

AN ABSTRACT OF THE THESIS OF

Barbara G. Wilson for the degree of Master of Science in
Human Development and Family Studies presented on December 9, 1983

Title: The Effects of a Health Education Program on Children's Health
Knowledge and Reactions to Routine Health Care

Redacted for Privacy

Abstract approved: _____

Contrasted to the rich body of literature on ill children in medical settings, well children's reactions to routine health care has drawn little attention. This study assessed healthy children's understanding of their bodies, medical procedures, and how this knowledge relates to their behavior during routine health care. The study also investigated the impact of a six-week health education program upon children's health knowledge and behavior during routine health care. The three-group experimental design consisted of 53 children (ages 4 and 5) enrolled in three preschools in Corvallis, Oregon. Children in Group I participated in a six-week health education program and home learning activities. The program was drawn from selected units from the Preschool Health Education Project (PHEP) curriculum. Children in Group II received only the home learning materials. Children in Group III served as the control group and received no health instruction of any kind. Data included pre-and posttest measures of children's cognition level for health concepts (Bibace & Walsh, 1980), and health knowledge, as well as behavior and anxiety level during routine health examinations.

The findings indicate that health education has a definite impact on children's health knowledge. Preschoolers exposed to selected units of the PHEP curriculum for a period of six weeks demonstrated greater knowledge on measures of body parts and self-care behaviors than children in a control group. Preschoolers who received only the home learning activities also demonstrated greater knowledge than the control group, but not as much as children who participated in the inschool health curriculum. Group membership, not cognition level for health concepts, significantly affected children's health knowledge. Thus, the current study demonstrates the short-range possibilities of PHEP in increasing health knowledge. Contrasted to previous studies depicting routine health examinations as a source of distress for children, the majority of children in the current study were calm and cooperative with medical procedures during health examinations and physiological measures of anxiety indicated no apparent anxiety. Because of the lack of variability in children's behavior and anxiety the effect of health knowledge on children's anxiety and behavior during health examinations could not be fully explored.

The Effects of a Health Education Program on
Children's Health Knowledge and Reactions
to Routine Health Care

by

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A THESIS

submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Master of Science

Completed December 9, 1983

Commencement June 1984

APPROVED:

Redacted for Privacy

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Date thesis is presented December 9, 1983

Typed by Heidi Williams Pearson for Barbara G. Wilson

ACKNOWLEDGEMENT

I would like to express my sincerest appreciation to Dr. Clara C. Pratt for her support and guidance in the preparation of this thesis. The task would have been impossible without her.

I would also like to thank the members of my committee, Dr. Allen Sugarwara, Dr. June Henton, and Dr. Ruth Gates for their suggestions concerning this research.

I am also grateful to my dear friend, Cheryl Wright, for the many hours she spent assisting me with the intervention aspect of the research. Her "pep talks" were invaluable throughout, not to mention the use of her apartment during crucial periods in the writing of the initial draft.

Finally, to my husband, Rick, for his never-ending patience, support, and love. Our lives can go back to "normal" now.

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THE EFFECTS OF A HEALTH EDUCATION PROGRAM ON
CHILDREN'S HEALTH KNOWLEDGE AND REACTIONS
TO ROUTINE HEALTH CARE

CHAPTER I

INTRODUCTION

Adults' health-related beliefs and behaviors have been the topic of much research (Cummings, Becker & Maile, 1980; Korsch, Gozzi & Francis, 1968; Mechanic, 1972; Parsons, 1951; Suchman, 1965; Zbrowski, 1952). Contrasted to this, children's health beliefs have drawn little attention. Over the past 30 years, less than a dozen published research and clinical studies have addressed this subject (Campbell, 1975; Gochman, 1972; Mechanic, 1964; Nagy, 1951; Natapoff, 1978; Pratt, 1973). Lewis and Lewis (1982) reviewed existing literature and identified various demographic, family, child, and health care system variables as the major determinants of children's health beliefs and behaviors. Several predictors of children's health behavior are: the mother's view of her own health (Campbell, 1975), the child's birth order (Tessler, 1980), and child-rearing practices within the family (Pratt, 1973).

Some factors which influence health behavior (i.e. socioeconomic status, ethnicity, child's ordinal position) are not amenable to change (Lewis & Lewis, 1982). Other factors such as the child's self-concept, self-esteem, health knowledge, and ability to perform self-care behaviors are more amenable to change and will be examined in this study. Since it is difficult to alter adults' health habits and behaviors, the best time to intervene may be during childhood (Lewis &

Lewis, 1982). Children's resources and abilities to care for their own health should be developed early in life (Bruhn & Nader, 1982).

Studies of children's conceptions of the body, health, illness, and/or medical procedures (Bibace & Walsh, 1980; Brodie, 1974; Campbell, 1975; Graves & Pinyerd, 1983; Mechanic, 1964; Neuhauser, Amsterdam, Hines & Steward, 1978; Palmer & Lewis, 1975; Steward & Regalbuto, 1975) clearly illustrate how dramatically different children's thinking is from that of adults. For example, children view health as the ability to perform desired activities, such as playing with friends or going outside, whereas adults tend to view health as the absence of symptoms or the ability to perform minimal activities (Natapoff, 1978). Three frequently investigated variables affecting children's definitions of health and illness are: age (Gochman, 1970; Lewis, Lewis, Lorimer & Palmer, 1974; Natapoff, 1978); level of cognitive development (Bibace & Walsh, 1980; Neuhauser et al., 1978; Steward & Regalbuto, 1975); and health status (Carandang, Folkins, Hines & Steward, 1979; Brodie, 1974; Gochman, 1971). Children's causal thinking has been examined in reference to internal body parts (Gellert, 1962; Tait & Ascher, 1955; Nagy, 1953; Porter, 1974), body functioning (Bultman, 1982; Gellert, 1962), and medical procedures (Steward & Regalbuto, 1975). Results of these and other studies suggest children's thinking follows a Piagetian developmental sequence; in all cases children's thinking was found to be more concrete than adults. As Piaget (1952) and Werner (1948) have shown children's logic about space, time, and causality is not only qualitatively different from adults but it follows a developmental sequence (cited in Bibace & Walsh, 1980). In terms of medical procedures, for example, children

at the preoperational stage of development think in terms of what they can see and their explanations often revolve around "magical thinking" (Steward & Regalbuto, 1975). In a study of common pediatric procedures, preschoolers described the stethoscope as an instrument used to tell if you're alive or dead. "The doctor listens, 'so he can tell if it's beating, cause maybe it's stopped,' and 'If it stops you'll die'" (Steward & Regalbuto, p. 148).

Another study found children's conception of illness varies as a function of the interaction between cognitive level of development and the particular content area (Bibace & Walsh, 1980). That is to say, not all children at the preoperational stage, for example, share the same beliefs about illness in terms of causality. The following responses were obtained from 4-year-olds in Bibace and Walsh's (1980) study of developmental stages in children's conceptions of illness. A child at the "Phenomenism" stage attributes the cause of a heart attack to "the sun," while a child at the "Contagion" stage attributes it to "falling down" (p. 292). At the third stage of illness conception, one child stated the cause of cancer was "from smoking without your mother's permission" (p. 293). Health care professionals often fail to take into account children's cognitive level with reference to their bodies and understanding of various medical procedures. For example, a physician warming the diaphragm of a stethoscope prior to listening to a child's heart, will do little to console a 4-year old who is not concerned with the "coldness" but rather is operating under the belief that the stethoscope (or "deathoscope" cited in Goodall, 1976) is used to discover if "I have a heart," a heart which he adds, "is what makes me live" (Bibace & Walsh, p. 286).

Interactions with health care professionals are important and frequent events for children (Hyson, Snyder & Andujar, 1982). In fact, persons under the age of 5 and over the age of 75 are the highest consumers of health services (Lewis, Lewis, Lorimer & Palmer, 1977). The average child will have experienced 13 visits to the physician prior to kindergarten (Haegerty, Glass, King & Manly, 1980). This figure reflects visits for health maintenance and does not include visits for treatments of common childhood illnesses or medical emergencies. The importance of investigating children's responses/reactions to routine health care is underscored by the fact that the child's first introduction to the health care system is through routine health examinations. To date, literature in this area is scarce. One can hypothesize from the literature on ill children in medical settings, how well children might respond to routine health care.

Medical treatment and routine examinations are a source of distress for many young children (Hyson et al., 1982). For example, many pediatric patients have misconceptions of the intent of medical procedures and may regard these procedures in terms of mutilation and pain. Fears and fantasies of unfamiliar machines and lab tests are common. These perceptions are a major source of stress to pediatric patients who are undergoing treatment for illness or injury (Erickson, 1958; Freud, 1968; Klinzing & Klinzing, 1977; Korsch, 1975; Prugh, 1973). Research studies (Prugh, Staub, Kirshbaum & Lenihan, 1953; Lende, 1971) suggest that with adequate preparation the ill child is more likely to be cooperative and compliant during medical exams. A variety of "preparation programs" and educational efforts have proven

effective in reducing stress and anxiety in hospitalized children (ACCH, 1981).

While the existing literature focuses primarily on ill children in medical settings, it is reasonable to assume that some of the same fears and fantasies that are experienced by ill children during medical treatments, may also influence well children during routine health care (Bernheimer, 1981). In one of the few studies investigating well children's responses to routine health examinations, behaviors indicative of fear and anxiety were found across all age groups. These behaviors included crying, protest, muscle tension, or resistance (Shirley & Poyntz, 1945). According to Bernheimer (1981), children's responses to routine health examinations is predicated upon adequate information concerning events and procedures, and the child's perception of them. The importance of providing children with accurate, age-appropriate information is based on assumptions Vernon, Foley, Sipowicz and Schulman (1965) put forth: (1) threats which are known and understood are less upsetting than vague, unidentified ones; and (2) expected events and procedures are less upsetting than the unexpected. By providing information, health education may be an effective means of lowering the anxiety well children may experience during routine health examinations.

The school is one setting for teaching healthy children about medical equipment and procedures commonly used in routine health care encounters (West, 1976). It is also an excellent setting for teaching children about their health and how to assume responsibility for it (Bruhn & Nader, 1982; Bruhn & Parcel, 1980; Means, 1973). School health programs for grades K-12 are common, or the majority of health

teaching begins at kindergarten. In terms of formal health education, however, the first four to five years of life are neglected (Bruhn & Nader, 1982). Nevertheless, the preschool years may be an excellent time to begin teaching children about health and for establishing positive health beliefs and behaviors. The preschool, itself, may be the best place for children to learn about health as it is a relaxed, natural setting, rather than an emotionally-charged situation like the medical setting.

The Preschool Health Education Project (PHEP) is a health curriculum designed specifically for preschoolers. Prior to 1980, no health curriculum was available that was appropriate for preschoolers. This current study will measure the impact of selected units from the PHEP curriculum on preschool age (4-5) children's health knowledge and behavior during routine health examinations. This curriculum was chosen because it has as its basis, social learning theory, which has been shown to be the "primary pathway" for acquiring a variety of health-related beliefs and behaviors (Lewis & Lewis, 1982). The conceptual framework in this study combines aspects of cognitive developmental psychology and social learning theory. The child assimilates information with regard to health-related events in the manner in which his cognitive developmental level permits. Research has shown that Piagetian theory is applicable to those cognitive structures and operations related to health and illness (Gellert, 1962; Lewis & Lewis, 1980). The child also assimilates information from health-related events through another set of messages which are transmitted through "social learning." According to Lewis and Lewis (1980) "this learning occurs through positive or negative reinforcement,

simulation, and modeling" (p. 145). For example, parents who overly "doctor their child" rather than encouraging positive self-care behaviors will produce a child with poor health behaviors (Lewis & Lewis, 1982). Through a program of health education based on cognitive developmental and social learning principles children can: (1) "act out" their fears and misunderstandings of medical procedures through medical play experiences, and (2) acquire appropriate health care behaviors from adults (i.e. the preschool teachers) who model desired behaviors and explain the rationale behind such actions (Lewis & Lewis, 1982).

Definition of Terms

The definitions of the eight terms used in the research study are stated below:

1. Health Education Program. Selected units from the Preschool Health Education Project (PHEP) curriculum, and home learning activities supplemented with medical play experiences.
2. Children's Health Knowledge. Children's understanding of their bodies and body functioning, knowledge of medical equipment and procedures, and self-care behaviors.
3. Children's Cognition Level. Level of cognition for health concepts. One of six developmentally ordered categories of health/illness conceptualization: Phenomenism; Contagion; Contamination; Internalization; Physiologic; Psychophysiologic (Bibace & Walsh, 1980).
4. Physical Examination. Five common procedures in a well child

checkup: measurement of height, weight, and blood pressure; use of stethoscope and otoscope. These procedures are not intended as diagnostic procedures, but rather for the purpose of assessing children's behavioral responses to the physical examination.

5. Behavioral Responses during the Physical Examination. In this study, perceived as having two components:
 - (a) level of cooperation--degree to which the child cooperates with selected procedures in the examination (complete cooperation to extreme resistance) (Wolfer & Visintainer, 1975).
 - (b) emotional state--the child's current emotional state during the examination (little or no fear or anxiety to extreme distress) (Wolfer & Visintainer, 1975).
6. Anxiety Level. Two physiological measures of the child's level of anxiety during the physical examination: pulse rates and systolic blood pressure.
7. Health Beliefs and Behaviors. Any activity undertaken by a person who believes himself to be healthy for the purpose of preventing disease or detecting disease in an asymptomatic stage (Kasl & Cobb, 1966).
8. Self-Care Behaviors. Learned behaviors that enable an individual to perform various activities of daily living (Facteau, 1980). Also referred to as the ability to assume an active role/responsibility in meeting one's own health care needs.

CHAPTER II

REVIEW OF THE LITERATURE

The literature on children's responses to medical events, which ranges from routine health examinations to long-term treatment for chronic conditions, spans four decades. Since the 1940's children's emotional and psychological reactions to illness, hospitalization, and surgery have been the topic of much research. Contrasted to this, well children's responses to routine health care has drawn little attention. Only a few studies have addressed this issue over the past 40 years (Andujar, 1979; Bernheimer, 1981; Hyson, in press; Shirley & Poyntz, 1945) compared to more than 200 books and articles that have investigated children's emotional reactions to illness and hospitalization (Vernon et al., 1965). This scarcity in the literature is surprising since, as Hyson and others (1982) note, most contacts between health professionals and children occur during routine health examinations. Hyson et al (1982) suggest "these examinations are important, not only for the child's physical health, but also as the child's first introduction to the health care system and to his or her role in it" (p. 139).

Children in Medical Settings

Most of what is known of children's responses to medical events is based largely on reports of ill, injured, or hospitalized children. Therefore, in order to examine well children's perceptions of routine health care, it is necessary to draw from some of the existing research concerning ill children. It is well documented in the literature that

hospital and medical procedures can be emotionally upsetting to children and their families (Thompson & Stanford, 1981), and that children from middle infancy to the late preschool period are most vulnerable to circumstances surrounding the hospital experience (Vernon et al., 1965). Hospitalization poses a series of "threats" (real, imagined, or potential) for young children which Wolfer and Visintainer (1975) describe in terms of five themes:

- (1) physical harm or bodily injury in the form of discomfort, pain, mutilation, death;
- (2) separation from parents and the absence of trusted adults, especially for preschool children;
- (3) the strange, the unknown, the possibility of surprise;
- (4) uncertainty about limits and expected "acceptable" behavior;
- (5) relative loss of control, autonomy, and competence (p. 248).

The preschool age child is particularly vulnerable to medical events due to his limited cognitive capacity, misconceptions regarding medical procedures, and his active use of fantasy to "fill in" the gaps of knowledge (Thompson & Stanford, 1981).

For these reasons, Thompson and Stanford (1981) state, "preparation for preschoolers is a necessity" (p. 33). Preparation has been referred to in the literature as "emotional inoculation" (Hardgrove, 1977) because it attempts to help children manage their feelings about potentially stressful events (Azarnoff, 1981). Numerous researchers (Azarnoff, 1981; Droske & Francis, 1981; Eckhardt & Prugh, 1978; Hardgrove, 1977; Johnson, 1974; Thompson & Stanford, 1981) speak to the importance of preparing children for medical encounters. A variety of preparation techniques in the form of: puppet therapy (Cassell, 1965), filmed modeling (Vernon, 1973; Melamed & Siegel, 1975), therapeutic play programs (Azarnoff, 1975; ACCH, 1980), "preparation parties" and hospital tours (Johnson, 1974);

as well as educational efforts such as guided medical play experiences (Ostrenga, 1980), use of medical play equipment (Patton & Dye, 1980), major preparation sessions (Petrillo & Sanger, 1980), and books that help children deal with the hospital experience (Altschuler, 1978) have proven effective in reducing stress and anxiety in hospitalized children. Although the "vehicles" for preparation differ, the underlying philosophy remains the same. Preparation of children for health care encounters deals with three basic components: "planning for the development of trust, understanding what is involved, and mastery of the experience" (Droske & Francis, 1981, p. 8).

In adapting the themes identified earlier in the literature on hospitalized children to the study of well children's perceptions of routine health care, Bernheimer (1981) dismisses the issue of parent-child separation since most parents accompany their child to the doctor's office for routine checkups. A second issue of little relevance in routine health care is the child's view of the hospital as a source of punishment (although there have been occasions in which "some parents threaten their misbehaving child with a trip to the doctor") (Moss, 1981, p. 18).

Clearly, the two themes common to the study of children (well and ill) in medical settings are: (1) misconceptions or lack of information concerning medical equipment and procedures and (2) unfamiliarity of surroundings (Bernheimer, 1981). Concerning the first, Bernheimer (1981) states, "many of the procedures experienced during hospitalization (i.e. blood tests, injections, physical examinations) are carried out during well-child care" (p. 8). Second, the theme of unfamiliarity is evident in doctor's offices and clinics which serve

as unfamiliar settings for both healthy and sick children.

Children at the preoperational stage of development operate under the same cognitive capacity for observation and thinking (regardless of their health status). This thinking, as Blos (1978) suggests is often "contaminated" by emotions aroused when things are done to their bodies. Given these two facts, one would agree with Bernheimer's assumption that some of the same fears and fantasies experienced by ill children during medical treatments, may also influence well children during routine health care. Siegel (1976) writes, "the emotional upset the child experiences is the result of the child's exposure to a setting [a doctor's office or clinic], procedures which the child does not understand [procedures performed on various parts of the body during a physical examination], and the people with which he is unfamiliar" [the doctor or pediatric nurse practitioner] (p. 27).

Children's discomfort and apprehension during physical examinations has been attributed in the pediatric literature to such factors as "a doctor's cold hands" or to the "use of a cold stethoscope" (de Angelis, 1979). Although it is important to consider the child's physical discomfort during the examination, health professionals must also take into account individual children's cognitive level in regard to medical equipment and procedures in routine health care. As Piaget (1928) has stated, "children function with a dual system of looking at the world--reality and fantasy--and they consider that both approaches yield verities" (cited in Blos, 1978, p. 1). It is hard to separate children's cognition and knowledge on the one hand and fantasy and belief on the other (Blos,

1978). To assist children in the cognitive-affective aspects of learning about their bodies and how they work, as well as issues related to health care, Blos (1978) suggests health professionals need to take a closer look at the cognitive functions at work in the child's mind.

Children's Concepts of Illness

"Illness, although an event of life experienced by all, is a phenomenon that is usually not deliberately explained to children" (Brodie, 1974, p. 1156). Children acquire their concepts of illness based on direct or indirect contact with illness, and these concepts change with the development of the child's cognitive and affective abilities. Most of the research on children's views of illness and medical treatments has been done with ill or hospitalized children (Campbell, 1975; Erickson, 1958; Eckhardt & Prugh, 1978).

In one of the few studies of healthy children, Brodie (1974) found the majority of children did not share the same view of illness as "punishment for misbehavior" that previous work with ill children had indicated. In one of the earliest studies with healthy children, Blos (1978) obtained 5 to 10-year-old children's responses to a series of pictures depicting various illness situations (i.e. a cold, stomach ache, transmission of germs). Based on the data from these 42 children he derived three stages in children's causal thinking: (1) descriptive, (2) exploratory, and (3) causative. In the descriptive stage, precausal thinking is evident; motive and cause of illness are confused. In the exploratory or second stage, the

child begins to shed some of his egocentrism and can see some associations between cause and effect (eg. a specific element, "germs," is associated with the onset of illness). The third stage, causative, is a more mature level of thinking in which multiple causes for a given illness are possible (eg. there is more than one way to get a cold or a stomach ache). In Blos's (1978) study, the oldest group, 9 to 10-year-olds, demonstrated a significantly higher level of causal thinking than the younger two groups. This would support the work of other researchers who found children's capacity for causal thinking increased sharply at around 8 to 9 years of age (Bibace & Walsh, 1980; Brodie, 1974; Gellert, 1962; Neuhauser et al., 1978).

Studies in the area of children's conceptions of illness (Brodie, 1974; Bibace & Walsh, 1980; Campbell, 1975; Mechanic, 1964), health (Natapoff, 1978; Neuhauser et al., 1978), the content and functions of their bodies (Gellert, 1962; Porter, 1974), and medical procedures (Steward & Regalbuto, 1975) suggest such concepts follow a developmental sequence. In a study of children's perceptions of routine pediatric procedures, third graders described the doctor's use of the stethoscope as "to see if it's thumping right," or "to see if you have too fast a heart beat" (Steward & Regalbuto, 1975, p. 147), whereas preschoolers saw the stethoscope as a way to determine life or death. The egocentric perception of the preschooler was also reflected in an understanding that the doctor listens to his heart to "see if I am happy" (p. 148). In Gellert's (1962) study of children's understanding of their bodies, 60% of children, 4-6 years old, placed the "heart" in the relatively correct position when given a body outline. Children at this age knew approximately three bodily

"ingredients" compared to 13 body parts for children, 15-16 years old. These studies, however, used age or Piagetian tasks of physical conservation to establish children's cognitive level of development. According to Bibace and Walsh (1980) "no attempt was made to highlight the ways in which children assimilate a particular phenomenon to the general schemas available to them at a given point in their cognitive development" (p. 287). To date, Bibace and Walsh are among the few researchers to consider general cognitive level of development as it relates to a particular content area (i.e. health and illness).

In a pilot study, Bibace and Walsh (1978) derived a category system of illness conception based on 3 to 13 year old children's (N=180) responses to a series of questions which probed different areas (i.e. a cold, measles, heart attack). These categories not only mirrored Piaget's major stages of development, but added two subtypes within each of these stages. In order to validate these subtypes and their developmental ordering, a second study was conducted on another group of children, 4, 7, and 11 year olds (N=72). Based on these results, six developmentally ordered categories of explanation of illness were defined: Phenomenism, Contagion, Contamination, Internalization, Physiologic, and Psychophysiologic. Within the Phenomenism category, illness is defined in terms of a single external symptom, usually sensory in nature (i.e. a sight or sound that the child at one time associated with the illness). In the Contagion stage the cause of illness is located in objects, persons, or events which are spatially near to, but not touching the child's body. Among 4-year-olds in the study, 54% were in the Contagion

stage of explanation. In the Contamination stage the cause and cure of illness is transmitted through physical contact with the body, bad or immoral behavior, just as dirt or germs, cause illness; 38% of the 4-year-olds were in this stage. The child in the Internalization stage is not as interested in the cause of illness as he is preoccupied with the way in which illness is internalized (i.e. swallowing, inhaling, ingesting "bugs"). Frequent use of analogies to describe body parts is common (i.e. the heart is "a pump," the stomach, "a bag of food"). In the first subtype within Piaget's formal operational stage, the Physiologic stage, illness is described in terms of internal body organs and functions. The most mature level of illness conceptualization, Psychophysiologic, a psychological component is added to the Physiologic explanation as a possible cause of illness. (For further explanation and examples of the six categories of illness conceptualization see Appendix D). Bibace and Walsh's (1980) efforts to "bridge the gap" between Piaget's stages of development and their expression in the area of health and illness has important implications for the study of children's responses to routine health care.

First, it can help predict or explain differences in preschooler's responses to health examinations by providing insight into children's beliefs about medical procedures, which could in turn aid educators in developing appropriate health education materials to alter children's misconceptions concerning these events. Second, it can help determine why some preschool children assimilate more information from a health education program than others. Third, it can help parents and pediatricians frame children's "quaint" explanations or seemingly exaggerated fears of medical procedures into a more meaningful context

(Bibace & Walsh, 1980).

Cooperation during Medical Procedures

"Gaining a child's cooperation during medical procedures is no easy task" (Moss, 1981, p. 19). Hospitals were the first to become aware of this as medical personnel spent a great deal of time coaxing reluctant patients to take medications, hold still for X-rays, and/or restraining frightened children for injections or anesthesia induction (Thompson & Stanford, 1981). A child's cooperation or lack of it during medical events is determined in part by his perception of the event (Bernheimer, 1981). For many young children even the most benign medical events, such as inoculations, tests, hearing screening, and physical examinations, are "intrusive" as they are perceived as disrupting the child's sense of bodily integrity (Moss, 1981; Patton & Dye, 1980). The child may also fear the examination because of preconceived notions of what the experience might entail (Moss, 1981). As Vernon et al. (1965) suggest "threats which are known and understood are less upsetting than vague, unidentified ones" (p. 74).

Based on clinical practice as a pediatric nurse practitioner, Moss (1981) cites three reasons for a child's lack of cooperation during physical examinations: (1) the developmental level of the child, (2) the child's temperament, and (3) previous experience in health care encounters (p. 18).

1. Developmental level of the child. Investigating the emotional reactions and coping behaviors of infants, toddlers, and preschool children to routine checkups, Hyson (in press) concluded that

differences found were due to the individual child's stage of cognitive, social, and emotional development. As Hyson et al. (1982) write,

An 'objective' event such as a visit to the doctor is seen through a highly selective cognitive and emotional filter; what is threatening to a 2-year-old may be innocuous or even pleasurable to a 5-year-old (p. 139).

In Hyson's (in press) study, the most "negative" reactions were observed in the infant group and with increasing age there was a decrease in observable negative reactions. In addition to age-related differences in children's reactions to the examination, the source of these reactions differed. For example, infants' fears were triggered by concrete actions (i.e. being examined or physically restrained), whereas preschool children's negative responses were activated by abstract actions (i.e. a doctor and a mother whispering in the room) (cited in Hyson et al., 1982). Typical reactions of preschoolers in the study were acting "confident and talkative before the doctor entered, quiet and passive during the examination, and bossy, domineering, and assertive afterwards" (p. 141). This is consistent with Bernheimer's (1981) description of 5- and 6-year-old children's responses to the health examination. The majority of children were "compliant, nonverbal, and passively apprehensive" (p. 108).

Thirty-five years prior to Bernheimer's study, Shirley and Poyntz (1945) found developmental trends in children's emotional responses to health examinations. Behaviors ranged from "non-specific and non-adaptive to highly specific and well-adaptive. The height of specificity both in motor and verbal forms of resistance seemed to occur in the late preschool years" (p. 93) in terms of specific acts

of avoidance, protection, withdrawal and/or verbal protests.

2. Child's temperament. Clinical studies suggest "the difficult child" as defined by Thomas, Chess, and Birch (1970) is more of a challenge to examine than the quiet one (cited in Moss, 1981). Although it is easy to examine the quiet "good" patient Hyson et al. (1982) argue such "passive behavior may mask tension and fear rather than calm indifference" (p. 141). In Bernheimer's (1981) study, the individual child's temperament, more than amount of knowledge or understanding of medical procedures, was the greatest predictor of behavior during the examination. Generalizability of results from her study are questionable as data were gathered using behavioral ratings (observation and self-report) of one group of 30 children. The present study will control for the effects of individual temperament by using several groups of children to see if knowledge gained from a health education program alters children's responses to the physical examination.

3. Previous experience in health care encounters. Unlike Bernheimer (1981) and Hyson (in press), Andujar (1979) explored the effects of different pediatrician's behavior on children's responses to the physical examination. The amount of "neutral-passive" behavior (i.e. lack of observable emotion, positive or negative; lack of either active cooperation or resistance) varied from one doctor to another. "The sole predictor of negative responses (i.e. crying, pulling away, resistance) was the child's age" (cited in Hyson et al., 1982, p. 142). Moss, on the other hand, stresses that recollections of painful procedures, such as needles, blood tests, etc. may color future experiences. For instance, ear infections, a commonly treated

childhood illness, produces fear of the otoscope for many children who have had frequent ear infections. Haegarty et al. (1980) predict "the first physical examination, if conducted properly, can prevent future health care encounters from provoking anxiety" (p. 65).

Three predictors of positive reactions and cooperation in children facing routine checkups are: (1) "the pediatrician's warmth," as measured by physical closeness to the child, expression of empathy during the exam, and "gift-giving" at the end of the exam; (2) the "doctor's child involvement," how much the doctor allows exploration of medical equipment; and (3) the "doctor's mother involvement," how much the physician elicits the assistance of the mother in the health examination (Andujar, 1979 cited in Hyson et al., 1982, p. 142). The best predictor of positive reactions was the "doctor's warmth" and to a lesser extent, the degree of "child involvement."

Games Pediatricians Play

Most efforts by pediatricians and nurse practitioners during routine health examinations are geared toward eliciting cooperation on the part of the child. This has been described in pediatric textbooks as the "art" of the physical examination (Haegarty et al., 1980). Among the many methods, practices, and procedures health professionals use to facilitate cooperation include calming an infant through means of a bottle or pacifier; the toddler via a mother's lap; and the preschooler through means of a ball, toy, or other "time-honored pediatric games" (deAngelis, 1979, chap. 3). Hyson's (in press) description of a preschooler's episode in the doctor's office will be used to illustrate a point.

Tim first reverses roles by giving an order to the doctor. That failing, he tries diversion, delaying tactics, and perhaps bribery before resorting to tears (cited in Hyson et al., 1982, p. 142).

Interestingly, physicians follow the same strategies with children (short of tears) in an attempt to gain their cooperation during medical events. If the child cooperates, the physician is more likely to get an accurate and complete assessment of the child's health status. The importance of this assessment is undisputed however, the means in which it is obtained is questioned. While tricks, games, enticements, bribery, and rewards have met with "success," how effective are they in helping the child cope with the examination? Research studies have shown that: the order of procedures in the examination (Wong, 1981; Haegarty et al., 1980; deAngelis, 1979), demonstration of equipment (Moss, 1981), and the presence of the mother and the warmth of the physician (Andujar, 1979)--though important--are not as predictive of cooperation and positive reactions as the child's inner sense of control or the anticipated control he expects to have over the situation in the doctor's office (Hyson et al., 1982).

In order to make "going to the doctor" a more positive experience for young children Hyson et al. (1982) suggest health professionals need to: understand the sources of children's fears, identify ways in which children respond to new or puzzling "stressful" events, and be cognizant of the effect their own behavior or "techniques" have on the child.

Children's Health Knowledge

A major source of children's fears of medical events stems from

misconceptions or lack of information concerning specific medical procedures and equipment. The only study to address the relationship between children's knowledge and their behavior during the examination was conducted by Bernheimer (1981). The majority of children in her study had a medically correct, evaluative orientation toward their understanding of the intent behind procedures. Although the amount and type of knowledge children had was the same, it did vary by event. For example, children had the least knowledge about blood pressure, the most knowledge about ear and mouth exams, and the most incorrect knowledge about blood pressure, stethoscope, and the otoscope.

Methodological problems arise in Bernheimer's (1981) study. Children's knowledge level varied according to the amount of individual preparation given by the pediatric nurse practitioner (PNP). At times children seemed to parrot the examiner's immediate preparation efforts. Knowledge was also limited to children's verbal abilities; a nonverbal measure of children's knowledge could have strengthened the study. No one has looked at the effects of education on children's knowledge of medical procedures. Gellert (1962) suggested that teaching children early and accurately about their bodies could be useful for well children in their experiences with routine health care. Another problem found in reviewing the studies of well children in routine health situations is in Hyson's (1982) statement that "children's reactions to being examined change over time" (p. 142). The credibility of this statement is tenuous since this study relied on cross-sectional data rather than on longitudinal data.

In conclusion, the difference between the few studies of children's responses to routine health care on a number of important dimensions such as the focus of the research, procedures used to measure children's responses, lack of common definitions used to rate subject's "negative" and "positive" responses, and variability of settings and procedures, prohibits a true comparison from one study to the next.

The Importance of Health Education

The literature on children in medical settings suggests a consensus among most authors that all children need some kind of preparation for medical events (Siegel, 1976). To summarize Patton and Dye (1980) "being prepared for a medical event greatly reduces children's fears and anxieties and is important to children's developing knowledge of their bodies and health care in general" (p. 5). Recognizing the need to prepare children before they are hospitalized led to the development of Hospital Orientation or "Outreach" programs in the 1970's (Mather, 1982; West, 1976). These community-based efforts informed healthy children about hospitals/hospitalization and assisted children psychologically if they entered the hospital at a later date (West, 1976). Only 10% of all children in this country, however, experience hospitalization. What efforts have been undertaken to serve the remaining 90% of the children?

Hospital Orientation programs have met with limited success due to the length of the program (one 1/2 hour session) and the fact that information is presented by "strangers" (hospital volunteers). Mather (1982) suggests the effectiveness of these programs could be improved

if they were incorporated into an educational unit over an extended period of time or made part of a larger health curriculum program. Another consideration is that "health and medical information should be presented to children in a familiar setting [the preschool] by adults who are known to the children" [preschool teachers] (Mather, 1982, p. 16). Preschool teachers can make a special contribution to children's medical experiences (Patton & Dye, 1980). Health care professionals and early childhood educators should work together toward promoting health education programming for young children (Mather, 1982).

Health Care in the School vs School Health

School health programs came into existence in the early 1900's and until 1930 school health services reflected the disease-oriented medical model used in primary health care (Igoe, 1980). The 1930's to the 1960's witnessed a shift toward prevention (i.e. "screening procedures for growth, vision, hearing, dental, and orthopedic defects") (Igoe, p. 487). By the 1970's the general public grew increasingly dissatisfied with the traditional role schools and school health nurses had played for forty years. Economic conditions required schools to take on a more primary role in the delivery of health services, one that entailed not only problem identification, but diagnosis and treatment as well. It was apparent from surveys and research studies that not all children have ready access to medical care (Igoe, 1980).

In fact, 15 million of the 45 million children of school age go nowhere for health care except in dire emergencies. . . . one out of two American families were cutting back in some essential

health area in order to cope with inflation (Igoe, p. 487).

School health is not a new idea, but health education, health promotion, and health care in the schools is new (Bruhn & Nader, 1982). Historically, schools have more often than not, failed to meet the challenge of adequately meeting their responsibilities for health education (Means, 1973). In the past "health education has suffered from an endless cycle of 'crash' or 'crisis' oriented programs--sex education, drug abuse..." (Means, 1973, p. 172). Schools need to take on a more comprehensive approach to health education. Bruhn and Nader (1982) challenge schools to work as partners with the family and with local health agencies and practitioners in meeting children's health needs. "Two models have recently been proposed to serve children's health needs within the school setting: (1) the medical model (health care in the school), and (2) the educational model (school health)" (Bruhn & Nader, 1982, p. 61). Although some innovative projects have been undertaken to provide primary health care on site at the school (Messenger, Nader & Parcel, 1978), the current review is interested in efforts involving the educational model. The latter model, emphasizing the educational aspect of health, extends beyond the prevention approach popular in the 1970's toward promoting high level "wellness" in the 1980's. The emphasis in medicine is on "health" rather than "illness" (Igoe, 1980).

The largest health education endeavor, the School Health Curriculum Project (SHCP), began over a decade ago and was a competency-based approach in health curriculum design. "Presently, SHCP is being used by more than 4000 teachers in approximately 1000

elementary schools in 34 states" (Green, Heit, Iverson, Kolbe & Kreuter, 1980, p. 15). Health teaching is often focused on increasing self-care behaviors, that is, learned behavior that enables an individual to perform various activities of daily living (Facteau, 1980). At every stage of development individuals exhibit specific potentials and abilities for self-care. For example, the preschool age child is able to engage in a variety of self-care behaviors, such as "brushing the teeth, washing the hands and face, using the toilet, dressing..." (Facteau, 1980, p. 153). Examples of health education programming in self-care for elementary and high school students include "Project Health P.A.C.T. (Participatory and Assertive Consumer Training) (Igoe, 1979) and the "Winning at Wellness Game" developed by Schodde (1978 cited in Igoe, 1980).

Although progress in terms of health education has and is being made at the K-12 level, efforts need to be focused on the first four to five years of life (Bruhn & Nader, 1982) when health attitudes and behaviors are formed (Lewis & Lewis, 1982).

Where do children get their ideas about health? Children model appropriate or inappropriate health care behaviors from adults. Parents are effective models for the learning of healthy and unhealthy behaviors and attitudes (eg. drinking, smoking, physical activity, eating behavior, and food preferences) (Bruhn & Nader, 1982). Social learning theory is cited in the literature as the "primary pathway for acquisition of a repertoire of behaviors related to health and illness" (Lewis & Lewis, 1982, p. 94). As a result, social learning theory is the basis of many health education programs (Lewis & Lewis, 1980; Bruhn & Parcel, 1980). Studies indicate that children's use of health

services parallels that of adults. A small percentage of adults (without serious medical problems) account for more than 50% of all visits to physicians (Avnet, 1967 cited in Lewis et al., 1977). An exploratory study of illness behavior in children found approximately 15% of the children accounted for more than 50% of all visits to the school nurse (Lewis et al., 1977). This group of "high users" of health services has been referred to in the literature as the "worried well" (Lewis et al., 1977). By the age of 5 or 6 children have developed a pattern of coping which involves seeking medical care (Lewis & Lewis, 1980).

Recognizing the need to reach children at the preschool level, in terms of health education, Bruhn and Nader, in collaboration with researchers at the Northern Early Childhood Learning Center, were the first to develop a health curriculum for preschoolers. In 1979, a 4-year project was undertaken entitled the Preschool Health Education Project (PHEP) (Bruhn & Parcel, 1980). Prior to this time, no appropriate health curriculum was available for preschoolers. Since it is hard to alter adults' health habits and behaviors and research indicates that many of today's modern health problems (i.e. heart disease, cancer, drug abuse, obesity, etc.) are related to life-long habits which are rooted in childhood, the most appropriate time to intervene may be during childhood (Bruhn & Parcel, 1980). The goal of PHEP is "to provide 3-and 4-year-old children the opportunity to learn beneficial health behavior and to encourage them to assume some responsibility for their own health" (Bruhn & Nader, 1982, p. 60). The health education materials were field-tested in 10 preschools in Galveston, Texas. Subjects consisted of 202 children, ages 3 and

4, and their parents (blacks, Mexican-Americans, and Anglo-Americans from lower socioeconomic status families). Children who had received and those who had not received the health curriculum were followed over time to assess behavior changes. (Presently, data from the study are being analyzed and results will be made available in 1983).

The self-contained PHEP curriculum consists of six units designed to develop positive health and safety behaviors in preschool children. The units emphasize: self-awareness, learning what is good and what is bad for the body, ways in which to stay healthy, how to avoid harmful substances, and self-care behaviors young children can perform for minor injuries or illnesses (Bruhn & Parcel, 1980).

Conceptual Framework

This research study combines social learning theory and cognitive developmental research in investigating children's learning about matters related to health and how this impacts on their behavior in routine health care encounters. In the literature thus far reviewed there is convincing evidence that Piagetian theory is applicable to those cognitive operations related to health and illness. Bibace and Walsh's (1980) efforts at defining developmental stages in children's conceptions of illness illustrates the importance of a cognitive developmental framework. This approach adds further insight into children's beliefs concerning medical procedures and how the fears, fantasies, and misconceptions of children cause them to experience stress and anxiety when undergoing even the most benign medical events, routine health examinations. Studies in the areas of children's conceptions of their bodies and body functioning

(Gellert, 1962; Porter, 1974) also highlight the developmental pattern in children's causal thinking. This information was used in developing the content of the health education program that deals with preparing children for health care encounters. Drawing from the literature on hospitalized children, the three basic components in the preparation process are: (1) planning for the development of trust, (2) understanding what is involved, and (3) mastery of the experience (Droske & Francis, 1981). Guided medical play experiences within the preschool will facilitate more positive experiences in routine health care. "To know what is going to happen and how it will be experienced increases one's feeling of mastery" (Blos, 1978, p. 14).

Aspects of the health education program that use the PHEP curriculum deal specifically with principles of social learning theory, that is, practice, repetition, and reinforcement. New behavior is acquired through imitation of a model under conditions of "vicarious reinforcement" (Bandura & Walters, 1963), while maintenance of that behavior is by direct reinforcement. Bandura and Walters (1963) outline the conditions in social learning theory conducive to imitation: the model is perceived as prestigious or powerful and the observer (i.e. the child) perceives a positive affective relationship between self and the model. These two conditions are readily observed in the preschool setting; therefore, the preschool teacher is an excellent model for the learning of positive health behaviors. In the curriculum two puppets serve as role models and introduce concepts to the children that deal with positive health behaviors in addition to the preschool teacher's role as facilitator of a variety

of activities throughout the curriculum that reinforce these concepts. Parents will reinforce what the child learns at school through use of the home learning activities which parent and child do at home together. An indepth description of the curriculum in terms of its social learning theoretical orientation is provided in the next section. In terms of preparing children for health care encounters, modeling techniques have been shown to be effective in reducing anxiety and avoidance behavior in children (Bandura, Blanchard & Ritter, 1969; Melamed & Siegel, 1975; Vernon & Bailey, 1974).

Bruhn and Parcel's (1980) longitudinal study is aimed at changing health behavior over time. The current study will explore the short-range possibilities of the PHEP curriculum, primarily, the effects of a preschool health education program on children's health knowledge and behavior during physical examinations.

Purpose of the Study

The first part of the study will examine children's understanding of their body and how it works and the relationships that exist between knowledge, cognition level for health concepts, and behavior during the physical examination. The second part of the study will examine the impact of a health education program on children's knowledge of the body and on behavior during a routine physical examination. The following research questions will be addressed:

1. What knowledge/perceptions do preschool children have about their bodies and bodily functions?
2. What is the relationship between children's health knowledge and their cognition level for health concepts?

3. At the conclusion of the intervention period, was there a statistically significant difference in health knowledge among the treatment groups (health education program, home learning only, no treatment/control)?
4. At the conclusion of the intervention period, was there a statistically significant difference in behavior (manifest upset and cooperation with medical procedures) among the treatment groups (health education program, home learning only, no treatment/control) during the routine health examination?
5. Do children who participate in a health education program experience less anxiety (as measured by physiological arousal) during routine health examinations than children who do not participate in the health education program?

CHAPTER III

METHOD

This study measured the impact of selected units from the Preschool Health Education Project (PHEP) curriculum on preschool age children's health knowledge and behavior during routine health care examinations. Data were collected from children ages 4 and 5 enrolled in a university child development center, a nursery school, and a day care center during the Winter Quarter of 1983. Data included measures of children's cognition level, health knowledge, anxiety level during routine health care examinations, and the degree to which children cooperate with medical procedures in the health care examinations.

Subjects

The research was a three-group experimental design. The sample consisted of 28 males and 25 females ($n = 53$) distributed among three experimental groups: Group I-the Health Education Program ($n=19$), Group II-the Home Learning Only ($n=19$), and Group III-No Treatment/Control ($n=15$). Mean ages of subjects by experimental group were: Group I - 4.72, Group II - 4.63, and Group III - 4.65 years. The average age of children in the total sample was 4.67 years ($sd = .44$). There were no significant differences among the experimental groups in terms of age, sex, or cognition level for health concepts. The children were divided into the following groups:

Group I. This group of children received a health education program and their parents received home learning activities designed for parents and child to do together to reinforce learning.

Group II. This group of children received no inschool health education program, but their parents did receive the same home learning activities designed for parents and child to do together.

Group III. This group of children served as the control group and received no inschool health education or home learning activities.

Children were included in the study if they: (1) were between the ages of 4 and 5, (2) attended a preschool, nursery school, or a day care center, (3) had no hospitalization within the past year, (4) were English-speaking (although for four of the children English was not their native language), (5) had no medical, psychological, or developmental problem that required consultation or special care. Most of the children (71%) were described by their parents as healthy. Informed consent was obtained from parents in order for children to participate in the study.

Curriculum Intervention

For purposes of discussion and clarity this description of the curriculum intervention was organized into three major sections: (1) Curriculum, (2) Teacher's Role, and (3) Home Learning Activities.

Curriculum

The health curriculum used in this study was developed by the Preschool Health Education Program at the University of Texas at Galveston, under grant number 5R01 HD13101 from the National Institute for Child Health and Human Development, Department of Health and Human Services. The goal of the program was to provide young children "the opportunity to learn beneficial health behavior

and to encourage them to assume some responsibility for their own health" (Bruhn & Nader, 1982, p. 60).

In the curriculum two puppet characters, "Peppy and Geri," served as role models and introduced concepts to the children that deal with positive health behaviors. The health education program emphasized the following four ideas: "I like my body; my body is important to me; I can do things to take care of my body; and taking care of myself helps me feel good" (Bruhn & Nader, p. 60). Songs, fingerplays, activities, and stories were used to reinforce these concepts. The health education program consisted of three units from the PHEP curriculum developed by Bruhn and Parcel (1980):

Unit I: "Me and My Body." This unit was designed to develop self and body awareness, to enable children to feel comfortable with their bodies, and to feel good about themselves.

Unit II: "How My Body Works." This unit introduced children to the five senses and developed children's awareness of external and internal body parts and functioning.

Unit III: "Taking Care of Myself When Sick or Hurt." This unit was designed to encourage simple self-care behaviors in young children, and assisted children in knowing when and how to "get help when sick or hurt." As a supplement to Unit III, children were read books and stories of children in medical settings (i.e. "Going to the Doctor"). Role playing and "hands on experiences" with medical equipment (i.e. a child could "treat" a doll patient using a blood pressure cuff, stethoscope, or otoscope) provided children with a vehicle to "act out" any fears or apprehensions they might have concerning medical procedures and equipment. Medical events, even

the most benign, such as routine health examinations, cause some degree of emotional stress and anxiety in young children (Patton & Dye, 1980) due to their "limited life experiences," misconceptions, and "active fantasies" (West, 1976, p. 18). The vicarious experience gained from reading books of children in medical settings combined with medical role playing provides what Hardgrove (1977) and Azarnoff (1981) refer to as "emotional inoculation."

Teacher's Role

Prior to implementation of the PHEP curriculum and medical play experiences, student teachers who worked with children in Group I attended a two-hour orientation seminar on the purpose of health education for young children. This seminar was conducted by the researcher. The purpose of the seminar was to increase teacher's awareness of the importance of: health teaching at an early age; fostering positive attitudes toward health; encouraging self-care behaviors in children; and making routine health care encounters positive experiences for young children. Teachers read the Introduction Section of the PHEP Manual as well as the specific units of the curriculum used in the study. The seminar closed with a discussion on children's conceptions of health and illness, their perceptions of various medical events, and how these beliefs will later impact on their health habits and behaviors as adults.

Following the orientation seminar, the health education program was implemented in Group I. The researcher supervised presentation of the curriculum and was responsible for introducing a number of activities in each unit. The head teacher and student teachers signed

up for specific activities in the curriculum they wished to teach. Each day, two new activities were presented to the children for a period of approximately six weeks. Each activity was 15-20 minutes in length, and there was a total of 48 activities (16 activities X 3 curriculum units). The learning activities provided "modeling, practice, and reinforcement to promote children's self-confidence/competence in performing selected behaviors" (Bruhn & Parcel, 1980).

During the last two weeks of the health education program--at which time activities in Unit III were presented--children also had opportunities to engage in medical play experiences. Only those teachers specifically selected and trained by the researcher helped facilitate the medical play activities. These teachers corrected any misconceptions children had concerning medical procedures and equipment by giving them accurate, age-appropriate information. They described to the child, in concrete terms, "what he would see, hear, feel, and be expected to do" (Droske & Francis, 1981, p. 10) during the health care examination. Further explanations were given based on the individual child's questions, interests, and concerns. Patton and Dye (1980) state "being prepared for a medical event greatly reduces children's fears and anxieties and is important to children's developing knowledge of their own bodies and health care in general" (p. 5). All activities were attended on a voluntary basis, giving children the right to decline participation.

Home Learning Activities

Because parents are "effective, strong models for the learning of healthy and unhealthy behaviors and attitudes" (Bruhn & Nader, 1982,

p. 67), parents of children in Groups I and II were provided with health education materials to use at home with their child. These materials were also provided by the Preschool Health Education Project. Each week during the intervention, home learning activities were sent to parents; there was a total of eight home learning activities. For Group I children these materials reinforced concepts presented in the preschool; for Group II these materials were the only intervention. Each "Doing It Together" activity sheet included: (1) one main theme, (2) a behavioral description of what the child would learn, (3) rationale behind the desired outcome behavior, (4) simple instructions on how to do the activity with the child, and (5) suggestions for positively reinforcing the child for learning something new to do (Bruhn & Parcel, 1980).

Parents were encouraged to contact the researcher if they had any questions about these activities. In a brief posttest questionnaire parents in Group I and II were asked to indicate the number of activities that were actually completed and their assessment of the activities. Out of a total of eight home learning activities, the average number of activities completed per parent in Group I was 4.7 compared to 6.2 per parent in Group II. For each home learning activity, parents in Group I spent 22 minutes with their child, whereas parents in Group II spent 14 minutes per activity. Although parents in Group I did fewer activities with their child, they spent almost twice as much time per activity with their child. When asked to rate these activities on a five-point scale from (1) poor to (5) excellent, the majority of parents in both groups (62%) rated the activities as "good." However some parents rated the activities as

"fair" (19%), others "excellent" (13%). No one rated the activities as "poor."

Measurement of Variables

Children's Health Knowledge. Children's health knowledge was measured using an instrument derived from the health curriculum. The basic components were questions on each of the three units included in the curriculum in the health education program, medical play experiences, and home learning activities. A 37-item instrument, developed by the author, dealt primarily with external and internal body parts and functioning, knowledge of medical procedures and equipment, and self-care situations. The test materials consisted of 12 colored felt pieces representing parts of the human body (i.e. heart, lungs, stomach, liver, mouth, eyes, ears), and the various medical instruments used to examine these parts of the anatomy (i.e. stethoscope, blood pressure cuff, otoscope). There was also a white body outline on which to place the body parts. The examiner asked the child to identify the correct body part in question, to give its proper name, and to place it on the white body outline in the correct location. For example, the researcher would ask, "Show me what pumps blood through your body." If the child picked up the "heart" felt piece he received "1" point. The researcher then asked, "What is it called?" If the child said "the heart" he received an additional point. Lastly, the researcher asked, "Show me where it belongs on this child." If the child placed the piece in the correct location on the body outline, he received another point. Scores could range from 0 to 37 points (i.e. Body Parts Knowledge-0 to 21,

Instrument Knowledge-0 to 12, Self-Care Knowledge-0 to 4 points). Body outlines have been shown to be an effective instrument for obtaining children's knowledge of internal body parts (Porter, 1974) and body functioning (Gellert, 1962). It is especially appropriate for tapping into children's thinking at the preschool level; children at this age have a receptive vocabulary that surpasses their expressive vocabulary (Fraser, Bellugi & Brown, 1963). This instrument was pilot tested on 10 children ages 4 and 5 years old (not included in the study) (see Appendix A).

Children's Cognition Level. The cognitive concepts most relevant to the origin of "health" are those concerning causality and identity (Bernstein & Cowan, 1975). Previous studies of children's conceptions of health and illness failed to define a novel set of categories that reflect both the general and the specific concepts children use to explain a particular phenomenon (Bibace & Walsh, 1980). Therefore, to illustrate the interaction between cognitive level of development and a specific content area (health/illness), children were questioned using the "Concept of Illness Protocol" developed by Bibace and Walsh (see Appendix C). This scale consisted of 12 sets of questions with each set directed at assessing the child's cognitive functions about a given health concept. The child's explanations of common illnesses such as a cold, headache, measles, heart attack were probed using Piaget's clinical method of questioning. For example, "What is a cold? How do people get colds? What makes colds go away?" (Bibace & Walsh, p. 289). The child's verbatim responses were taped and later transcribed so that two raters could read the responses and assign each child to one of six developmentally ordered categories

(i.e. Phenomenism, Contagion, Contamination, Internalization, Physiologic, and Psychophysiologic). In assigning subjects to one category, raters considered the child's overall responses to the questions rather than scoring each separate response. The raters were blind to the children's membership--the experimental or control groups. In training the raters, the above six categories were described (see Appendix D) and raters practiced scoring sample responses until interrater reliability of .85 was achieved. However, when interrater reliability was assessed during the actual study it was only .73 compared to .88 in Bibace and Walsh's (1980) study.

Children's Cognitive Development. In order to identify children's Cognitive level of development each child in Group I was given two Piagetian tasks of physical conservation. Two independent raters were selected to administer the following tests: (1) the conservation of liquids and (2) the conservation of matter tests to children. Based on these Piagetian tasks children were classified into the preoperational or concrete stage of cognitive development.

Children's Responses/Reactions to Routine Health Examinations

Anxiety Level. Two physiological measures were used to assess children's level of anxiety during the health care examination: pulse rates and systolic blood pressure. Pulse rates and systolic blood pressure have been used in previous studies as reliable physiological indicators of anxiety (Johnson, Kirchoff & Endress, 1975; Mahaffy, 1965; Skipper & Leonard, 1968; Wolfer & Visintainer, 1975).

Behavioral Responses during the Examination. Ratings of the child's emotional state and degree of cooperation during the health

care examination were obtained. Emotional state was assessed using the Manifest Upset scale (Wolfer & Visintainer, 1975) which is a five-point Likert scale reflecting the child's current emotional state (see Appendix E). The scale assessed both verbal and nonverbal expressions of fear or anxiety. Specifically,

A rating of "one" indicates little or no fear or anxiety (calm appearance, no crying, no verbal protest). A rating of "three," a moderate amount (some temporary whimpering and/or mild verbal protest), and a rating of "five" indicates extreme emotional distress (agitated, hard crying, or screaming and/or strong verbal protest), (Wolfer & Visintainer, p. 249).

The Cooperation scale (Wolfer & Visintainer, 1975), which is also a five-point Likert scale, measured the degree to which a child cooperated with a given medical procedure (see Appendix E). Specifically,

A rating of "one" indicates complete cooperation including active participation in and assistance with the procedure or compliance with examiner's request. A rating of "three" indicates mild or initial resistance or passive participation without assistance. A rating of "five" indicates extreme resistance, strong avoidance, pulling away, noncompliance and/or the necessity to restrain the child (Wolfer & Visintainer, p. 249).

Interrater reliability for both measures was considered "adequate" in previous studies (Wolfer & Visintainer, 1975). The children's Manifest Upset and Cooperation scales were completed for each of five events (measurement of height, weight, and blood pressure; use of stethoscope, and otoscope) in the health examination. Scores were given by the nurse-rater conducting the examinations. Prior to this time, nurses practiced noting behaviors until there was essential agreement on what types of observable behaviors were to correspond to the scale points. In order to eliminate bias, nurse-raters were unaware of which children were assigned to the experimental and

control groups. For each of the two scales, possible scores could range from 0 to 25 points.

Parent Questionnaire. To provide background information, parents were sent a pretest questionnaire to complete which included demographic data, parents' level of education, health history of the child (e.g., Has your child been hospitalized? or had a health checkup? When?), and sources of information the family used concerning health matters (see Appendix B). These data revealed that the majority of subjects were members of intact families (89.5%). Data concerning parents' level of education indicated both mothers and fathers of children in the study were highly educated. Specifically, the average education level of mothers among the experimental groups was 15.25. Similarly, the average education level of fathers was 16.4 years. Although father's level of education was slightly higher than mother's, a substantial percentage of parents (mothers and fathers) in all three experimental groups had advanced degrees.

Subjects and families varied in the use of medical facilities; and the number of visits to health professionals by subjects in the past year ranged from 0 to 9 (mean = 3.7). The average number of visits per child by experimental group were: Group I--2.5, Group II--3.4, and Group III--4.2 visits to the doctor. Ninety-five percent of the children visited the doctor at least once in the past year; only two children did not visit the doctor in the past year. The three most frequently cited reasons for doctor's visits, according to parents, were: (1) ear, throat infections (61%), (2) flu, stomach disorders (56%), and (3) routine health checkups, shots (42%). Parents listed doctors, books, and other parents as the top three sources of health

information used in the management of their own health and that of their child. In addition, when asked to rate their own health status on a continuum from excellent to poor, the majority of parents in all experimental groups rated their health as "excellent" (60%) or "good" (40%). No parent reported having poor health. Eighty-seven percent of parents reported no health problems among any other family members.

Upon completion of the health education program parents of children in Groups I and II were asked to complete a brief posttest questionnaire evaluating the home learning activities (see Appendix F). Parents indicated how many of the activities were actually completed and their assessment of the activities.

Procedure

The study was conducted at three school sites located in a city in the Northwest. The final sample consisted of 53 children between the ages of 4 and 5 enrolled in a preschool, nursery school, and a day care program. Nineteen children were assigned to each of two treatment groups and 15 children were in a control group. Children in Group I received a health education program and home learning materials; children in Group II received only the home learning materials; and children in Group III served as the control group and received no inschool health education or home learning activities. A variety of pretest-posttest measures were used to assess the impact of a health education program on children's health knowledge and responses/reactions to routine health care. First, a letter describing the research study (see Appendix H) was sent to parents along with consent forms; signatures were obtained in order

for children to participate in the study. Second, descriptive data were gathered on all subjects concerning their cognition level. Third, children were given a pretest to determine their health knowledge. Fourth, a student nurse was assigned to each of the three groups and conducted the first of two physical examinations on all children in that particular group. To assess children's responses to the physical examination, two physiological and two behavioral measures were utilized. Student nurses recorded children's behavior using these measures for each of five events in the physical examination (height, weight, blood pressure, stethoscope, and otoscope). It should be noted that the physical examination in this study was not meant for diagnostic purposes, but rather for the sole purpose of assessing children's initial reactions to selected procedures similar to those in a well child checkup. Fifth, preschool children in Group I participated in a six-week health education program combined with home learning activities and children in Group II received home learning activities alone. Sixth, upon completion of the health education program a posttest measure of children's health knowledge was obtained for all three groups. Seventh, a second physical examination was conducted for the three groups. The same procedures used to assess children's initial responses to the physical examination were used during the second physical examination.

The health education program was implemented over a six-week period of the Winter Quarter, 1983. The subjects for the experimental group (Group I) were preschool age children enrolled in the afternoon program at the Oregon State University Child Development Centers. Subjects for Groups II and III were selected from two similar school

settings in the same geographic area as children in Group I. A letter describing the purpose of the research and eliciting cooperation was sent to directors of local preschools (see Appendix G). When two schools were identified to participate, letters were sent to parents of children in these schools. These letters included consent forms and signatures were obtained before children could participate in the study. The letter informed parents in Groups I and II that a parent orientation meeting would be held during the second week in January, 1983 at the school sites. During this meeting, the research study was explained and parents of children in Groups I and II were informed as to their role in the study. All of the parents were then asked to complete a short questionnaire which provided background data for the study.

Data Collection

Data from the participating children were collected at three points in time: (1) the first week of the study, (2) the second week of the study, prior to implementation of the health education program, and (3) the ninth week of the study, immediately following completion of the health education program. Each subject was given a code number to insure anonymity and to facilitate the matching of the pretests and posttests prior to the analysis of data. To further facilitate analysis of data, data were color-coded allowing a different color to be given to each of the three groups.

During the first week, data were gathered on all subjects concerning children's cognition level. The "Concept of Illness Protocol" developed by Bibace and Walsh (1980) was administered to

children individually. Children were assigned to one of six categories based on their overall response to these questions. The Children's Health Knowledge Test was also administered to subjects at each of the school sites during this time as a pretest measure of children's health knowledge.

During the second week of the study, physical examinations were conducted on all children. A student nurse was assigned to each of the three groups and conducted all examinations on children in their assigned groups. During the day, one child at a time was taken to a side room in the school and examined by the student nurse. During the examination the observational records were kept by the nurse; two behavioral and two physiological measures were used to measure children's responses to the physical examination. The behavioral ratings consisted of the Manifest Upset scale and the Cooperation scale. The physiological measures of anxiety consisted of the child's pulse rate and systolic blood pressure recorded during the physical examination. Charts of the "normal" range for pulse rates and systolic blood pressure rates for 4- and 5-year-old children served as baseline measures against which the physiologic measures recorded by the student nurse during the first and second physical examinations were compared (Allen-Williams, 1945 cited in deAngelis, 1979).

During the third week of the study, the health education program began. Each week during the intervention, parents of children in Groups I and II were sent home learning activity sheets entitled "Doing It Together." Parents were requested to do all eight of these activities with their child at home.

Following completion of the health education program, the

Children's Health Knowledge Test was administered to all subjects to obtain a posttest measure of children's health knowledge. A second physical examination was conducted for three groups. The same procedures and measures used to assess behavior during the first physical examination were utilized during this second (posttest) physical examination.

CHAPTER IV

FINDINGS

Data revealed no significant differences among the experimental groups in terms of age, sex, or cognition level for health concepts. The average age of children in the total sample ($n = 53$) was 4.67 years ($sd = .44$) (Table 1).

One-way ANOVA comparing the average age of children in each cognition level found no significant age differences among cognition levels for health concepts ($F = 1.69$) although children in the Contamination level averaged three months older (4.98 years) than children in the Phenomenism (4.56) and the Contagion (4.64) levels.

Table 1. Numbers, Mean Ages, and Standard Deviations of Children by Level of Cognition for Health Concepts ($n=53$)

Cognition Level for Health Concepts	No. of Children	Mean Age	S.D.
Incomprehension	$n = 4$	4.92	$sd = .35$
Phenomenism	$n = 18$	4.56	$sd = .34$
Contagion	$n = 26$	4.64	$sd = .49$
Contamination	$n = 5$	4.98	$sd = .40$
Total ($F = 1.69$)	53	4.67	$sd = .44$

NOTE: Children in the Incomprehension level were also three months older (4.92 years) than children in other levels of cognition. In previous studies this category has characterized the very youngest subjects (Bibace & Walsh, 1980). In this study all of the children in the Incomprehension level were foreign-born. As a result, they had difficulty comprehending many of the questions on the "Concept of Illness Protocol" (Bibace & Walsh, 1980) used to categorize children as to their level of understanding of health concepts. Therefore, they were classified in the Incomprehension level primarily due to their inability to understand the questions, rather than as a true reflection of their cognition level for health concepts.

Further analysis was conducted to determine if there was a relationship between children's cognition level for health concepts (Bibace & Walsh, 1980) and Piaget's stages of cognitive development. The Chi-square procedure was utilized to examine for a possible relationship between levels of health cognition and Piaget's stages of cognitive development. Only children in experimental Group I were assessed. For these children a relationship did exist ($\chi^2 = 6.16$, $df = 2$, Table 2). That is, the majority of children in the health education program who were in the Phenomenism ($n = 6$, 75%) and the Contagion ($n = 7$, 87.5%) levels of cognition were also in the preoperational stage of cognitive development. All children in the health education program who were in the Contamination ($n = 2$, 100%) level were in the concrete stage of cognitive development.

Table 2. Children's Level of Cognition for Health Concepts by Piagetian Stages of Cognitive Development (Group I Only, the Health Education Program, $n = 18$)

Levels of Cognition for Health Concepts	Piagetian Stages of Cognitive Development	
	Pre-operational	Concrete
Phenomenism	$n = 6$ (75%)	$n = 2$ (25%)
Contagion	$n = 7$ (87.5%)	$n = 1$ (12.5%)
Contamination	$n = 0$	$n = 2$ (100%)
Total	13 (72.2%)	5 (27.8%)
$\chi^2 = 6.16^*$	$df = 2$	

* $p \leq .05$

Research Question #1: What knowledge/perceptions do preschool children have about their bodies and how they work?

Prior to implementation of the health education program, children's levels of health knowledge were assessed. These pre-intervention data were analyzed to answer Research Questions #1 and #2 (Table 3).

Children's mean pretest scores on knowledge of self-care was .47 (sd = .25) out of a possible score of 1.00. That is, most of the children were able to answer correctly two out of four self-care questions. Children's initial self-care knowledge was limited to "how to care for cuts." Very few children knew how to care for bruises. When asked, "What can Jane do for her bruise to make herself feel better"? sample responses included: "Put a band-aid on it," "Watch TV," or "Go to bed." In addition, when children were asked how to care for colds, their self-care procedures included such statements as "Watch TV," "Eat an ice cream cone," or "Ride a bike," although some children said "you should stay in bed." One child responded, "You should throw your cold away in the garbage."

Children's mean pretest scores on knowledge of body parts was .51 (sd = .18) out of a possible score of 1.00. That is, most of the children were able to answer correctly 11 out of 21 body part questions. Further item analysis indicated children's initial knowledge of body parts was limited to external body parts and functioning (i.e. eyes, ears, mouth). Knowledge of internal body parts and functioning was sparse (i.e. heart, lungs, stomach). With respect to internal body parts, children knew most about the functions of the organs (mean = .35); the least about the actual names of the organs (mean = .16) (Table 4). Knowledge of the locations of internal body parts (mean =

Table 3. Overall Health Knowledge, Body Parts, Instrument Knowledge, and Self-Care Pretest Scores (Mean Percentage Correct) by Cognition Level (n = 53)

Cognition Level for Health Concepts	Overall Health Knowledge	Body Parts Knowledge	Instrument Knowledge	Self-Care Knowledge
Incomprehension	1.20 (sd = .21)	.49 (sd = .19)	.21 (sd = .17)	.50 (sd = .20)
Phenomenism	1.32 (sd = .47)	.51 (sd = .17)	.37 (sd = .22)	.43 (sd = .24)
Contagion	1.31 (sd = .45)	.48 (sd = .19)	.40 (sd = .22)	.43 (sd = .24)
Contamination	1.96 (sd = .13)	.67 (sd = .11)	.54 (sd = .09)	.75 (sd = .18)
Total	1.37 (sd = .46)	.51 (sd = .18)	.39 (sd = .21)	.47 (sd = .25)
F-Ratio	3.6* (df = 3,49)	1.57 (df = 3,49)	1.87 (df = 3,49)	2.8* (df = 3,49)

* $p \leq .05$

Table 4. Number and Percentage of Correct Responses on Pretest Knowledge of Internal Body Parts (Heart, Lungs, Stomach) by Function, Label, and Location of Body Parts (n = 53)

	Internal Body Parts	Number of Correct Responses	Percentage of Correct Responses
FUNCTION	Heart	26	49%
	Lungs	19	36%
	Stomach	10	19%
	Total Mean Percentage of Body Part Functions		35%
LABEL	Heart	9	17%
	Lungs	5	9%
	Stomach	12	23%
	Total Mean Percentage of Body Part Labels		15%
LOCATION	Heart	15	28%
	Lungs	10	19%
	Stomach	15	28%
	Total Mean Percentage of Body Part Locations		25%

¹Percentages in Table 4 are rounded to the nearest whole percent

.25) fell between scores for function and label of body parts.

Twenty-eight percent of all the children placed both the heart and the stomach in the correct locations on the body outline, although there was a tendency for children to place the stomach in the abdominal area. When asked, "Show me what pumps blood through your body," 49% of the children picked up the "heart" felt piece. However, only 17% of these children were able to identify it by its proper name. Children referred to the "heart" felt piece as "an apple," "red," "a pumper," "neck," or "brain." Parts of the body associated with breathing included the "lips," "mouth," "mouf," and "nose." One child insisted

the felt piece representing the "lungs" were really "shoes" and promptly placed them at the foot of the body outline.

Children's mean pretest scores on knowledge of medical instruments was .39 (sd = .21) out of a possible score of 1.00. That is, most of the children were able to answer correctly five out of 12 instrument knowledge questions. These scores reflected nonverbal knowledge of three common pediatric tools (i.e. stethoscope, otoscope, blood pressure cuff). Specifically, the child's ability to demonstrate how each instrument worked (e.g., child picks up the stethoscope, puts the earpieces in his ears, and the diaphragm to his own chest). Based on nonverbal knowledge, children knew the most about the stethoscope and the blood pressure cuff; the least about the otoscope. Only a few children demonstrated correct verbal knowledge of medical equipment.

Children's understanding of why these procedures were done or the "intent" behind specific medical procedures in a routine health examination were assessed. Sample responses identified great discrepancies between nonverbal knowledge (i.e. how an instrument was used) and children's level of understanding (i.e. why an instrument was used) concerning medical equipment and procedures (Chart 1).

In summary, the pre-intervention data on children's levels of health knowledge indicated children initially knew more about their bodies and self-care procedures than they did about medical equipment and procedures commonly used in routine health care.

Research Question #2: What is the relationship between children's health knowledge and their cognition level for health concepts? The analysis of variance procedure was used to compare each of

Chart 1

SAMPLE RESPONSES OF CHILDREN WITH RESPECT TO THE REASONS
OR "INTENT" BEHIND SPECIFIC MEDICAL PROCEDURES (PRETEST)

Q. "Why is this (stethoscope) used"?

- R. "To make sure you can still breathe. If the doctor doesn't hear your heart beeping you already died."
- R. "Listen to your heart with it. To see if your heart isn't beating. Heart moves sideways when you breathe. If it stops, then your heart is in the middle and you can't breathe."
- R. "To see if your blood's right."
- R. "So you can listen to your heart 'cause you can't hear it inside; only outside. If it's not beating you're not healthy. If it is (beating) you are healthy."
- R. "So the doctor knows how good your mind is working."

Q. "Why is this (otoscope) used"?

- R. "To see if your ears are looking right."
- R. "They can tell how good you're hearing."
- R. "To see if it's (ear) dirty and clean. The doctor tells mom if it's clean or dirty."
- R. "To check if you have a scab in the ear or not."
- R. "You listen to your ears with it (otoscope)."

Q. "Why is this (blood pressure cuff) used"?

- R. "To see how much blood you have."
- R. "Because it helps your blood so the air could get in your blood."
- R. "To see what blood temperature is going fast."
- R. "To make sure your arm is O.K. and it doesn't have any pressure in it."
- R. "This is for your blood...If it (blood) isn't right you have to go to the hospital for five days."
- R. "It sees your blood...You feel the blood...And you hear the blood. It finds out what your blood is doing. It pumps blood...makes it move."

the four levels of cognition with respect to pre-health knowledge. There were significant differences in overall health knowledge ($F = 3.6$, $df = 3, 49$) and self-care knowledge ($F = 3.8$, $df = 3, 49$) by level of cognition (Table 3) (page 50). Using Newman-Keuls Procedure it was established that children in the Contamination level of cognition scored significantly higher on overall health knowledge and self-care knowledge than children in other levels of cognition (Table 3). A clear trend existed of increasing knowledge with each subsequent advance in cognition level. Children in the Contamination level tended to score higher in all areas of health knowledge (i.e. body parts, instrument knowledge, self-care). This trend was statistically significant for self-care and overall health knowledge.

Research Question #3: At the conclusion of the intervention period, was there a statistically significant difference in health knowledge among the treatment groups (health education program, home learning only, no treatment/control)?

Using analysis of variance, potential treatment group differences on pretest health knowledge scores were explored. Significant differences by treatment group were apparent.

Since initial health knowledge was significantly different between groups, the effects of the intervention on posttest scores were investigated using an analysis of covariance procedure. ANCOVA controls for initial treatment group differences. Fink and Kosecoff (1978) presenting a rationale for using ANCOVA, stated:

ANCOVA is a form of ANOVA in which the dependent variable is " 'corrected' " by adjusting for the effects of an outside variable called a covariate (p. 57).

ANCOVA was conducted comparing the three treatment groups and Cognitive developmental levels with respect to posttest scores for health knowledge with pretest scores as the covariate.

This analysis indicated that treatment group membership, not cognitive developmental level, significantly affected posttest health knowledge. Specifically, there were significant differences in children's posttest overall health knowledge by treatment group (Table 5). Using the Newman-Keuls Procedure to interpret this finding of significant differences, it is apparent that children in the health education program (mean = 2.24) scored significantly higher on overall health knowledge than children in the home learning group (mean = 1.83) and children in the home learning group scored significantly higher than children in the control group (mean = 1.48) (Table 6).

Similarly, significant differences in children's self-care knowledge were found by treatment group but not by cognitive developmental level or pretest self-care knowledge scores (Table 7). Children in the health education program were the most knowledgeable in terms of self-care procedures (mean = .81); the children in the control group (mean = .47) were the least knowledgeable (Table 8). Scores of the children in the home learning group (mean = .58) fell between scores for the children who received the indepth health education program and those of the control group. Health education subjects had significantly higher mean scores on self-care knowledge than home learning subjects and the home learning subjects mean scores were significantly higher than were the control subjects mean scores.

A similar trend was found for children's knowledge of body parts. ANCOVA was conducted examining the effect of experimental group

Table 5. Analysis of Variance Summary Table for ANCOVA Procedure Examining the Posttest of Overall Health Knowledge Level by Group and by Cognitive Developmental Level with Initial Health Knowledge as Covariate (n = 53)

Source of Variation	Sum of Squares	d.f.	Mean Squares	F
Covariate				
Initial Health Knowledge	1.12	1	1.12	7.86*
Main Effects				
Group	4.38	2	2.19	15.43*
Cognitive Developmental Level	.11	3	.04	.27
Error	6.53	46	.14	
Total		52		

* $p \leq .05$

Table 6. Posttest Overall Health Knowledge Scores by Experimental Group Membership (n = 53)

Source	Freq	Adjusted Group Means	S.D.
Treatment Groups			
Health Education Program	n = 19	2.24	.33
Home Learning Only	n = 19	1.83	.34
Control	n = 15	1.48	.44

Table 7. Analysis of Variance Summary Table for ANCOVA Procedure Examining the Posttest of Self-Care Knowledge by Group and by Cognitive Developmental Level, with Initial Self-Care Knowledge as Covariate (n = 53)

Source of Variation	Sum of Squares	d.f.	Mean Squares	F
Covariate				
Initial Self-Care Knowledge	.185	1	.185	3.36
Main Effects	1.028	2	.514	9.35*
Group				
Cognitive Developmental Level	.249	3	.083	1.50
Error	2.53	46	.055	
Total		52		

* $p \leq .05$

Table 8. Posttest Self-Care Knowledge Scores by Experimental Group Membership (n = 53)

Source	Freq	Adjusted Group Means	S.D.
Treatment Groups			
Health Education Program	n = 19	.81	.21
Home Learning Only	n = 19	.58	.27
Control	n = 15	.47	.22

membership and cognitive developmental level on posttest body parts knowledge, with pretest scores as the covariate. Treatment group membership, not cognitive developmental level, significantly affected children's knowledge of body parts and functioning (Table 9). As with overall health knowledge and self-care knowledge, children in the health education program scored the highest in body parts knowledge (mean = .76) followed by children in the home learning group (mean = .65) and then the control group (mean = .53). Again using Newman-Keuls comparisons among adjusted group means statistically significant differences were identified in knowledge level among the treatment groups (Table 10). Health education program subjects had significantly higher mean scores on body parts knowledge than home learning subjects and the home learning subjects mean scores were significantly higher than were the control subjects mean scores.

Item analysis conducted on the subscale of Body Parts Knowledge, Internal Body Parts, revealed further group differences in posttest scores (Table 11). Children in the health education program showed the greatest increase in all areas of internal body parts knowledge (i.e. function, label, and location of bodily organs). At the conclusion of the intervention period, 72% of these children knew the correct locations of internal body parts compared to 34% in Group II and 31% in Group III. In addition, 54% of the children in the health education program were able to identify internal body parts (heart, lungs, stomach) by their proper names compared to only 21% of children in the home learning group and 13% of children in the control group. A similar trend was apparent in children's knowledge of internal bodily functions. (65%, 51%, and 31%,

Table 9. Analysis of Variance Summary Table for ANCOVA Procedure Examining the Posttest of Body Parts Knowledge by Treatment Group and by Cognitive Developmental Level, with Initial Body Parts Knowledge as Covariate (n = 53)

Source of Variation	Sum of Squares	d.f.	Mean Squares	F
Covariate				
Initial Body Parts Knowledge	.076	1	.076	4.34*
Main Effects				
Group	.418	2	.209	11.98*
Cognitive Developmental Level	.026	3	.009	.50
Error	.803	46	.017	
Total		52		

* $p \leq .05$

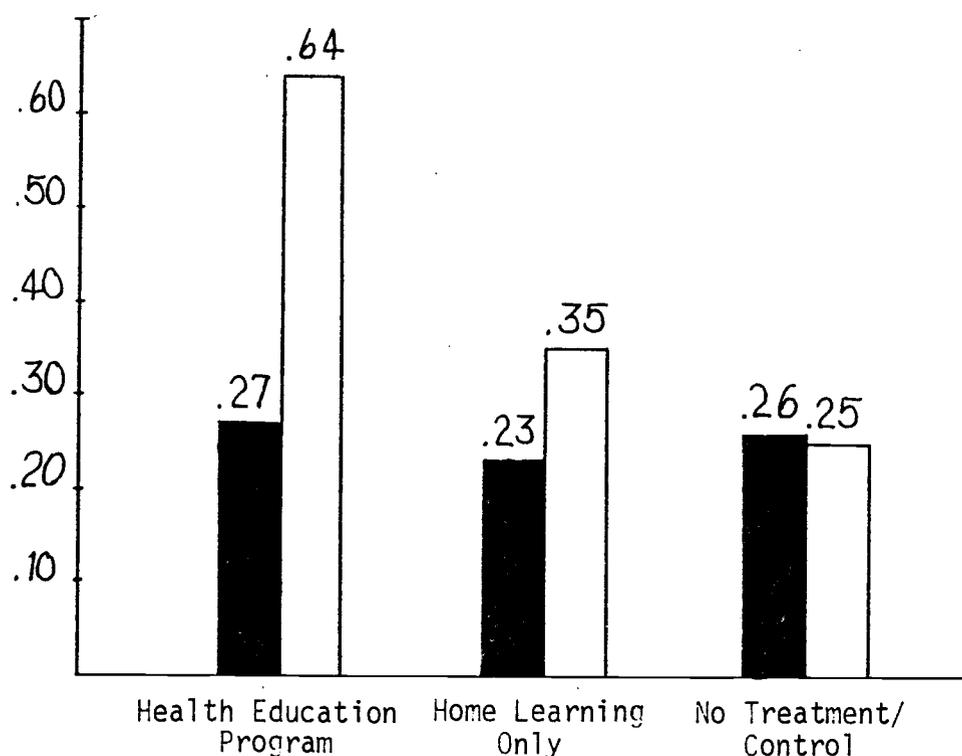
Table 10. Posttest of Body Parts Knowledge by Experimental Group Membership (n = 53)

Source	Freq	Adjusted Group Means	S.D.
Treatment Groups			
Health Education Program	n = 19	.76	.13
Home Learning Only	n = 19	.65	.12
Control	n = 15	.53	.14

Table 11. Number and Percentage of Correct Responses on Posttest Knowledge of Internal Body Parts (Functions, Labels, and Locations) by Experimental Group Membership (n = 53)

		GROUP I Health Education Program (n = 19)		GROUP II Home Learning Only (n = 19)		GROUP III Control Group (n = 15)	
Internal Body Parts		Freq	Percent	Freq	Percent	Freq	Percent
FUNCTION	Heart	12	63%	15	79%	6	40%
	Lungs	17	89%	7	37%	5	33%
	Stomach	8	42%	7	37%	3	20%
	Total		65%		51%		31%
LABEL	Heart	11	58%	4	21%	2	13%
	Lungs	11	58%	1	5%	1	7%
	Stomach	9	47%	7	37%	3	20%
	Total		54%		21%		13%
LOCATION	Heart	13	68%	3	16%	4	26%
	Lungs	14	74%	6	32%	5	38%
	Stomach	14	74%	10	53%	5	33%
	Total		72%		34%		31%

Figure 1. Pretest and Final Mean Percentage Scores on Knowledge of Internal Body Parts (Function, Label, and Location) by Intervention Group (n = 53)

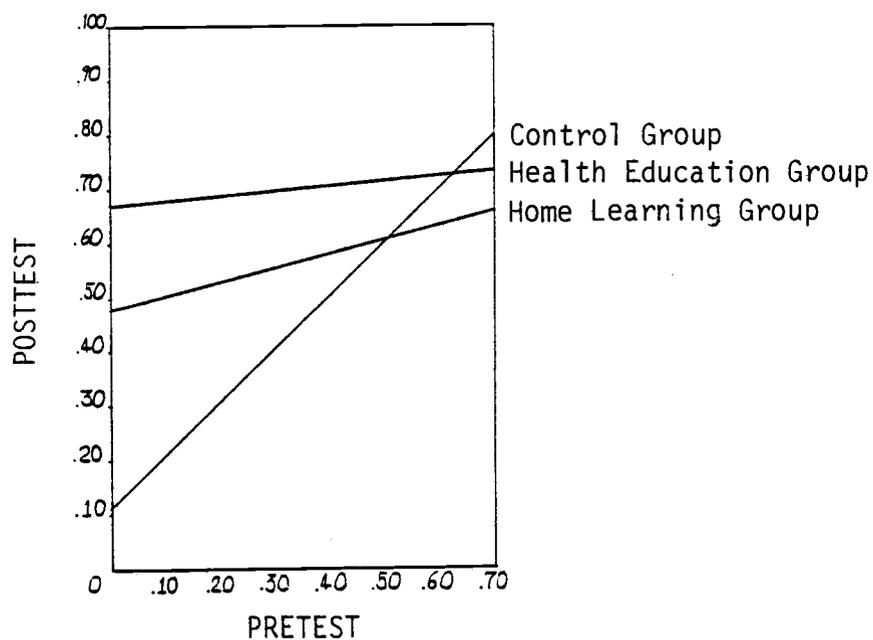


respectively). In summary, children who received the health education program scored significantly higher on posttest overall knowledge of internal body parts (mean = .64) than children who received only the home learning activities (mean = .35) and the control group (mean = .25 (Figure 1).

There were no significant differences in pretest instrument knowledge by treatment group. ANCOVA was not used to compare posttest scores because the regression equation relating the dependent variable (posttest instrument knowledge) to the covariate (pretest scores) were not parallel and consequently ANCOVA procedures were not valid (Fink & Kosecoff, 1978). Specifically, children in

experimental groups with low pretest scores showed the greatest increases in instrument knowledge on the posttest. Children in experimental groups with high pretest scores on instrument knowledge did not increase in knowledge on the posttest. For children in the control group, pretest and posttest scores were related; children with low pretest scores had low scores on the posttest; children with high pretest scores had high scores in instrument knowledge on the posttest (Figure 2).

Figure 2. Regression Graph Comparing Individual Children's Pretest and Posttest Scores on Instrument Knowledge by Treatment Group (n = 53)



Because pretest scores were not significantly different by treatment group ANOVA procedures were used to compare instrument knowledge difference (posttest - pretest) scores. No significant differences were found by treatment group (Table 12).

In summary, levels of posttest self-care, body parts, and overall health knowledge, when adjusted for initial knowledge, were significantly different by experimental group membership. No significant differences were identified by cognitive developmental level in posttest health knowledge.

Table 12. Analysis of Variance Summary Table for ANOVA Procedure Examining the Difference Between Posttest and Pretest Scores of Instrument Knowledge by Treatment Group and by Cognitive Developmental Level (n = 53)

Source of Variation	Sum of Squares	d.f.	Mean Squares	F	Significance of F
Main Effects	.464	5	.093	2.04	.091
Group	.103	2	.051	1.13	.333
Cognitive Developmental Level	.272	3	.091	1.99	.129
Error	2.144	47	.046		
Total	2.609	52	.050		

Research Question #4: At the conclusion of the intervention period, was there a statistically significant difference in behavior (manifest upset and cooperation with medical procedures) among the treatment groups (health education program, home learning only, no treatment/control) during the routine health examination?

During the initial health examination, prior to implementation of the health education program, all children were rated on manifest upset behavior and cooperation. Pretest scores for each of the three groups on these ratings were analyzed separately for each of the five events in the health examination. Chi square analysis revealed no significant differences among treatment groups in terms of behavior during the initial health examination. The majority of children in all three treatment groups were calm and cooperative for all five events (Appendix I). Specifically, the majority of children scored "1", calm on pretest upset behavior ratings with respect to height (n = 42, 79.2%), weight (n = 45, 84.9%), blood pressure (n = 42, 79.2%), and use of the stethoscope (n = 44, 84.6%), and otoscope (n = 36, 69.2%). Likewise, on the pretest the majority of children scored "1", complete cooperation/compliance with examiner's requests with respect to examination of height (n = 46, 86.8%), weight (n = 49, 92.5%), and blood pressure (n = 48, 90.6%); and the use of the stethoscope (n = 49, 94.2%), and otoscope (n = 46, 88.5%).

At the conclusion of the intervention period, all children were again rated on manifest upset behavior and cooperation. Specifically, children who participated in the health education program (n = 19,

100%) were slightly more cooperative with medical procedures during the posttest health examination than children who did not participate in the health education program ($n = 13$, mean = 83%) (Table 13).

Results of analysis of variance procedures, however, indicated this difference between treatment groups was not significant for any of the five events in the examination. In fact, there was a general tendency across all three treatment groups for children to respond cooperatively with medical procedures during both pre- and posttest health examinations (90% and 93%, respectively; Table 13).

The same group patterns were apparent in manifest upset behavior during the posttest health examination (Table 13). As with cooperation, children in the health education program ($n = 13$, mean = 87%). This difference between groups, however, was not statistically significant at the .05 level. The majority of children in the total sample ($n = 49$) appeared calm (showed no observable degree of emotional upset or apprehension) during both pre- and posttest health examinations (80% and 91%, respectively; Table 13). Overall, those children who were slightly upset or passive during the initial examination were calmer and more cooperative during the second examination.

In summary, no significant differences in behavioral measures (manifest upset and cooperation) were found by treatment group in response to any aspect of the routine health examination (i.e. measurement of height, weight, and blood pressure; use of stethoscope and otoscope) (Figures 3 and 4) (page 68-69).

Table 13. Summary Table of Mean Number and Percentage of Children Scoring "1" Calm and Cooperative* on Pre and Posttest of Upset and Cooperation Ratings During the Health Examination, By Intervention Group (n = 49)

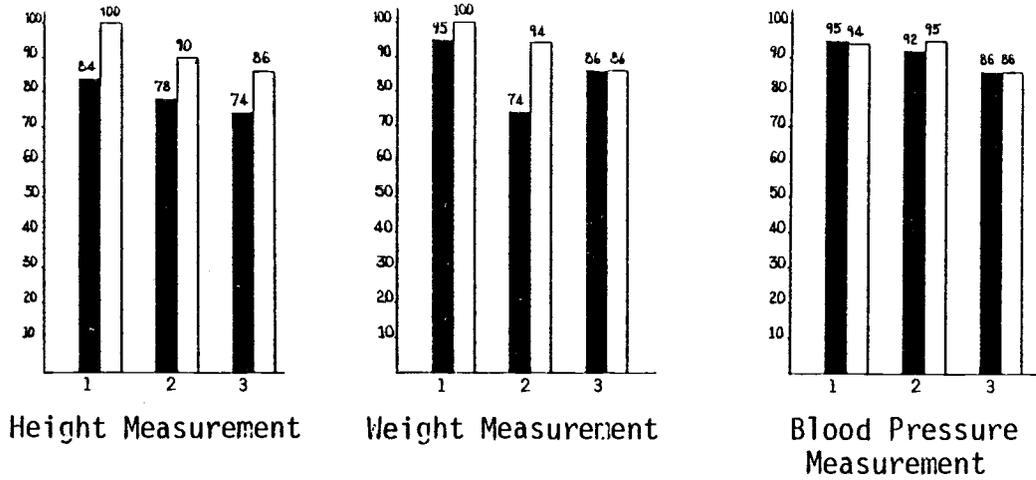
Group	Health Examination 1		Health Examination 2	
	Freq	Mean Percent	Freq	Mean Percent
Manifest Upset Scale				
Health Education Group	17	92%	18	95%
Home Learning Only	12	65%	18	92%
Control	12	83%	13	87%
Total	41	80%	49	91%
Cooperation Scale				
Health Education Group	18	95%	19	100%
Home Learning Only	17	89%	18	95%
Control	13	85%	12	83%
Total	48	90%	49	93%

Percentages in Table 13 are rounded to the nearest whole percent

*The remaining percentage of children scored "2" passive assistance/compliance with examiner's request; relatively calm.

1. Pretest
2. Posttest

Figure 3. Percentage of Children who Scored "1" Calm for Each Event During Initial and Final Health Examinations, by Intervention Group



1 = Health Education
 2 = Home Learning
 3 = Control
 ■ = Pretest
 □ = Posttest

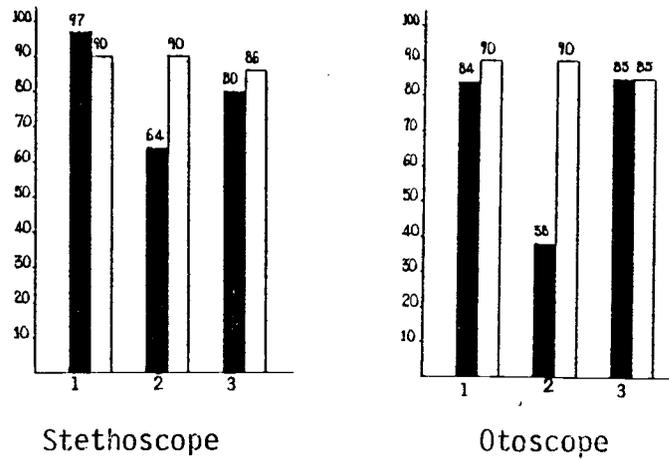
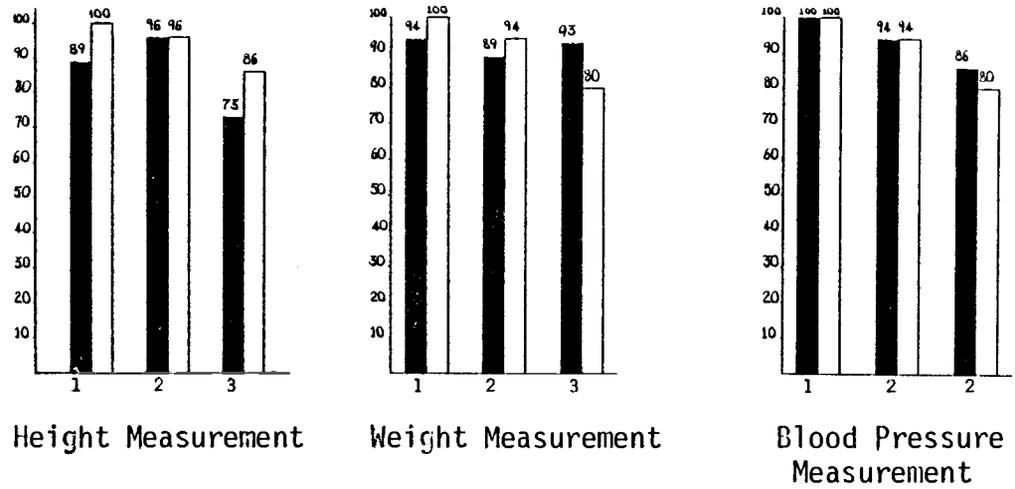
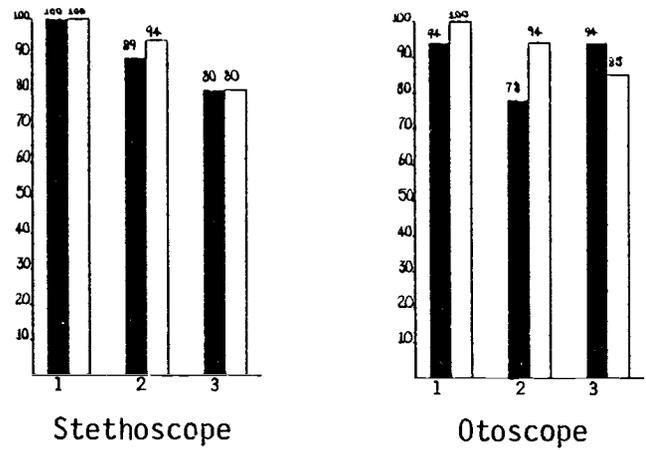


Figure 4. Percentage of Children who Scored "1" Cooperative for Each Event During Initial and Final Health Examinations, by Intervention Group



1 = Health Education
 2 = Home Learning
 3 = Control
 ■ = Pretest
 □ = Posttest



Research Question #5: Do children who participate in a health education program experience less anxiety (as measured by physiological arousal) during routine health examinations than children who do not participate in the health education program?

In addition to the behavioral measures used to assess children's emotional state and degree of cooperation during the health examination, two physiological measures (pulse rates and systolic blood pressure) were obtained to assess children's responses to routine health care. The mean systolic blood pressure rates of children during the health examinations, classified by treatment group and time of measurement (prior to and following completion of the health education program) are presented in Table 14. Blood pressure rates ranged from 88 - 98 and thus fell within the normal range for children this age (Allen-Williams, 1945 cited in deAngelis, 1979). The ANOVA procedure revealed that the children in the control group had a significantly lower systolic blood pressure rate (mean = 88.71, sd = 9.30) during the initial health examination than children in the health education program (mean = 98.21, sd = 6.70) and the home learning group (mean = 95.39, sd = 7.30). In order to control for this initial group difference in systolic blood pressure rates, ANCOVA was conducted on posttest scores. The ANCOVA procedure identified that systolic blood pressure rates at the post-assessment were significantly related to the covariate, pretest systolic blood pressure ($F = 29.81$, $df = 1$), but not to experimental group membership ($F = 1.67$, $df = 2$) or cognitive developmental level ($F = 1.44$, $df = 3$) (Table 15).

Table 14. Mean Systolic Blood Pressure Rates for Experimental and Control Groups During Pretest and Posttest Health Examinations (n = 49)

Source	Pre-Test			Post-Test		
	Freq	Means	1. S.D.	Freq	Means	1. S.D.
Treatment Groups						
Health Education Program	19	98.21	6.70	18	92.04	8.55
Home Learning Group	18	95.39	7.30	17	89.04	5.51
Control	14	88.71*	9.30	13	95.70	5.19
Total	51	94.61	8.46	49	92.26	6.42

* $p \leq .05$ 1. Mean Scores Adjusted for the Covariate, Pre-Test Systolic Blood Pressure Rates

Table 15. Analysis of Variance Summary Table for ANCOVA Procedure Examining the Posttest Systolic Blood Pressure by Treatment Group and by Cognitive Developmental Level, with Initial Blood Pressure Rates as Covariate (n = 48)

Source of Variation	Sum of Squares	d.f.	Mean Squares	F
Covariate	1348.57	1	1348.57	29.81*
Initial Systolic Blood Pressure				
Main Effects				
Group	151.43	2	75.72	1.67
Cognitive Developmental Level	195.99	3	65.33	1.44
Error	1854.71	41	45.24	
Total	3581.71	47		

* $p \leq .05$

Data concerning the second physiological indicator of anxiety, pulse rates, are presented in Table 16. The mean pulse rates of children assessed during the health examination are classified by treatment group and time of measurement. Analysis of variance procedures on the pulse rates across the two measurement times indicated there was no significant differences by treatment group. Summary table of analysis of variance procedures exploring possible group and cognitive developmental interaction influences on anxiety level is presented in Table 17. The ANCOVA procedure identified that pulse rates at the post-assessment were significantly related to the covariate, pretest pulse rates ($F = 11.98$, $df = 1$), but not to experimental group membership ($F = .61$, $df = 2$) or cognitive developmental level ($F = 1.74$, $df = 3$) (Table 17). Children in the three treatment groups did not differ on the posttest with respect to anxiety level (103.11, 105.95, and 105.85). These pulse rates fell within the normal range when compared to normal heart rates for 4- and 5-year-old children (Allen-Williams, 1945 cited in deAngelis, 1979). In fact, all children manifested little or no anxiety as reflected by pulse rates during the health examination.

In summary, no significant differences existed among treatment groups or levels of cognitive development for posttest measures of systolic blood pressure and pulse rates, after adjusting for differences in pre-systolic blood pressure and pulse rates.

Table 16. Mean Pulse Rates for Experimental and Control Groups at Pretest and Posttest Health Examinations (n = 46)

Source	Pre-Test			Post-Test		
	Freq	Mean ¹	S.D.	Freq	Mean ¹	S.D.
Treatment Groups						
Health Education Program	19	109.05	8.73	18	103.11	9.28
Home Learning Only	19	105.16	10.74	18	105.95	10.32
Control	14	108.21	11.50	10	105.85	9.93
Total	52	107.40	10.22	46	104.97	9.84

1. Mean Scores Adjusted for the Covariate, Pre-Test Pulse Rates

Table 17. Analysis of Variance Summary Table for ANCOVA Procedure Examining the Posttest Pulse Rates by Treatment Group and By Cognitive Developmental Level, with Initial Pulse Rates as Covariate (n = 46)

Source of Variation	Sum of Squares	d.f.	Mean Squares	F
Covariate	1127.58	1	1127.58	11.98*
Initial Pulse Rates				
Main Effects				
Group	115.15	2	57.58	.61
Cognitive Developmental Level	492.28	3	164.09	1.74
Error	3671.34	39	94.14	
Total		45		

* $p \leq .05$

CHAPTER V

DISCUSSION

This study examined children's understanding of their bodies, medical procedures, and how this knowledge related to their behavior during routine health examinations. Secondly, the study assessed the impact of participation in a health education program on children's knowledge and behavior during routine health examinations.

Initial assessment of children's perceptions of their bodies, bodily functions, and their knowledge of medical procedures reflected an immature level of thinking, as would be expected for children at the preoperational stage of cognitive development. Children's beliefs concerning medical procedures and equipment revolved around the use of "magical thinking" and misconceptions were common in terms of children's conceptions of internal body parts and functioning. At the conclusion of the intervention period, however, children who participated in a health education program, in contrast to those who did not, demonstrated a significant increase in their understanding of their bodies and how they worked. Group membership, not cognition level for health concepts, significantly affected children's health knowledge. Group membership, however, had no significant effect on children's knowledge of medical equipment and procedures.

The extent to which health knowledge affected children's behavior during routine health examinations was inconclusive. Although the health education program had a measureable impact on children's knowledge, the degree to which the program influenced behaviors during health examinations could not be determined because the majority of

children in all three treatment groups were calm and cooperative with medical procedures during both initial and final health examinations. Furthermore, the majority of children, regardless of assigned group membership, manifested little or no anxiety (as assessed by blood pressure and pulse) during these health examinations.

Based on these findings, the following discussion advances some conclusions regarding children's health knowledge and behavior, and the effectiveness of formal health instruction at the preschool level in increasing children's knowledge and facilitating positive behaviors during routine health care. Further, suggestions are presented for future research that would expand our understanding of children's perceptions of routine health care.

Children's Health Knowledge

Body Parts Knowledge

Children's knowledge of themselves and how their bodies function remains a mystery to most adults. In an effort to tap into children's thinking in this area researchers often rely on a projective technique utilizing a blank body outline on which children are asked to draw what they think is inside their body (Bultman, 1982; Graves & Pineyard, 1982; Nagy, 1953; Porter, 1974; Tait & Ascher, 1955). Children at the age of 4 and 5, however, are not yet at the representational stage of art. Therefore, this approach seemed inappropriate for this study. Other studies have used an interview method in conjunction with a body outline (e.g., Gellert, 1962). Although this approach provides rich anecdotal accounts of children's thinking it is limited to the subjects' verbal abilities. Preschool children, by

virtue of their level of development, have difficulty verbally expressing their ideas. As a result, a nonverbal measure of children's knowledge was used in the present study because it was more consistent with children's abilities at the preschool level. Subjects were choosing from colored felt pieces representing parts of the human body and placing them on a body outline as opposed to spontaneously naming or drawing in body parts. Therefore, the assessment tool used in previous studies was modified to accommodate a younger group of children. Unfortunately, this modification may have altered the results and caution should be taken when comparing one study to the next.

The three areas assessed in children's understanding of their bodies included: (1) the names, (2) the functions, and (3) the locations of bodily organs. Children's initial perceptions of their bodies consisted primarily of knowledge of external body parts (e.g., eyes, ears, mouth). This would be expected since the pre-operational thinker views his own body in concrete terms. That is, knowledge of the body is acquired through means of what the child can see, feel, and validate through another's presence. In comparison to the body exterior, children knew little concerning the workings of the body interior. In reference to this "unknown region" of the body Blos (1978) writes,

Much is mystery here because the body is enclosed by skin; often the only evidence of things going on are proprioceptive, kinesthetic, and tactile. Furthermore, since the touched and the toucher are one, this evidence is unique and reality testing is difficult in the absence of another's validation (p. 2).

The names of organs. In regard to the body interior, children

knew the most about the functions of organs (mean = .35); the least about the actual names of organs (mean = .16). Unlike the nonverbal measure used to assess knowledge of the functions and locations of organs, knowledge of the names of organs required a specific verbal response on the part of the child. Thus the low score for naming internal organs might be attributed to children's inability to verbalize the names spontaneously. Bibace and Walsh (1980) state:

Children at the prelogical (2 - 6 years) stage of development do not spontaneously conceptualize the internal parts of the body, and when asked to do so, they rely on external visible parts. (p. 916)

Consistent with this observation, the current study found that the majority of children did not know the proper names of internal body organs. Many relied on the color or shape of the body part as a visible cue. For instance, children described the "heart" felt piece as "red," "an apple," "a tomato;" the "lungs" as "shoes," " a boat." One child picked up the felt piece representing the "liver," called it "hair" and proceeded to place it on top of the head of the body outline. It is also consistent with Gellert's finding that 4 to 6-year-olds were able to name only three bodily "ingredients" spontaneously. In the current study 23% of the children were able to identify the stomach (belly, tummy), 17% identified the heart, and only 9% were able to identify the lungs by name. These findings concerning the names of bodily organs were similar to Nagy's (1953) and Gellert's (1962) findings.

The functions of organs. The findings of the present study concerning children's knowledge of how the body functions differed from those of Gellert. The following examples of three bodily organs (heart, stomach, and lungs) and how they function illustrate

the difficulty in comparing across studies. Differences in these two studies may be primarily due to the different methods used to assess children's knowledge. For example, 49% of children in the present study knew the correct function of the heart compared to 5% of children (4 - 6 years) in Gellert's (1962) study. Children in Gellert's study were asked, "What does the heart do?" versus the present study in which children were asked, "Show me what pumps blood through your body?" Gellert reported:

Although the heart's function was related to blood by some of the younger subjects, it was not until age 11 that more than half referred specifically to circulation, or described the process of moving blood from one body part to another. . . Statements such as the heart pumps blood through the body were typical of children over the age of 10 years old. (p. 331)

Therefore, it may be that children in the present study who picked up "the heart" felt piece in response to "Show me what pumps blood through your body" were merely responding to the word "blood" and associating it with the heart. It is unlikely that preschoolers would comprehend the physiologic function of the heart since Gellert (1962) reported this did not occur until the age of 11 in her study. Although 4- to 6-year-olds in Gellert's study knew the heart was an important part of their body, they varied widely in their explanations of the actual function of the heart.

Similar methodological problems arise when comparing these two studies in terms of how the stomach functions. For instance, 70% of Gellert's subjects were able to correctly identify the function of the stomach in terms of its relationship to food/eating compared to 19% of the children in the present study. However, 19% of the subjects in the present study were able to relate

the stomach's function to the body's growth compared to only 5% of the subjects in Gellert's study. Again, the method of assessment may account for some of these differences. For example, in Gellert's study children were asked, "What does the stomach do?" versus the present study in which children were asked, "Show me where your food goes to help make your body grow." This approach yields data of a more qualitative nature, yet preschool children are bound by their limited expressive vocabulary. Therefore, it seems doubtful that children at this age and developmental level could have verbally responded in the correct manner (i.e. related the stomach's function to digestion) since Gellert asserts this type of explanation was typical of 11-and 12-year-olds in her study. Consequently we are faced with the dilemma, how can we assess preschool children's perceptions of their bodies using the present study's method, which involves receptive vocabulary, without giving too many verbal cues to children in the questions themselves?

In addition, when using this nonverbal measure 36% of children in the present study demonstrated knowledge of the lungs. In contrast to this, Gellert (1962) reported subjects below the age of 9 or 10 showed little understanding of the function of the lungs. Only one child below the age of 7 stated the lungs had a relationship to breathing and more than half of the 4-to 6-year-olds in her study had no idea of the function of this organ. Some related its function to "attaching or moving the arms," or enabling them "to talk, sing, to swallow, or to eat" (p. 341). Not until age 9 did children begin associating the lungs with respiration, the movement of air in and out of the body (Gellert, 1962; Nagy, 1953). While children in the

current study were able to pick up "the lungs" felt piece in response to the question, "Show me what moves the air you breathe in and out of your body," it may be that fewer would have been able to describe the function of this bodily organ verbally.

The locations of organs. Most of children in the present study knew the correct locations of external body parts, but were unable to identify the proper locations of internal body parts. For example, almost half the children placed the lungs in the head or neck region. This was consistent with other studies (Nagy, 1953; Gellert, 1962). Similarly, two-thirds of the children located the stomach either too high (as in Nagy's study) or too low (as in Gellert's study) on the body outline. Gellert suggests "this may be due to the frequency with which reference is made to the whole abdominal area by the incorrect use of the word 'stomach'" (p. 390). More children in Gellert's study placed the heart in the relatively correct location on a body outline (60%) than children in the current study (28%). Perhaps the present study was stricter in its location criteria as suggested by Gellert's use of the word, "relatively." The fact that so many young children had difficulty placing internal body parts in correct locations supports a theory of children's conceptions of the body interior. Specifically, "internal organs are not fixed or stationary" in the minds of young children (e.g., the heart moves, food goes around and around) (Gellert, p. 391).

Based on the data it is tempting to speculate as to the possible relationship between children's understanding of the functions and the locations of organs. It appeared that those children who knew the function of body parts were able to indicate their proper

location on a body outline. On the other hand, those children who did not know the function of body parts consistently placed them in incorrect locations. For example, in response to the question, "Show me what you use to taste with" many children selected incorrect body parts (e.g., liver, brain, stomach, lips, mouth, and kidneys). When asked, "What is it called?" these same children responded "a potato," "a pig," "pineapple," and "gum."

The finding that knowledge of function and location are related is inconsistent with Gellert's (1962) study. Although 60% of young children in her study knew the correct location of the heart, only 5% of these children said the function of the heart was to pump blood. Gellert hypothesizes that knowledge of internal body parts (e.g., function, label, and location) varies according to body organs and body systems. According to Gellert, children first formulate their "theories" about their bodies and how they work based on those inner body parts which they can "feel, control, and manipulate" (p. 392). As Bultman (1982) suggests:

Young children first recognize the more perceptually available organs such as the heart, which can be perceived when it beats; the bones, which can be felt through the skin; and the brain, which can be identified by the inner speech accompanying thought (p. 16).

Compared to knowledge of the heart and the stomach, previous studies found knowledge of the lungs was sparse (Gellert, 1962; Nagy, 1953; Porter, 1974). Consistent with these findings, the present study reported children knew more about the heart (mean = .31) and the stomach (mean = .23) than the lungs (mean = .21). This seems logical since children can feel their heart beat when they run fast; their stomach when they are hungry (it "growls") or full. In

contrast to this, the lungs are abstract. Although children are aware that air is taken in through the nose and mouth, they know little about the lungs because they cannot conceive of this organ in concrete terms. It should be noted, however, that three times as many children in the present study had accurate knowledge about the lungs than children under 9 years of age in Gellert's (1962) study.

In conclusion, basic methodological differences between studies may account for different findings. These differences were most apparent when comparing studies of children's perceptions of the functions of internal organs. In the present study a nonverbal measure of children's knowledge was used because, at the preschool level, children's receptive vocabulary far surpasses their expressive vocabulary (Fraser et al, 1963). However, it may be that in phrasing questions to accommodate a younger group of children verbal cues may have been provided to children. That is, key words or phrases in the questions themselves may have provided children with cues to the correct body part in question. In contrast to this approach, Gellert used open-ended questions which proved to be a much more difficult task for children. Further research may clarify preschool age children's knowledge of body parts and functioning. The present study found that for most children their perceptions of their bodies were limited to external body parts and to those internal body parts that are observable or "perceptually available," as would be expected for children at the preoperational stage of cognitive development.

Self-Care Knowledge

The present study examined children's self-care knowledge, that is,

their knowledge of specific behaviors to perform to care for self when sick or hurt. Most children's initial self-care knowledge was limited to "how to care for cuts." It may be that the common experience of recovering from minor scratches and cuts explains preschool age children's accurate knowledge of how to care for cuts. Even as young as 2 years of age, children feel "whole" again when their scratch is covered by a Band-Aid (Fraiberg, 1959).

The two-year-old plasters Band-Aids on the most imperceptible scratches, or even purely imaginary ones. He feels immediately restored after a trifling hurt if we paste a Band-Aid on him (Fraiberg, 1959 cited in Gellert, 1962, p. 347).

In contrast to how to care for cuts, children had little knowledge of how to care for bruises or colds. Many children suggested, "put a Band-Aid on it," in response to "how to care for a bruise." One possible explanation for this is the association of any injury to the skin (e.g. cut or bruise) with Band-Aids as a remedy. Another reason for the lack of knowledge concerning bruises is that these injuries are often not seen (i.e. "black and blue marks") in the visible sense for several days, whereas, when the skin is cut or scratched, the injury is seen immediately in the form of blood. Unlike cuts which manifest themselves in concrete terms, colds are abstract. In the present study children described "how to care for colds" in terms of tangible, concrete behaviors (e.g., "watch TV," "eat an ice cream cone") to feel better, though some children said, "drink water and stay in bed." Again, the concrete level of thinking may reflect the child's cognitive level of development as well as experience with respect to self-care knowledge.

Instrument Knowledge

Results of the present study indicate healthy children do not view medical equipment and procedures in the same way as do ill children. This finding is consistent with Bernheimer's (1981) research in which she found healthy "children did not perceive the (medical) procedures as being particularly helpful; nor did they perceive them as being harmful or punitive" (p. 111). This is in clear contrast to the findings that children who suffer from various illnesses often view medical procedures as forms of punishment (Bergmann, 1965; Erickson, 1958; Goodall, 1976).

Children's initial knowledge of medical equipment reflected nonverbal knowledge of three common pediatric tools (i.e. stethoscope, otoscope, and blood pressure cuff), that is, the child's ability to demonstrate how each instrument was used. Based on this type of knowledge children knew the most about the stethoscope and blood pressure cuff and the least about the otoscope. Other studies have shown that most children are familiar with the stethoscope (Mather, 1982; Steward & Regalbuto, 1975). This is the primary instrument young children commonly associate with "going to the doctor."

Although the majority of children demonstrated a keen ability to show how instruments were used, only a few children knew why these procedures were done. Steward and Regalbuto (1975) found similar results in regard to children's understanding of the stethoscope. In contrast to these two studies, the majority of children (ages 5 and 6) in Bernheimer's (1981) study had a medically correct, evaluative orientation toward their understanding of events/procedures in routine

health examinations. One reason for the differences in these findings may be attributed to the time of measurement. The present study assessed children's knowledge prior to any health teaching and before the physical examination. In the previous study children's knowledge was assessed after the physical examination. In Bernheimer's (1981) study children's knowledge varied by the amount of individual preparation given by the pediatric nurse practitioner (PNP). At times children seemed to parrot the examiner's immediate preparation efforts.

The present study as well as previous studies (e.g., Steward & Regalbuto, 1975) identified great discrepancies between children's nonverbal knowledge and their level of understanding (i.e. why an instrument was used) concerning medical equipment and procedures. This raises questions as to what do children really know? Nonverbal knowledge may tap only a superficial level of children's understanding of medical procedures. The clinical method of questioning used in assessing the reasons behind medical procedures may be a better indicator of what children really know. This method has been used effectively in assessing older children's knowledge in such content areas as health (Natapoff, 1978), illness (Brodie, 1974), healing (Neuhauser et al., 1978) and internal body parts and functioning (Gellert, 1962) but was not used in this study because preschool children, by virtue of their developmental level, have difficulty verbally expressing their ideas.

Children's explanations of medical instruments mirrored some of the responses of preschoolers in Steward and Regalbuto's study. For example, the egocentric view of the preoperational child was

evident in one girl's understanding that the doctor listens to your heart "so he can know how good your mind is working." As in the previous study some preschoolers described the stethoscope as an instrument to determine life or death (e.g., "If the doctor doesn't hear your heart beeping you already died"). Similarly, one child said the otoscope was used "so you can check if your ear is still good and you don't die." However, other children's explanations reflected a "defective orientation" (i.e. procedure was done because something was wrong) or an "evaluative orientation" (i.e. procedure done so doctor can evaluate child in terms of function of specific body parts). Both defective and evaluative orientations have been described by Bernheimer (1981) as typical of children's perceptions of medical events in routine health care.

Children in the present study knew least about the actual names of medical instruments. Only three children identified the blood pressure cuff, one child knew the proper name for the stethoscope. No one gave the correct name for the otoscope. Rather children ascribed to these instruments such names as "a doctor thing," "a checking thing," "a nurse thing," and a "telescope" (the stethoscope); "an ear thing," and a "tethoscope" (otoscope); and "an arm thing," "air pressure," and "pump blood" (blood pressure cuff). Perhaps these are some of the words and phrases children have heard during routine health care examinations in adults attempts to "simplify" (explain) procedures to children. It may also be that children may never have been exposed to the proper names of medical instruments or children may have reshaped these abstract, long names into labels that were more meaningful, and consistent with their frames of reference.

Cognition Level and Knowledge

The current study is the first known attempt to examine the relationship between children's health knowledge and their cognition level for health concepts (Bibace & Walsh, 1980). Based on pre-intervention data, children's cognition level was related to their level of knowledge. A clear trend existed of increasing knowledge with each subsequent advance in cognition level. That is, children in the Phenomenism level of cognition knew the least in terms of health knowledge (i.e. body parts, instrument knowledge, self-care); children in the Contamination level of cognition were the most knowledgeable in these areas. At the conclusion of the intervention period, group membership was more important than cognition level for health concepts, in affecting children's level of health knowledge. This indicates that both cognition level and experience are important variables in health knowledge for preschool children.

In addition, this study explored the possibility of a relationship between Bibace and Walsh's levels of health cognition and Piaget's stages of cognitive development. Although Bibace and Walsh imply their six stages correspond to Piagetian stages of cognitive development, the current study was the first known to test this hypothesis empirically. In addition to classifying children into various levels of cognition based on their responses to the "Concept of Illness Protocol" (Bibace & Walsh, 1980), children in Group I were given two Piagetian tasks of physical conservation (i.e. conservation of liquids and matter). For these children a relationship did exist between levels of cognition and Piaget's stages of cognitive development. Future research should be conducted with a large sample

of subjects in the concrete stage of cognitive development to explore further the relationship between Piagetian levels and the Bibace and Walsh concepts.

Such future research should, however, respond to some methodological problems which were encountered with the Bibace and Walsh scheme of classification. It was often difficult to categorize children according to Bibace and Walsh's stages of cognition because of the high frequency of "no response" and/or "I don't know" to many of the questions on the "Concept of Illness Protocol" (Bibace & Walsh, 1980). In some cases, raters classified children based on responses to only 2 out of 12 questions (e.g., "How do people get colds"? and "Where do germs come from"?). Furthermore, the responses given did not always match sample responses of children in the original categories in Bibace and Walsh's study. This might explain the lower interrater reliability level (.73) in the present study compared to that of Bibace and Walsh's study (.88).

Impact of Health Education Program

Children's Health Knowledge

The results of this study indicate that health education does impact on children's health knowledge. Preschoolers exposed to selected units of the PHEP curriculum for a period of six weeks demonstrated significantly greater knowledge on measures of body parts knowledge and self-care behaviors than children in a control group. This is consistent with numerous studies that have shown increased knowledge as a result of school health education curriculum (Bell, 1976; Caramanica, Feiler, & Olsen, 1973, cited in

Green et al., 1980) for older children. Furthermore, the current study demonstrates the short-range possibilities of the PHEP curriculum in increasing children's health knowledge.

Preschoolers who received only the home learning activities during a six-week period also demonstrated significantly greater knowledge of the body and self-care behaviors than children in a control group. However, the greatest increase in knowledge occurred in children who received the inschool health curriculum in addition to the home learning activities. This implies that the preschool health curriculum made a difference. These findings support Bruhn and Nader's (1982) belief that at an early age children can learn and assume some responsibility for their own health.

From a health education program preschoolers can learn about their bodies and how they work. In addition, they can learn about simple self-care behaviors to use when sick or hurt (Bruhn & Parcel, 1980). These findings may support a social learning interpretation of health behaviors, suggesting that children learn about their bodies and self-care behaviors through exposure to effective role models (e.g., parents and teachers) and active participation in a variety of health-related activities.

Body parts and self-care knowledge. According to Crider (1981) children at the preoperational stage of development conceive of the body's functions in global terms. They cannot conceptualize external and internal structures and functions like children in the concrete stage of development. However, children exposed to a health curriculum demonstrated increased knowledge in terms of the functions, labels, and locations of three internal body organs: lungs, heart, and

the stomach in comparison to children who received no health instruction. Consistent with the pretest findings, after the health education program children knew more about the locations of these organs than the actual functions or the names of these organs. Apparently learning the locations of internal organs proved an easier task than comprehending the actual functions of these organs. Findings in the area of children's conceptions of the body interior support Gellert's and in particular, Escalona's belief that..."children have, on the whole, a better understanding of the workings of the body than they are credited with" (cited in Gellert, 1962, p. 387). The current findings are also consistent with Bultman's (1982) assessment of school age children's retention of knowledge following a health education program. In her study of school age children's knowledge of internal body parts Bultman attributes an "increase [in knowledge]...to exposure to learning experiences the children had in relation to body structure and function" (p. 38).

Health education significantly affected preschool children's health knowledge, and cognition level for health concepts did not significantly affect these children's ability to learn about their bodies and self-care. This contrasts with Bibace and Walsh's (1980) statement that children at the prelogical stage of development (i.e. Phenomenism and Contagion) cannot conceptualize internal body parts. According to these researchers, only when children reach the formal logical stage of development (i.e. Physiologic and Psychophysiologic) can they conceptualize internal body parts and their functioning. Yet, the majority of children in the health education program who were in the Phenomenism and Contagion levels of cognition demonstrated accurate

knowledge of the body interior compared to children in a control group who were at the same levels of cognition. The current findings indicate that preschool children may be responsive to educational experiences despite cognitive level.

Instrument knowledge. The health education program had little impact on children's understanding of medical instruments. Perhaps children at the preschool level do not have the cognitive capacity to understand the functions of various medical instruments. Their specific functions in routine health care examinations appear to be too abstract for the concrete thinking that occurs at the preoperational stage of development.

Future research needs to focus on preschool age children's actual perceptions of why medical procedures are performed during routine health care. Using the clinical method of questioning, researchers can obtain a more accurate picture of what children at this developmental level really know concerning medical equipment and procedures.

Children's Behavior in Response to Routine Health Care

Findings in the area of children's responses to routine health care were inconsistent with those obtained in previous research investigations (e.g., Shirley & Poyntz, 1945; Hyson et al., 1982). The current study found none of the motor and verbal forms of resistance (i.e. avoidance, protection, withdrawal and/or verbal protests) reported in Shirley and Poyntz' (1945) study. On the contrary, the majority of children in the present study were calm and cooperative with medical procedures during the health examinations.

A number of factors account for the disparity between current findings and those of previous studies depicting routine health examinations as a source of distress for many young children. These include: (1) the variability of settings in which health examinations were conducted, (2) measurement tools used to assess children's behavior, (3) the procedures/events in the examination, and (4) the interpretation of results. Each of these possibilities warrants individual consideration and will be discussed in turn.

One possible reason that children in the present study showed no upset may be traced to the setting in which health examinations were conducted. "Unfamiliarity of surroundings" is a common theme cited in the literature as adding to emotional upset in young children facing medical events (Siegel, 1976). Unlike previous studies which used a doctor's office (Hyson et al, 1982) or a public health clinic (Bernheimer, 1981) as the site for conducting physical examinations, children in the present study were examined at their own school. Thus, children may not have perceived the health examination as stressful as it was conducted in a relaxed, familiar setting rather than a clinical setting which is an unfamiliar place for both ill and healthy children.

A second reason for the calm behavior among children in all three treatment groups may be attributed to the instrument used to assess behavior during the health examinations (i.e. Manifest Upset Behavior and Cooperation Ratings, Wolfer & Visintainer, 1975). Originally, these two scales were used in a hospital setting with children scheduled for minor surgery. Children's behavior was assessed under much more stressful conditions (e.g., admission examination,

transport to surgery, blood tests, preoperative medication) than the events in the health examination (e.g., measurement of height, weight, and blood pressure; use of stethoscope and otoscope). Future studies of well children's responses to routine health care should use more sensitive measures of behavior (i.e. defining specific behaviors observed during the examination) and emphasis should be placed on developing and refining a standard measure for use in assessing behavior and anxiety level of children in routine health care encounters.

Third, the specific procedures chosen as representative of events experienced in a well child examination may not have paralleled or replicated the potentially stressful aspects of an actual examination. For instance, unlike a real physical examination, children were not required to remove their clothing, lie in the prone position on an examining table, nor did they experience a lengthy comprehensive examination which often includes an injection (inoculation) or blood test. In addition, children did not have to wait for a long period of time prior to the health examination, as is often the case in well child clinics. These factors may account for the lack of anxiety observed in children during the examination.

Fourth, the current study challenges the notion that routine health care examinations are a source of distress for many young children (Hyson et al, 1982). Although actual behaviors recorded during the examinations were similar to those in Bernheimer's (1981) and Hyson and others (1982) studies, the interpretations of these behaviors are different. In Bernheimer's study the majority of 5- and 6-year-old children were "compliant, nonverbal, and passively

apprehensive" (p. 108). Therefore, according to Bernheimer's interpretation, the examination was stressful. Similarly, Hyson and others' (1982) interpretation of children's quiet and "passive behavior" (during the examination) was described as ... "masked tension and fear rather than calm indifference" (p. 142). In the present study the majority of preschoolers were calm and cooperative with examiner's requests during both pre and post health examinations. In addition, two physiological indicators of anxiety (pulse rates and systolic blood pressure) were used to assess children's anxiety level during the examination. Findings revealed that children's mean pulse rates and systolic blood pressure rates were within the normal range for children this age. Therefore, it is suggested that the examination, in this case, was not stressful. It should be noted, though, that a few of the children in the present study were uncooperative and anxious during the examination. This was apparent during the examination of the ears (i.e. "my ears are just fine?" "Will this (otoscope) hurt"? one child put his hand up to the otoscope and pushed it away, his eyes were somewhat alarmed.) another child stated, "I don't like that ear thing?"). However, the majority of children were talkative, explored the equipment with ease, smiled, and showed positive affect toward the student nurse throughout the examination.

The literature maintains that misconceptions or lack of adequate information concerning medical equipment and procedures contributes to emotional upset in children undergoing routine health examinations. Yet, the majority of children were calm and cooperative with medical procedures during the health examinations, although many demonstrated a lack of understanding of medical equipment. This is consistent with

Bernheimer's study (1981) in which no significant correlation was found between the amount and/or type of knowledge (instrument knowledge) and children's behavior during the physical examination. According to Bernheimer, the individual child's "temperament was a more powerful predictor (of behavior during the examination) than was the child's knowledge or understanding of events" (p. 111).

Because the majority of children demonstrated an optimum score for manifest upset and cooperation ratings on the initial examination, the impact of the health education program on children's behavior during routine health care could not be fully explored. This does not imply that there is no relationship between these two variables, but rather that potential relationships could not be accurately assessed.

Implications for Future Research

Several important findings have been outlined regarding the effects of health education on preschool age children's knowledge and their behavior during routine health examinations. Perhaps the single most important contribution this study makes is that it provides a framework or basis for future research of children's perceptions of routine health care. In this section suggestions for future research are presented, as well as some practical applications for health professionals, educators, and other individuals concerned with quality health care for children.

One area in which research needs to be done at the preschool level is in children's understanding of their bodies. The present study was the first study known to assess preschoolers' actual perceptions

of their bodies, and to assess their retention of knowledge following a health education program. These findings indicate health education can influence children's health knowledge. The more education they receive, the better. Children can learn from home learning activities but they learn more when this learning is combined with an inschool health curriculum. Furthermore, this study demonstrates the ease with which the PHEP curriculum can be implemented by teachers of various levels of teaching experience. In this study children's knowledge was based upon pre- and posttest measures of knowledge separated in time by six weeks. In order to demonstrate that knowledge gained from a health education program can endure over a much longer time span, further research needs to be conducted over a longer time period.

Differences between the current study's findings regarding children's knowledge of the body interior and those of previous studies raises a methodological question. How can we best assess what children, at this age level, really know regarding such content areas as health, illness, the contents and functions of the body, and medical procedures? Research needs to be conducted to develop an instrument for use in assessing these areas of health knowledge. This instrument should rely on children's receptive vocabulary (as opposed to their limited expressive vocabulary). Caution must be taken in phrasing questions in such a way as to avoid providing any verbal cues to answers.

Another area of future research concerns the tentative relationship between Bibace and Walsh stages of health cognition and Piagetian stages of cognitive development. Although the present study found a

relationship did exist between these two frameworks more research needs to be conducted to explore the value of Bibace and Walsh's categories. This research should have a larger sample size and include more subjects in the concrete stage of cognitive development.

The question of how does knowledge relate to children's behavior during routine health examinations could not be fully explored in the present study. Future research efforts need to focus on this question as it could have important implications for health education programs.

In addition to suggestions for future research, the findings of the present study have practical applications for pediatric practice. First, the setting in which routine examinations are conducted may be a key factor influencing children's responses to routine health care. If children are calm in a relaxed setting such as school, why not conduct routine health care (e.g., well child checkups) in a familiar setting--the school. Second, health professionals should encourage children to assume a more active role in events during the health examination (i.e. encourage the child in handling of medical equipment, and selecting the order of events in the examination), and as Hyson and others suggest, show the child in concrete ways that the health examination is over (i.e. taking off white coat, putting away medical instruments, etc.). Finally, health professionals need to be aware of how their own behavior may affect children's reactions to routine health examinations. Nurses and physicians don't always take the time to spend with a child prior to the actual examination and, in the busy and demanding business of health care, they may

appear less than sympathetic to the individual child's needs. It should be noted that health examinations in the present study were conducted by student nurses. The amount of time spent with each child and type of interaction with the child during the examination may be atypical of the real world.

Future studies of well children's behavior during routine health care should consider the following recommendations: First, conduct physical examinations in both a clinical setting (e.g., a doctor's office or clinic) and at school sites and compare children's behavior to determine the impact of the setting. Second, select procedures/events that replicate the potentially stressful aspects of a well child examination. Such events might include those used in Bernheimer's (1981) study: examination of eyes, ears, mouth; blood pressure; use of stethoscope; examination of abdomen; TB test, blood test, and shots. In this way comparisons can be made from one study to the next. Third, develop and refine a standard instrument for use in assessing children's behavior and anxiety level during routine health care encounters. This measure should be easy to use and include: the child's verbalizations, "the child's body posture and movements, facial expression, and portions of the environment monitored by the child" (Bernheimer, 1981, p. 37) during the health examination.

The present study consisted primarily of Caucasian children from middle class, highly educated families. Future studies should include children from lower socioeconomic status and different ethnic/cultural backgrounds to see how these children might respond to routine health examinations. Also, previous studies suggest children's reactions to

being examined change over time. Yet, these findings are based on cross-sectional data. A true picture of how children at different ages and developmental levels react to routine health care requires a longitudinal study. Furthermore, the few studies of healthy children in medical settings have studied children at different ages, or single groups of children and assessed behavior at one point in time. Future studies should incorporate comparison groups of children (similar in age) and repeated measures of behavior into the research design in order to strengthen results.

The findings of the present study have important implications for education. Modeling techniques might prove effective in preparing well children for routine visits to the doctor. Previous studies have investigated the use of modeling techniques in preparing ill children for health care encounters (Bandura, Blanchard & Ritter, 1969; Melamed & Siegel, 1975; Vernon & Bailey, 1974). These studies found modeling techniques effective in reducing anxiety and avoidance behavior in children. Although results of the present study could not prove or disprove the use of modeling, previous findings have important implications for the study of children's reactions to routine health care.

The following suggestion is one example of how positive behaviors might be facilitated. The day prior to undergoing a well child checkup, the child along with his parent, could view a videotape depicting a child of similar age and developmental level experiencing an actual physical examination. The child in the film would manifest reactions typical of the child at that particular age (as described in Hyson et al., 1982 study). This could serve as a kind of "emotional

inoculation" for the child. Through viewing the videotape, the child could vicariously experience the examination before actually physically experiencing it. In addition, the videotape could serve as a vehicle for parent-child discussion of what the experience will entail. The parent or a nurse could answer any questions/concerns the child might have concerning the impending visit to the doctor. This would need to be empirically tested to warrant such a policy in doctor's offices or clinics. A study could be conducted with one group of children and their parents viewing the videotape, another group viewing a cartoon or a videotape depicting children in a "non-threatening" situation. Children's behaviors during the health examination could be compared to determine the efficacy of using modeling techniques with well children undergoing routine health care.

Understanding what children know in such areas as internal body parts and functioning and medical equipment and procedures can help educators in developing health education curriculum to increase children's knowledge in these areas. Although some researchers caution against the "recipe approach" to health teaching, educators do not have the same luxury that health care professionals do in gearing their instructions to children on an individual basis. Perhaps the best approach to health teaching may be to present preschoolers first with "sensory information" (i.e. what the child will see, feel during events in routine health care examinations), followed by "procedural information" (i.e. how and why various procedures are performed during routine health examinations. Again, further research needs to be conducted concerning the impact of this

type of health teaching on children's knowledge of medical equipment.

Bibace and Walsh (1980) suggest the best approach to working with 4- and 5-year-old children (Phenomenism and Contagion levels of cognition) is to focus teaching primarily on external observable events surrounding the health care encounter (e.g., well child checkup) for example, lights, equipment in the doctor's office, uniforms of nurses and doctors, etc. rather than things that would be happening to the inside of the body.

In conclusion, special consideration needs to be given to all individuals involved in routine health care situations. "Negative" reactions in a well child checkup are defined in numerous ways depending on one's role in the event. Consider the parent who tries to calm the crying, clinging, anxious child during the examination; the physician or nurse practitioner trying to get an accurate health assessment from a squirming, frightened child; and the child himself who perceives the event, according to Hyson and others (1982) "through a highly selective cognitive and emotional filter" (p. 139). How can we, as educators, help facilitate a positive experience for all those involved in the health care of young children? Health education and guided medical play experiences in the preschool setting may help facilitate more positive experiences for children and parents and medical personnel in routine health care.

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APPENDICES

APPENDIX A
CHILDREN'S HEALTH KNOWLEDGE TEST

Form # 1

Code # _____

Children's Health Knowledge Test

Child's Age _____

_____ Pretest _____ Posttest

Date _____

Rater _____

Part I. Body Parts - Functions and Locations

INSTRUCTIONS Note the number assigned to each body part. Change sequence with each item. "1" for a correct response, "0" for incorrect.

- ____ 1. (a) Show me what you use to see. (9-1-10-6)
 ____ (b) What is it called? ("eyes")
 ____ (c) Show me where it belongs on this child.
- ____ 2. (a) Show me what you use to touch. (6-3-7-1)
 ____ (b) What are they called? ("fingers")
 ____ (c) Show me where they belong on this child.
- ____ 3. (a) Show me what pumps blood through your body. (4-11-5-2)
 ____ (b) What is it called? ("heart")
 ____ (c) Show me where it belongs on this child.
- ____ 4. (a) Show me what moves the air you breathe in and out of
 your body. (4-12-11-9)
 ____ (b) What are they called? ("lungs")
 ____ (c) Show me where they belong on this child.
- ____ 5. (a) Show me what you use to hear. (6-8-5-3)
 ____ (b) What is it called? ("ear")
 ____ (c) Show me where it belongs on this child.
- ____ 6. (a) Show me what you use to taste. (8-7-1-9)
 ____ (b) What is it called? ("tongue")
 ____ (c) Show me where it belongs on this child.
- ____ 7. (a) Show me where your food goes to help make your
 body grow. (5-4-11-6)
 ____ (b) What is it called? ("stomach")
 ____ (c) Show me where it belongs on this child.

 Sub Total

Part II. Medical Equipment used during a Physical Examination

- ___ 8. (a) What is this instrument? ("stethoscope")
 ___ (b) How is it used?
- | <u>Nonverbal Knowledge</u> | <u>Verbal Knowledge</u> |
|------------------------------|-------------------------|
| ___ Puts in ears | ___ Medically Correct |
| ___ Holds diaphragm to heart | ___ Medically Incorrect |
| ___ Holds diaphragm to back | |
- ___ (c) Why is it used? "I want to write that down." _____
-
- ___ 9. (a) What is this instrument? ("otoscope")
 ___ (b) How is it used?
- | <u>Nonverbal Knowledge</u> | <u>Verbal Knowledge</u> |
|----------------------------|-------------------------|
| ___ Looks through eyes | ___ Medically Correct |
| ___ Looks through ears | ___ Medically Incorrect |
- ___ (c) Why is it used? "I want to write that down." _____
-
- ___ 10. (a) What is this instrument? ("blood pressure cuff")
 ___ (b) How is it used?
- | <u>Nonverbal Knowledge</u> | <u>Verbal Knowledge</u> |
|----------------------------|-------------------------|
| ___ Wraps around arm | ___ Medically Correct |
| ___ Pumps up | ___ Medically Incorrect |
| ___ Uses stethoscope | |
| ___ Examines dial | |
- ___ (c) Why is it used? "I want to write that down." _____
-

Part III. Self-Care Behavior

- ___ 11. John was riding his tricycle too fast. He fell off and scraped his knee and elbow. What should he do first for his cut to make himself feel better? ("Wash with soap and water"). (7-6-1-2-5)
 ___ What should he do next for his cut to make himself feel better? ("Put a bandaid on the cut").
- ___ 12. Jane fell off the swing and got a big bruise on her arm. What should Jane do for her bruise to make herself feel better? ("Put ice on it"). (1-6-2-3-4)
- ___ 13. Mary woke up this morning, but she didn't feel like getting dressed, or eating breakfast. Her throat was soar. She didn't feel good at all! Her mom said, "I think you have a cold." What should Mary do to make herself feel better? ("Get plenty of rest and drink water"). (7-4-2-5-3)

APPENDIX B
PARENT QUESTIONNAIRE

Form # 2

Code # _____

Parent Questionnaire

Please complete this questionnaire and return it to school tomorrow. This data will provide the necessary information for the study on children's responses to routine health care examinations. In this study "your child" means your 4 or 5 year old who is participating in this study. Thank you for your cooperation.

1. Child's Name _____ 2. Child's Age _____
 First Last
3. Parent's Name _____ 4. Child's Sex _____
5. Are you, at this time: _____
 single married divorced separated widowed
6. What is the highest grade (in years) that you completed in school? _____
 That your spouse, or former spouse, completed in school? _____
7. Where do you get most of your information about taking care of your health
 and the health of your child? (CHECK ALL ITEMS ON THE LIST THAT APPLY)
- | | |
|------------------------------------|-----------------------|
| _____ Parents | _____ Doctors |
| _____ T.V. Programs | _____ Books |
| _____ T.V. Commercials | _____ Church |
| _____ Magazines | _____ School/Teachers |
| _____ Friends/Neighbors | _____ Radio |
| _____ Clubs/Organizations | |
| _____ Other (PLEASE SPECIFY) _____ | |
8. Does your child have any health problem(s) now? ___ Yes ___ No (IF NO, SKIP TO
 NEXT QUESTION). If yes, please explain the nature of the problem:

9. Have you taken your child to the doctor in the last year? ___ Yes ___ No (IF NO,
 SKIP TO QUESTION # 11).
10. If yes, (a) about how many times _____ (b) list all reasons for doctor's visits
 1) _____ 2) _____ 3) _____
11. Have you taken your child for treatment to any of these places in the last
 year? (CHECK ALL THAT APPLY)
- | | |
|------------------------------------|----------------------|
| _____ Well Child Clinics | _____ Private Doctor |
| _____ Emergency Room | _____ Hospital |
| _____ Other (PLEASE SPECIFY) _____ | |
12. How would you rate your own health status: _____
 excellent good fair poor
13. Does anyone in your home (besides your child) have any health problem(s) now?
 ___ Yes ___ No If yes, please explain: _____

APPENDIX C
CONCEPT OF ILLNESS PROTOCOL

Form # 3

Code # _____

"Concept of Illness Protocol"

INSTRUCTIONS Probe relevant aspects of the following concepts using "how" and "why" questions. Record each child's verbatim responses to these questions. Use the clinical method of questioning when the child's reasoning is not evident in the response, that is, when the response is vague, sparse, or unclear.

1. What does it mean to be healthy?
2. Do you remember anyone who was sick? What was wrong? How did he/she get sick? How did he/she get better?
3. Were you ever sick? How did you get sick? Why did you get sick? How did you get better?
4. What is the worst sickness to have? Why? What is the best sickness to have? Why?
5. What happens to people when they are sick? What happens to people when they are very sick?
6. What is a cold? How do people get colds? Where do colds come from? What makes colds go away?
7. What are the measles? How do people get the measles? Where do measles come from? What makes the measles get better?
8. What is a heart attack? Why do people get heart attacks?
9. What is cancer? How do people get cancer?
10. What is a headache? Why do people get headaches? How do people get headaches?
11. Have you ever had a pain? Where? What is a pain? Why does it come? Where does it come from?
12. What are germs? What do they look like? Can you draw germs? Where do germs come from?

Interviewer's Name _____ Rater _____

APPENDIX D
DEVELOPMENTAL STAGES
IN CONCEPTIONS OF ILLNESS
(Bibace & Walsh, 1980)

Scoring Categories for Developmental Conceptions of Illness

Category 0: Incomprehension
Pre-logical explanations
Category 1: Phenomenism
Category 2: Contagion
Concrete-logical explanations
Category 3: Contamination
Category 4: Internalization
Formal-logical explanations
Category 5: Physiologic
Category 6: Psychophysiologic

Description of Six Developmentally Ordered Categories of Illness Conception

Pre-logical Explanations

0. Incomprehension. The child evades the why, what, and how of the question or gives answers that appear irrelevant. The child does not appear to respond to the "content" of the question.

Examples: What is a heart attack? "A heart attack is on vacation."
Why is a heart attack on vacation? "Can I have the pencil?" Why
do people get heart attacks? "I don't know."

1. Phenomenism. Within this category, illness is defined in terms of a single external symptom, usually sensory in nature (ie. a sight or sound that the child has at one time associated with the illness). It may co-occur with the illness, but it is spatially and/or temporally remote. Children at this stage are unable to explain the manner in which these events caused the illness other than by co-occurrence or "magic."

Examples: What is a heart attack? "A heart attack is falling on your back." Why do people get heart attacks? "A heart attack is from the sun." How does the sun cause a heart attack? "It's the sun."

2. Contagion. The cause of illness is located in objects, persons, or events which are spatially near to, but not touching the child; or it might be an event that is temporally prior to, but not simultaneous with, the occurrence of the illness. The source of illness must be near the body in order to have an effect. More articulate, less vague, than the prior stage. The child does not restrict his account of the illness to a single experience. He might say, "coughing a lot" in contrast to "I coughed at my aunt's house."

Examples: What are measles? "Measles are bumps on your arm." How do people get measles? "From other people." How do people get measles from other people? "When you walk near them." How does walking near them give you measles? "When you go near them." How do people get colds? "When someone else gets near them."

Concrete-logical Explanations

3. Contamination. The cause is viewed as a person, object, or action that is

external to the child. Bad or immoral behavior, just as dirt or germs, causes illness. The definition of illness entails multiple symptoms, often including references to bodily functions (ie. external body parts or areas). The source of illness is transmitted through physical contact (ie. direct or indirect touch or participation). The cure is something that comes into surface contact with the body. The cure often involves a medicine that is rubbed on the surface of the body.

Examples: What is a cold? "It's like in the wintertime." How do people get them? "You're outside without a hat and you start sneezing. Your head would get cold--the cold would touch it--and then it goes all over your body." What are measles? "Measles are bumps all over you, they's small and red." How do people get measles? "People get measles from someone else who has them." How do people get measles from other people? "By rubbing up against them, they get on you and you've got them." How do people get cancer? "From smoking without their mother's permission."

4. Internalization. Illness is described as being within the body. The child is not concerned with what is happening in the body but with the way in which the illness is internalized (ie. swallowing, inhaling, ingesting "bugs"). Illness is still described in vague, nonspecific terms. Confusion about internal organs and functions is apparent.

Examples: How do people get colds? "In the winter they breathe in too much air into their nose and it blocks up the nose." How does this cause colds? "The bacteria gets in by breathing. Then the lungs get too soft, and it goes to the nose." How does it get better? "Hot fresh air, it gets in the nose and pushes the cold air back."

Formal-logical Explanations

5. Physiologic. the child describes illness in terms of internal body organs and functions. The child perceives multiple causes and cures for a single illness. The child also exhibits more internal locus of control, that is, an increased sense that personal actions can contribute to outcome.

Examples: What is cancer? "Cancer is when there's too many cells. They're invisible but I think that they grow." How do people get cancer? "Some people think it's air pollution or chemicals; some people don't know. It causes the cells to start growing."

6. Psychophysiologic. The most mature understanding of illness, the child now perceives an additional or alternative cause of illness--a psychological cause. The child is aware that a person's thoughts or feelings can affect the way the body functions.

Examples: How do people get a heart attack? "It can come from being all nerve wracked. You worry too much. The tension can affect your heart."

APPENDIX E
BEHAVIORAL RESPONSES DURING THE EXAMINATION
(COOPERATION AND MANIFEST UPSET SCALES)

Form # 4

Code # _____

Behavioral Responses during the Examination

___ Pretest ___ Posttest

Rater _____

Manifest Upset Scale

A five-point Likert scale reflecting the child's current emotional state. A rating of "one" indicates little or no fear or anxiety (calm appearance, no crying, no verbal protest). A rating of "three," a moderate amount of anxiety (some temporary whimpering and/or mild verbal protest), and a rating of "five" indicates extreme emotional distress (agitated, hard crying, or screaming and/or strong verbal protest).

Cooperation Scale

A five-point Likert scale reflecting the degree to which a child cooperates with a given medical event or procedure. A rating of "one" indicates complete cooperation including active participation in and assistance with the procedure or compliance with examiner's request. A rating of "three" indicates mild or initial resistance or passive participation without assistance. A rating of "five" indicates extreme resistance, strong avoidance, pulling away, noncompliance, and/or having to restrain the child.

INSTRUCTIONS Circle one rating of Manifest Upset Scale and one rating of Cooperation Scale for each of the following procedures: (height, weight, blood pressure, stethoscope, and otoscope).

(MANIFEST UPSET SCALE)

(COOPERATION SCALE)

(HT) 1 2 3 4 5

1 2 3 4 5

(WT) 1 2 3 4 5

1 2 3 4 5

(BP) 1 2 3 4 5

1 2 3 4 5

(STET) 1 2 3 4 5

1 2 3 4 5

(OTO) 1 2 3 4 5

1 2 3 4 5

APPENDIX F
PARENT QUESTIONNAIRE
(GROUPS I & II ONLY)

Form # 5

Code # _____

Parent Questionnaire

Please complete this brief posttest questionnaire and return it to your child's school tomorrow. In this study "your child" means your 4-or 5-year-old who is participating in the Preschool Health Education study. Thank you for your cooperation.

1. Please indicate which home learning activities you completed with your child (CHECK ALL THAT APPLY).

#1 "What Do I See" _____	#5 "My Wonderful Body" _____
#2 "Feelings" _____	#6 "What To Do When Sick" _____
#3 "My Body Can Move" _____	#7 "Caring For Cuts" _____
#4 "My Senses" _____	#8 "I Can Do Chart" _____

2. Approximately how much time did you spend on each activity _____.

3. How would you rate these home learning or "Doing It Together" activity sheets?

a. poor
b. fair
c. undecided
d. good
e. excellent

4. Additional comments concerning the home learning activities:

5. Has your 4-or 5-year-old child had any health experiences since January? _____ Yes _____ No If yes, please explain the nature of these experiences:

6. Have you taken your child for treatment to any of these places since January?

_____ Well Child Clinics	_____ Private Doctor
_____ Emergency Room	_____ Hospital
_____ Other (PLEASE SPECIFY) _____	

APPANDIX G
LETTER SENT TO LOCAL PRESCHOOL DIRECTORS
AND
AN EXPLANATION OF RESEARCH STUDY

School of
Home Economics



Corvallis, Oregon 97331 (503) 754-3351

December 8, 1982

Preschool Director
Name of Preschool
Street Address
City, State, Zip Code

Children are anxious and fearful of what they do not understand. The preschool years are a particularly vulnerable time for children to experience routine health care. Common events, such as routine health examinations, can be a source of stress for young children because of their limited life experiences, misconceptions, and active fantasies concerning medical procedures and equipment.

You and the children at Little Beavers Full Day Preschool can help us identify ways to reduce this stress. As a graduate student in the OSU Department of Human Development and Family Studies I am investigating the effects of a health education program on preschool age children's responses to routine health care. This study will assess children's understanding of their bodies, medical procedures, and how this knowledge relates to their behavior during routine health examinations. The study will also determine how participation in a health education program alters children's knowledge and responses to routine health care.

Little Beavers Full Day Preschool has been selected as one of several schools in the Corvallis area to participate in this study. Your cooperation and the participation of the children at your school will add greatly to our understanding of children's perceptions of routine health care. Please read the attached form describing the purpose of the research, as well as the specific procedures that will be implemented. I will be contacting you within a week to discuss the project with you. If you have any questions or concerns please call me or my major professor, Dr. Clara Pratt at 754-4765.

Thank you for your cooperation.

Sincerely,

Redacted for Privacy

Barbara G. Wilson, Principal Investigator
Human Development and Family Studies

Redacted for Privacy

Clara C. Pratt, Associate Professor
Human Development and Family Studies

DESCRIPTION OF RESEARCH

Purpose: To investigate the effects of a health education program on preschoolers responses to routine health care. The study will also assess children's understanding of their bodies, medical procedures, and how this knowledge relates to their behavior during routine health examinations.

Subjects: Preschoolers-4 and 5 years old. Approximately 60 children from the Corvallis area will participate in the study.

Methods: Data will include measures of children's cognition level, health knowledge, anxiety level during routine health examinations, and the degree to which children cooperate with medical procedures in the health examinations.

Time Frame: A1. Pre-test (January, 1983)
 1. Children's Health Knowledge Test
 2. Concept of Illness Protocol
 3. Physical Examination₁
 A2. Post-test (March, 1983)
 1. Children's Health Knowledge Test
 2. Physical Examination₂

Procedure: On two prearranged days in January, 1983 a rater will visit the school and administer the Children's Health Knowledge Test and the Concept of Illness Protocol to children on an individual basis. The following week a student nurse will conduct a short physical examination on all of the children. The student nurse will observe and record each child's behavioral responses during the following five procedures (height, weight, blood pressure, stethoscope and use of an otoscope).

On a specified date in March, 1983 the same student nurse will return to the school and will conduct the second physical examination on all of the children. The same procedures and measures used to assess behavior during the first physical examination will be used during the second physical examination. The Children's Health Knowledge Test will also be administered at this time to obtain a post-test measure of children's understanding of health concepts. Each procedure should not take longer than 15 minutes. Information from these assessments will be made available to the parents following the second assessment. All curriculum materials used in the preschool health education program will be made available free of charge to those preschools participating in the study.

Your school's participation will add greatly to our efforts to define an appropriate health education program for preschoolers. This research will be conducted within the guidelines established by the Society for Research in Child Development which sets the ethical standards for research with children. All data collected from this project will be kept strictly confidential.

Name: Barbara G. Wilson, Principal Investigator; Dr. Clara C. Pratt, Major Professor

Professional Discipline: Department of Human Development and Family Studies

Position/Institution: Graduate Student, Oregon State University

<u>Address:</u>	<u>Corvallis</u>	<u>OR</u>	<u>97331</u>	<u>754-4765</u>
	<u>City</u>	<u>State</u>	<u>ZIP</u>	<u>Telephone Number</u>

APPENDIX H
LETTER OF EXPLANATION OF RESEARCH STUDY
AND
CONSENT FORM FOR RESEARCH STUDY

School of
Home Economics



Corvallis, Oregon 97331 (503) 754-3251

December 13, 1982

Parents' Name
Street Address
City, State, Zip Code

Dear Parents:

Have you ever tried to calm a crying, clinging, frightened child during a health examination? If you have, you know how distressing these events can be for both child and parent. Children are anxious and fearful of what they do not understand. Common events, such as routine health examinations, can be a source of stress for young children because of their limited life experiences, misconceptions, and active fantasies concerning medical procedures and equipment.

You and your child can help us identify ways to reduce this stress. As a graduate student in the OSU Department of Human Development and Family Studies, I am investigating the effects of a health education program on preschool age children's responses to routine health care. This study will assess children's understanding of their bodies, medical procedures, and how this knowledge relates to their behavior during routine health examinations. The study will also determine how participation in a health education program alters children's knowledge and responses to routine health care.

Your child's preschool has consented to be one of several schools in the Corvallis area to participate in this study. Your cooperation and your child's participation in this study will add greatly to our understanding of children's perceptions of routine health care. Please read the attached consent form, and return it to your child's school. If you have any questions or concerns please call me or my major professor, Dr. Clara Pratt at 754-4765.

Thank you for your cooperation.

Sincerely,

Redacted for Privacy

Barbara G. Wilson, Principal Investigator
Human Development & Family Studies

Redacted for Privacy

Clara C. Pratt, Associate Professor
Human Development and Family Studies

INFORMED CONSENT

This study will investigate the effects of a health education program on young children's responses to routine health care. Routine health examinations are a source of distress for many young children because of fears and fantasies associated with medical procedures and equipment. Since interactions with health care professionals are important, frequent, and "potentially threatening" events for children, it becomes imperative to research the area of children's behavior in relation to health care examinations.

Your child's behavioral responses will be observed and recorded during two short health examinations at school, one in January, 1983, the other in March, 1983. Information from these assessments will be made available to you following the second assessment. Also during these two points in time, your child's understanding of health concepts will be assessed using the Children's Health Knowledge Test developed by the author. Each procedure should not take longer than 15 minutes.

Your child's participation will add greatly to our efforts to define an appropriate health education program for preschoolers. This research will be conducted within the guidelines established by the Society for Research in Child Development which sets the ethical standards for research with children. All data collected from this project will be kept strictly confidential.

This is to certify that I, _____, give my consent for my child to participate in the health education project as an authorized part of the education and research program at Oregon State University under the supervision of Dr. Clara C. Pratt, Associate Professor of Human Development and Family Studies.

I understand that Barbara G. Wilson or Clara C. Pratt, Ph.D., who can be reached at 754-4765, will answer any questions I may have at any time concerning details of the procedures performed as part of the study. I understand that I may refuse to consent to my child's participation or to withdraw from this research at any time.

I have been informed that any data or answers to questions will remain confidential with regard to my child's identity. I understand that if I have any questions, comments, or concerns regarding the study or informed consent process, I may address them to Barbara G. Wilson or Dr. Clara C. Pratt, Associate Professor in the Department of Human Development and Family Studies.

Date _____

Signature of Parent or Legal Guardian _____

APPENDIX I
MANIFEST UPSET AND COOPERATION RATINGS
DURING PHYSICAL EXAMINATION

Summary Table of Number and Percentage of Children Scoring 1, "calm"* and cooperative on Pre and Posttest of Upset and Cooperation with Medical Procedures During Physical Exam, by Intervention Group

Behavior Rating	PRETEST				POSTTEST			
	Health Ed. Program	Home Learning	Control	TOTAL	Health Ed. Program	Home Learning	Control	Total
Upset HT	16(84.2%)	15(78.9%)	11(73.3%)	42(79.2%)	19(100%)	17(89.5%)	13(86.7%)	49(92.5%)
Upset WT	18(94.7%)	14(73.7%)	13(86.7%)	45(84.9%)	19(100%)	18(94.7%)	13(86.7%)	50(94.3%)
Upset STET	18(94.7%)	13(72.2%)	13(86.7%)	44(84.6%)	18(94.7%)	18(94.7%)	13(86.7%)	49(92.5%)
Upset BP	18(94.7%)	12(63.2%)	12(80.0%)	42(79.2%)	17(89.5%)	17(89.5%)	13(86.7%)	47(88.7%)
Upset OTO	16(84.2%)	7(38.9%)	13(86.7%)	36(69.2%)	17(89.5%)	17(89.5%)	13(86.7%)	47(88.7%)
Coop HT	17(89.5%)	18(94.7%)	11(73.3%)	46(86.8%)	19(100%)	18(94.7%)	13(86.7%)	50(94.3%)
Coop WT	18(94.7%)	17(89.5%)	14(93.3%)	49(92.5%)	19(100%)	18(94.7%)	12(80.0%)	49(92.5%)
Coop STET	19(100%)	17(94.4%)	13(86.7%)	49(94.2%)	19(100%)	18(94.7%)	12(80.0%)	49(92.5%)
Coop BP	19(100%)	17(89.5%)	12(80.0%)	48(90.6%)	19(100%)	18(94.7%)	12(80.0%)	49(92.5%)
Coop OTO	18(94.7%)	14(77.8%)	14(93.3%)	46(88.5%)	19(100%)	18(94.7%)	13(86.7%)	50(94.7%)

Derived from Chi Square Contingency Tables

*The remaining percentage of children scored "2" passive assistance/compliance with examiner's request; relatively calm.