be an effective method for providing the child with concrete information about dental procedures, as well as assisting him in coping with stressful situations. On the basis of this and other information, the question arises as to whether the nurse can effectively relieve stressful experiences by utilizing therapeutic play techniques as communication on an age-appropriate level. Another question arises as to whether physiological measurements can be utilized more readily to determine the relief of stress by means of play techniques within the dental clinic setting, where one does not have to deal in combination with the effects of the stress factors related to the hospitalization process.

#### Conceptual Framework

Many factors influence the child's ability to cope with stress during his process of development. One dominant theme that emerges from the literature and supports the

major premise for this investigation is that play activities can be utilized as learning tools for the school-age child in decreasing stressful situations. The view that something is learned by play and games has long been the assumption of the "play way" theory of education (Herron & Sutton-Smith, 1971). Researchers have also identified that illness, hospitalization, pain, and surgical, dental, and medical procedures are stress producing factors to the child within the hospital or clinic setting. Erik Erikson's (1963) theory that play for the child is a function of the ego--an attempt to synchronize bodily and social processes with the self--provides the explanation for the preceding premise.

Erikson (1963) suggested that play is particularly important in the child's development and is one of his major ego functions. The ego is assumed to be a psychological configuration comprised of and controlling conscious actions--the synthesis and integration of past experience with the tasks confronting the child in his perceptual-cognitive field in the present.

For Erikson (1963), play usually involves three major dimensions: (1) the content and configuration of its parts which create the underlying theme; (2) the verbal and non-verbal communicative components; and (3) the modes of termination or play disruption. Play deals with life experiences

which the child attempts to repeat, master, or negate in order to organize his inner world in relation to his outer world. Play further involves self-teaching and self-healing. The child uses play to make up for defeat, suffering, fear, frustration, stress, and anxiety. "Playing it out" is a common expression for this form of behavior. Play activity becomes the child's means of reasoning and permits him to free himself from the ego boundaries of time, space, and reality--yet remain in a reality orientation. In other words, play is the ego's acceptable tool for self-expression. For Erikson (1963), the playing child has the capability of advancing toward new mastery and new developmental stages.

The school-age child, roughly between the ages of 7 to 11 years, enters what Erikson (1968) called the "world of skills and tools." The child realizes that he needs to find a place among those his own age, because he is neither capable nor invited to take part in the realm occupied by adults. Consequently, he directs all of his energies toward working on those social problems that he can successfully master. The polarity of this phase, as Erikson (1968) phrases it, is a sense of industry versus a sense of inferiority. On the one side, there is an increasing energy to invest all possible effort in producing. Opposing this is

the ever present pull toward a previous level of lesser production. The fear of the latter is also supported by the very fact that he is still a child and this also tends to further instill feelings of inferiority. The child tends to resolve those fears by diligently taking all opportunities to learn by doing and experimenting with the rudimentary skills required by his culture.

In his play, the school-age child relies much upon the social aspects and he incorporates into play activities real-life situations. Sex is not necessarily the content of play, and the two sexes tend to segregate into separate play habits, although, upon occasion boys and girls enter into each other's world. Nevertheless, the basic modalities related to psychosocial sex roles ultimately determine the major preoccupation of the child's play (Erikson, 1963). Erikson (1968) further elaborated on the fact that during stressful situations, the child chooses for his dramatizations play material which is available in the culture and manageable for his age. What is manageable depends upon his power of coordination and level of maturation.

According to Erikson (1963), fear, stress, and anxiety in childhood are so closely related that they are indistinguishable. The child, because of his immature equipment, has no way of differentiating between inner and outer, real

or imagined dangers. He has yet to learn this, and as he learns, he needs the adult's reassuring instruction and assistance. Insofar as the child fails to be convinced by the adult's reasoning, a panicky sense of vague catastrophe (ego-involved fearful state) remains an ever ready potentiality. A child has a right, then, to develop stress or anxiety when he is afraid, even as he has a right to have "childish" fears until guidance has helped him, step-by-step, to develop judgement and mastery.

#### Assumptions

The following assumptions were considered basic to this study:

1. Play is considered the natural means of communication for the child.
2. The child utilizes play materials that are available in his culture and manageable for his age.
3. Illness and treatments are often poorly understood by the child.

#### Hypothesis

To carry out the purpose of this study, the following hypothesis will be tested:

School-age children, 7 through 10 years of age, who receive situational play activity prior to dental

treatments in a clinic setting will have significantly lower levels of stress than those school-age children, 7 through 10 years of age, who do not receive situational play activity prior to dental treatments in a clinic setting.

#### Definition of Terms

For the purpose of this study, the following terms were defined:

1. Clinic setting--a dental clinic located in a hospital setting (specializing in the care of children) where children were brought by a parent for the purpose of receiving dental treatments directed toward the prevention or diagnosis of tooth or gum problems.
2. Control group--children from the ages of 7 through 10 years selected for the sample of this investigation and receiving a short explanation and no situational play activity prior to dental treatments in the clinic setting.
3. Dental treatment--a special short-term physician activity carried out in the clinic setting in a special room designated for that purpose, and directed toward the prevention or diagnosis of tooth or gum problems. The specific procedures included teeth cleaning, dental X rays, and an oral examination.

4. Experimental group--children from the age of 7 through 10 years selected for the sample of this investigation and receiving situational play activity prior to dental treatments in the clinic setting.
5. Fear--an emotional response to a real or imaginary threat (Rees, 1973). Fear is considered a stressor (Munday, 1976).
6. Nurse--a graduate of an educational program in nursing that offers a diploma, an associate of science degree, or a bachelor of science degree, and who has a current permit and/or license by the state in which he/she is practicing.
7. School-age child--a child of either sex between the ages of 6 and 12 years (Chinn, 1979). For purposes of this study, the term refers to any child between the ages of 7 and 10 years admitted to the specific clinic setting where the investigation took place.
8. Situational play activity--play activity controlled by the nurse and used with school-age children in the clinic setting prior to dental treatments. The nurse set up dental equipment utilized for dental treatment procedures, explained and demonstrated the procedure, and allowed the child to play and practice with the equipment on a teaching doll in her presence.

9. Stress--a nonspecific response of the body (involving changes in the autonomic nervous system) to situational demands made upon it or the common result of exposure to any stimulus (Selye, 1974) as measured by the Palmer Sweat Print (PSP). For purposes of this study, stress and transitory anxiety were utilized synonymously.
10. Transitory anxiety--a temporary "ego-involved" or fearful state which has been induced by situational factors and always involves changes in autonomic nervous system activity (Lore, 1966). Transitory anxiety is considered a stressor (Munday, 1976).

#### Limitations

The following limitations were considered basic for this study:

1. A convenience sample from only one clinic setting was used in this investigation which precluded the generalization of the findings beyond the sample units.
2. The child's perception of dentists and nurses based on his past experience was not evaluated.

#### Summary

Professional nurses are frequently involved with children who experience stressful situations such as medical

or dental treatments in the clinic setting. This is an opportunity and challenge for the nurse to facilitate adaptive responses in children to those stressful experiences. School-age children have physical, cognitive, and psychosocial competencies that characterize their ability to respond to stress. Theories of growth and development assist with the understanding of those competencies. These developmental competencies are discussed in more detail in Chapter 2, along with the situations that cause physiological and psychological stress in school-age children. Included is a review of play and play activities that can be applied by the nurse as tools of learning to assist children in adapting to stressful events such as treatment procedures. The situational play activity served as a basis for the implementation of this study. Situational play was used with the experimental group of children to determine if play decreases stress prior to dental treatments. Chapter 3 describes the methodology used for the collection and treatment of data. A detailed description of the physiological tool employed in the study for the collection of palmer sweat stress measurements is included. The results and interpretations of the stress measurements made on the children are described in Chapter 4. Chapter 5 gives direction for future study based on the findings of this investigation.

## CHAPTER 2

### REVIEW OF LITERATURE

The focus of this study was the implementation of situational play activity in school-age children ages 7 through 10 years prior to stressful treatment procedures. Guidance for this task was found in a wealth of theory and research writings in child development. Stress levels were tested using the Palmer Sweat Prints before and after dental treatment procedures to determine if differences existed between children receiving the situational play activity and children not receiving the play activity. Guidance for this task was more difficult because of the limited amount of research found that tested stress levels in relation to preparatory information given to children. Past research related to stress levels in children was generally focused on the effects of hospitalization or illness. Interventions were usually directed at the parents rather than the children. However, some recent research related to stress and various forms of verbal information given to children prior to dental treatment has been found in the literature.

The first section of this chapter includes theories related to growth and developmental tasks of school-age

children. Erikson's (1950) theory is emphasized because he was the first to recognize the interaction between the individual and culture as a contributor to personal growth. In the following section, an overview of the physical, cognitive, and psychosocial developmental competencies of school-age children is presented. Next, the major concepts of stress and stress producing factors are discussed along with the physiological measurements of stress. Finally, play is reviewed as a tool of learning that can be utilized by the professional nurse with children for facilitating adaptation to stressful events such as treatment procedures.

#### Theories of Growth and Development in School-Age Children

The analysis of developmental stages in man can be traced back to the ancient Greeks, but Sigmund Freud formulated the first meaningful stage theory (Luthans, 1973). He has been credited with the origination of concepts related to the unconscious mind, defense mechanisms, and the psychosexual stages of development. He identified the underlying motivation for human behavior at all ages to be sexuality and termed it the libido. According to Freud (1962), school-age children (6 or 7 years of age) turn their attention from sexuality because of the futility seen in pursuing incestual wishes for the opposite parent and

because of the anxieties and fears of losing parental love. Freud (1962) identified these years as the latency period because of this controlled and repressed sexual drive. Children become intent with the tasks of socialization which include those things learned at school and the refinement of roles and role relationships. Children use defense mechanisms such as isolation of thought, reaction formation, and compulsive rituals (i.e., stepping on cracks) to aid in the process of self-control. It is during this period of time that the superego develops as children continue to identify with the sex-appropriate parent (Lidz, 1976).

In recent years, many aspects of Freud's theory have been rejected. However, the concepts of children's identification with their parents and internalization of parental standards have remained influential.

Erikson (1963) identified eight psychosocial stages of development. Each of these stages has a central task to be resolved and a positive or negative outcome of the crisis involved. Positive resolution lays a favorable foundation for progression to the subsequent stage, while negative resolution makes later development more difficult. In none of the stages is the central task resolved totally and forever; good adjustment consists of developing the favorable alternative so that it predominates over the unfavorable

one. According to Erikson (1968), school-age children from the ages of 7 to 11 years who successfully attain the ability to initiate acceptable goals and to persevere in attempts to reach them are in good stead for entering this period. The central task identified by Erikson (1963) for this period is a sense of industry rather than a sense of inferiority. School-age children use the physical, cognitive, and social skills attained in the preschool phase, and turn their attention to learning what must be known in preparation for success in the adult world of skills and tasks. Setting aside former explorations of fantasy and preoccupation with the family, children now focus on reality and the larger social sphere of peers and other adults.

There is much for school-age children to learn; reading, writing, mathematics, history, geography, science, the rudiments of religion and politics, social roles, and the social and physical skills required for dealing successfully with the realities of the almost-adult world in which they operate are just a few of the required learning tasks (Scipien, Barnard, Chard, Howe, & Phillips, 1979). School-age children work incessantly on body, muscular, and perceptive skills as well as on a growing knowledge of the world which becomes increasingly important to them. A sense of accomplishment for having done well, being the

strongest, best, wittiest, or fastest are the successes for which they strive (Maier, 1969). Children who find their abilities inadequate become discouraged in the development of industriousness and may conceptualize themselves as inferior (Erikson, 1968). According to Erikson (1968), "Many a child's development is disrupted when family life may not have prepared him for school life or when school life may have failed to sustain the promises of earlier stages" (p. 124).

Eriksonian theory has been criticized because of the difficulty in operationalizing the basic postulates so that they can be confirmed or refuted by the use of the scientific method (Scipien et al., 1979). Nevertheless, his theory has been applied to many disciplines, such as psychology, sociology, and nursing during the past 20 to 30 years. After all, Erikson was the first to present human development as inseparably interrelated with culture and physical growth within the realm of the psychology of the growing person.

Piaget's theory (Piaget & Inhelder, 1969), like Freud's and Erikson's, is a stage theory. It presents cognitive development as undergoing qualitative change from one period of childhood to another. Piagetian theory is more difficult to understand because he approached his work with concepts and specialized language that many behavioral

scientists are unfamiliar with (Scipien et al., 1979). Therefore, the material presented is a brief and highly simplified overview of Piaget's theory.

To Piaget (1965), intellectual functions provide the core of all human activity. The story of intellectual development is also the story of personality formation. Intellectual processes provide direction by organizing and integrating the functions of the human personality (Maier, 1969). Schiamberg (1970) stated that according to Piaget, the motive for children's learning is to gain mastery or competence in relation to the environment. Piaget's (Piaget & Inhelder, 1969) second stage of cognitive development is presented in two substage periods running from the ages of 2 to 7 and then from 7 to 11 years. During the school-age period from the ages of 7 to 11, cognitive development proceeds through the stage of concrete operational thought. Operational thought refers to the mental capacity to order and relate experience to an organizational whole (Piaget & Inhelder, 1969). Children gradually overcome egocentrism; in other words, they become able to take another person's point of view instead of believing that their own experiences are universal and that even strangers should know persons and events referred to by them in conversation. They also gradually overcome the propensity to

center, which is the tendency to see more than one quality of any feature. They master the concepts of reversibility and conservation. Reversibility refers to the ability to conceptualize so that a completed process can also be performed in the reverse order and the materials involved are returned to their initial condition. Conservation refers to the ability to understand that a thing is essentially the same even though its shape or arrangement is altered (Scipien et al., 1979). During the period of concrete operations, children become skilled at classifying objects by any of their several characteristics. However, they do not attain a fully adult quality of thinking until the last stage of cognitive development which is termed the formal operations period (Piaget & Inhelder, 1969).

Piagetian theory deals only with the development of thought, and nursing has not found his work as broadly applicable to children's health care as the other theories that deal with wider areas of development and behavior (Scipien et al., 1979). However, Piaget has produced the largest body of theoretical and observational literature about children's thinking presently in existence. His formulations suggest a great many ways in which concepts about children's health care experiences might be better understood.

In contrast to the preceding theories, Sears (Sears, Macoby, & Levin, 1957) has developed a learning theory whereby the developmental process is not divided into stages. Instead, behavior is viewed as an outcome of learning and the learning process is considered to be the same at all ages. Learning is noted to take place by association. Children initially respond to the environment in random ways consistent with their developmental capabilities (physical, cognitive, and so forth), and the rewards and punishments that result from this action influence subsequent behavior. Acts which bring pleasure are retained in the behavior repertory and are repeated in similar situations while behavior which results in punishment, frustration, or pain tends to be discontinued (Scipien et al., 1979).

Sears et al. (1957) viewed child development primarily as a mirror of child-rearing practices built on innate drives which are modified by the child's socializing environment. These innate drives gradually become the secondary motivational drives and are potentially stronger than the innate drives. The secondary motivational drives determine individuals' behavior patterns. These socially acquired motivational systems determine the development of internal desires for action and the control of them. Young

infants start behaving in the direction toward which parental control steers them. Later on, they enact this parental control through identification. Identification becomes another motivational system which drives them to behave as expected. To conclude, Sears' theory can be summarized as the totality of children's behavior; as they behave, they develop. In turn, their behavior is the product of the immediate social experiences of being reared. Sears thought that child development is the visible product of the parental child-rearing efforts (Maier, 1969).

Sears has been criticized by developmentalists for dealing too simplistically and atomistically with isolated aspects of behavior rather than with the "whole child" (Scipien et al., 1979). However, there is little doubt that learning by association and the effects of reward and punishment are major parts of child rearing and socialization. Also, the research done by learning theorists has traditionally lent itself appropriately to investigational designs that can be readily applied to theory construction (Scipien et al., 1979).

Each of the theories presented embodies a dynamic system of its own. At the same time, each supplements the other and together are essentially congruent. In the final analysis and for purposes of this paper, Erikson (1950)

probably stands out above the others because he visualized the individual united in biological, psychological, and social forces. To quote Erikson, "a human being, thus, is at all times an organism, an ego, and a member of society and is involved in all three processes of organization" (Erikson, 1950, p. 32).

Physical, Cognitive, and Psychosocial Competencies  
of School-Age Children

Building upon Erikson's (1950) and Piaget's (1965) conceptualization of man, further expansion is necessary in those specific areas of physical, cognitive, and psychosocial competencies for viewing children's development during the school-age period.

Children's physical growth and development follow an orderly, predictable process (Scipien et al., 1979). The neurological system of school-age children continues gradually to grow and develop in functional ability. By age seven years, the brain weighs 1,200 grams and is 9/10s of the adult size of 1,350 grams which is reached shortly after puberty (Lowrey, 1978). By this same year, children should develop full capacity to perform all gross and fine motor tasks with an adult-like level of coordination. Children's handedness should be established by the time they enter school. Early during the sixth year, they should be

able to write letters of the alphabet and be able to draw a figure of a man with at least six distinct body parts (Chinn, 1979). Certain neurological mechanisms may gradually mature during the school years permitting most children to engage in quiet activities for longer periods of time (Swarman, 1978).

Full capacity to imitate sounds linguistically develops during these years. Children possess full articulation capacity and full auditory-mental-speech-visual capacity. The child's ability to listen and make associations with incoming auditory stimuli is fully mature. Visual capacity should reach optimal function by six or seven years; peripheral vision should be fully developed; acuity should be at a maximum level of development. Children should be able to associate incoming visual stimuli with past and present mental images. Full developmental potential through use and practice is a task of later years (Chinn, 1979). The development of tactile sensation is completed early in life and young children are capable of distinguishing tastes but full development is dependent on continued experiences (Wieczorek & Natapoff, 1981).

The tissues of the respiratory system achieve maturity; differences in lung capacity are a function of body size during this period (Chinn, 1979). The digestive process is

almost fully mature by six years of age with all digestive enzymes present and functioning effectively (Wieczorek & Natapoff, 1981). The years from 6 to 10 are important ones for dentition. Primary teeth are lost and permanent teeth begin to erupt. Children become dexterous enough to adequately learn to brush their teeth between seven and nine years of age (Brown & Murphy, 1981). Foman (1977) reported that 80% of children between 7 and 10 years suffer from dental disease--primarily caries--in their newly acquired teeth. Less than half of these children receive regular dental care.

Endocrine control of homeostasis and the ability to respond to stress gradually increase during the school-age period (Chinn, 1979). Ferreira and Winter (1965) studied large samples of both males and females from ages 6 months to 80 years and found that autonomic sweating increased from birth to seven or eight years and then began to slowly decrease. Females were found to be heavier sweaters than males. According to Chinn (1979), all endocrine functions except those regulating reproduction approach adult capacity. The renal and circulatory functions that are regulated by endocrine control mature in proportion to endocrine maturity (Chinn, 1979). Immunological functions of the body are at their peak during the late school-age period

and early adolescence. As structures exposed to infection enlarge and gain maturity in composition, danger from infection decreases significantly (Wieczorek & Natapoff, 1981). Complications arising from minor infection are seldom encountered because the lymphatic system becomes effective in localizing infection processes (Chinn, 1979).

The skin gains structural maturity and approaches adult appearance and texture. Sebum and eccrine sweat production remains minimal throughout the school-age years. The ability of these glands to respond to temperature and emotional stimuli increases only slightly (Chinn, 1979).

The most dramatic physiological events during the school-age years occur in the musculoskeletal system. While growth is not as rapid as in infancy or adolescence, it is relatively gradual and constant during this period. The growth of adipose tissue begins to accelerate and children gain girth as well as height and weight (Chinn, 1979). Physical strength of boys and girls is about equal although cultural expectations dictate how this strength is used (Wieczorek & Natapoff, 1981). Bone growth gradually replaces cartilage with narrowing of epiphyseal centers. Skeletal maturity is less advanced for whites than blacks and children in the United States mature more rapidly than children from the same racial group living in other countries (Skeletal Maturity, 1975).

For purposes of this paper, cognitive development also includes development of conscience and morality, learning capacity, and those factors that influence learning performance. The school-age period is a time of rapid intellectual growth. Six and seven year old children enter this stage of development viewed by Piaget (Piaget & Inhelder, 1969) in concrete terms of the "here and now." Their thinking becomes operational. They must learn many facts about the outside world, must formulate these facts into concepts which are usable in different situations, and must learn to tune in on how others think and feel. This learning requires a more mature level of cognition than that which was relied upon by the preschooler (Wieczorek & Natapoff, 1981).

Piaget and Inhelder's (1969) studies of cognitive growth have explained much about how and why children learn and how intellectual processes develop. Gradually at about the age of seven years, children begin to move into the period when perceptions are dominated by intellectual operations. These operations (the ability to order and relate experience to an organized whole) begin to occur within a framework of relationships that make possible the mobility of thinking (Chinn, 1979). In other words, children from seven to adolescence are able to form lasting

concepts, can change focus from one perceptual aspect of an object to contemplate both part and whole together, can conserve transformations in size, shape, and volume, can reverse their thinking and go back to the beginning of a given sequence, and can classify objects into hierarchical classes showing an ability to understand the idea of class inclusion. Children's thinking remains dominated by ideas and objects from the real world, but they cannot form mental hypotheses based on abstract ideas. Not until adolescence will they be able to intelligently view the world in abstract terms (Ginsburg & Opper, 1969). Piaget (1965) repeatedly mentioned the importance of providing learning experiences that allow school-age children to explore. If they have developed the necessary mental structures, then learning experiences become crucial to facilitate development of thinking. Children should be able to discuss things from among various experiences in order to form ideas based on the maturation of cognitive structures (Wieczorek & Natapoff, 1981).

Another major task of the school-age period is the development of a conscience--the internalized ability to tell right from wrong. Horizons expand and children begin to function as group members. A type of social consciousness grows and is later replaced by an internalized set of

values (Wieczorek & Natapoff, 1981). Freud (1950) and Erikson (1950) thought that this process begins when children identify with the appropriate parent and begin to experience guilt. Piaget (1965) saw moral development originating out of peer experiences with a desire for order and approval from adults. This development follows a definite sequence and depends both upon social influences and cognitive maturation. From about 7 to 11 years, children begin to learn rules but see them as fixed and unchangeable. In other words, a rule is sacred because it is traditional and brings order to the world. Gradually, children begin to consider intention as well as social factors. Kohlberg (1976) also based a theory of moral development on cognitive maturation, but differed from Piaget in that he viewed the development of rule orientation as simply a desire of children not to be punished. According to Mussen, Conger, and Kagan (1979), conscience and moral development are not solely a function of cognitive maturation. While children's cognitive development makes them aware of moral values, adherence to these values depends on other factors--particularly parental identification. The standards of parents and the nature of parent-child relationships play crucial roles in determining whether children's developing consciences will be weak, normal, or overly punitive.

Bruner (1971) has been a leader in developing ideas regarding the nature of learning and the role of the environment as factors that influence the performance of learning. He viewed the growth of the mind and the ability to learn as functions of the culture in which children live and grow. The limits of growth depend on how the culture assists children to use their intellectual potential. The culture provides this growth-provoking stimulation by providing amplification systems (senses, thought processes, logic processes) by which human beings can link themselves. The modern society has chosen the setting of the school to accomplish this function for children over the age of six years. It has further assigned the school with the specific function of converting knowledge and skill into more symbolic, abstract, and verbal forms. For Bruner (1971), it is the processing of information that yields the significance of the learning experience and not the receipt of information. Some of the factors that influence learning performance were presented by Chinn (1979).

1. The capacity of the children's sense organs (vision, hearing, tasting, smelling, touching) are vital factors in the ability to learn.
2. The relationships between children's state of health or well-being and the capacity to learn is poorly

understood. However, it is assumed that a serious state of illness or physical malfunctioning can be detrimental to the ability to concentrate.

3. The level of intelligence with which children are endowed and the environmental factors that influence the development of intelligence determines the effectiveness of learning.
4. Environmental opportunities for learning and the nature of those experiences greatly influence children's learning abilities.
5. Emotional and personality factors play a significant role in the learning performance of children.

Since school-age children can begin to form lasting concepts, understand higher-order mental processes, and put ideas into a framework or cohesive whole, they can profit from learning experiences and education related to health and the human body. Nurses can take advantage of this new learning capacity and children's natural interest in biology to teach about health and related procedures (Wieczorek & Natapoff, 1981).

Probably the most predominant feature of the school-age years is the change in the socialization focus of childhood. Whereas influence of the family predominated in formulating previous social interactions, the world of school, teachers

and peers becomes a predominant influence on social behavior at this time (Chinn, 1979). Children at age seven years begin to realize that there is a need to find a place among those of their own age because they are still not capable of competing in the realm occupied by adults. Consequently, they delve diligently into all opportunities to learn by doing. As children learn to wield the symbols and tools of the culture, they seem to understand that this sort of learning will help them to become more themselves. Children come to recognize that they must eventually break with accustomed family life (Erikson, 1963). Child-parent relationships evolve to a realistic level of dependence in those areas where dependency is still necessary, while in other areas, children tend to relate with parents and other adults on a more equal basis. Since children see parents as representatives of the society in which they must operate, they begin to measure them against other representatives, such as teachers, friends of parents, and parents of friends. Children may shift their ideals and personal dedication to anyone or a combination of adult roles. They will identify with those aspects of people which are more meaningful to them without considering the total personality of the individual with whom they are identifying (Erikson, 1968).

The world of peers assumes a position of equal or more importance than that of adults. School-age children are

influenced by peers in play, dress, hobbies, and language (McFarlane, Whitson, & Hartley, 1980). Peers are needed for self-esteem and serve as criteria for measurement of success or failure (Erikson, 1963). The standards of the peer group become vitally important and all efforts are made to conform. In order to succeed, children must find ways to cope and conform to the new standards; success may be judged more harshly among peers than previously among the family group (Chinn, 1979). Interestingly, siblings are no longer competitors unless they are also members of the same peer age group (Erikson, 1963).

School influences every aspect of children's development. Achievement in academics and motor skills strengthens their sense of industry. They learn to work and play with children of different races, socioeconomic classes, and ethnic groups; they observe and interact with adults other than parents (McFarlane et al., 1980). Both school attendance and teachers affect the way that children feel about themselves, their abilities, their responses to peers, and their ultimate intellectual and affective learning. School-age children are forced to rely on themselves as never done previously; they find themselves exposed to an increasing amount of stimuli which must be processed (Wieczorek & Natapoff, 1981). Bandura (1977), who has

studied children and schools intensively, thought that teachers profoundly influence how children view school and this viewpoint is a determinant of achievement and self-esteem. He further stated that effective elementary teachers, who are warm, supportive, and in a position of control, have the opportunity to aid in learning and influence the behavior of school-age children.

As children develop, society seems to become more and more concerned with admitting them on an equal basis. Schools, churches, and youth organizations encourage them toward more advanced participation (Erikson, 1963). Children's pursuits are clearly segregated according to similarities including socioeconomic class, religion, and intellect (McFarlane et al., 1980). A hierarchy emerges with leaders and followers rigidly determined and relatively stable over time (Wieczorek & Natapoff, 1981). These groups serve many purposes but essentially reflect competitive rather than autonomous strivings (Erikson, 1968). According to Chinn (1979), the degree to which children are able to fit in socially, to make the adjustment to learn to cope, and to receive satisfaction from the group is a powerful determinant of healthy socialization. Erikson (1963) stressed that many of the individual's later attitudes toward work and work habits can be traced to the degree of

a successful sense of industry which was fostered during the school-age period.

As children enter the school years, their play takes on new dimensions that reflect this new stage of physical, cognitive, and psychosocial development. Play involves increased physical skill, intellectual skill, and fantasy, as well as the evolvment of a sense of team or club spirit (Whaley & Wong, 1982). Erikson (1963) viewed play as an act of the ego, an attempt to synchronize bodily and social processes with the self. He placed emphasis on the ego's need to master various areas of life and especially those in which children find "the self, the body, and the social role wanting and trailing" (pp. 184-185). In other words, play activity becomes the means of reasoning and permits children to free themselves from the ego boundaries of time, space, and reality, yet remain in a reality orientation. Whaley and Wong (1982) further expanded on this dimension by indicating that play affords school-age children the means to acquire representational (ego) mastery over the self, the environment, and others. Through play children can be as big, powerful, and skillful as the imagination will allow; they attain vicarious mastery and power over whomever and whatever they choose. Children need to feel in control in their play.

Piaget (1965) has stressed that play and conversation for school-age children are no longer the primary means of self-expression as noted in previous years. Instead, they become the media for understanding the physical and social worlds. School-age children rely much upon the physical and social aspects of play and incorporate into play activity real life situations (Erikson, 1963).

The need for conformity, rules, and rituals are strongly manifested in the activities and games that are so important to school-age children. The games played are often fixed and have unvarying rules that may be bizarre and extraordinarily rigid (Whaley & Wong, 1982). Team games and sports become part of their lifestyle. They learn to subordinate personal goals to goals of the group; they learn about the nature of competition and the importance of winning (McFarlane et al., 1980). In addition, school children need the opportunity to use large muscles in exuberant outdoor play; they need space to exercise and to work off tension, frustration, and hostility (Whaley & Wong, 1982). Other ritualistic activities of the school-age culture include clubs, secret societies, hobbies, and collections. Collections include stamps, insects, records, shells, and dolls--they often constitute odd assortments of unrelated objects in disorganized piles (Herron & Sutton-Smith, 1971;

McFarlane et al., 1980; Whaley & Wong, 1982). Riddles tend to permeate ritualistic behavior and language noted in such chants and taunts as "Johnny's mad and I am glad" or "Step on a crack, break your mother's back" (Herron and Sutton-Smith, 1971; Whaley & Wong, 1982).

In a review of literature, Herron and Sutton-Smith (1971) found that although there was a great variety of play activities characteristic of the school age period, there was a lesser need for play materials than in earlier years. There is a gradual decrease in make-believe play and an increase in creative play such as drawing, construction, and so forth. Children become interested in pets, reading, and attending motion pictures. Doll play was found to be most popular between the ages of 7 to 10 years, with a climax between 8 and 9 years. Both sexes preferred adult dolls to those representing babies or children. In essence, play continues to be the "work" of children throughout the school-age period (Whaley & Wong, 1982). Play has the unique power for building body control and interpersonal relations; it provides a base for language, learning, and investigation. Play teaches children much about themselves and their growing world (Caplan & Caplan, 1973).

In summary, school-age children are not new creations at the age of seven years. Instead, their growth and development reflects an accumulation of experiences since birth.

Children's abilities to process clues from the environment increase with age as does exposure to the environment itself. Perception is based on children's ability to pick up these clues and interpret the incoming stimuli by utilizing the five senses and other functions of the nervous system. Other factors involved in this interpretation include personality, cognitive tools, physical skills, social skills, play, and conscience and moral development. Concepts about the self and the larger world, fears and stresses, and language development are some of the powerful influences of thought. The end result is each child's individual interpretation of events and the environment surrounding him (Wieczorek & Natapoff, 1981).

#### Stress and Physiological Measurements of Stress

With the review of developmental competencies completed, it is possible to determine those situations that may be stressful psychologically or physiologically to school-age children. According to Selye (1976), stress is a nonspecific response of the body (pleasant or unpleasant) to the demands of a stressor (causative agent or situation) which is experienced by the child or adult. The stressor causes the body to respond or cope with the demand (change or threat) that the stressor represents. The response of the body to stressors is influenced by inner conditioning

factors (heredity, knowledge, past experience) and outer conditioning factors (climate, drugs, diet). A group of individuals may have a variety of reactions to the same stressor or a variety of stressors may cause the same reaction in different individuals. Stress may be pleasant or unpleasant, helpful or harmful. Selye (1976) described harmful or unpleasant stress as distress. However, he indicated that it is immaterial whether the agent or situation faced is pleasant or unpleasant. All that counts is the intensity of the demand for readjustment or adaptation. Selye (1976) further explained that stress causes certain changes in the structure and chemical composition of the body which can be accurately appraised. Some of these changes are merely signs of damage; other changes are manifestations of the body's adaptive reactions or mechanisms of defense against stress. The nervous system and endocrine system play particularly important roles in maintaining resistance during stress. They help keep the structure of the body steady despite exposures to stressor agents, such as nervous tension, infections, and so forth. This steady state is known as homeostasis. Nevertheless, every biological activity or reaction leaves some irreversible chemical scars. Selye described childhood as a period that generates a characteristically low resistance to stress and requires

excessive responses to any kind of stimulus. As children gradually move into adulthood, adaptation to most commonly encountered agents has occurred and resistance is increased.

Physiological measurements have been used to indicate the degree of stress in school-age children. These measurements are based on knowledge of situational stress on the sympathetic branch of the autonomic nervous system (Selye, 1974). Physical indicators found to measure autonomic nervous system activity include the following:

1. Sweat gland activity (Ferreira & Winter, 1963; Harrison, 1962; Johnson & Dabbs, 1967; Lewis & Law, 1958; Lindeman & Stetzer, 1973; Lore, 1966; Munday, 1976; Shapiro, 1975; Silverman & Powell, 1944; Sonnenberg & Venham, 1977),
2. Cardiac rate (Howitt & Stricker, 1965; Lewis & Law, 1958; Rosenberg & Katcher, 1976; Skipper & Leonard, 1968; Sonnenberg & Venham, 1977),
3. Face and hand temperature (Lewis & Law, 1958),
4. Body temperature (Shapiro, 1975; Skipper & Leonard, 1968),
5. Peripheral pulse rate (Diebenow, 1977; Howitt & Stricker, 1965; Munday, 1976; Shapiro, 1975),
6. Blood pressure (Diebenow, 1977; Skipper & Leonard, 1968),

7. Physical activity (Rosenberg & Katcher, 1976).

Palmer sweating has been studied by chemical analysis, electrical study of skin resistance, observation of palmer sweat glands, and measurement of sweat gland activity. More recent literature has utilized the Palmer Sweat Index (PSI) and the major population has been that of adults (Johnson & Dabbs, 1967; Lindeman & Stetzer, 1973; Munday, 1976). Since 1966, when Lore refined the technique for palmer sweat prints, only a minimal amount of research has been conducted in relation to children and sweating techniques.

Shapiro (1975) used finger sweat tape bands to compare palmer sweat and heart rate on 12 year old girls to determine differences in the behavior of kibbutz and urban children receiving injections. Verbal rating scales and behavioral observations were also compared and served to validate the use of physiological measurements in monitoring stress.

Rosenberg and Katcher (1976) investigated the effects of stress on heart rates and skeletal muscle activity on 58 children between 3 and 12 years during dental treatment (intraoral injections). Palmer sweating was not monitored. Electrocardiograms were continuously monitored in conjunction with separate observations of skeletal and facial movements. They found that all children showed signs of

anxiety. Children with grossly observable signs of physical activity had accelerated heart rates; children who had no movement except changes in facial expressions experienced decelerated heart rates. Their conclusion was that heart rates cannot be used to index anxiety and, furthermore, anxiety cannot be described along a single dimension of arousal.

Sonnenberg and Venham (1977) compared human figure drawings with a combination of five other measures including heart rate, basal skin response (lead electrodes taped to the dorsal and ventral surface of a finger), picture test, clinical ratings of anxiety, and clinical ratings of behavior to test stress levels. This investigation was done on 64 preschoolers at an initial dental visit including an oral examination and X rays, plus all subsequent visits required on each child. A highly significant negative correlation was found between age and four of the measures based on external signs of the children's responses. This indicated that as age increased, the child's negative response to the dental situation decreased. The physiological measures (heart rate and basal skin response) did not produce an age related relationship. This indicated that with increasing age, signs of fear and stress may be suppressed, leading to inaccurate conclusions about the stressful nature of the dental situation and the older child's response to it.

Children's fears, stresses, and anxieties about hospitalization, surgery, and death have received considerable attention in literature (Miller, 1979; Petrillo & Sanger, 1980; Vernon et al., 1967; Visintainer & Wolfer, 1975). Visintainer and Wolfer (1975) tested variations of psychological preparation and supportive care designed to increase the adjustment of children hospitalized for elective surgery. They classified threats or fears of children related to surgery and hospitalization into five categories: (1) physical harm or bodily injury in the form of discomfort, pain, mutilation, or death; (2) separation from parents and absence of trusted adults; (3) the strange, the unknown, and the possibility of surprise; (4) uncertainty about limits and expected "acceptable" behavior; and (5) relative loss of control, autonomy, and competence.

Miller (1979), who reviewed the literature regarding children's fears from a developmental perspective, found that developmental changes in children's fears had essentially been ignored. The studies she did find suggested that as children's fears change with age, they become more complex, varied, and realistic. This corresponds with Piaget and Inhelder's (1969) idea that children move toward more differentiated, perceptual, and cognitive functioning with maturation. The studies reviewed by Miller (1979)

further suggested that between the ages of 7 to 12 years children become less afraid of the dark, supernatural, ghosts and spooks, and animals and more afraid of realistic phenomena, such as bodily injury, death, school, and injury or death of relatives. To the extent that these fears or threats are not removed, minimized, or coped with more or less effectively, the child is under varying degrees of stress (Visintainer & Wolfer, 1975).

From that perspective and for the purposes of this study, the fears that could cause stress to children (not necessarily threatened with illness and hospitalization) receiving treatments in an outpatient clinic setting will be examined. In general, school-age children are better equipped to handle fears and cope with stress than pre-schoolers (Chinn, 1979; Erikson, 1963, 1965; Scipien et al., 1979). Because of their developing cognitive ability, children gradually become aware of the significance of different illnesses, the indispensibility of certain body parts, the potential hazards in treatments, the consequences of permanent injury, and the meaning of death (Whaley & Wong, 1982). They generally take an active interest in health and scientific explanations for body functioning (Wieczorek & Natapoff, 1981). They request factual information and quickly perceive lies or half truths.

Seeking information tends to be one way of maintaining a sense of control despite the stress that might accompany the information. Children generally want to know if a procedure will hurt, the purpose of the procedure, how it will make them better, and what injury or harm could result (Whaley & Wong, 1982). Intrusive procedures of a non-sexual nature are generally well tolerated but privacy becomes increasingly important. School-age children may or may not want parents present during the procedure (Wieczorek & Natapoff, 1981).

By 9 or 10 years, most children show little overt resistance to pain. They generally have learned passive methods of dealing with discomfort, such as holding rigidly still, clenching fists, or trying to act brave by the "grin and bear it" routine. They tend to later deny overt resistance, such as kicking, crying, or plea bargaining if they are displayed, especially to peers for fear of losing status within the group (Whaley & Wong, 1982).

School-age children may need and desire guidance and support from parents or other adult figures but are unwilling to ask for it. Because the goal of attaining independence is so important, they may be reluctant to seek help for fear of appearing weak or childish. Cultural expectations to "be brave and strong" or "act like a man" bear

heavily on this age group of children, especially males who tend to react with stoicism, withdrawal, or passive acceptance. Often the need to express anger, hostility, or other negative feelings finds outlets in alternative ways, such as irritability toward parents, rivalry toward siblings, or behavioral problems in school (Whaley & Wong, 1982).

Florence Erickson (1965) stated that school-age children are in a sense "in-between" or "middle" children. Because they are better able to cope with stress than younger preschoolers and cause less conflict than older adolescent children, they arouse less adult concern. Therefore, illness or procedures have a potential for causing more serious emotional reactions in school-age children. This leaves an "open door" for nursing interventions in relation to school-age children and parents.

#### Use of Play in Adapting to Stressful Events

The interaction between children's innate capacities and life experiences determines to a large extent how they learn to cope with the stresses of growing up as well as how they view themselves (Scipien et al., 1979). Coping is a method of handling impacts from events on the outside in combination with those feelings, conflicts, and stresses that are within themselves (Marks, 1978). It includes the

ways that children deal with new demands and stressful experiences that cannot be handled by reflex or habit. Coping includes a process of steps taken to meet a challenge or to take advantage of an opportunity. It involves all the complex ways in which children deal with reality as they see it and involves elements of problem solving.

Coping begins very early, at least in an elementary form, when infants learn to manage stimuli from the environment (Murphy, 1962). As children move through the toddler and preschool years, many more elements for coping arise as they gain pleasure in mastering locomotion, body functions, and language and begin the stubborn defense against adult pressure. In general, coping is required each time children are faced with a new situation or set of circumstances. Situations requiring mastery may range from simple to complex and may present various combinations of challenge, gratification, frustration, or threat. Gradually, children develop their own characteristic coping styles (Scipien et al., 1979). This technique of emotional adaptation is, of course, based on personality patterns, early life experiences, and the chronological and emotional stages of development (Marks, 1978). More specifically, the level of development helps determine children's ability to respond and the number of response choices that are available. In

turn, the number and kinds of experiences that are encountered exert a great deal of influence on development (Scipien et al., 1979).

Scipien et al. (1979) reiterated five determinants of children's coping responses. These are: (1) children's perceptions of the situation; (2) children's memories of other similar new experiences and the feelings related to those memories; (3) children's resources such as energy and stamina; (4) children's environmental supports such as parents or peers; and (5) children's defense mechanisms and the way in which they are used.

There is a close relationship between coping operations and self-esteem. Young children's concepts about themselves are a reflection of how they believe others feel about them. By the time they enter school, the conscience takes over many controls formerly exerted by parents (Scipien et al., 1979). It is at this age when children begin to establish identity through doing and producing (Erikson, 1968). If they are helped to do at least some of the tasks well and receive recognition for accomplishments, they will see themselves as reliable and worthwhile (Scipien et al., 1979).

Marks (1978) strongly advocated that the most effective techniques for assisting school-age children with adaptive responses to stressful situations are those that help them

become more competent and skillful as well as those that encourage them to undertake active dealings with those events that cause fear and concern. Axline (1947), Barton (1962), Green (1974), and Knudson (1975) have suggested that play is a natural and available means of communication for children and, therefore, play experiences should assist with constructive coping mechanisms to stressors in life. Children use play as a tool to express themselves, to experiment, and to learn about the environment (Knudson, 1975; Welch, 1977). Play is a tool of learning that helps children cope with stress (Welch, 1977).

Freud (1950) recognized the importance of play in the life of coping children. He emphasized that children repeat in their play everything that has made a great impression on them in order to obtain mastery of the situation. Piaget (1965) further explained this same theme by stating that play sometimes takes the form of repetition of painful states of mind. It does so not to preserve the pain, but to make the pain more bearable, even pleasurable, through assimilation to the whole activity of the ego. Erikson (1963) also recognized the need for play by viewing it as the most natural self-healing measure that childhood affords.

Studies have been done on different forms of play activity with children. Most have been done with preschool

children related to the effects of hospitalization or hospital experiences (Cassell & Paul, 1967; Erickson, 1958a,b; Flemming, 1973; Lockwood, 1970; Visintainer & Wolfer, 1975). Cassell and Paul (1967) studied children from 3 to 11 years of age to determine the effects of puppet therapy on the stress responses of children hospitalized for cardiac catheterization. The experimental group received brief sessions of puppet therapy before and after the procedure; the control group was treated similarly to the experimental group, but did not receive the puppet therapy. Behavioral responses were evaluated by parent questionnaires and observations the day before, during, and the day after cardiac catheterization. The children receiving puppet therapy showed significantly less emotional disturbance during the procedure than children not receiving puppet therapy. They also expressed more willingness to return to the hospital for further treatment.

Lockwood (1970) also studied 20 hospitalized children from four to seven years of age to ascertain if situational doll play, focused upon the child's fantasy about his impending surgery, would diminish the level of stress experienced during the time he was hospitalized prior to surgery. The Hospital Picture Test, a thematic apperception test, was used to determine the level of fantasy and the

focus of stress reactions in the children. The experimental group of children received situational doll play between the Hospital Picture Tests, while the control group received no play session. The investigators concluded that the situational doll play did not have any effect upon the preoperative level of stress experienced by the children. However, the anxiety defense of the children receiving situational doll play decreased significantly and the stress reactions in relation to doctors and medical procedures decreased significantly.

Information giving and forewarning have also been used without play to bridge the gap between what children believe will happen and what really happens (Diebenow, 1977). Janis (1958) suggested that correct predictions of future events by authority figures contribute to the development of a trusting attitude of children toward physicians and nurses. The goal of these preparatory explanations should be as complete and reassuring as possible. A complete, nonthreatening explanation provides children with a cognitive framework for appraising the perceptions that might be experienced. Surprise and ambiguity are then prevented. Mischel (1976) took a different viewpoint when he noted that while some children may benefit from information and forewarning, others may become debilitated by anticipatory stress and anxiety. Others may find it difficult to

imagine a traumatic experience before it occurs if they have had no relevant past experiences with similar dangers. He felt that it is difficult to predict reactions to stressful situations because of the many variables to be considered.

Johnson, Kirchoff, and Endress (1975) investigated the effects of two different verbal explanations given to children before orthopedic cast removal. Forewarning by nurses was found to be helpful in reducing the stress of school-age children. The highest distress scores were displayed by children in the control group who had no advanced preparation, the second highest distress scores were exhibited by the procedure group who had been told the order of events from an observer point of view, and the lowest distress scores were displayed by children who had been given an explanation based on words, phrases, concepts, and sensations of children who had previously experienced cast removal. Therefore, the data supported the hypothesis that congruency between expected and experienced sensation is associated with reduced emotional stress.

That same year, Visintainer and Wolfer (1975) investigated the effects of nursing care in reducing pre-operative and postoperative stress in 84 children ages 3 through 12 years receiving elective surgical procedures.

The content of the verbal explanations was not controlled in the study. Nevertheless, the investigators demonstrated that children who received preparation and continued supportive care showed significantly less upset and more cooperation than children not receiving the preparation and supportive care. The parents of those children also reported significantly greater satisfaction and less anxiety. Younger children between three and six years were significantly more upset and less cooperative than the older children between 7 and 14 years.

Heffernan and Azarnoff (1971) investigated 50 mothers and children, between 4 and 12 years, in an outpatient clinic to determine what type of communications contribute to or reduce children's anxiety about impending clinic visits. The mothers were surveyed about the child's anxiety on prior clinic visits, the mother's anxiety about visiting her own physician, and the content and the initiator of communications between mother and child about the child's impending visit to the clinic. The children were shown a picture of a child being examined by a physician and asked to select from an inventory of objectives the ones that best described how the child in the picture felt. The investigators suggested that communication between the parent and child about a forthcoming clinic visit helped to reduce the

child's anxiety if the child had initiated the communication. If, on the other hand, the mother, on her own initiative, gives the child a premature and detailed description of the impending visit, she may only provoke the child's anxiety, especially if she is highly anxious herself.

Diebenow (1977) conducted an experimental study on 30 children between six and eight years of age in a pediatric clinic receiving two different types of verbal preparatory information prior to CBC finger-stick procedures. The experimental group of children was prepared for the procedure with a verbal explanation of the treatment and expectations of their behavior during the treatment. The children were also asked if they had questions and were given positive reinforcement for cooperation during the treatment procedure. The control group of children received only the verbal explanation of the treatment. Stress measurements of heart rate and blood pressure were taken on all children at three intervals which included before, immediately after, and 10 minutes after the fingerstick procedure. The results of the study indicated that there were no significant differences between the two methods of preparatory information and the stress measurements of heart rate and blood pressure. However, the stress measurements were consistently lower for the experimental group than the control group in

the same direction of change. Borderline significant differences were noted for lower stress measurements in females compared to males and for first born children compared to other positions such as middle or last children.

Finally, Herbertt and Innes (1979) reported an experimental study conducted on 422 children from 5 to 11 years of age receiving dental treatments in six different dental clinics. The purpose of the study was to test the effectiveness of the provision of both familiarization and information techniques of short duration on the emotional state and cooperation of children prior to dental examination and dental treatment procedures. The control group of children received a short lesson in dental health, the familiarization group of children received a lesson in dental health and were taken to visit the dental treatment area, and the preparatory information group of children received all of the above in addition to an explanation of the procedures to be used in the examination or treatment. Children were rated by therapists on both a cooperation and an anxiety scale. The ratings for dental examination and dental treatments for both cooperation and anxiety were correlated negatively and considered significant. Therefore, it was concluded that the greater the anxiety, the less cooperation shown by the child. Analysis of variance

indicated that the experimental manipulations had no significant effect upon either the anxiety ratings or the ratings of child cooperation at either the examination or treatment stages. Results of the study did indicate that school grade and age showed a significant effect upon the dependent variables. Rated anxiety was at a peak at grade 4 (age nine years) and cooperation at a minimum at grades 3 and 4 (age eight and nine years). In other words, children at older ages appeared to show the greatest effect of the information provided. Younger age groups may be especially sensitive to anxiety about dental treatments and, therefore, unable to assimilate the dental experience. Analysis of variance also failed to indicate any significant effect of sex or previous dental experience upon the dependent variables and no significant interactions upon the experimental conditions. Herbertt and Innes (1979) further concluded that brief familiarization and brief lectures on what was to occur in the clinic are unlikely to have a substantial effect upon the cooperation and anxiety of the child patient. Children may not be able to remember the information long enough to derive any benefits from it or they may not be capable of engaging in the "work of worrying," which Janis (1958) suggests is beneficial in reducing anxiety in adults. In addition, too much information may be as detrimental as too little.

McFarlane, Whitson, and Hartley (1980) advocated the use of models, diagrams, slides, pictures, and movies for teaching school-age children about equipment and procedures. However, they also indicated that school-age children still need concrete experiences such as going through the motions of the procedure by participating in a "dress rehearsal." School-age children are accustomed to following directions, listening to explanations, and solving problems, but they still are not capable of abstract thinking and often have expectations that are incorrect or incomplete (McFarlane et al., 1980).

Petrillo and Sanger (1980) suggested the following guidelines for preparing school-age children from 7 to 13 years for diagnostic, medical, or surgical types of procedures: (1) teaching of scientific terminology for body parts and procedures since school-age children are interested in the scientific approach; (2) utilization of a teaching doll for visualization where appearance of a body area or part is difficult to describe; (3) taking advantage of school-age children's ability to reason, generalize, and understand the concepts of time by encouraging questions and expression of feelings along with active participation in the teaching process; (4) expressing confidence in the physician and staff managing the treatment as school-age

children are reality-oriented, but often develop misconceptions about illness, treatments, physicians, and nurses.

McFarlane et al. (1980) and Petrillo and Sanger's (1980) suggestions and guidelines were used to develop the combination of information giving and forewarning into the situational play activity developed for purposes of this study. The play activity was devised as a tool of learning to assist school-age children in adaptive responses to the stressful experiences of dental treatments. Marks (1978) indicated that early stressful experiences have far reaching implications for personality growth in children. These experiences may increase their ability to adapt to later stress and enable them to reduce emotions in order to acquire a more positive attitude toward accepting and maintaining their own health. Chambers (1970) further emphasized that the major problem in child management is not the stress or anxiety, but the possibility that children may learn dysfunctional strategies for coping with stress. The role of the nurse, physician, or dentist in educating young patients should be to assist children to manage their stress and adjust it to a level that is appropriate for each child and each situation.

### Summary

In summary, a great deal of information has been written on the theory of growth and developmental tasks of school-age children. The conceptual framework of Erikson is one way to view the physical, cognitive, and psychosocial competencies of children as they interact holistically with the world around them to further develop personal growth. Based on those competencies, it is possible to infer situations such as medical, surgical, and dental procedures that may be stressful for children. Professional nurses are in a unique position to develop verbal and situational play activities that can facilitate adaptive responses in school-age children to these stressful experiences, so that they can increase their ability to adapt to later stress and acquire positive attitudes toward accepting and maintaining their own health.

## CHAPTER 3

### PROCEDURE FOR COLLECTION AND TREATMENT OF DATA

The investigation was designed as a two-group, before-after experimental study (Abdellah & Levine, 1979). The independent variable was the use of situational therapeutic play in the experimental group of school-age children prior to dental treatment procedures. The control group of children received a simple verbal explanation without play prior to dental treatment procedures. The dependent variable was stress measurement of palmer sweating using the Palmer Sweat Print. A baseline (pre-play) measurement of sweating was obtained on both the experimental and control groups of children, as well as before (post-play) and after (post-treatment) treatment measurements.

#### Setting

This study was conducted in an outpatient dental facility of a children's hospital located in a large metropolitan area with a population of nearly 2.9 million people. The dental clinic accommodates clients of any sex, race, or economic status up to the age of 12 years by referral from a physician or dentist.

The clinic is located on the first floor of the building and consists of a waiting room, physician's office, consultation room, preventative periodontal treatment room, laboratory, minor X ray and dental treatment room, and major dental treatment room. The major dental treatment area was constructed to represent an "open bay" concept and consists of four separate chairs and treatment facilities within one large room. The waiting room was used to obtain the parent/child consent form and the preventive periodontal treatment room was used for conducting the situational play activity and obtaining the Palmer Sweat Prints.

The periodontal treatment room is decorated to reflect a warm, relaxed, and "child-like" atmosphere. The color of the room is a warm yellow. The furniture is sized for school-age children, so that the nurse investigator could conduct the verbal and play activity at eye level with the children. Pictures decorate each wall and a "Sesame Street" mobile hangs from the ceiling directly above the table and chairs. A child-sized sink is available in one corner of the room, so that the children could easily wash their hands after the sweat prints were completed.

#### Population and Sample

The target population included school-age children (males and females) from the ages of 7 through 10 years

being treated in an outpatient dental facility for dental cleaning, dental X rays, and an oral examination. This was the routine dental procedure for all clients initially admitted to the dental clinic. A total of 20 children were selected by the convenience sampling method. The children were randomly assigned to either the experimental or control group utilizing a flip of a coin as they were admitted for their scheduled appointments. As previously determined, the initial child was placed in the experimental group because the coin flip denoted a "head." Henceforth, the children were alternately assigned to either group as they were admitted to the clinic. The investigation was conducted from October 29th, 1981, through March 25th, 1982. In addition, the following criteria were included to minimize the effects of extraneous variables:

1. Children were scheduled for dental procedures to prevent undue anxiety and discomfort that possibly could be related to an emergency procedure.
2. Parents or guardians accompanied the children to the clinic setting, but did not remain with the child during the play activity or the treatment.
3. Children had no major known physical, perceptual, or communication problem which might have interfered with their ability to comprehend and participate in the situational play activity.

4. Children did not receive any type of sedative medication that might change the results of the physiological measurements.
5. This was each child's first admission to this particular dental setting.

#### Protection of Human Subjects

The proposal for this investigation was submitted to the Human Research Review Committee at Texas Woman's University for approval prior to the collection of data (Appendix A). Approval was also sought from the dental agency selected for the investigation (Appendix A). Written permission was obtained from each parent or guardian of the children used in the study (Appendix B). The following steps were taken to protect the individual rights of the subjects:

1. Written and verbal explanations of the study and instrument were given to the parents prior to measuring the children's responses to stress or the utilization of the play activity.
2. The children were also given verbal explanations and asked to sign the consent form if they so desired and could write their name.
3. Parents were asked to complete a demographic data sheet on the children to assist in analyses of research findings.

4. In addition, the parents were verbally instructed about the following specific information:
  - a. Participation in the project was voluntary.
  - b. Participation in the study did not involve a monetary charge.
  - c. Withdrawal from the study at any point in time could be done upon verbal request of the child.
  - d. Information received would be handled discretely and individual names would not be reported.
  - e. Solutions used for the Palmer Sweat Print were not harmful, but would create a cool feeling and cause a slight purple discoloration of the children's fingers (the discoloration was temporary and would gradually be washed off the fingers).

#### Instrument

The instrument that was used in the present investigation was the Palmer Sweat Print (Appendix C). It was initiated to test the stress levels of the children according to the previously stated hypothesis.

According to Lore (1966),

The investigator who wishes to use a reliable indicator of acute or transient anxiety finds that he has few appropriate measurement techniques at his disposal. This shortcoming is particularly apparent in research with children, in which the various psychometric, performance, and clinical methods used successfully with adults are usually of limited applicability or of questionable validity. (p. 115)

Palmer sweating has been accepted as scientific observation and has been utilized as a physiological correlate and as an objective measurement of stress and emotional tension since 1934, when Kuno published his work on human perspiration. Kuno demonstrated that palmer sweat reflects the existence of certain emotional states of tension and conflict within the human organism, and that the palms of the hands (as well as the soles of the feet, forehead, axillae, and pubic areas) respond to emotion with an increase in the activity of their respective sweat glands. This mental sweat, as distinguished from thermal sweat, did not involve the whole body surface. Kuno further demonstrated in a series of experiments that sweating in these particular areas of children varied directly with the severity of the stressful situation. In 1965, Ferreira and Winter reported a study where they obtained Palmer Sweat Prints on a large sample of males and females from the ages of 6 months to 80 years old and found that palmer sweating increased from birth to eight years old and then began to slowly decrease through adulthood. Wilcott (1963) demonstrated that increases in environmental temperatures produced relatively little change in the activity of sweat glands located in these same areas until an extreme temperature increase had been induced by an emotional reaction in the subject.

Lore (1966) noted technical refinements and procedural simplicity involved in measuring palmer sweat revealed that this method was a practical means of measuring changes in autonomic nervous system activity in children which was presumably related to the construct of anxiety in stressful situations. Lore also reported that the Palmer Sweat Print was an easy test to use with children and that the testing did not cause additional anxiety or stress.

Since Kuno's study in 1934 and until the present, palmer sweating has been studied by chemical analyses, electrical study of skin resistance, observation of palmer sweat gland activity, and measurement of sweat gland activity. In 1944, Silverman and Powell (cited by Johnson, 1972) developed one of the current methods for measuring palmer sweat and also established a colorometric technique for grading the degree of sweating response. The test and the grading have been refined over the years, but the principle and basic method have remained the same.

In 1963, Ferreira and Winter reviewed the methodology of the Palmer Sweat Print and standardized the way in which the materials should be prepared in order to obtain reliability of results in the testing. They stated that previous studies in the literature reported an interjudge reliability coefficient of .99 when reading finger prints at the point

of maximum density by means of a densitometer. They further stated that little improvement could be expected by increased efforts of study in this area and concentrated their efforts on four other variables: finger pressure, length of finger contact, interfinger differences, and right/left finger symmetry. Some of the guidelines which Ferreira and Winter (1963) developed are as follows:

1. The solution should be applied by the same person and in the same manner throughout the study.
2. A standard amount of time should be used for the fingers to remain in contact with the paper.
3. Before and after comparison (difference) scores in a given individual provide better results than absolute scores.
4. There is no justification for cumbersome measures to keep the pressure of the fingers constant on the paper.

A reliability study utilizing the measurement procedures and materials of Ferreira and Winter was reported by Lore in 1966 on 26 second grade students from the Knoxville city school system. Palmer Sweat Prints of all four fingers of each child were obtained on two successive days and a third set of prints was obtained on the 15th day. All interfinger correlations reported in the paper were significant at the .01 level. Test-retest reliability

coefficients for the mean of all four fingers and for individual fingers reported .64 on the 1st day and .60 on the 15th day. Therefore, there was essentially no difference in the magnitude of the two sets of coefficient reports.

Lore (1966) also reported a validity study conducted with 12 pre-school children divided into four groups of three children each. This study was conducted in an attempt to assess the ability of the palmer sweat technique to reflect an induced stressful change in the child's environment. The children in the control setting were allowed to play for a five minute period before their prints were made, while the experimental group played for five minutes and were read a story of a stressful nature before their prints were made. The difference between the prints for the two groups was significant at the .05 level in the predicted direction. Lore stated,

Evidence for the validity of the technique is accumulating: a number of studies have demonstrated an increase in palmer sweating associated with the introduction of an arousing stimulus situation in the subject's life. (p. 122)

Haywood and Hunt (1963) demonstrated that injections of epinephrine elevate heart and pulse pressure, but did not affect palmer sweating. Conversely, delayed auditory feedback increased palmer sweating without appreciably altering heart rate and pulse pressure. The latter two studies

suggested that the two types of arousal indicators (heart functioning versus palmer sweating) may be differentially responsive to different classes of stimulation. As Haywood (1963) suggested, the palmer sweating response might be more sensitive to perceptual-cognitive stimulation than to purely physiological stimulation and, consequently, a more sensitive index of what is meant by the construct "anxiety" in humans.

Interest in the measurement of palmer sweat activity as an indicator of emotional states has gradually been renewed over the past decade. Several nurse researchers (Harrison, 1962; Johnson & Dabbs, 1967; Lindeman & Stetzer, 1973; Yoder, 1970) have investigated the use of the Palmer Sweat Index (defined as the number of glands secreting sweat in a 4 mm square area around the central whorl of a forefinger) related to stress levels with adults. Lindeman and Stetzer (1973) included 30 children between the ages of 5 through 15 in their study related to pre-operative visits by operating room nurses. However, the children were added late in the planning phase and results for this group were not added to most areas of the statistical analysis and in general were not conclusive.

An investigation by Shapiro (1975) studied the usefulness of Finger Sweat Tape Bands, developed by McNair,

Droppleman, and Kussman (1967), in relation to stress levels of kibbutz and urban children receiving injections. Results of this finger sweat measure attested to high internal reliability, but the validity of the test was defeated by its exceptional sensitivity to non-emotional sources of sweat production.

Because of the limited reports of validity and reliability on the more recent measures of palmer sweating in relation to children, the investigator of this study chose to use the methodology of the Palmer Sweat Print developed by Silverman and Powell (1944), standardized by Ferreira and Winter (1963), and reported as reliable and valid by Lore (1966). The materials and procedure, as further used by Johnson (1972) in an investigation on stress levels of children related to hospital admissions, are listed in Appendix C.

#### Data Collection

The secretary of the dental clinic maintained the records of the new clinic clients scheduled for admission. She notified the investigator on a weekly basis and confirmed on a daily basis those children being admitted and meeting the previously determined criteria.

Parents or guardians were approached in the waiting room of the dental clinic setting and asked if their

children might be included in the study. The children were also asked for their permission. The purpose of the study and the Palmer Sweat Print were explained to the parents and children and written consents were obtained. Parents and children were given the opportunity to ask questions and refuse or consent to participate. All children and parents approached consented to be in the study. Five of the parents asked to be notified of the eventual results of the study. All children were able to sign their names on the consent form. At this same time the parents were also asked to fill out the short demographic data sheet (Appendix D) on their children that would assist in the analysis of the data findings.

The demographic data sheet obtained from each parent included nine areas of information germane to the study. Questions 1, 4, and 5 were asked to be sure that each child met the criteria of age, grade, and ability to speak English. These criteria were necessary for assurance that the children could communicate, comprehend, and participate in the situational play activity designed for the study. Questions 1, 2, and 3 were asked to determine if there were differences in the stress measurements related to age, sex, and race. Ferriera and Winter (1965) had previously found that females were heavier sweaters than males. Herbertt and

Innes (1979) had noted age differences in children's ability to assimilate dental experiences. Racial differences had not been previously identified. Questions 6, 7, 8, and 9 were asked to discover what knowledge the parents and children had with regard to their present dental care and needs. In addition, the children were individually asked what they understood about the present dental procedure. Heffernan and Arazanoff (1971) had previously found that information given to the child by the parent was a factor in children's reactions to stress in clinic visits. Questions 10, 11, and 12 were asked to discover the children's previous experiences with dental care as these criteria could be additional stressors for those children participating in the study.

The dentists, dental residents, hygienists, secretary, and other personnel received an explanation of the study in a general meeting held with the investigator in order to obtain their cooperation, but were unaware of what children were included in the control or experimental groups in order to avoid bias in the groups (Abdellah & Levine, 1979).

A pilot study was conducted on four children (two in the experimental and two in the control group) before the actual research investigation was conducted. The functions of this pilot study were twofold: the first was to assess

the value of the measurement instrument and the second was to assess the need for improvements or revisions in the project (Polit & Hungler, 1978). After the pilot study was completed on the first two children (one experimental and one control) as previously determined, the investigator found that the Palmer Sweat Print required much accuracy and expertise for correct measurements by the densitometer. Practice was accomplished on approximately 12 adult subjects in order to gain this expertise. In addition, the solution for the sweat print (Appendix C, No. 3) was reconstituted, as the acetone readily evaporated causing smearing of the finger print. The pilot study was then repeated with no further difficulties.

The following demonstrates the actual procedure that was used to conduct the investigation. The children permitted to participate in the study and meeting the previously specified criteria were assigned randomly to either the experimental or control group. The health record and specific dental treatment were identified by way of the appointment book and patient record. A total of four children were eliminated from the study because of developmental problems.

Upon admission and immediately after permission was obtained and the demographic data sheet completed, the children were accompanied to the periodontal treatment room

and administered the Palmer Sweat Print test. The procedure for the test was first demonstrated on and by the nurse researcher, along with an explanation. Then the procedure was done on the children and explained each time the sweat tests were repeated (Appendix E).

The children in the control group immediately received a simple verbal explanation of the treatments they were to receive (Appendix F) and then were accompanied back to the waiting room to remain with the parents. Those children in the experimental group remained in the room and the situational play was administered by the nurse investigator (Appendix G). The total time period for the play activity averaged 35 minutes. These children were also accompanied back to the waiting room following the situational play activity and remained with the parents until called for the specific dental procedures. This involved different time intervals of from 10 to 20 minutes. The children then had the Palmer Sweat Print test administered for the second time just prior to the specific dental treatment.

The nurse investigator was not in attendance while the children (experimental and control) received their specific dental procedure. This was done to assure that it was the situational play activity and not the investigator's presence in the treatment room that influenced the stress

levels of the children in relation to the Palmer Sweat Print testing.

The children (experimental and control) had the sweat test administered immediately after the dental treatments were completed. This entire time lapse from parental permission to completion of the treatment could not be controlled and involved time intervals from one and one-half to two and one-half hours, depending upon how soon the dentist was able to evaluate the children's dental status and needs. Information from the demographic data sheet was immediately transferred to the data collection record (Appendix H) for assisting with the analysis of the findings.

The Palmer Sweat Prints were consistently recorded on the first finger of the right hand of the children to prevent any variations that might occur. Lore (1966) had previously indicated that any one of the first three fingers revealed essentially identical results. The stress measurements were analyzed within two to three days following the recordings in the dental clinic with the assistance of the chief physician and chief technologist of a research biochemical laboratory in a nearby medical facility.

According to Ferreira and Winter (1963) and Lore (1966), the palmer sweat dissolves the ferric chloride solution and this solution reacts with the tannic acid leaving a permanent stain on the paper, which varies in

color from light gray to dark purple. The relative darkness of the print is directly proportional to the amount of sweating.

The prints were read, according to Lore's (1966) technique, by first adjusting the light intensity on the densitometer to give a full-scale reading when an unused portion of the filter paper was over the 0.25-inch hole where the photocell was located. Next, the stained area was placed over the photocell opening and the darkest portion of the print was found by adjusting the paper position by hand. Finally, the print was scanned by the densitometer resulting in a recording that was counted and placed in a decimal reading (e.g., 15.02, 16.25). The measurements were then transferred to the data collection record (Appendix H) with the other information for final analysis of the data.

#### Treatment of the Data

Frequency counts were calculated separately on both the experimental and control groups of children on the demographic data obtained from the parents including: age, sex, race, school grade, mother's understanding of the child's knowledge of the present dental visit, child's understanding of the present dental visit, last dental visit, last dental procedure, and child's reaction to the

last dental procedure. Frequency counts and means were calculated on the same demographic data for the total (experimental and control) group.

Baseline (pre-play), pre-treatment (post-play), and post-treatment scores from the Palmer Sweat Print stress measurements were obtained by having the density of each child's fingerprints determined by the use of a densitometer--set with the white background of the fingerprint paper on zero. The scores were given a decimal reading with the score increasing as the density increased. Increased density of the prints denoted increased palmer sweating, which in turn denoted an increased stress level. An illustration was made to show examples of the density changes in the Palmer Sweat Prints. A table was prepared to show the mean, median, mode, standard deviation, and the ranges of the stress levels from the Palmer Sweat Print density scores.

Utilizing a two-way analysis of variance (ANOVA), the experimental and control groups were compared by the F-ratio statistic in order to denote changes in the Palmer Sweat Prints over the different time intervals. Following the analysis of variance, a post-hoc Newman-Keuls procedure (multiple comparison procedure) was computed to determine if Treatment A (situational play activity) was significantly more effective than Treatment B (no situational play

activity) in the baseline and pre-treatment interval at a significance level of  $p \leq .05$ . A one-way analysis of variance was used to compare the categories of age, race, and sex with the dependent variable of stress.

#### Summary

This experimental study was undertaken to determine if situational play activity would have a significant effect upon the stress levels experienced by school-age children receiving threatening types of procedures such as dental treatments. Stress levels were determined by the physiological measurement of the Palmer Sweat Print on both an experimental and control group of children at three different intervals, which included baseline, pre-treatment, and post-treatment measurements. Results would contribute to nursing theory by providing a method that the nurse could use to facilitate adaptive responses in school-age children prior to stressful situations.

CHAPTER 4  
ANALYSIS OF DATA

The following research hypothesis was examined in this study: School-age children, 7 through 10 years of age, who receive situational play activity prior to dental treatments in a clinic setting will have significantly lower levels of stress than those school-age children, 7 through 10 years of age, who do not receive situational play activity prior to dental treatments in a clinic setting. Several methods were used to analyze data collected in this study. Absolute and relative frequencies were calculated on all demographic data collected from the parents of the control and experimental groups of children. Means, medians, modes, standard deviations, and ranges of the Palmer Sweat Print stress measurements were calculated on each of the three intervals of data collection for baseline (pre-play), pre-treatment (post-play), and post-treatment time periods. The variable of stress measured on each member of the two groups of children were compared by the two-way analysis of variance. The post-hoc Newman-Keul's multiple comparison procedure was used to determine which means within the groups were significantly different. Analysis of variance was also computed to determine if there were any significant effects of

race, age, and sex upon the dependent variable of stress measurements.

#### Description of Sample

Twenty school-age children, consisting of 12 females and 8 males, participated in the study. This was the first admission for the children to this particular dental clinic. All children received the same dental procedure of teeth cleaning, dental X rays, and oral examination. If additional dental work was required, the children were scheduled for future clinic appointments. Sixteen (80%) of the children verbally indicated at the time that they were glad the dental work was finished. In addition, most of the children did not attend the final conferences between the dentist and parents held immediately after the children's procedures.

All children spoke and understood English and were able to sign their own consent forms. Eighteen of the children were brought to the dental clinic by mothers; one child was brought by a guardian grandmother and one by a father. None of the children had any perceptual or communication problems according to their health histories. Eighteen of the children had no known physical illness; two of the boys had genetic hemophilia, which was under control through medical care received at a nearby medical facility. For this

reason, it was not considered necessary to eliminate them from the study.

All demographic data were answered by the parents on the Demographic Data Sheet (see Appendix D). However, it was found that question 6, "Does your child have a major dental problem?", was not clear to the parents and was, therefore, eliminated from the findings.

As shown in Table 1, 10 (50%) children were assigned to the control group and 10 (50%) children were assigned to the experimental group. Only three (15%) of the children participating in the study were 7 years old, five (25%) were 8 years old, six (30%) were 9 years old, and another six (30%) were 10 years of age. The mean age for the total sample was 8.75 years of age. Twelve (60%) of the total group were males and eight (40%) were females and all major races (Latin, Black, and White) were represented with nine (45%) being White, six (30%) being Black, and five (25%) being Latin. School grades ranged from the first through the fifth with a mean representation from the third grade. All children were in the appropriate grade for their age in months. Sixteen (80%) of the parents indicated that their child had been told what procedure was to be done during the present dental visit. However, 15 (75%) of those children said that they did not know or were unsure of the

Table 1

Frequency and Percentage Distribution of Demographic Variables Obtained on 20 Children Participating in an Experimental Study on Play Activity in Relation to Stress Measurements

Variables	Absolute Frequency	Relative Frequency (Percentage)
<u>Group</u>		
Control	10	50
Experimental	10	50
<u>Age</u>		
7 years	3	15
8 years	5	25
9 years	6	30
10 years	6	30
<u>Sex</u>		
Male	12	60
Female	8	40
<u>Race</u>		
Latin	5	25
Black	6	30
White	9	45
<u>School Grade</u>		
First	3	15
Second	5	25
Third	3	15
Fourth	5	25
Fifth	4	20
<u>Mother's Understanding of Child's Knowledge</u>		
Yes	16	80
No	4	20
<u>Child's Understanding of Dental Visit</u>		
Yes	5	25
No	12	60
Not sure	3	15

Table 1 (Continued)

Variables	Absolute Frequency	Relative Frequency (Percentage)
<u>Last Dental Visit</u>		
Six months	8	40
One year	5	25
Two years	2	10
Over two years	3	15
Never	2	10
<u>Last Dental Procedure</u>		
Teeth cleaning	10	50
Dental extraction	2	10
Dental capping	3	15
Dental filling	2	10
Root canal	1	5
None	2	10
<u>Reaction to Last Procedure</u>		
Accepted	14	70
Cried	3	15
Tired of holding mouth open	1	5
Do not know	2	10

present procedure. The last dental visit in another dental setting ranged from six months to never. The mean time since the last dental visit was over one year. Ten (50%) of the children who had previously been to another dentist required teeth cleaning only, while another eight (40%) had a more major type of procedure such as extraction, filling, capping, or root canal. Two (10%) of the children had never been to a dentist. Fourteen (70%) of the children had accepted that last dental procedure, while another four (20%)

cried or became tired of holding their mouth open. Two (10%) of the parents were unaware of their child's reaction to the last procedure. (See Appendix I, Table A, for absolute and relative frequencies of the demographic variables obtained from parents for the separate experimental and control groups of children.)

### Findings

The Palmer Sweat Prints taken on each child resulted in a permanent stain on Whatman's density paper, which varied in color from light gray to dark purple. The relative darkness of the prints was directly proportional to the amount of sweating. Increased density or color of the prints denoted increased sweating, which in turn denoted increased stress levels (see Figure 1 for examples of the Palmer Sweat Prints). The density of the prints varied from child to child. Ferreira and Winter (1963) had indicated that before and after comparison scores in a given child provided better results than absolute scores because of this variability from individual to individual. The Palmer Sweat Prints were scanned by a densitometer resulting in decimal readings of the scores.

Changes in the Palmer Sweat Print stress measurements were calculated for three intervals which included baseline (pre-play), pre-treatment (post-play), and post-treatment.

---

#1

1.  
Baseline (or Pre-Play)



#2

19.5

2.  
Pre-Treatment (or  
Post-Play)



#3

11.8

3.  
Post-Treatment



9.5

---

Figure 1. Examples of Palmer Sweat Print Density Scores Recorded on One Child in Study of Play Activity.

The first measurement was done on each child immediately after the consent form was signed and prior to a simple verbal explanation to the control group of children or the conduction of situational play activity with the experimental group of children. The second measurement was done after the verbal explanation or the conducting of the situational play activity and immediately before the dental treatment. The third measurement was done immediately after the dental treatment was completed and before the dentist spoke with the parent and child about the child's future dental needs.

Table 2 shows the mean, median, mode, and standard deviation, with minimum and maximum ranges of density scores calculated on the total group of children for the three intervals. The baseline or pre-play interval on all children ranged from 6.80 to 39.88 with a mean of 17.40 and a standard deviation of 9.3; the pre-treatment or post-play interval ranged from 4.33 to 45.40 with a mean of 15.71 and a standard deviation of 10.24; the post-treatment interval was considerably lower ranging from 3.00 to 15.40 with a mean of 8.92 and a standard deviation of 3.64.

Table 3 shows the standard deviations and mean scores of the Palmer Sweat Print measurements separately for both experimental and control groups of children for all three

Table 2

Mean, Median, Mode, Standard Deviation, Minimum and Maximum Ranges of Palmer Sweat Prints for Three Measurement Intervals on Children Participating in an Experimental Study on Play Activity in Relation to Stress Measurements

Measurement Interval	Mean	Median	Mode	<u>SD</u>	Minimum	Maximum
Baseline (or Pre-play)	17.40	13.51	6.8	9.30	6.80	39.88
Pre-treatment (or Post-play)	15.71	12.04	4.33	10.24	4.33	45.40
Post-treatment	8.92	8.69	7.50	3.64	3.00	15.40

Table 3

Standard Deviation and Mean Palmer Sweat Print (M PSP) Measurements for Three Intervals on an Experimental and Control Group of Children Participating in a Study on Play Activity in Relation to Stress Measurements

Interval	<u>Experimental Group</u>		<u>Control Group</u>	
	<u>SD</u>	<u>M</u> PSP	<u>SD</u>	<u>M</u> PSP
Baseline (or Pre-play)	7.31	19.72	10.84	15.08
Pre-treatment (or Post-play)	6.42	13.09	12.85	18.32
Post-treatment	3.57	8.60	3.86	9.24

intervals (baseline, pre-treatment, and post-treatment) that the measurements were recorded. The experimental group's mean score for the baseline interval was 19.72 with a standard deviation of 7.31; the mean score for the pre-treatment interval was 13.09 with a standard deviation of 6.42; the mean score for the post-treatment interval was 8.60 with a standard deviation of 3.57. The control group's mean score for the baseline interval was 15.08 with a standard deviation of 10.84; the mean score for the pre-treatment interval was 18.32 with a standard deviation of 12.85; the mean score for the post-treatment interval was 9.24 with a standard deviation of 3.86. In other words, the Palmer Sweat Print stress measurements for the experimental group of children were higher for the baseline interval than the control group of children. However, the stress measurements for the experimental group decreased after play and decreased further after the dental treatment was completed. The stress measurements for the control group increased after the simple verbal explanation and then decreased after the treatment was completed.

To address the hypothesis--School-age children, 7 through 10 years of age, who receive situational play activity prior to dental treatments in a clinic setting will have significantly lower levels of stress than those children, 7 through 10 years of age, who do not receive

situational play activity prior to dental treatments in a clinic setting--a two-way analysis of variance was computed. This two-way ANOVA indicated that there was no difference between the experimental and control groups of children for the three measurement intervals of stress. Therefore, the hypothesis was not accepted. However, a significant  $F = 4.94$  ( $p = .04$ ) indicated a significant difference across the stress measurements within the groups (Table 4). Therefore, a multiple comparison test using the post-hoc Newman-Keul's procedure was computed and indicated a significant difference within the experimental group of children from the baseline (pre-play) interval to the pre-treatment (post-play) interval. The experimental subjects' stress levels were significantly lower following situational play than prior to the situational play activity. In addition, there was a significant interaction effect in that the control subjects' stress levels were significantly higher following verbal explanation than prior to the simple verbal explanation (see Figure 2).

#### Other Findings

Analysis of variance was also computed to note any effects of sex, race, or age upon the dependent variables of stress measurements. The analysis failed to show any significant differences.

Table 4

Two-Way ANOVA for Stress Measurements on Experimental and Control Groups of Children Participating in a Study with Situational Play Activity

Source	Sum of Squares	Degrees of Freedom	Mean Square	<u>F</u>	<u>p</u>
Between Groups	0.849	1	0.849	0.00	0.95
Error 1	3289.926	18	182.773		
Within Groups	28.679	1	28.679	4.94	0.04
Interaction	243.394	1	243.394	41.96	0.00
Error 2	104.413	18	5.800		

#### Summary

Based on the data that was collected, the two-way ANOVA indicated that there was no significant difference in the Palmer Sweat Print stress measurements between the experimental and control groups for the three intervals of baseline (pre-play), pre-treatment (post-play), and post-treatment. Therefore, the hypothesis for the study was not accepted. The ANOVA did indicate a significant difference across the stress measurements and, therefore, the post-hoc

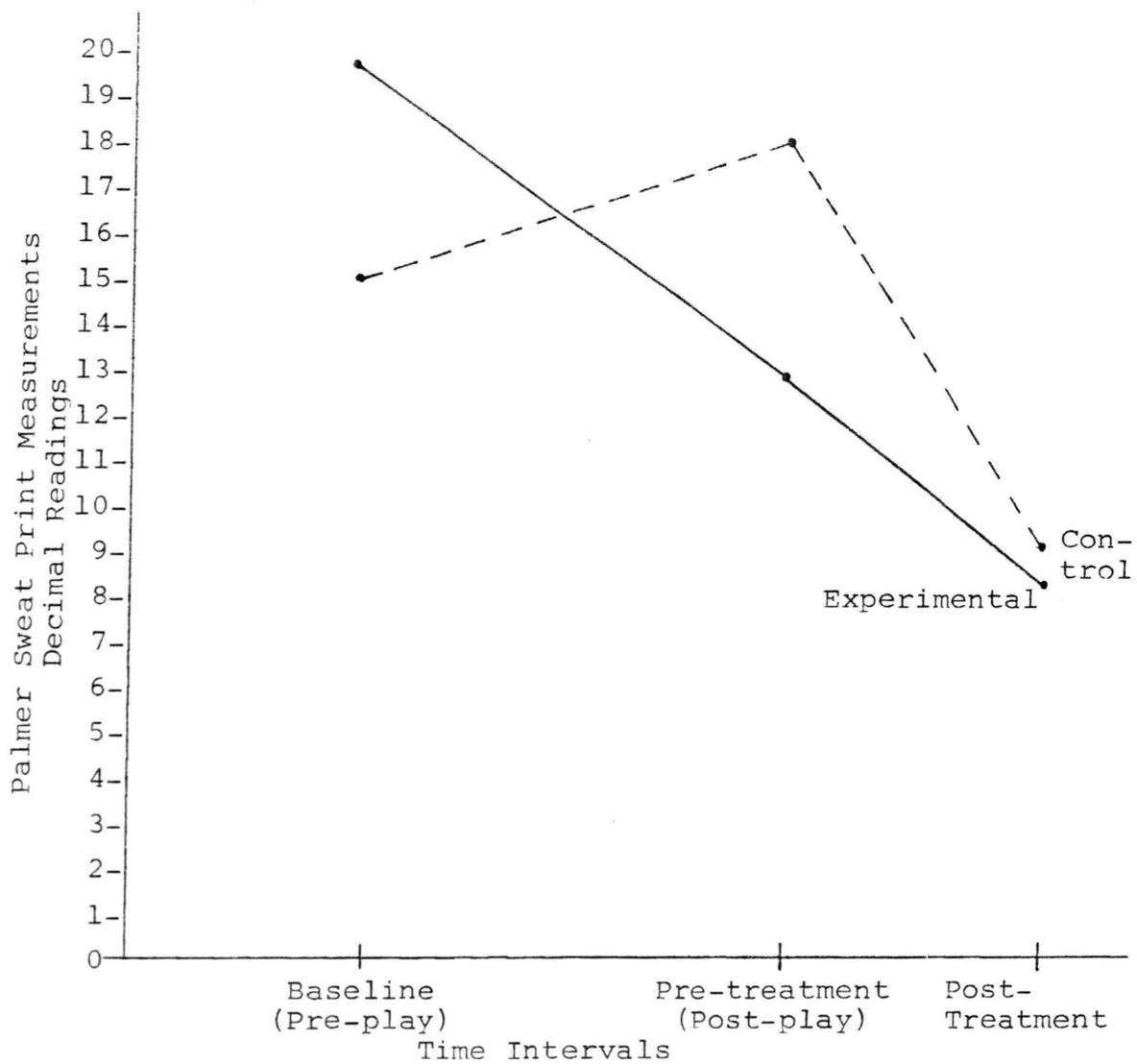


Figure 2. Diagram of Interaction Effect of Stress Measurements for Pre-Play and Post-Play Time Intervals for Experimental and Control Groups of Children.

Newman-Keul's procedure was computed. This procedure indicated that there was a significant difference within the experimental group of children between the first two intervals of baseline (pre-play) to pre-treatment (post-play) time periods. Analysis of variance failed to show any significant effects of sex, race, or age upon the dependent variable of stress measurements.

CHAPTER 5  
SUMMARY OF THE STUDY

This chapter includes a review of the research problem and hypothesis, as well as a summary of the findings, conclusions, implications, and recommendations made as a result of the study. This investigation was conducted to determine if situational play initiated by the nurse prior to dental treatment procedures in the dental clinic would alter the level of stress which the child experienced prior to the treatment procedure. The following research hypothesis was examined: School-age children, 7 through 10 years of age, who receive situational play activity prior to dental treatments in a clinic setting will have significantly lower levels of stress than those children, 7 through 10 years of age, who do not receive situational play activity prior to dental treatments in a clinic setting. The meanings extrapolated from the findings and conclusions are discussed and related to other research. Implications for the outcomes of the findings are directed toward the pediatric professional nurse and other health professionals who interact with children in stressful situations within dental or other types of out-patient health care settings. Recommendations for further study are based on interpretation of the data.

### Summary

An experimental design was used in this study to compare physiological stress measurements on an experimental group and a control group of school-age children receiving dental treatments in an out-patient dental clinic located in a large southern metropolitan city. The experimental group of children was prepared for the dental treatment with situational play activity conducted by the nurse investigator, which included an explanation and demonstration of the treatment with time available for the children to practice and play with the dental instruments on a teaching doll. The control group of children received a simple verbal explanation of the dental treatment by the nurse investigator without a demonstration or play activity.

Twenty children between the ages of 7 and 10 years participated in the study and were assigned randomly to one of the two groups on their initial admission to the specific dental clinic. All children received the same dental procedure which included dental X rays, dental cleaning, and an oral dental examination.

All children were accompanied by a parent or guardian to the dental clinic and each parent and child appropriately consented to the study procedure. Each parent or guardian completed specific information requested by the investigator

on a demographic data sheet. The demographic data sheet was used to determine basic information related to a past and present dental history on each child.

Stress measurements were done using the Palmer Sweat Print to determine if there was a difference in the stress levels of the two groups of children prior to dental treatments. The stress measurements were taken in the same manner on all the children at three intervals, which included baseline or pre-play, pre-treatment or post-play, and post-treatment time periods. The sweat prints were scanned and analyzed on a densitometer, resulting in decimal readings of the scores.

Analysis of variance was used to determine if there were any significant differences among and between the physiological stress measurements of the two groups of children. Results indicated that there were no significant differences between the two groups of children, but there was a significant difference within the experimental group from the baseline or pre-play interval to the pre-treatment or post-play interval. No significant effects of race, age, or sex were found upon the dependent variable of stress measurements.

### Discussion of Findings

The findings of this study indicated that there were no differences in the stress measurements between the experimental and control groups of children or between the two methods of preparatory information (simple verbal information and situational play activity) employed on the children. However, the significant difference noted across the stress measurements of the experimental group of children from baseline or pre-play to the pre-treatment or post-play interval suggests that differences do exist. The experimental group of children appeared to benefit from the combination of explanation, demonstration, and play activity. This was in contrast to the control group of children who received a simple verbal explanation. In addition, there were no significant relationships between age, race, and sex and the dependent variable of stress measurement.

The results of this study were basically inconsistent with several studies that had previously indicated that different forms of play activity or preparatory information given to children prior to surgical or treatment procedures reduced stress levels in children (Cassell & Paul, 1967; Erickson, 1958a,b; Heffernan & Azarnoff, 1971; Johnson, Kirchoff, & Endress, 1975; Visintainer & Wolfer, 1975). Of

these studies, only Johnson et al. (1975) directed preparatory information to the well child in a clinic setting. Heffernan and Azarnoff (1971) studied preparatory information exchanged between parent and child in a clinic setting. The investigators found that communication about the treatment and clinic visit helped reduce the child's stress level if the child had initiated the communication. Premature and detailed information tended to provoke the stress levels of school-age children. The aspects of the initiation of the communication and the detail of the information exchanged between parent and child were not considered in the present study.

None of the above investigators evaluated stress using the Palmer Sweat Print as a physiological measurement. Visintainer and Wolfer (1975) included heart rate, and Johnson et al. (1975) used pulse rate as part of their measurement parameters.

In contrast to the above studies, other investigators have indicated conflicting results related to play activity and preparatory information (Diebenow, 1977; Herbertt & Innes, 1979; Lockwood, 1970). These results were similar to those obtained in the present study. Lockwood (1970) studied the effects of situational doll play on the levels of stress experienced by children hospitalized prior to

surgical procedures. The investigator concluded that the situational doll play did not have any significant effect upon the preoperative levels of stress experienced by the children. However, the stress reactions of the experimental group of children toward the doctors and medical procedures decreased significantly after receiving the situational doll play.

Herbertt and Innes (1979) reported an experimental study using three different informational techniques with children prior to dental examinations. Through analysis of variance, the investigators determined that none of the experimental conditions had any significant effect upon anxiety ratings or cooperation ratings. They concluded that brief familiarization and brief lectures on what was to occur in the clinic are unlikely to have any significant effect upon cooperation and anxiety of the child patient. Possibly children are unable to remember the information long enough to derive benefits from it. This may have been a factor for the increased stress levels noted in the control group of children at the pre-treatment interval after simple verbal explanation in the present study.

Diebenow (1977) also reported results of an experimental study on 30 children in a pediatric clinic setting receiving two different types of preparatory

information prior to finger-stick procedures. The experimental group received consistent positive verbal reinforcement for cooperation and were told what to expect. Physiological stress measurements of heart rate and blood pressure were recorded on the children at baseline, before, and after the procedure. No significant differences were found between the two types of verbal preparation. However, the experimental group of children had consistently lower levels of stress measurements than the control group with the same pattern of change. Once again, none of these studies measured stress in terms of palmer sweat indexes.

No other study described in the literature that measured the physiological parameter of palmer sweat similarly used play or preparatory information as an experimental manipulation for the investigation. Therefore, the findings of the present study have been difficult to compare with other investigational information and results.

Contrary to previous indications by Ferreira and Winter (1963), Lore (1966), Shapiro (1975), and Munday (1976) that the Palmer Sweat Print was easily applicable and manageable with children, the investigator of this study learned early in the pilot study that skill was required in administering the measurement tool. Experience had to be gained in this area before proceeding with the investigation. Munday (1976)

investigated palmer sweat indexes and further indicated that this was a feasible method for studying physiological arousal in clinical settings. However, she felt that this measure was unlikely to show linear relationships between cause and effect due to idiosyncratic reactions of individuals. The effects of the stress syndrome on physiological measurements are very complex. The same stressor may produce the same or different responses in the same or different individuals (Selye, 1976). It is possible that stress cannot be described along a single dimension of arousal (Rosenberg & Katcher, 1976). Mischel (1976) described the difficulty associated with predicting reactions of children to stressful situations because of the many variables to be considered.

All or some of the above variables may have been responsible for the lack of significant differences noted between the two groups of children. In addition, the sample size of the children was small consisting of a total of 20 children from all races and socioeconomic levels. Financial assistance and transportation were available to lower and middle socioeconomic groups of children, making the particular clinic setting accessible to all.

### Conclusions and Implications

Based upon the findings and within the limitations of this study, the following conclusions were drawn:

1. Situational play does not have any significant effect upon the stress levels of children receiving an initial dental procedure in a clinic setting.
2. Children exposed to situational play activity demonstrate lower stress levels following situational play than prior to situational play.
3. Children exposed to simple verbal explanations demonstrate higher stress levels following verbal explanations than prior to verbal explanations.
4. Age, race, and sex have no significant effects upon the stress levels of children receiving initial dental procedures in a clinic setting.

The implications of this study are directed toward pediatric nurses and other personnel within the health professions who interact with children in stressful health care situations.

The findings of this study indicated that there were no significant differences between the experimental manipulation of situational play activity and the incidence of physiological stress levels of palmer sweat in children experiencing dental treatment procedures in a clinic setting.

However, the significant difference noted within the experimental group indicated that those children who received situational play benefited from the play experience, because their stress levels decreased following the play activity. This response of decreased stress levels could be due to the "Hawthorne effect," which Abdellah and Levine (1979) describe as "a psychological reaction to the study conditions" (p. 697). The children may have viewed the situational play activity as a novelty situation or they may have felt that they were being treated in a special manner. The control group did not seem to benefit from the simple verbal explanation and, indeed, their stress levels increased following the verbal explanation. Perhaps children do not benefit from a limited amount of information, because they are unable to engage in the "work of worrying" which Janis (1958) suggests is beneficial in reducing stress in adults as previously noted by Herbertt and Innes (1979).

It is for the practitioner to decide whether the extra 30 to 45 minutes of time in play activity with those children warrants the cost of that derived benefit. Since both groups of children received some degree of preparation, more information might be learned if one group of children received no type of preparation prior to the treatment. For purposes of this study, it would have seemed unethical to

deprive any child of the benefit of even a limited amount of preparation time.

Age, sex, and race were not found to influence the children's response to stress or the children's ability to assimilate the preparatory information. Diebenow (1977) found that birth order may have important influences on stress. Herbertt and Innes (1979) found that younger age children (7, 8, and 9 years old) did not seem to assimilate the dental experience, while the older children (10 and 11 years old) did seem to assimilate the experience. Possibly the effects of sex, birth order, race, and age on stress require further study in order to assist with the identification of those factors that influence the developmental competencies of emotions and intellect.

Because of the complexity of the stress syndrome and the effects upon physiological arousal, the investigator suggests the inclusion of other physiological and/or psychological measurement parameters for future investigations. An increased knowledge base of the variables involved in the stress syndrome could assist health professionals in guiding children and their parents to acquire a more positive attitude toward maintaining their own health care.

In conclusion, the limitations of the study must be kept in mind before definitive decisions are made on the

basis of the results. The study was carried out in only one clinic setting and the sample was small and systematic. In addition, the children's perception of nurses and dentists based on past experience was not evaluated.

#### Recommendations

Based upon the findings and conclusions of this study, the following recommendations for future research are presented:

1. A similar study should be conducted that includes the addition of projective techniques such as human figure drawings, puppet play, play interviews, filmed modeling and needle play.
2. A similar study should be conducted including additional physiological parameters with a comparison of a behavioral or psychological scale of anxiety such as that conducted by Herbertt and Innes (1979).
3. A similar study should be undertaken to further examine the related elements of age, race, sex, and birth order of children.
4. Replication of this study should be done using different clinic settings and/or treatment procedures with a larger, randomly selected group of children.

5. A study should be done to examine and compare different forms of situational play activity that could be used with school-age children.
6. A similar study should be conducted to include a third group of children that would not be given any type of preparatory information about the treatment procedure.

APPENDIX A

AGENCY PERMISSIONS

## TEXAS WOMAN'S UNIVERSITY

DENTON, TEXAS 76204



DEPARTMENT OF PSYCHOLOGY  
AND PHILOSOPHY  
Box 24133, TWU Station

5-9-77

Ms Sandra Krebs  
Houston Nursing Center

Dear Ms. ~~Smith~~ Krebs

The Human Research Review Committee has reviewed and approved your program plan " The Effect of Situational Play Activity on the ~~xxx~~ society Level in Children ."

Sincerely yours,

  
Calvin Janssen, Vice Chairman  
Human Research Review Committee

cc: Dr. Bridges

DALLAS CENTER  
1810 INWOOD ROAD  
DALLAS, TEXAS 75235

HOUSTON CENTER  
1130 M. D. ANDERSON BLVD.  
HOUSTON, TEXAS 77030

AGENCY PERMISSION FOR CONDUCTING STUDY\*

THE Texas Children's Hospital - Dental Clinic

GRANTS TO Sandra K. Krebs, R.N.

a student enrolled in a program of nursing leading to a Master's Degree at Texas Woman's University, the privilege of its facilities in order to study the following problem:

An Experimental Study: The Effect of Situational Play  
on Stress Levels of Children Receiving Dental Treatments

The conditions mutually agreed upon are as follows:

1. The agency (may) (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (may not) be identified in the final report.
3. The agency (wants) (does not want) a conference with the student when the report is completed.
4. The agency is (willing) (unwilling) to allow the completed report to be circulated through interlibrary loan.
5. Other The agency wishes to be recognized; if the results are published.

Date:

Nov 25<sup>th</sup>, 1981

Sandra K Krebs  
Signature of Student

Craig K B...  
Signature of Agency Personnel

\_\_\_\_\_  
Signature of Faculty Advisor

\* Fill out and sign three copies to be distributed as follows: Original-Student; First copy - agency; Second copy - TWU College of Nursing.



Texas Children's Hospital

P.O. Box 20269, Houston, Texas 77025

Operated jointly with St. Luke's Episcopal Hospital  
and Texas Heart Institute in the Texas Medical Center

COMMITTEE ON CLINICAL INVESTIGATION  
AND PUBLICATIONS (TCH)  
October 29, 1981

Sandra K. Krebs, R.N.  
Texas Woman's University  
College of Nursing  
1130 M.D. Anderson Blvd.  
Houston, Texas 77030

Dear Ms. Krebs:

Your research proposal entitled "An experimental study: The effect of situational play on stress levels of children receiving dental treatments" has been granted temporary approval until its review on November 25, 1981 by the Texas Children's Hospital Committee on Clinical Investigation and Publications.

Yours truly,

  
George W. Clayton, M.D.  
Chairman

GWC/kkm

APPENDIX B

INFORMED CONSENT

CONSENT FOR A CHILD TO ACT AS A SUBJECT FOR  
RESEARCH AND INVESTIGATION

1. I hereby allow Sandra Krebs, R.N. to perform the following investigation on my child, \_\_\_\_\_, who is \_\_\_\_\_ years of age.

The purpose of this study is to test whether performing special play activities with children before they have dental treatments will increase or decrease their stress levels immediately after the treatment.

It is hopeful that the results of this study will assist nurses and other medical personnel to find ways that they can utilize in understanding and reducing stress levels when caring for children having dental treatments. It is also hopeful that better ways can be found to inform children about their treatments, so that they do not see them as punishment for bad behavior.

The procedure for doing the study will consist of getting acquainted with your child and than doing a Palmer Sweat Print on him. The sweat test consists of painting his/her fingers with a cool liquid and than obtaining finger prints on special filter paper. At this time, half of the children selected for the study will receive a simple verbal explanation of the specific treatment. The other half of the children will remain with the nurse and be given a detailed explanation and demonstration of the treatment and allowed to play and practice the procedure on a doll using some of the dental instruments. Nobody, except the nurse, will be aware of which group the child has been assigned.

Immediately before and then again following the dental treatment, each child will have a repeat sweat test done.

A special machine will be utilized to read each child's sweat prints to determine which children have an increased sweating response (meaning an increased stress level) or a decreased sweating response (meaning a decreased stress level) after the dental treatment.

2. I understand that the results of the study will be given to the agency in which the study is conducted and to the Jesse Jones Library. The participants names will not be included in the results of the study.
3. The procedure of the investigation described above (Paragraph 1) has been explained to me by Sandra Krebs, R.N. An offer to answer all of my questions regarding the study has been made. I understand that I may terminate my child's participation in the study or that my child may refuse to participate verbally or by refusing to cooperate in the study at any time.

4. Signatures:

Subject (if able to sign) \_\_\_\_\_

Parent or Guardian \_\_\_\_\_

Relationship \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_

Phone \_\_\_\_\_ Date \_\_\_\_\_

Witness \_\_\_\_\_ Date \_\_\_\_\_

APPENDIX C

MATERIALS AND PROCEDURE FOR PALMER SWEAT PRINT

## PALMER SWEAT PRINT

Materials:

1. Whatman no. 1 filter paper
2. Densitometer (Mac Beth RD 100)
3. Solution of 13 gm of anhydrous ferric chloride in 400 cc of pure acetone with three drops of hydrochloric acid (this is the solution the child's fingers are painted with)
4. A 5 per cent tannic acid aqueous solution (for impregnating the filter paper)

Procedure:

1. Obtain materials (above).
2. Soak filter paper in the 5 per cent tannic acid solution for three minutes, remove from solution and allow to dry.
3. Paint the child's fingers with a small paint brush saturated in solution (number 3 under materials).
4. Allow the child's fingers to dry for thirty seconds.
5. Place the child's fingers on the filter paper for one minute.

APPENDIX D

DEMOGRAPHIC DATA SHEET

## DEMOGRAPHIC DATA SHEET

Child Number \_\_\_\_\_

The following is information needed on your child in order to assist in the evaluation of the findings. All names will be withheld from the study.

1. What is the birthdate of your child (month/day/year)?

\_\_\_\_\_

2. What is the sex of your child?

Male \_\_\_\_\_

Female \_\_\_\_\_

3. What is the race of your child?

Caucasian \_\_\_\_\_

Negroe \_\_\_\_\_

Latin American \_\_\_\_\_

Other (explain) \_\_\_\_\_

4. Does your child speak English?

Yes \_\_\_\_\_

No \_\_\_\_\_

5. What is your child's present grade in school?

Kindergarten \_\_\_\_\_

First \_\_\_\_\_

Second \_\_\_\_\_

Third \_\_\_\_\_

Fourth \_\_\_\_\_

Fifth \_\_\_\_\_

Other (explain) \_\_\_\_\_

6. Does your child have a major dental problem?  
Yes \_\_\_\_\_  
No \_\_\_\_\_
7. What is the dental problem?  
Dental filling \_\_\_\_\_  
Dental capping \_\_\_\_\_  
Other (explain) \_\_\_\_\_
8. Is your child aware of what he is to have done on this visit to the dentist?  
Yes \_\_\_\_\_  
No \_\_\_\_\_
9. If the answer is yes to the question above, what is the procedure that he/she is to have done on this visit?  
Teeth cleaning \_\_\_\_\_  
Dental filling \_\_\_\_\_  
Dental capping \_\_\_\_\_  
Other (explain) \_\_\_\_\_
10. When did your child last visit the dentist?  
Within the last 6 months \_\_\_\_\_  
Within the last the last 6 months to 1 year \_\_\_\_\_  
Within the last 1 to 2 years \_\_\_\_\_  
Over 2 years ago \_\_\_\_\_
11. What did your child have done on his/her last dental visit?  
Teeth cleaning \_\_\_\_\_  
Dental filling \_\_\_\_\_  
Dental capping \_\_\_\_\_  
Other (explain) \_\_\_\_\_

12. How did your child react to the dental treatment on his/  
her last visit?

Cried \_\_\_\_\_

Tried to run away \_\_\_\_\_

Refused treatment \_\_\_\_\_

Accepted treatment \_\_\_\_\_

Other (explain) \_\_\_\_\_

APPENDIX E

PALMER SWEAT PRINT EXPLANATION (EXPERIMENTAL  
AND CONTROL GROUPS)

PALMER SWEAT PRINT EXPLANATION FOR  
EXPERIMENTAL AND CONTROL GROUPS

<u>Verbal Explanation &amp; Demonstration</u>	<u>Actions of Nurse Researcher</u>
<p>(Child's name), I am going to take the finger prints of some of the children coming to visit the dentist. I would like to place your finger prints on a special piece of paper.</p>	<p>Sit with child at a table and talk with him/her at eye level. Show a sweat print that has already been done on Watman's paper.</p>
<p>I will paint your first and second fingers of your right hand with a cool liquid--just like this. The liquid does not hurt--just feels cool.</p>	<p>Demonstrate painting fingers on self.</p>
<p>I will then ask you to hold your fingers still until the liquid dries. We will watch the time by the big hand on this clock.</p>	<p>Allow own fingers to dry and observe clock with child for 30 seconds.</p>
<p>I will then ask you to place your fingers on this paper until I tell you to stop--just like this. We will once again watch the big hand on this clock while we wait. That is all there is to the test.</p>	<p>Allow own fingers to remain on Watman's paper for one minute as we observe the clock.</p>
<p>Do you have any questions? Now, we will do the same thing on your fingers.</p>	<p>Proceed with the same procedure on the child. The same explanation will be repeated for each step.</p>
<p>I will do this same finger print test just before your <u>(name of specific scheduled treatment)</u> and then again when you are all done with your treatment.</p>	

APPENDIX F  
VERBAL EXPLANATION OF DENTAL TREATMENT  
(CONTROL GROUP)

VERBAL EXPLANATION OF DENTAL TREATMENT FOR  
CONTROL GROUP

(Example is the Dental Cleaning Treatment)

<u>Verbal Explanation of Specific Dental Treatment</u>	<u>Action of Nurse Researcher</u>
(Child's name), do you know what you are going to have done in the dentist's office today?	Sit at a table with child and talk with him/her at eye level. Allow time for child to explain.
You are going to have your teeth cleaned and x-rays taken.	
The lady who cleans your teeth is called a hygienist. She will have you sit in a special chair and crank you up real high. Then she will have you open your mouth very wide, so that she can see your teeth easily with a small mirror.	Continue to talk with child at eye level.
The next thing that she will do is to take a little pick with a handle and scrape off your teeth.	
Following that, she will take some special powder on a brush that has a motor on it and polish your teeth so they shine.	Continue discussion at eye level without demonstration.
Then she will clean between each tooth with some string called dental floss.	
She will also have you rinse your mouth with a liquid medicine called fluoride. You will need to hold it in your mouth until she tells you to spit it in a basin.	

Verbal Explanation of Specific  
Dental Treatment

The last step that the hygienist will do is to take pictures of your teeth with a special x-ray machine. Do you have any questions?

Action of Nurse Researcher

Allow time for child's questions.

APPENDIX G

SITUATIONAL PLAY OF DENTAL TREATMENT  
(EXPERIMENTAL GROUP)

SITUATIONAL PLAY OF DENTAL TREATMENT FOR  
EXPERIMENTAL GROUP

(Example is the Dental Cleaning Treatment)

<u>Play and Verbal Explanation of Specific Dental Treatment</u>	<u>Actions of Nurse Researcher</u>
<p>(<u>Child's name</u>), do you know what you are going to have done in the dentist's office today?</p> <p>You are going to have your teeth cleaned and have x-rays taken. I am going to try to explain what will be done and what you can do to help make the treatment easier and quicker.</p> <p>Do you know why you need to have your teeth cleaned and x-rays taken?</p> <p>Cleaning your teeth helps to get rid of a white and flaky type of film that gets on and between your teeth. This is called plaque and is hard to see easily. Bacteria live in this film and try to eat off the outer covering of your teeth. This covering is called the enamel of the tooth. We do not want that to happen, because if the bacteria eat too far into the tooth--it causes the tooth to hurt and makes it hard to chew your food. Your teeth are very important as you need them your entire life to eat your food. Do you have any questions?</p>	<p>Sit at a table with child and talk with him/her at eye level. Allow time for child to explain.</p> <p>Allow time for child to explain.</p> <p>Demonstrate the areas of the tooth where plaque forms by using a set of artificial teeth. Allow time for questions.</p>

Play and Verbal Explanation of  
Specific Dental Treatment

First, I am going to show you all of the different instruments used to clean your teeth. Do you have any questions?

The lady that cleans your teeth is called a hygienist. She will have you sit in this special chair and crank the chair so you are sitting real high. Then she will want you to open your mouth very wide, so that she can see all your teeth with a little mirror.

Next, she will take a pick and scrape all of your teeth and between your teeth to get off the film or plaque. This should hurt only a little when she gets close to the gum line of the tooth. You can hold your first finger up in the air to let her know if it starts hurting. There will be a "scratchy" sound as she scrapes your teeth.

She will probably spray your mouth with some water every once in a while and have you swish the water around in your mouth. Then you can spit it out in this basin.

Then she will take a special brush with a motor on it and polish all your teeth with some power to make them shine.

Actions of Nurse Researcher

Show child different pieces of equipment. Explain each piece and demonstrate how used on a pair of artificial set of teeth. Allow time for questions.

Demonstrate chair and show child how to open his/her mouth wide.

Show child where gum line area is located and demonstrate use of pick on the set of artificial teeth.

Demonstrate rinsing mouth with water and spitting it out. Allow child to practice swishing mouth.

Show child brush and listen to sound of polisher.

Play and Verbal Explanation of  
Specific Dental Treatment

Next, she will take some string called dental floss and clean between each tooth--just like this. Maybe, your mother and Dad have you do this at home after you brush your teeth.

Then she will give you some special liquid called fluoride to just hold in your mouth until she says to stop. Do not swallow the medicine--spit it out into the basin when she says "stop". This liquid helps protect the outer coating of the teeth from the bacteria that want to eat into the teeth.

The last thing that the hygienist will do is to take x-rays. She will put a little piece of hard cardboard on each side of your teeth and ask you to bite down on the cardboard. Then she will take a special x-ray picture of your teeth with a machine. It will be very important for you to hold very still while she takes the picture. Do you have any questions?

I have a doll here called (name of doll). Would you like to practice using some of the instruments to clean his/her teeth? Why don't you explain what you are doing as you go along?

Actions of Nurse Researcher

Show child the dental floss and demonstrate use of flossing on artificial and own teeth.

Show the child what the liquid looks like and allow him to smell the fluoride.

Show the child the bite block and allow him/her to see the x-ray machine. Allow time for questions.

Allow child to practice cleaning doll's teeth under supervision. Have child explain what he/she is doing as the play progresses. Allow time for questions.

APPENDIX H

DATA COLLECTION RECORD

## DATA COLLECTION RECORD

Child Number \_\_\_\_\_

Experimental \_\_\_\_\_

Control \_\_\_\_\_

Date \_\_\_\_\_

1. Age \_\_\_\_\_
2. Sex \_\_\_\_\_
3. Race \_\_\_\_\_
4. Language \_\_\_\_\_
5. School Grade \_\_\_\_\_
6. Major Dental Problem \_\_\_\_\_
7. Present Dental Procedure \_\_\_\_\_
8. Child's Understanding of Procedure \_\_\_\_\_
9. Last Dental Visit \_\_\_\_\_
10. Last Dental Procedure \_\_\_\_\_
11. Reaction to Last Procedure \_\_\_\_\_
12. PSP Baseline \_\_\_\_\_
13. PSP Pre-treatment \_\_\_\_\_
14. PSP Post-treatment \_\_\_\_\_

APPENDIX I  
DISTRIBUTION OF DEMOGRAPHIC VARIABLES BY GROUPS

Table A

Frequency and Percentage Distribution of Demographic Variables by Groups Obtained on 20 Children Participating in an Experimental Study of Play Activity in Relation to Stress Measurements

Variables	Experimental (N=10)		Control (N=10)	
	Absolute Frequency	Relative Frequency %	Absolute Frequency	Relative Frequency %
<u>Age</u>				
7 years	2	10	1	5
8 years	4	20	1	5
9 years	2	10	4	20
10 years	2	10	4	20
<u>Sex</u>				
Male	6	30	5	25
Female	5	25	4	20
<u>Race</u>				
Latin	3	15	2	10
Black	2	10	4	20
White	4	20	5	25
<u>School Grade</u>				
First	2	10	1	5
Second	4	20	1	5
Third	1	5	2	10
Fourth	1	5	4	20
Fifth	2	10	2	10
<u>Mother's Understanding of Child's Knowledge of Dental Visit</u>				
Yes	8	40	8	40
No	2	10	2	10
<u>Child's Understanding of Dental Visit</u>				
Yes	3	15	2	10
No	5	25	7	35
Not sure	2	10	1	5

Table A (Continued)

Variables	<u>Experimental (N=10)</u>		<u>Control (N=10)</u>	
	Absolute Frequency	Relative Frequency	Absolute Frequency	Relative Frequency
		%		%
<u>Last Dental Visit</u>				
Six Months	5	25	3	15
One Year	3	15	2	10
Two Years	0	0	2	10
Over Two Years	1	5	2	10
Never	1	5	1	5
<u>Last Dental Procedure</u>				
Teeth Cleaning	5	25	5	25
Dental Extraction	0	0	2	10
Dental Capping	3	15	0	0
Dental Filling	0	0	2	10
Root Canal	1	5	0	0
None	1	5	1	5
<u>Reaction to Last Procedure</u>				
Accepted	6	30	8	40
Cried	2	10	1	5
Tired of Holding				
Mouth Open	1	5	0	0
Do Not Know	1	5	1	5

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