Order Number 9303932

Influences on the early development of general health knowledge in young children

Clark, Kathryn Summers, Ph.D.

The University of North Carolina at Greensboro, 1992

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

INFLUENCES ON THE EARLY DEVELOPMENT OF GENERAL
HEALTH KNOWLEDGE IN YOUNG CHILDREN

by

Kathryn Summers Clark

A Dissertation Submitted to
the Faculty of the Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Greensboro
1992

Approved by

Garrett W. Lange
Dissertation Adviser

APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of the Graduate School at The University of North Carolina at Greensboro.

Dissertation Adviser ____________________

Committee Members ____________________

____

____

April 13, 1992
Date of Acceptance by Committee

March 26, 1992
Date of Final Oral Examination

ACKNOWLEDGEMENTS

Sincere appreciation is expressed to the following individuals:

To members of the advisory committee, Drs. Garrett Lange, Dale Farran, Rebecca Smith, and Susan Keane, for their assistance with this project.

To Dr. Grace Kissling for her consultation, advice, and support. Her contributions qualify her as an honorary committee member.

To Richard Allen and Judy Fulbright for their assistance with the data.

To the directors and teachers of the early childhood education programs and their families for their cooperation and participation.

Finally, and most importantly, to Tom, to my parents, and to my friends for the moral support and good humor shared throughout this experience.

TABLE OF CONTENTS

TABLE OF CONTENTS

(Continued)

CLARK, KATHRYN SUMMERS. Ph.D. Influences on the Early Development of General Health Knowledge in Young Children. (1992) Directed by Dr. Garrett Lange. 177 pp.

This study examined the interrelationships and and contributions of selected child characteristics and family and school variables to the early development of health knowledge among four-year-old children. It was expected that (1) both a child's general cognitive ability and health status would be positively associated with the child's level of health knowledge; (2) the family's socioeconomic status and their adherence to health-related rules would be positively associated with children's level of health knowledge; and (3) the early childhood classrooms' emphasis on health-related issues would be positively associated with children's level of health knowledge.

The sample was comprised of 125 children and their families recruited from nine early childhood programs that were nonprofit and that met the standards for "A" licensure for the State of North Carolina.

The results of the multiple regression analyses indicated that the children's general cognitive abilities emerged as the only positive predictor of health knowledge. The family's attention to health-related issues, as measured by the number of rules that each family reported to have established for health-related behaviors, emerged as a significant, but negative, predictor of health knowledge.

Additional analyses were conducted to examine the measurement properties of the Picture Identification Assessment of Health Knowledge (PIA). Several measurement deficiencies were noted: (1) marginal test-retest reliability of the PIA, (2) low internal consistency of the overall scale and its subscales, (3) low correlations between many of the items and the total score, and (4) an unacceptably high percentage of correct responses on the scale. Overall, the PIA in its present form was deemed to be an unreliable measure of children's health knowledge.

CHAPTER I

INTRODUCTION

In recent years there has been a growing interest in the development of health concepts, beliefs, and behaviors in young children. This interest stems largely from educators concerned with the provision of optimal health care services and health education to children. Designing effective health care education programs for young children requires additional research to (1) develop accurate assessments of young children's health knowledge, (2) identify individual differences associated with varying levels of health knowledge, and (3) identify factors that may contribute to general health knowledge. The present research is based on the reasoning that variations in children's health knowledge are attributable to (1) differing levels of general conceptual ability, (2) health-related experiences that expose the child to information about health and illness, (3) the extent to which parents deliberately attempt to transmit health-related information via the establishment and enforcement of health-related rules, and (4) the extent to which teachers provide health-related instruction through their curriculum and daily routines.

Background of the Study

Previous research on children's health care knowledge has focused primarily on the role of developmental changes in children's conceptual development within the general context of Piagetian theory. Much of this cognitive developmental research indicates that children's concepts of illness follow a systematic, predictable sequence that is consistent with Piagetian theory. The findings of this research have indicated that for preoperational children, the conceptualization of illness is global and nonspecific (e.g., Natapoff, 1978; Perrin & Gerrity, 1981). Preoperational children do not appear to differentiate between the symptoms of illness and the causes of illness (e.g., Bibace & Walsh, 1979; Perrin & Gerrity, 1981), and they overextend the concept of contagion to include noncontagious illness (Kister & Patterson, 1980; Potter & Roberts, 1984). For example, preoperational children tend to answer open-ended questions such as "what is health?" and "how does one become sick?" with answers such as "health is feeling good" and "you get sick by catching a disease." Also, children at this stage rely on external cues, such as the presence of rosy cheeks, to evaluate health status (e.g., Neuhauser, Amsterdam, Hines, & Steward, 1978).

In contrast, children at the concrete operational level tend to list specific acts or rules for avoiding illness (e.g., Natapoff, 1978; Perrin & Gerrity, 1981). For example, these children believe that illness can be prevented by not going near sick people. The determination of health status is made on the basis of internal cues, such as whether or not they are feeling good (Neuhauser et al., 1978). They associate illness with germs and infections even though they cannot explain these concepts in detail (e.g., Bibace & Walsh, 1979; Perrin & Gerrity, 1981), and they are aware of causes of some contagious illnesses (Kister & Patterson, 1980; Potter & Roberts; 1984). It is only at the level of formal operations that children are able to explain the processes whereby causal factors induce physical illness. In addition, more mature levels of cognitive reasoning are associated with more sophisticated illness concepts even when the effects of age are partialled out (Brewster, 1982; Kister & Patterson, 1980; Simeonson, Buckley & Monson, 1979).

This line of research has also addressed how the child's health status and health history impact upon health- and illness-related knowledge. In this regard, however, the results of the research tend to be inconclusive and at some points contradictory. Some researchers have suggested that the illness concepts of hospitalized children are less cognitively mature (Cook, 1975), whereas others have suggested that hospitalized children's concepts are as mature as their healthy counterparts (Brewster, 1982; Myers-Vando, Steward, Folkins, & Hines, 1979).

A problem common to the cognitive developmental research has been its inadequate description of samples, instruments, and procedures (Burbach & Peterson, 1986). Descriptions of the samples have sometimes failed to include the ages of the children, their intellectual status or socioeconomic status. Descriptions of how children's levels of cognitive development and illness concepts were assessed are often lacking (Burbach & Peterson, 1986), and there has been little consensus regarding the criteria for determining which responses are indicative of the different levels of operational thought (Hergenrather & Rabinowitz, 1991). Moreover, there has been little effort to control for the potential confounding effects of variables, such as the types of illnesses children have experienced, the chronicity or severity of the illnesses, and the number of previous hospitalizations (Burbach & Peterson, 1986).

A complementary body of literature has focused upon the relationship between health beliefs and health behaviors; this has been formally presented as the Health Beliefs Model (e.g., Rosenstock, 1974). This model posits that an individual's health behaviors are influenced by beliefs about one's susceptibility to illness, the severity of illness, and the benefits of preventive action or treatment. Much of this research has examined the health beliefs and behaviors of adults. The few investigations that have been conducted on children's health beliefs have focused on the degree to which children believe they are likely to encounter a variety of health problems, illnesses, or accidents (e.g., Gochman, 1971, 1972, 1985). The term _perceived vulnerability_ has been used to designate this general concept. Children who have relatively high expectations of encountering one health problem usually have relatively high expectations of encountering others (e.g., Gochman & Saucier, 1982). Although it appears that perceived vulnerability increases between the ages of eight and 13 years, children and young adults do not perceive themselves to be generally vulnerable to health problems (Gochman, 1985).

There is also some research examining children's health-related behaviors in relation to child-rearing practices. Pratt (1976) explored the effects of family interactions, role relationships and child-rearing practices on children's health behaviors. She observed that child-rearing practices that (1) emphasized rewards for good behavior, (2) included the use of inductive reasoning techniques, and (3) encouraged independent and autonomous behaviors were associated with higher levels of desirable health practices among children, such as personal cleanliness and dental care. Dielman, Leech, Becker, Rosenstock, Horvath & Radius (1982) examined whether parental health beliefs and behaviors influenced those of their children. A composite of parental health behaviors (that included smoking, drinking, eating, breakfast, snacking, and preventive health care) was a significant predictor of their children's health behaviors, but not of the children's health beliefs. Also, the demographic variables of parental age and education were found to be significant predictors of the children's health behavior and their perceived vulnerability to illness.

There has been some research that provides information on the role of general family characteristics and the development of school-aged children's concepts of illness. Campbell (1975) found that maternal definitions of illness were not significant predictors of their children's understanding of illness concepts. It was the difference in the mothers' definitions of being sick (e.g., "it's when I'm lying down and I can't get up and feed the children") and the childrens' definitions of being sick (e.g., "I'm sick when I have something that hurts") that led Campbell (1975) to conclude that children do not simply incorporate maternal definitions into their own. According to Campbell (1975), children do not learn about concepts through a direct transmission of parental values and definitions, but as part of a general socialization process.

The above research focuses primarily upon the health beliefs and behaviors of school-age children. Little is known from this research about the development of health- and illness-related concepts or about family influences on the acquisition of this knowledge. To date, no investigation has focused on family correlates of health knowledge in very young children.

Rationale and Purposes of the Study

The success of health education programs for young children will depend largely on two considerations. First, one must have means to assess accurately the extent and quality of children's health knowledge. Second, one must have an understanding of the interrelationships and contributions of individual, family and school variables to the knowledge base of young children.

Attempts to assess young children's health-related knowledge have taken two basic forms. Much of the research (namely, that which has been limited in focus to children's concepts of illness causality, prevention, and cure) has presented children with open-ended questions followed by probes similar to those used in Piaget's clinical method. For example, questions such as "how do children get sick?" would be followed by probes such as "what else?" The limitations of this format are obvious. Given the young child's expressive language limitations, this procedure may underestimate children's health knowledge. This method also makes it difficult to make direct comparisons across studies and to replicate findings. Also, when illness concepts are viewed within the Piagetian framework, a child's general intelligence may be confused with domain specific knowledge (Hergenrather & Rabinowitz, 1991).

Recently, two forced-choice forms of assessment have been developed to assess children's health knowledge that appear to be more appropriate for young children: The Preschool Health Knowledge Test (Jubb, 1982) and The Preschool Health Knowledge Inventory (Hendricks & Peterson, 1991). There is minimal overlap in the items each scale uses, and each scale has its own strengths and weaknesses. The scales are similar in that both are picture identification tasks where the correct response is presented with two distractors. This format serves to minimize problems associated with young children's expressive language skills. The scales differ in the amount of detail in the pictures, the amount of verbal narrative given to the child, and the domains that the scale items tap.

The Preschool Health Knowledge Test (PHKT) (Jubb, 1982), suffers from several serious limitations. On the one hand, the administration procedures may not be appropriate for young children. The PHKT is a group-administered test and requires the relatively complicated motoric response of marking an "X" on the correct answer. Also, when the pictures are presented to the children, there is no accompanying verbal narrative describing the pictorial content. In some of the pictures, the significant content is difficult to discern and a child's interpretation may be different from that which the researcher intended. A second limitation of the PHKT has to do with the restricted variability reported and the level of difficulty of the test. When Jubb (1982) reduced the test from a 72-item test to a 45-item test, the items deleted were the ones most frequently missed by the children. The restricted variability made the reliability measures impossible to calculate. The scale was ultimately judged to be too easy for five- and six-year-old children.

A third problem about this test concerns the breadth of the content of the instrument. Questions, such as those requiring the child to identify community health workers (e.g., "who do you go see when you are sick") and basic emotions (e.g., "which picture shows the person who is afraid"), are indirectly related to health knowledge. Those items tapping desirable health practices, identification of body parts by function, prevention and causality of illness, knowledge of safety procedures, and dental health are more likely to form a central core of this knowledge base.

A strength of the PHKT is that its items have been judged by a review panel of health professionals to have content validity.

The Preschool Health Knowledge Instrument (PHKI) (Hendricks & Peterson, 1991) also has strengths and weaknesses. One strength of the PHKI is the administration procedures. The test is designed to be an individually administered and requires the child to point to the correct response. It includes a verbal narrative that describes the pictorial content to minimize idiosyncratic interpretation. A major weakness concerns the meager number of items used to tap the child's knowledge of various content areas; i.e., there are only two items that assess a child's knowledge of illness prevention and causality. Another concern is the age-appropriateness of the items; for example, identifying food with too much salt. In an attempt to address the limitations of both of the instruments discussed above, the present study will employ an instrument that combines the strengths of the PHKT and the PHKI (see Appendix A). A composite instrument will be developed by using five of Jubb's content areas as a framework for subscales. The criteria used to select items was based on three factors: (1) the centrality of the domains and the items tapped as children's health knowledge; (2) the age-appropriateness of the items and the pictorial descriptors; and (3) the use of items covering a broad range of difficulty. There is a total of five items per subscale. Twenty of the 25 items come from the PHKT and were judged by a panel of reviewers as appropriate items for assessing children's health knowledge. The remaining five items--one for each of the five subscales---come from the PHKI. The present instrument, the Picture Identification Assessment of Health Knowledge (PIA), will be individually administered and will require children to respond by pointing to their answers.

Given that some earlier research of children's health knowledge has drawn its conclusions from open-ended questions, the present study will also use an open-ended assessment instrument for descriptive, hypothesis generating purposes. Five open-ended questions (described in Chapter II: Methodology and Procedures) that correspond to the five subscales of the PIA will be presented to the children. The information generated in response to these open-ended questions may disclose health knowledge that the picture identification format fails to assess and could be used to develop future items for an assessment of health knowledge.

Statement of the Problem and Hypotheses

The present research is based on a model which presumes that the early development of health knowledge requires 1) sufficient conceptual maturity to understand elementary health concepts, 2) health-related experiences that afford the opportunity to acquire health- and illness-related concepts, 3) a family that provides information and concepts by integrating them into the daily experiences of the child, and, 4) early education experiences that provide learning about health-related topics.

Much of the previous research on children's conceptual maturity has been based on Piagetian theory using measures of conservation, transformations, causality and abstract thinking to describe cognitive maturity. For the purposes of the present research, the short form of the McCarthy Scales of Children's Abilities was administered to assess children's general cognitive abilities. It was expected that general conceptual maturity contributes to variations in children's health concept development.

The second component of the present model concerns the contribution of children's prior health experiences and encounters with illness to differences in children's health knowledge. Previous research studies examining the relationship between children's health status/history and health concepts have produced contradictory findings. For the present study, child health status/history is assessed via parental report (see Appendix B: Part B). Based on the assumption that young children learn best via concrete experiences, it was expected that their own experiences with health and illness serve as an important source of information and learning, and that this measure is positively associated with health knowledge.

Health-related knowledge is likely to be acquired from several sources. One important source would appear to be the family. The third component of the present model includes three aspects of the home environment that may be important in the early development of health knowledge: the general home environment, the establishment of health-related rules, and the enforcement of these health-related rules.

The relationship between early home environmental experiences and cognitive outcomes has been widely explored (Gottfried, 1984). The daily interactions of family members provide models of specific behaviors and roles as well as the stimulation of the development of language and cognitive skills. Socioeconomic status has been often used as an index of the family environment. The Hollingshead's Four Factor Index has been recommended for use in developmental research because of its high reliability and high correlations with the developmental status of children (Gottfried, 1985). It is expected that this measure is positively associated with children's health knowledge.

It is important to introduce good health habits and attitudes during early childhood. Many behavior patterns that affect the long-term quality of health become well established early and are frequently carried over to adulthood (Mahoney, 1982). It is important that parents provide young children with accurate information and help them develop practices that will promote good health. Much of that which children learn at home occurs through incidental learning of daily rules. Therefore, it was expected that when parents have established health-related rules and enforce them, the children will have increased levels of general health knowledge.

The fourth component of the present model calls for a measure of the influence of early childhood education (ECE) upon the development of children' general health knowledge. Some children spend only three to five hours daily in ECE programs, but many children spend as much as eight to 10 hours daily in these programs. Therefore, the responsibility for children's health care and health knowledge is often shared by parents and teachers (Christiano, 1982). Teachers can provide direct instruction and incorporate daily learning experiences that are designed to promote a child's health knowledge and habits.

The present research was designed to investigate the interrelationships and contributions of selected child characteristics and family and school variables to the early development of health knowledge. To meet this goal, four specific hypotheses were tested:

Hypothesis One: The child's general cognitive ability, as measured by the General Cognitive Index (GCI) of the McCarthy Scales of Children's Abilities, is positively and significantly associated with the level of the child's health knowledge.

Hypothesis Two: Children's experience with illness, as measured by parental ratings of the child's health status, serves as an important source of information and learning for the child and is positively associated with the child's level of health knowledge.

Hypothesis Three: The family's socioeconomie status, its rules for the child's health behaviors, and the degree to which parents purport themselves to enforce health-related rules are positively associated with children's levels of health knowledge.

Hypothesis Four: The emphasis on health-related issues in the preschool environment (i.e., teacher ratings of the degree of importance that health-related concepts and units have in the total curriculum, and observer ratings of health-related routines in the classroom) is positively associated with children's level of health knowledge.

CHAPTER II

REVIEW OF LITERATURE

Four content areas of research are pertinent to the present investigation: 1) children's concepts of health, illness, body function and illness causality; 2) children's health beliefs and behaviors; 3) family influences on children's health beliefs and behaviors; and 4) the assessment of children's health knowledge. The primary foci of research on these issues have been children's illness concepts and children's health beliefs and behaviors. Investigations have been conceptualized primarily within the context of two theoretical orientations: cognitive developmental theory and social expectancy theory. Researchers utilizing the cognitive developmental framework have focused on children's definitions of health, anatomical knowledge, and concepts of physical illness and illness causality. The findings have been organized and explained using Piaget's stages of cognitive development. Researchers within the field of expectancy theory have focused on the degree to which children perceive themselves to be vulnerable to health problems and the relationship of perceived vulnerability to potential health behavior.

Research from Cognitive Developmental Theory

Studies utilizing the cognitive developmental framework have been concerned primarily with the specific ways that children conceptualize illness over the course of development. Central to this research is the hypothesis that children's concepts progress through a predictable and systematic sequence of developmental stages as described by Piaget (e.g., Burbach & Peterson, 1986).

Definitions of health

Several studies have examined developmental differences in children's definitions of health. Natapoff (1978) interviewed first, fourth, and seventh grade children to determine how they defined health, how they felt when they were healthy, and how they determined when someone else was healthy. She found that six-year-old children equated health with feeling good, being able to do what they wanted, and not being sick. External cues such as the presence of rosy cheeks and clear eyes were cited as important indicators of health. Older children acknowledged the difficulty of defining a healthy state and relied on internal cues to determine a healthy state.

Eiser, Patterson & Eiser (1983) examined children's ideas of health, illness and illness prevention. Eighty children at ages six, eight, nine and 11 years were questioned. For all ages, children defined health in terms of exercise and being energetic (75%) and eating good food (40%). As children matured, they were more likely to define health as not being ill, exercising, and being fit. Some older children stated that being healthy involved an increased resistance to infection.

<u>Anatomical Knowledge</u>

Research regarding children's knowledge about their bodies has been relatively sparse. Eiser (1985) has suggested that the reasons for this lack of information are twofold: 1) there is general confusion over what is being investigated, and 2) there are methodological problems in conducting this research. The first problem indicates the lack of distinction between knowledge of anatomy and the psychological aspects of body image and self-concept. The second problem becomes obvious when one examines how data have been obtained. Subjects are frequently asked to draw what is inside their bodies. This direction assumes that the children's drawings will reflect their knowledge and is unaffected by the constraints of language. However, a separate problem emerges since children's ability to depict knowledge is dependent in part on their graphic skills.

Schilder and Wechsler (1935) conducted one of the first investigations in this area. Children between four and 13 years of age were asked to name what was inside their bodies. The youngest children consistently stated that food was inside them. It was reported that children older than 11 years gave correct answers, although the authors did not elaborate on how complex their answers were.

Gellert (1962) studied 96 children hospitalized for both acute and chronic conditions. Children were asked to name the parts of their body and then to draw organs on an outlined figure. They were also asked a number of questions about body parts. Children between five and seven years of age drew an average of 3.3 body parts whereas children between 13 and 17 years of age drew an average of 14 body parts. Regardless of age, the most frequently mentioned body parts were bones, blood vessels, heart, blood and brain. Many children mentioned body parts that were associated with their particular illness or surgery. This latter finding suggests that children's body concepts may be influenced by temporary phenomena, such as hospitalization.

Porter (1974) conducted a similar study with 144 healthy children ages six, eight, and 10. Children were asked to draw what was inside outlined human figures. Children of all ages were able to name more body parts than had been previously reported. Porter also noted that organs tended to be drawn with accuracy and proportion and that correct medical terms were used even among the youngest group.

Basically these studies have documented that children's knowledge of body parts increases with age. A question of greater interest concerns how knowledge is acquired. Why do children learn about the heart first, then about the brain and the stomach, and later about the lungs? Why is knowledge about the kidneys, liver, and bladder usually minimal?

Crider (1981) addressed this issue of sequenced learning of health knowledge. Twenty-one children, ages six to 12 years, were interviewed and asked to name what is inside the body, to draw it, and to locate different organs on a figure shown to them by the examiner. They were then asked to describe the function of different organs and to describe what happens to food and to air in the body. During the preoperational period, children perceived body functioning in a relatively global way. The young child tended to include items of food in drawings of the body, and functions were perceived in terms of purpose (e.g., the lungs are for breathing). It is during the concrete operational period that children differentiated between structures and functions. Functions were perceived in terms of coordinated movements in space and time; for example, muscles are in the leg to help it bend. During the period of formal operations, functions are organized in terms of organs, systems, and the interdependence of systems.

Concepts of Physical Illness and Illness Causality

It is only recently that studies have examined children's concepts of physical illness using a cognitive developmental framework (Burbach & Peterson, 1986). Bibace and Walsh (1979, 1981) proposed that children's concepts of illness parallel the findings of Piaget regarding the development of causal reasoning. They interviewed children at three age levels: four, seven, and 11 years of age. The children's responses were coded according to guidelines consistent with Piaget's stages of cognitive development. Two substages were created for each of the Piagetian stages. A few of the youngest children who did not understand the questions at all were placed in an incomprehension category. Children between the ages of two and six years offered explanations of physical illness that were influenced by the immediacy of some aspects of their perceptual experience. The explanation that was cognitively the most immature, phenomenism, was offered in Stage 1. Phenomenism is characterized by children conceptualizing the cause of illness as a concrete phenomenon that may co-occur with the illness, but that is spatially or temporally remote (e.g., "people get colds from the sun"). Children are unable to offer explanations as to how these events cause illness. The most common explanation of preoperational children is offered in stage 2, contagion. This stage is characterized by children viewing the cause of illness as being located in objects or people close to, but not touching the child (e.g., "people get colds when someone else gets near them").

Children between seven and 10 years offer explanations in terms of contamination. This third stage occurs when children distinguish between the cause of illness and how the cause becomes effective. The cause--a person, object or action--is often viewed as external to the child and possessing a harmful or bad quality (e.g., "people get colds when they go outside without a hat"). Illness is contracted when the child's body makes physical contact with a person who is sick or with a contaminated object.

A more mature explanation of the concrete operational child is internalization. This is characterized by children now linking an external cause of illness to some internal effect on the body. This process usually occurs through the processes of swallowing or inhaling (e.g., "people get colds by breathing in bacteria"). Illness is still vaguely described and nonspecific, and reflects the child's confusion about internal organs and their function.

The two substages of formal operations, the physiologic and the psychophysiologic, are both characterized by children differentiating between self and other. The source of illness is described as being within the body even if an external agent is the cause.

In stage 5, children conceptualize illness as the breakdown of internal processes and structures (e.g., "people get colds from viruses"). A malfunctioning or nonfunctioning organ/process is viewed as the culprit. In stage 6, the psychophysiologic, children conceptualize illness in terms of internal physiologic processes while considering the psychological causes of illness simultaneously. Children now understand that thoughts and feelings can influence the way the body functions (e.g., "people get heart attacks by being stressed").

Using a similar approach, Perrin & Gerrity (1981) interviewed healthy children enrolled in kindergarten, second, fourth, sixth, and eighth grades and questioned them about their understanding of causes, prevention, and treatment of illness. Kindergarten children often viewed illness as a consequence of their "bad" behavior. Fourth graders viewed illness as a consequence of the presence of germs. By sixth grade, children were beginning to understand that illness may be caused by a variety of factors.

Banks (1985) examined children's factual knowledge of health-related concepts and the cognitive implications of their answers. Children between three and 15 years of age were asked questions such as "what makes a person sick?" and "what is medicine?". Older children tended to be less egocentric and magical and used standard medical and cultural explanations of colds, germs, and illness.

In one of the first studies to utilize a Piagetian framework, Carandang, Folkins, Hines & Steward (1979) interviewed children with diabetic siblings regarding their concepts of the causes of illness and treatment. It was hypothesized that children who must deal with the illness of a sibling may not conceptualize illness with the same cognitive maturity as do other children. Stress may function as an "intrusion factor" that results in poorer concept development. Seventy-two children ranging in age from six-and-a-half to 15 years were interviewed. Cognitive level was assessed using a physical conservation task. A significant correlation was obtained between the cognitive level of the child and the maturity of the concepts of illness causality and treatment. Children with chronically ill siblings had less mature concepts than did an age-matched group of children with healthy siblings. The authors concluded that the stress of an illness may affect other family members with one result being cognitive regression in illness-related concepts.

Redpath and Rogers (1984) compared the understanding of children who had never been hospitalized with children who had experienced prior hospitalizations but were healthy at the time of the investigation. Maturity of conceptual development was assessed with measures of physical causality and conservation. Illness concepts were positively correlated with measures of physical causality, but not with conservation. Previous hospitalization experience was found be related to older children's understanding of physical illness, but not the younger children's. The research results suggested that second graders were able to utilize the experience of their earlier hospitalization in answering questions about medical procedures and personnel. However, the authors expressed caution in making this interpretation because of the small number of children who had experienced prior hospitalizations.

Potter and Roberts (1984) found that elementary school children's concepts of a hypothetical peers' chronic illness varied as a function of the symptoms of the disease, the information received, and the level of cognitive development. They used Piagetian tasks to establish the level of cognitive development of children in the first, third, and fourth grades. The children were then assigned to different conditions that provided information about a disease. In the "description" group, children were presented with a brief description of a hypothetical child whose observable symptoms and behaviors were associated with a specific disease. In the "explanation" group, children were given the same descriptive explanation plus an additional explanation of the nature of the disorder. The children's comprehension of illness was affected by the type of information presented as well as the child's cognitive level. The children who received an explanation of the illness demonstrated more general comprehension of the illness that did those children who received a description of the illness. Not surprisingly, the children in the concrete operational stage demonstrated better comprehension and retention of specific illness information than did those in the preoperational stage.

Kister and Patterson (1980) examined the concepts of contagion in a sample of preschoolers, kindergarteners, and second and fourth graders. Three ailments were described to the children: a common cold, a toothache, and a scraped knee. Children were asked if each ailment could be caught by sitting next to a person with that ailment. The children were told stories about a naughty child who developed one of these ailments and were asked if the behavior was the cause of the ailment. Preschool children were more likely to overextend the concept of illness contagion and to accept immanent justice as an explanation of illness. Children with a more mature understanding of contagion were less inclined to accept this explanation.

However, later research indicated that preschoolers are more knowledgeable about contagion and contamination (Siegal, 1988). In phase one of this research, preschoolers, and first and third graders were shown videotaped segments of puppets suffering from a cold or a toothache. The puppets indicated they had contracted one of the two ailments either from a friend, or as the result of naughty behavior. The children were asked (1) if the puppet was right or wrong, and (2) if the ailment could be a result of naughty behavior. Although the younger children demonstrated some knowledge of contagion and contamination, they were more likely to refer to the proximity of a sick person and naughty behavior as causes of toothaches than were third graders.

In a second phase of this study children were read stories about an insect, a comb, and a spoon falling into a glass of milk a child was about to drink. The children were asked to evaluate the effects of drinking milk that had come into contact with a used comb, a roach, and a spoon. Most preschoolers accepted the idea that contamination can be prevented by washing a dirty spoon.

Shagena, Sandler, and Perrin (1988) examined the relationship between children's concepts of illness and locus of control in a sample of healthy children, a sample of children with seizure disorders, and a sample of children with orthopedic problems. Children ranging in age from five to 16 years were interviewed about their knowledge of disease etiology, prevention, and treatment and were administered the Children's Health Locus of Control Scale. It was hypothesized that children with an internal locus of control would demonstrate a more complex understanding of illness causality, treatment, and intervention than would children with an external locus of control. Indeed, healthy children scored significantly higher on the questions assessing their knowledge of health concepts and expressed a significantly higher internal locus of control than did the children with chronic illness. The authors concluded that children's perceptions of their control over health issues seem to be a mediating factor between their illness experience and their understanding.

Although Maheady's research was not conducted within a Piagetian framework, it is pertinent here since it examines young children's health-related concepts. Maheady (1986) interviewed 10 three-year-old and 20 four-year-old healthy children. The following questions were posed to the children: how often are you sick?; how are you sick?; do you take any medicine?; do you need to eat any special foods?; do you have any allergies?; is anyone in your family sick?; and, has anyone in your family been in the hospital? Following the children's interviews, questionnaires that asked slightly modified questions (for example, "how often is your child sick," instead of, "how often are you sick?") were mailed to the parents. The results indicated that the children's responses generally agreed with those of their parents. The most accurate responses were from the three-year-olds. The author hypothesized that this finding could be due to the four-year-old children having a more sophisticated and detailed knowledge of illness.

Maheady described the children's responses to each question. There were children who did not understand or answer the question "how often are you sick?" When the children were asked, "how are you sick?", most cited ear and upper respiratory illness. For the question "do you take any medicine?", the four-year-old children gave more specific names of medication than did the three-year-olds. When asked, "do you need to eat any special foods?" some children stated that they ate chicken soup, jello, and tea and toast when they were sick. Most children answered "no" in response to the question "do you have any allergies?" It was not clear they understood the term allergy. The question "is anyone in your family sick or in the hospital?" seemed difficult for some children to answer. Inaccurate responses were thought to indicate that children were describing past illnesses or interpreting visits to a clinic or emergency room as being in the hospital.

Parents and children differed significantly in response to the question "do you take any medicine?" All the children responded that they were currently taking or had taken medicine. They included vitamins and aspirin as medicine. The parents may have interpreted this question to mean prescription medicine taken rather than over-the-counter medications.

The question concerning how a child's experience with illness may influence the acquisition of illness concepts is an important one. Recent studies have examined the development of illness concepts of children who are sick or hospitalized. Simeonson, Buckley, and Monson (1979) studied 60 hospitalized children, ages five, seven, and nine. Six questions were asked: how can children keep from getting sick?; what does medicine do?; how do children get sick?; how do children get stomachaches?; how do children get bumps or spots?; and, when children are sick, how do they get better again? The children's responses were scored in three categories. The first stage used to characterize the children's responses was described as global or undifferentiated and reflected magical thinking or superstitious ideas (e.g., "you get sick when you kiss old people and women"). The second stage included responses of a more concrete and specific nature which associated illness with the violation of rules. The children seemed to be aware that some specific action was the cause of the illness, but they did not know generalized principles (e.g., "taking medicine you're not supposed to causes illness"). It was in the third stage that children demonstrated an awareness of a generalized principle, such as "catching germs from other people causes illness" and "taking medicine can help." The authors noted that children's concepts of illness causality seemed to progress from more global to more abstract functions as a function of age. As the children's understanding of physical conservation increased, so did their understanding of the causes of illness, irrespective of age.

Brewster (1982) reported that measures of cognitive development had a significant positive correlation with children's understanding of illness causality and other illness concepts. Fifty chronically ill children between five and 12 years of age who had spent at least 10 days in the hospital were administered five tasks based on Piagetian theory. It was hypothesized that children's understanding of disease (a high affect area) would lag behind their comprehension of low affect areas, even though similar cognitive skills are involved. However, children demonstrated the same level of cognitive sophistication when answering both types of questions. There was a recurrence of egocentric or magical thinking for questions asking about illness causality and the purposes of medical procedures. It appeared that magical thinking persisted in times of high stress. Children maintained egocentric concepts even though they knew their actions had not caused their illness.

The content of the children's interviews regarding the cause of illness, medical procedures and medical personnel was also analyzed. Three stages were identified. Stage 1 was characterized by children conceptualizing disease to result from human action and was typical of children less than seven years of age. In this stage, medical procedures were viewed as punishment for being bad. Stage 2 was characterized by children identifying one cause for all illness (such as "germs"). In stage 3, children acknowledged that illness may have multiple causes.

Beales, Holt, Keen and Mellor (1983), interviewing 75 children with chronic juvenile arthritis, questioned them about their illness and medical treatment. The patients were divided into two groups: those between seven and 11 years of age, and those between 12 and 17 years of age. They were asked what they imagined their arthritis to be, how it affected their body, and how it made their body different from a healthy one. Responses were categorized on the following bases: subjective feeling ("it makes my finger ache"), surface appearance ("it makes my knee look red"), motor ability ("it stops my finger bending"), and internal pathology ("it damages my bones"). Then the children were asked to draw how they imagined their affected joints looked and to describe them. Lastly, they were asked to explain medical treatments.

The younger children viewed their illness in a concrete manner; arthritis was defined in terms of its effect on the body. It was difficult for them to draw a depiction of the internal state of the joint. Rather, their drawings concentrated on the redness and swollen features of the outside of the joint. The older group recognized that the outward signs were the consequences of internal pathology. Their drawings tended to depict the internal damage to bones and blood vessels. Beales et al. (1983) concluded that children require qualitatively different explanations of their disease depending on their age. It was suggested that, whereas children older than 12 can cope with medical descriptions of their disease, younger children are more likely to benefit from analogies based upon their experiences.

In one of the first research studies comparing healthy children and children with chronic illness, Myers-Vando et al. (1979) examined 12 children with congenital heart disease and 12 healthy children on measures of cognitive development and concepts of the causes of illness. The children's cognitive developmental levels were assessed using the Piagetian tasks of clay and water conservation. Illness causality concepts were assessed via a projective picture task and a semi-structured interview. Whereas the sick children scored lower on measures of cognition, both groups demonstrated an equal understanding of the causes of illness.

In an examination of healthy and hospitalized children, children's concepts of illness causality were found to become more mature over the course of development (Cook, 1975). Less cognitively mature children conceived of illness as a moral issue and interpreted it in terms of self-causation and blame.

Research from Expectancy Theory

Expectancy theory proposes that an individual will take action based on his subjective appraisal of whether the action will achieve a particular outcome. That is, an individual will take preventive health measures if he estimates that the action will result in a desirable state of health (Kalnins & Love, 1982). Researchers utilizing this theoretical framework have been concerned with the degree to which children perceive themselves vulnerable to health problems and with the relationship of perceived vulnerability to children's health behavior.

Perceived vulnerability to health problems

Much of the research in this area is derived from the health-belief model. This model postulates that perceptions of susceptibility, of severity, and of behaviors that will treat or prevent a specific condition are all positively related to the likelihood that preventative action will be taken (Gochman, 1985). This line of research has been the focus of Gochman and his colleagues.

Although Gochman initially defined perceived susceptibility with reference to a single health problem, it evolved to include the degree to which children believe they are susceptible to a variety of health problems (Gochman, 1985). Perceived vulnerability became the term describing this generalized belief.

Gochman and his colleagues conducted a series of studies that examined the construct of perceived vulnerability (e.g., Gochman 1971, 1972, 1981, 1985). Children in various settings were asked questions about the likelihood of their encountering different health problems. Fifteen items were scored on a range from no chance (1) to certain (7). Children were asked how likely they were to experience the following: the flu, a bad accident, a rash, a fever, having a tooth pulled, a sore throat, a toothache, a cold, bleeding gums, an upset stomach, missing a week of school because of sickness, a cavity, a bad headache, breaking or cracking a tooth, and cutting a finger accidentally. Children who had relatively high expectations of encountering one problem usually had relatively high expectations of encountering others (Gochman & Saucier, 1982). Although it appears that perceived vulnerability increases between the ages of eight and 13, older children and young adults do not perceive themselves to be vulnerable to health problems (Gochman, 1981). It has been suggested that the relationship between perceived vulnerability and health behaviors is influenced by an individual's locus of control (Gochman, 1971).

Locus of control

Parcel and Meyer (1978) developed a measure, the Children's Health Locus of Control Scale (CHLC), to assess health locus of control. Their findings indicated that health locus of control is multidimensional in children and centers around three factors: general beliefs about the degree of control children feel that they have over their own health, beliefs that health and illness are determined by chance, and beliefs about how powerful external agents are in determining health outcomes. Children's cognitive levels, locus of control, and understanding of illness were examined in a study by Neuhauser et al. (1978). Using a relatively small sample of 12 four- and five-year-old children and 12 eight- and nine-year-old children, the researchers administered a standard Piagetian conservation task and the Norwicki-Strickland Internal-External Locus of Control Scale to all children. It was found that preoperational children used more external cues to determine when they were ill (or healthy) and were less accurate in describing the recovery process. In contrast, concrete operational children used more internal cues to determine their health status and indicated that they had more control over recovering from illness.

Research by Wood (1983) indicated that older children may not differ from younger children in the use of internal and external cues. Grantz & Pilivian (1984) found that younger children may use more internal cues than do older children to assess their health status. Further research is needed to resolve these discrepancies.

Family Influences on Children's Health Beliefs, Behaviors and Concept Development

The manner in which the family determines the child's concepts of health and illness remains virtually unexplored. However, some studies have considered the family in terms of its socioeconomic status or other social and demographic characteristics. Other studies have examined the relationships between the child's health concepts and characteristics of particular family members, such as the mother or a sibling.

Campbell (1975) compared the consensus between mothers and their children on the meaning of illness and examined developmental differences in illness concepts. Two hundred sixty-four children between six and 12 years of age and their mothers were questioned about their definitions of illness. All of the children were experiencing a short-term stay of less than five days in the hospital. Marked similarities were evident in the comparison of maternal definitions of illness with their children's definitions of illness; however, the elaborateness of maternal definitions were not significant predictors of the extent of their child's understanding of illness concepts. The differences in these definitions led Campbell to conclude that children do not simply incorporate maternal definitions into their own. Rather, he suggests that learning may be more informal and result from general socialization experiences.

With regard to developmental differences, Campbell (1975) found that as the age of the child increased, the definitions of illness more closely approximated those of the mothers. Whereas younger children defined illness in terms of feeling states, there was an increase in the sophistication of definitions that included specific diagnoses and qualifying statements of what was not an illness.

In a second study, Campbell (1978) noted that maternal education and paternal socioeconomic status (SES) were related to children's reports of their conceptions of sick role. Children tended to be stoic and less emotional about illness when their mothers were better educated, but this relationship was mediated by the age and sex of the child. Both maternal education and paternal SES were positively related to the likelihood of the children rejecting a sick role.

Dielman et al. (1982) examined the relationship between parental health beliefs and behaviors and those of their children. Two hundred fifty parents and their children were interviewed regarding their health beliefs and behaviors. Parental health behaviors were associated with children's health behaviors, but no single parental variable consistently predicted children's behaviors. Parental health beliefs were not associated with children's health beliefs. The authors postulated that parental beliefs may operate more as a distal influence, whereas parental behaviors are more immediate and are observed on a daily basis.

Measurement Issues

Research regarding the development and measurement of health concepts has focused primarily on children over age six years of age. Recently, however, two instruments have been developed for the assessment of health knowledge of children ranging in age from three to five years.

The Preschool Health Knowledge Test (PHKT) was developed as a measure of health knowledge that a child would acquire prior to entering first grade (Jubb, 1982). After a review of health education curricula and research projects, Jubb developed 14 instructional objectives and submitted them to a 10-member review panel. Each objective was rated as either very essential, somewhat essential, less essential, or an unessential skill. Nine of the 14 objectives were judges to be very essential or somewhat essential and were retained for further use. These nine objectives were as follows: child can select health practices that are necessary to maintain a healthy body; child can identify a nurse, a doctor, or dentist as a health worker; child can identify the feelings of anger, fear, happiness, and sadness; child can identify common body parts by major function; child can identify the five senses; child can identify basic concepts related to prevention and cause of disease; child can select safety procedures for himself; child can identify ways of showing responsibility for a healthy environment; and child can select health behaviors for keeping teeth healthy and strong.

Eight test items per objective were then developed; each item consisted of a statement and the presentation of three pictures from which the child could choose the correct answer. These 72 items were submitted to the review panel in order to establish content validity. The panel rated each item on the following dimensions: the content appropriateness of each item to its health objective, the vocabulary level of each item statement, and the appropriateness and clarity of the picture responses. All were judged to be content valid and comprehensible. Some pictures were modified to improve clarity.

Pilot testing of this 72-item instrument was completed with 30 kindergarten children; it took 45 minutes to complete the test. Because of the length of time required to complete the test, it was revised as a 45-item instrument. Three items that were the most frequently missed were omitted for each objective.

For the second phase in developing this instrument, it was administered to 100 four-, five-, and six-year-old children. The revised instrument had 45 items and took 20 minutes to complete.

The mean scores for the four-, five-, and six-year-old groups were 40.12, 41.57, and 44.43, respectively. Scheffe analyses indicated that group differences existed between the four- and six-year-old groups and between the five- and six-year-old groups. There were no statistically significant differences between boys and girls. Jubb (1982) concluded that the Preschool Health Knowledge Assessment Test was a valid and practical, but unreliable instrument. Given that the total variability within the group was very low, the test was judged to be too easy.

The Preschool Health Knowledge Inventory (PHKI) is a 27-item instrument that examines children's knowledge of growth and development, mental and emotional health, personal health, family life, nutrition, disease prevention, safety, consumer health, drug use, and community health management (Hendricks, Peterson, Windsor, Poehler & Young, 1988; Hendricks & Peterson, 1991). Using the guidelines set forth by the School Health Education Evaluation for instrument qualifications, the authors designed this test to be an individually administered test (1) requiring approximately 10 minutes to complete, (2) used with multiple ages (three to five years), and (3) used to test knowledge in the 10 health areas listed above.

The PHKI was administered to 75 three-year-olds, 126 four-year-olds, and 87 five-year-olds. Twenty percent of the sample was randomly selected for retesting two weeks after its initial administration. The mean scores for the three-, four-, and five-year old groups were 12.8, 18.0, and 22.45, respectively. Scheffe analysis indicated significant age differences between all three groups.

An item analysis indicated that two items related to smoking and air pollution had low item discrimination coefficients (less than r = .20), or an item difficulty index greater than r = .90. Another item on smoking had a test-retest reliability less than r = .89 and was omitted. The data were then scored again using 27 items. Reliability coefficients were calculated using Pearson's

Product Moment Correlation and the Kuder Richardson 21 formula. Pearson r's for instrument stability by group were as follows: .84 for three-year-olds; .89, four-year-olds; .67, five-year-olds; and .89, for all ages combined. KR21 r's for internal consistency by group were as follows: .90 for three-year-olds; .79, four-year-olds; .62, five year olds; and .83 for all ages combined.

The authors concluded that this individually administered instrument is reliable for children ages three to five. It was thought that the lower reliability indexes for the five-year-old group may reflect that the test was too easy for that age group. Although the authors specified that attempts were made to deal with content validity, there were no data presented as to how this was done.

CHAPTER III

METHODOLOGY AND PROCEDURES

Subjects

The subjects for this study were 125 Caucasian children who ranged in chronological age from 46-69 months and their families. Only one child per family was selected for participation in the study.

Day care centers and preschool programs in Guilford and Forsyth Counties that were nonprofit and that were "A" licensed by the State of North Carolina were identified. Licensing consultants and officers in the local chapters of the North Carolina Association for the Education of Young Children were contacted and asked to assist in identifying centers that fit these criteria. A list of 15 centers that consultants and officers agreed represented programs of similar quality was compiled. From this list, 11 programs were randomly selected and their directors were contacted. Because of (1) an insufficient number of returns from one program, and (2) the refusal of one director to participate, children in the sample represented nine different programs.

A total of 317 letters that described the research project and included informed consent forms (see Appendix C) were distributed to families by classroom teachers or center directors. One hundred forty-four families (46%) returned the informed consent forms agreeing to participate. Twenty-three (7%) families declined to participate. One hundred fifty families (47%) failed to return the consent form.

Of the 144 families who agreed to participate in the study, 13 were excluded. Three families represented a program with too few returns. The remaining 10 families who were excluded were Black families for whom the health knowledge assessment (PIA) was deemed inappropriate; the data collected from these families were not included in the data analysis.

Of the remaining 131 Caucasian families who agreed to participate, six were excluded from data analysis for the following reasons: (a) two families failed to return the family questionnaire, (b) two children refused to participate, and (c) two children were withdrawn from their school programs during the period of data collection. This procedure resulted in a complete set of data for 125 (95%) of the families who agreed to participate in the study.

Instruments (Dependent/Criterial Measures)

The two instruments used to assess the children's general health knowledge were one using an open-ended question format and the other, a picture identification format. Each instrument was individually administered. An open-ended assessment was used to obtain descriptive information concerning the numbers and kinds of health-related issues young children generated freely when not constrained by forced response alternatives. This instrument was administered first in order to preclude any bias that prior questioning could create with regard to the subjects' health knowledge. The following open-ended questions were presented to the children:

1) Everyday we do things to take care of our body so we stay strong and healthy. Tell me all the things you can think of that you do to stay strong and healthy.
2) Tell me the names of all the parts of your body that you can think of and what they do.
3) How do children get sick? Tell me all the things that can make children get sick.
4) How can children make sure they don't get sick? Tell me all the things children can do to keep from getting sick.
5) What things can children do to get better when they are sick? Tell me all the things children do to get better when they are sick.
6) It is easy for children to get hurt when accidents happen. What kind of things can children do to stay safe so they won't get hurt? Tell me all the things you can think of that children do to stay safe.
7) What can children do to keep their teeth strong and healthy? Tell me all the things children can do to take care of their teeth.

Children's verbatim responses were recorded. Standard probes, such as "tell me more" and "can you think of anything else," were used with each open-ended question until the examiner was satisfied that the child had answered the question to the best of his ability. It was hoped that the information generated in response to these open-ended questions would disclose health knowledge untapped by the picture identification assessment. Responses to these open-ended were submitted to qualitative analysis.

The Picture Identification Assessment of Health Knowledge (PIA) is a composite instrument consisting of questions and procedures developed by Jubb (1982) and Hendricks & Peterson (1991). In an attempt to overcome the limitations of the earlier-developed instruments (discussed in a prior section), the present instrument included a combination of items which built upon the strengths of two instruments, the Preschool Health Knowledge Test (Jubb, 1982) and the Preschool Health Knowledge Inventory (Hendricks & Peterson, 1991) instruments. The composite instrument (PIA) was developed using five of Jubb's content areas as a framework for the following subscales: (1) knowledge of desirable health practices, (2) knowledge of the function of body parts, (3) knowledge of prevention and causality of illness, (4) knowledge of safety procedures, and (5) knowledge of dental health practices.

Each subscale contained two items included in Jubb's revised instrument, two items deleted from the Jubb (1982) instrument because of their higher difficulty level, and one item selected from the Hendricks and Peterson (1991) scale. Thus, the present instrument contained a total of 25 items. Items for these subscales were selected according to the following criteria: (1) the age-appropriateness of the items and the pictorial content; (2) the use of items covering a broad range of difficulty; and (3) the centrality of the domains and items to children's health knowledge.

The identification test required the child to point to one picture, from an array of three, that best described an appropriate health practice, body part, or safety procedure. The directions and picture plates for the PIA are specified in Appendix A. Scoring for the PIA represents the total number of correct answers, and scores can range from zero to 25.

Instruments (Independent/predictor measures)

General cognitive ability. The short form of the McCarthy Scales of Children's Abilities (MSCA) (Kaufman, 1977) was used to assess children's general cognitive abilities (GCI). This form was proposed by Kaufman (1977) as a screening instrument for children's cognitive skills and required 20 - 25 minutes administration time. The six-subtest form (problem-solving, word knowledge, numerical memory, verbal fluency, counting and sorting, and conceptual grouping) has been shown to have excellent psychometric properties (Kaufman, 1977). In the standardization sample, the reliability of the estimated GCI was $r = .90$ for preschoolers (Kaufman & Kaufman, 1977). The two forms of the scale correlated r = .92 for all ages (Kaufman & Kaufman, 1977). The standard error of estimate reported for the short form was six points. Sixty-six percent of the time the child's estimated GCI will differ from the actual GCI by four points; 95% of the time, by 12 points (Kaufman, 1977). Test-retest reliability was r = .89 at ages 3-3 1/2 and r = .88 at ages 5-5 1/2 (Kaufman, 1977).

Based on the sum of the child's weighted raw score for the short form, an estimated General Cognitive Index (GCI) was computed by converting the short form score to estimated GCI scores. The equations used for this conversion are presented by Kaufman (1977); there is one equation that corresponds to each three-month period between 2-1/2 and 8-1/2 years. The mean and standard deviation of the estimated GCI are set at 100 and 16, respectively. It would be expected that approximately two-thirds of children tested would obtain GCIs between 84 and 116; approximately 95% would score between 68 and 132.

Child health status. To examine how children's health status and health history may influence health-related knowledge, a seven-item questionnaire was used that was adapted from the Rand Health Insurance Experiment and reported by Lewis, Pantell, and Kieckhefer (1989). It was designed to assess the children's general health status by asking parents to rate items, such as their child's susceptibility and resistance to illness (see Appendix B: Part B). The first three questions were rated on a scale of one to four; the last four questions, on a scale of one to five. A rating of '1' indicated that parents had a great deal of concern regarding their child's health or that their child had experienced more health problems. A rating of '4' or '5' indicated that parents had little or no concern regarding their child's health or that the child had experienced fewer health problems. Possible scores could range from seven to 32. Higher scores were viewed as indicative of better health status for the child.

This measure of child health status has been described as a reliable measure for researchers who want to use a brief questionnaire to assess child health status. Lewis et al. (1989) reported internal consistency (Cronbach's alpha) of $r = .78$. A moderate correlation between this measure and a functional status questionnaire ($r = .47$, $p < .001$) was cited as evidence for construct validity.

Hollingshead's Four Factor Index of Social Economic Status (SES) (Hollingshead, 1975). This revised four factor index of SES considers the factors of educational level, occupation, marital status, and gender of head of household. Gender is not used in the calculations. Education and occupation are scored, then weighted and summed to produce a single SES index. Marital status determines whose information is utilized in the calculations. In a dual wage earner family, SES would be calculated for each spouse and the average score is used for the family. In a single parent family, SES would be calculated based on the education and occupation of the single head of household.

Educational level is based on the number of years of schooling:

Score	Level of schooling completed
1	Less than 7th grade
2	Junior high (9th grade)
3	Partial high school (10th or 11th grade)
4	High school graduate
5	Partial college (at least one year) or specialized training
6	College or university graduate
7	Graduate professional training

Occupations are placed in the following nine categories:

Score	Occupational Category
1	Farm laborers/menial service workers
2	Unskilled workers
3	Machine operators/semiskilled workers
4	Smaller business owners/skilled manual workers/craftsmen/tenant farmers
5	Clerical & sales workers/small farm and business owners
6	Technicals/semiprofessionals/small business owners
7	Smaller business owners/farm owners/managers/minor professionals
8	Administrators/lesser professionals/proprietors of medium sized businesses
9	Higher executives/proprietors of large businesses/major professionals

The following formula was used to calculate SES: SES = (Education Score x 3) + (Occupation Score x 5). Scores can range from a low of 8 to a high of 66, with higher scores reflective of higher SES. This index has been recommended for developmental research because of its demonstrated high reliability and its consistently high correlations with the developmental status of young children (Gottfried, 1984). Information for determining the SES of the families participating in the study was obtained via questionnaire (see Appendix B: Part A).

Home health-related rules. This measure was designed to assess the family's endorsement of and adherence to health-related rules. The first component, family attention to health, was measured by asking the parents to identify on a questionnaire whether they had rules in their household for each of the 15 health- and safety-related practices which were presented on a pre-established list. If parents noted that they did have rules for these behaviors, they were asked to describe the specific rules(s) during a telephone follow-up call. In addition, there was one open-ended question that asked parents to describe any additional rules they had for their family's health or safety that had not been covered by the previous 15 items. The number of specific rules parents described were summed, and the total was used as a measure of the family's attention to health (PARR).

Parents were also asked to rate the degree of enforcement for each of the pre-established, health-related rules. This measure consisted of 15 items rated from '1' = Never enforced to '5' = Almost daily enforcement. A mean rating of the number of times per week that health-related rules were enforced yielded a measure of the adherence to health rules which was assumed to reflect the importance of health for the family (ENFORCE). The questions for both measures are listed in the family information form (see Appendix B: Part D).

The three open-ended questions that parents answered on the questionnaire were as follows: 1) Do you have any additional rules for health or safety that are not covered above? If so, please list them. 2) How do you help your child learn about ways to stay healthy? 3) What are the most important things you think a child this age needs to know about health? (Please explain). The purpose of these questions, which were subjected to qualitative analysis, was to generate information that could be helpful in future test development.

School ratings. Two rating scales were designed to assess the extent to which day care centers and preschools incorporate health-related units and basic health and safety routines into their programming for children. The first rating scale was completed by each of the 14 classroom teachers. Twenty units were rated on a scale of one (no emphasis) to five (most emphasis). Nine of the 20 units related specifically to health-related issues and were later used in the multiple regression analysis. Higher scores were assumed to reflect a greater emphasis upon health concepts within the overall curriculum (CURRIC).

A second rating scale was an observation scale designed to examine basic health and safety routines of the classroom. One three-hour observation was completed in each classroom prior to any data being collected; brief, daily observations were also made during the period of data collection. Ten items were rated on a scale of one (never) to five (always). The items rated included scheduled times for health routines, attention to grooming and hygiene, and safety. Higher scores were assumed to reflect a greater emphasis on daily health-related routines (CLRR). Appendix D contains both of the rating scales outlined here.

Procedures and Tasks

All children were tested individually at the day care center or preschool where they were enrolled. For two children, it was necessary to divide the testing into two shorter time periods. The other children maintained attention and interest during a single 40 - 45 minute testing session. Testing was conducted in an area separate from the classroom that was relatively quiet and free of distractions.

Child testing sessions. The examiner was introduced to the students in the classroom prior to her asking children to leave the classroom with her. The classroom teacher was shown the list of children whose parents had agreed to participate, and then the teacher selected a volunteer from that list. Each child was asked to accompany the examiner to the testing area as specified in the following directions:

> "Hi, Child's name. I'm Mrs. Clark. I would like to learn some things about you today. I have some word games, puzzles and picture games for you to play with me today. Your (mom or dad) signed this letter saying it was O.K. for you to come and play games with me. (The letter was shown to the child). Will you come with me to (site of the testing)? Let's go."

If a child refused, the examiner asked for another volunteer. Each child who refused was offered another opportunity to participate.

The order of the presentation of the testing instruments was counterbalanced with half of the children receiving the short form of the MSCA first and half of the children receiving the health knowledge measures (PIA and the open-ended questions) first. When the MCSA was presented first, the examiner began the session by saying the following: "I have some different games for us to play, like puzzles and blocks. Are you ready to begin?" The items for the MCSA were presented to the children according to its standardized instructions.

The health knowledge assessment began with the open-ended questions. For this segment the examiner began with the following: " (Child's name), I have been talking to children here at your school about different things that children do to take care of themselves and to stay healthy. Everyone has had really good ideas to share with me. I hope you will share your ideas with me." Then the first question was presented to the child, and his/her verbatim response was recorded. Subsequent questions were presented and responses recorded.

Upon the completion of the open-ended questions, the Picture Identification Assessment of Health Knowledge (PIA) was administered. The pictures were in a notebook format, and each question was presented one at a time. For each question, the examiner presented the page, read the question, and pointed to each picture as it was described in the question. The number of the picture the child selected as his answer was recorded. This instrument is contained in Appendix A. The PIA was readministered to 72 of the children approximately two weeks later to obtain an estimate of test-retest reliability.

Parental questionnaires and interviews. During the week that testing began in each center, the family questionnaires were distributed to parents who had agreed to participate (see Appendix B). Parents were contacted by telephone after their child had been tested. The purpose of this telephone contact was fourfold: 1) to obtain information concerning any item that was not answered on the questionnaire, 2) to ask families to describe specific rules their family had established for their home health-related practices, 3) to ask parents who reported that their child had experienced a major illness several follow-up questions (see Appendix B), and 4) to answer any questions the families had about their child's performance.

Statistical Analysis Plan

The present research was designed to accomplish three primary objectives.

I. Preliminary analyses were conducted to examine the measurement properties of the composite instrument, the Picture Identification Assessment of Health Knowledge (PIA). Although error is involved in any type of measurement, the extent to which error is minimized refers to an instrument's reliability. Since the measurement of the dependent variable, children's health knowledge, was a composite instrument developed from two existing instruments, there was no previous reliability information available. For this study, test-retest reliability, item reliability, internal consistency (for the overall scale and its five subscales), and item difficulty were examined.

II. The primary analyses of the present study focused on the interrelationships and contributions of selected child, family, and school variables to the early development of health knowledge. To meet this objective, Pearson Product Moment Correlations and multiple regression analyses were performed. Children's health knowledge, as measured by PIA scores, served as the dependent variable. To assess the direction and degree of association between children's health knowledge and GCI and CHS, Pearson Product Moment Correlations were computed. Prior to the multiple regression analyses, the data were examined for any missing values, for outliers, and for violations of assumptions. The assumptions which were examined included normality, linearity, homoscedasticity, and lack of multicollinearity.

For the first multiple regression analysis, the level of analysis was the individual child and the family. To assess the relative contribution of the child and family variables to the early development of health knowledge, two multiple regression analyses were performed. The first analysis employed a forward multiple regression procedure whereby the measures of general cognitive index (GCI), child health status (CHS), socioeconomic status of the family (SES), the number of parental rules established for health-related behaviors (PARR), and the enforcement of these health rules (ENFORCE) served as predictor variables for children's health knowledge. This analysis was used to determine the best prediction equation and to examine the relative contributions and interrelationships among the predictor variables under study.

A second forced-entry multiple regression procedure was employed whereby GCI served as forced entry variable, and the remaining variables were free to enter in order of their importance. The purpose of this analysis was to determine the extent to which experiential variables predict the child's health-related knowledge when cognitive abilities are controlled.

For the second multiple regression analysis, the level of analysis was the classroom. To assess the relative contributions of child (GCI and CHS) and school variables (CURRIC and CLRR) to children's health knowledge, a forward multiple regression analysis was performed.

III. Qualitative analyses of the responses to the open-ended health knowledge questions presented to both children and parents provided descriptive information as a basis on which to construct future tests. A content analysis was used to derive categories through the reduction of open-ended responses (Miles and Huberman, 1984).

Initially, responses were read and re-read in order to familiarize the researcher with the material and to begin to develop possible categories. The second step of this process was to extract and list on a case-by-case basis all pertinent responses to each question. The categories were considered to be "post defined," that is, defined on the basis of how the data functioned and how many categories emerged (Miles & Huberman, 1984). A unit of analysis was defined as a phrase, sentence, or paragraph that could stand on its own as an answer to a question. Each unit was listed with its accompanying identification number. Because all salient responses were included, there could be more responses per question than subjects in the study.

Next the responses to each question were grouped by similar content. Preliminary category names were devised to approximate the central concepts for each grouping. The data were reviewed to insure that the responses had been placed consistently in the appropriate group. Grouping responses with similar themes or patterns was used as a way to arrive at the overall phenomena by allowing the categories to emerge rather than being defined a priori (Miles & Huberman, 1984). The end result of this analysis was a set of general categories, a set of more specific subcategories, and a count of the number of responses in each category and subcategory.

CHAPTER IV

RESULTS

The present research was designed to investigate the interrelationships and contributions of selected child characteristics and family and school variables to the early development of health knowledge among four-year-old children. The following hypotheses were tested:

H1: The child's general cognitive ability, as measured by the General Cognitive Index (GCI) of the _McCarthy Scales of Children's Abilities,_ is positively and significantly associated with the level of the child's health knowledge.

H2: Children's experience with illness, as measured by parental ratings of the child's health status, serves as an important source of information and learning for the child and is positively associated with the child's level of health knowledge.

H3: The family's socioeconomic status, its rules for the child's health behaviors, and the degree to which parents purport themselves to enforce health-related rules are positively associated with children's levels of health knowledge.

H4: The emphasis on health-related issues in the preschool environment (i.e., teacher ratings of the degree of importance that health-related units have in the total curriculum, and observer ratings of health-related routines in the classroom) is positively associated with children's levels of health knowledge.

To address these questions, families of children enrolled in four-year-old classrooms were recruited from early childhood education (ECE) programs in Guilford and Forsyth Counties of North Carolina. The previous chapter detailed the procedure for recruitment that resulted in a complete set of child and family data for the final sample of 125 families. From the nine participating ECE programs, data were collected from 14 classrooms. The number of children participating in each classroom ranged from 7 to 13. Sixty children were enrolled in day care programs; 65 children were enrolled in half-day preschool programs. The numbers and percentages of children enrolled in each type of early childhood program and the number of classes recruited from each are shown in Appendix G: Table G-1.

The chronological ages of the children ranged from 46 to 69 months with an average age of approximately four and a half years (M = 54.8 months, SD = 5.1). There were 57 male children (45.6%) and 68 female children (54.4%) participating in the study.

The results of the study are presented below in five sections. First, the demographic characteristics of the sample are presented. Second, the subjects' performance on the principal measures of analysis is summarized. Third, the results of the multiple regression analyses are presented. Fourth, the results of the analysis of the measurement properties of the PIA measure of children's health knowledge are presented. Lastly, the results of the qualitative analysis of responses to the open-ended questions about health-related knowledge are summarized.

Demographic Characteristics of the Sample

A summary of the demographic characteristics of the families is presented in Table 1. These data were collected via the parent questionnaire (see Appendix B). As can be seen, the majority of the respondents were the

Table 1

Demographic characteristics of parent respondents

(N = 125)

Characteristic	N	%
Gender of parent respondent		
Male	14	11.2
Female	111	88.8
Marital Status		
Single	2	1.6
Married	116	92.8
Separated/divorced	7	5.6
Maternal Education		
High school graduate	6	4.8
Some college	25	20.0
College degree	40	32.0
Graduate training	54	43.2
Maternal Occupational Level		
Smaller business owner	2	2.1
Clerical & sales workers/ small business owners	3	3.1
Technicians/semiprofessionals/	17	17.7
Small business owners/ managers/minor professionals	28	29.5
Administrators/lesser professionals	29	30.2
Higher executives/major professionals	17	17.9
Not presently employed	29	
Paternal Education		
High school graduate	2	1.7
Some college	18	15.5
College degree	42	36.2
Graduate education	54	46.6

Table 1

(Continued)

Characteristic	N	%
Paternal Occupation Level		
Small business owner	3	2.6
Clerical & sales workers/small business owners	4	3.4
Technicians/semiprofessionals	12	10.3
Small business owners/managers/ minor professionals	21	18.1
Administrators/lesser professionals	39	33.6
Higher executives/major professionals	37	31.9
Family Income		
$10,000 or less	2	1.7
10,001-15,000	1	0.8
15,001-20,000	1	0.8
20,001-25,000	1	0.8
25,001-30,000	1	0.8
30,001-35,000	8	6.6
35,001-40,000	11	9.1
40,001-45,000	7	5.8
45,001-50,000	12	9.9
50,000 or more	77	63.6
Socioeconomic Status (SES)		
High-middle	46	36.8
High	79	63.2
Health Insurance		
Yes	125	100
No	0	0
Regular medical doctor		
Yes	123	98.4
No	2	1.6
Talk with child about health		
Yes	122	98.4
No	1	.8

Table 1

(Continued)

Characteristic	N	%
Frequency of discussions		
Once every 3 months	3	2.5
Once a month	18	14.8
Once a week	57	46.7
Daily	44	36.1
Child interest in body		
No interest	0	0
Little interest	11	8.9
Some interest	57	46.3
More interest	27	23.0
Great interest	28	22.8
Comparison of health knowledge to same age peers		
Much less	0	0
Little less	1	.8
About the same	60	48.4
Somewhat more	52	41.9
Much more	11	8.9
Child with major illness		
Yes	43	34.4
No	82	65.6
Illness required hospitalization		
Yes	6	13.3
No	37	84.4
Positive aspects to illness		
Yes	14	32.6
No	8	18.6
Don't know	21	46.9

children's mothers (89%) and most were two-parent families (90%). Most of the mothers and fathers had either a college degree (32% and 36%, respectively) or postgraduate training (44% and 47%, respectively). A report of family income indicated that the sample was skewed toward the upper-middle income levels with the majority of families (64%) earning more than $50,000 per year.

The Hollingshead Four-Factor Index was used to determine the socioeconomic level for each participating family. These scores ranged from 40 to 66 (M = 56.8, SD = 6.6), indicating that the sample was skewed toward the higher end of the scale. Approximately two-thirds of the sample (63%) fell within the "high SES" strata of major business and professionals, whereas the remaining one-third (37%) fell within the "high middle SES" strata of medium business, technical, and minor professionals.

All of the respondents indicated that their families had health insurance, and most (98%) indicated they had regular pediatricians or family doctors. Most of the parents (99%) indicated that they talked with their child about health-related issues, and approximately 83% reported that these discussions occurred on a weekly basis.

Approximately one-third of the families (34%) indicated that their child had experienced a major illness in the past two years. If a family reported that its child had experienced a major illness, further inquiries were made during a telephone follow-up call (see Appendix

B). A summary of the children's illnesses, as reported by parents, is shown in Appendix G: Table G-2. For the 44 families reporting a major illness for their child, hospitalization was required in only 13% of these cases. Thirty-three percent of these families noted their child's illness was a positive learning experiences for the child and made statements such as "he is no longer afraid of going to the doctor" and "he knows hospitals take good care of people."

Subjects' Performance on the Principal Measures of Analysis

Child measures. A summary of the means and standard deviations for the child and family measures is presented in Table 2. One hundred twenty-five children were administered the short form of the McCarthy Scales of Children's Abilities (MCSA) and were given the initial administration of the Picture Identification Assessment of Health Knowledge (PIA). As would be expected from the SES findings, the mean score of the General Cognitive Index (GCI) for the MCSA (M = 111.8, SD = 15) fell near the top of the average range, with scores ranging from 73 to 145. The mean health knowledge score (PIA) was 21.2 (SD = 2.8), with scores ranging from 13 to 25 (with 25 being the maximum total score). Approximately two weeks after the initial administration, the PIA was re-administered to 72 children selected at random so that test-retest reliability could be calculated. The mean health knowledge score on the retest (PIA-R) was similar to that

Table 2

Means, standard deviations, and ranges of scores for child and family variables

Variables	N	M	SD	Range
Child variables				
CA	125	54.8	5.1	46-69
PIA	125	21.2	2.8	13-25
GCI	125	111.8	15.0	73-145
CHS	124	26.9	3.8	10-32
PIA-R	72	22.0	2.7	9-25
Family variables				
SES	125	56.8	6.6	40-66
PARR	124	19.6	5.0	9-37
ENFORCE	125	4.0	.5	2-5

Note: CA = Chronological Age
PIA = Picture Identification Assessment of Children' Health Knowledge
GCI = General Cognitive Index
CHS = Child Health Status Score
PIA-R = Picture Identification Assessment-Retest
SES = Hollingshead Four Factor Index
PARR = The total number of health-related rules parents described
ENFORCE = The degree to which parents enforce the health-related rules

shown for the original administration (M = 22.0, SD = 2.7), with scores ranging from 9 to 25.

The children's health status scores (CHS) were derived from parental ratings on seven questions calling for an assessment of their child's health status (see Appendix B: Part B). Higher ratings of '4' or '5' indicated that parents had no concern regarding their child's health status or that the child had experienced few or no major health problems. A rating of '1' indicated that parents expressed a great deal of concern regarding their child's health, and/or that their child had experienced frequent health problems. Possible scores could range from 7 to 32, with higher scores indicating better health status for the child. The mean total score for these ratings was 26.9 (SD = 3.8) with a range of 10 to 32. Thus, this sample of children was deemed by parents to be healthy and able to resist illness, a belief resulting in relatively little parental worry about their child's health status.

Family variables. Table 2 summarizes the means, standard deviations, and ranges of scores for the family variables. The family's attention to health in the home was measured by summing the number of idiosyncratic rules parents reported in response to the pre-established list of health-related practices and the number of additional rules parents listed in response to an open-ended question on the family information form. It was possible for parents to list varying numbers of rules per health-related practice, and there were no limits on the number of idiosyncratic rules they could have listed. As shown in Table 2, the total number of rules that parents reported (PARR) ranged from 9 to 37 ($M = 19.6$, $SD = 5.0$). Most parents reported rules for those health-related behaviors that could be considered daily routines around which family life is often organized, such as eating breakfast and brushing teeth. In addition, most parents also reported rules for those items that pose immediate threats to their child's safety, such as crossing the street and operating appliances.

The degree to which families claim to enforce the health-related rules was viewed as a measure of their adherence to health-related practices in the home (see Table 3). This measure (ENFORCE) reflects parental ratings of each of the 15 health-related behavior items on the pre-established list of the questionnaire (see Appendix B: Part D) that were rated on a scale from one to five, with 1 = never enforced and 5 = almost daily enforcement. The means and standard deviations for the enforcement of health-related practices rated by parents are shown in Table 3. The rules that parents purported themselves to enforce most often were related to the child's brushing his teeth ($M = 4.9$, $SD = .4$), followed by rules for eating breakfast ($M = 4.8$, $SD = .6$), bedtime ($M = 4.7$, $SD = .8$), handwashing ($M = 4.6$, $SD = .9$) and crossing the street ($M = 4.4$, $SD = 1.0$). The health-related behaviors receiving the highest enforcement

Table 3

Means and standard deviations of parental ratings of their enforcement of health-related rules (Almost daily enforcement=5; Never enforced=1) (N = 125)

Rule/routine	M	SD
Brushing teeth	4.9	.4
Eating breakfast	4.8	.6
Bedtime	4.7	.8
Washing hands	4.6	.9
Crossing street	4.4	1.0
Snacking	4.3	1.0
Mealtime	4.3	1.1
Television	4.1	1.4
Putting away toys	4.0	1.0
Playing outside	3.9	1.3
Choosing clothes	3.8	1.4
Toileting	3.6	1.7
Operating appliances	3.6	1.6
Taking medicine (when applicable)	3.5	1.6
Sick behavior (when applicable)	3.1	1.6

ratings were in most cases those for which the highest percentage of parents reported having established rules. The notable exception is the moderate enforcement rating for "operating appliances." Some parents reported that their children did not test this limit; therefore, there was little need to enforce it.

The questionnaire asked parents to rate 10 potential sources of their child's learning about health-related issues (see Appendix B: Part C). The means and standard deviations of these ratings are shown in Table 4. Items were rated from not important (1) to most important (5). As can be seen from Table 4, the sources believed to be the most influential were mothers (M = 4.7, SD = .6) and fathers (M = 4.1, SD = 1.0). Day care and preschool programs received moderate ratings (M = 3.1, SD = 1.2), whereas other children, other caregivers, and siblings were rated to have little influence.

It was not surprising to find that parents consider themselves to be the primary sources of health information. However, in view of the cooperative relationship that usually exists between home and school, it was surprising that parents rated their children's day cares/preschools as having only a moderate degree of influence on their child's knowledge about health and illness. However, this fact may be due to parents underestimating the opportunities for learning about health that exists in the early childhood classroom.

School variables. Teachers were asked to rate the

Table 4

Means and standard deviations of parental ratings of sources of children's learning about health

Sources	N	M	SD
Mother	125	4.7	.6
Father	124	4.1	1.0
Doctor	125	3.5	1.0
Day care/preschool	124	3.1	1.2
Books	125	3.1	1.0
Illness experience	125	2.9	1.3
Siblings	108	2.6	1.4
Television	124	2.6	1.0
Other caregivers	122	2.3	1.1
Other children	122	2.2	.9

extent to which they emphasize each of 20 curriculum units (see Appendix D) on a scale of *no emphasis* (1) to *most emphasis* (5). The means and standard deviations for the ratings of these units are presented in Table 5. Of the nine curriculum units relating to general health knowledge, safety was rated as receiving the most emphasis (M = 4.2, SD = .9), followed by ways to stay healthy (M = 3.6, SD = 1.0), the functions of body parts (M = 3.6, SD = 1.6) and sensory awareness (M = 3.6, SD = 1.1). Physical fitness received the lowest mean rating (M = 2.9, SD = 1.0). Units developed to teach safety, body parts, and sensory awareness are frequently found within the preschool curriculum, and are independent of an explicit focus on health related issues. Moreover, the degree of emphasis of health-related units was comparable to the degree of of emphasis placed upon nonhealth-related units.

One three-hour observation was completed in each classroom in order to gain an independent rating of the specific routines contributing to the general health and safety environment for each classroom (see observation form in Appendix D). Also, brief daily observations were made during the period of data collection to corroborate the ratings. Each dimension was rated on a scale of *never* (1) to *always* (5). As can be seen in Table 6, all of the classrooms had scheduled times for health routines of toileting and handwashing (M = 5.0,) . Children and adults almost always washed their hands before handling food and after toileting (M = 4.9), and children were

Table 5

Means and standard deviations of teacher ratings of emphasis placed in each curriculum area

(N = 14)

Curriculum area	M	SD
Making friends	4.8	.6
Self-concept	4.6	.9
Colors, sizes, shapes	4.5	.7
Number & letters	4.4	.7
Safety*	4.2	.9
Holidays	4.1	.9
Plants and animals	3.8	.9
Ways to stay healthy*	3.6	1.0
Function of body parts*	3.6	1.6
Sensory awareness*	3.6	1.1
Taking care of body*	3.5	1.2
Nutrition*	3.5	1.1
Pre-reading skills	3.5	1.3
Health workers*	3.4	1.2
Family life	3.4	1.3
Transportation	3.4	1.2
Illness prevention*	3.1	1.4
Physical fitness*	2.9	1.0
Machines	2.2	1.1
Cultural awareness	2.1	.8

* denotes health-related units

Table 6

Means and standard deviations of observer ratings of classroom health-related routines

(N = 14)

Item	M	SD
Schedules	5.0	0.0
Hand washing	4.9	.3
Supervision	4.8	.4
Environment	4.6	.5
Tables	4.5	.5
Toilet facilities	4.2	.7
Soap	4.1	.6
Nutritious snacks	4.1	.3
Tissues	3.5	.5
Brush teeth	1.0	0.0

almost always supervised (M = 4.8). In addition, the observations showed that most teachers had modified the classroom environment to make it safe (M = 4.6), had cleaned tables prior to use for meals/snacks (M = 4.5), and had provided toilet facilities that were easily accessible (M = 4.2). None of the programs observed made provisions for children to brush their teeth. These scores showed little variability across classrooms.

Multiple Regression Analyses

Regression 1: Predicting children's PIA scores from child and family variables. For the first multiple regression analyses, the unit of analysis was the individual child and family. Children's general health knowledge scores (PIA) served as the dependent variable. The predictor variables were (1) the child's general cognitive index (GCI), (2) the child's health status (CHS), (3) the family's socioeconomic status (SES), (4) the total number of health-related rules reported by parents (PARR), and (5) the degree to which parents purported themselves to enforce these rules (ENFORCE).

The first step in these analyses was to insure that the independent and dependent variables were distributed normally. Visual inspections indicated that the histograms of PIA, GCI, SES, and ENFORCE were approximately normally distributed. However, the plot of CHS was negatively skewed and kurtotic (reflecting the higher health status of children), and the plot of PARR was positively skewed and kurtotic. These results were confirmed by an examination of the standard errors of skewness and the standard errors of kurtosis that showed that the measures of skewness and kurtosis were outside of their expected ranges. However, these violations were not deemed severe enough to void the robustness of the multiple regression analysis.

The bivariate plots between the dependent variable (PIA) and the independent variables (GCI, CHS, SES, PARR, and ENFORCE) were examined for linearity. The plots indicated a general linear relationship between PIA and each of the predictor variables. Further analyses of the relationships among the independent variables failed to indicate evidence of multicollinearity that might otherwise interfere with the regression equation.

The relationships between the dependent and the independent variables were examined with Pearson product-moment correlations that are reported in Table 7. As can be seen, the correlations among these variables are quite low, and most approached zero. The only predictor variable that bore a statistically significant relationship with the PIA was the child's general cognitive ability (GCI), $r = .35$, $p = .0001$.

Two regression equations were estimated. First, a forward selection regression analysis was performed with the child's health knowledge score as the dependent variable (PIA) and the five independent variables (GCI, CHS, SES, PARR, and ENFORCE) entering in order of significance. Table 8 presents a summary of this

Table 7

Correlation matrix with dependent and independent variables for child and family variables

(with *p* values)

	GCI	CHS	SES	PARR	ENFORCE
PIA	.356 (.001)	.015 (.869)	.094 (.298)	-.117 (.195)	.068 (.450)
GCI		.011 (.901)	.133 (.139)	.077 (.391)	-.162 (.072)
CHS			.131 (.146)	-.015 (.870)	.043 (.633)
SES				.054 (.552)	.096 (.287)
PARR					.199 (.027)

Note: PIA = Measure of children's health knowledge

GCI = General Cognitive Index

CHS = Measure of child health status

SES = Measure of socioeconomic status

PARR = Number of health-related rules parents reported

ENFORCE = Degree of enforcement of health-related rules

Table 8

Results of the forward multiple regression for child and family variables

Variable	b	Std. Error	*t*	*p*-value
GCI	.067	.02	4.266	.0001
PARR	-.095	.05	-1.981	.0499
Intercept	15.599	1.945		

R-squared = .15

Adjusted R-square = .13

Overall F = 10.66 (*p* = .0001)
df = 2,122

analysis. The first variable to enter was GCI ($\underline{t}$ = 4.27, $\underline{p}$ = .0001), reflecting its significant and positive relationship to children's health knowledge. The only other variable to enter the equation at $\underline{p}$ < .05 was PARR ($\underline{t}$ = -1.98, $\underline{p}$ = .0499), reflecting its significant, but unexpectedly negative, relationship to children's health knowledge. The negative contribution of PARR, although contrary to the present prediction, may indicate parents' tendencies to establish more explicit rules for children having less awareness of health-related issues. It may be the case that children who are more knowledgeable about health-related issues incorporate this knowledge into their daily behavior spontaneously, making it less necessary for parents to specify explicit rules.

The $\underline{R}$-square for this two-variable model was .15 (F = 10.6, $\underline{df}$ = 2,122, $\underline{p}$ = .0001). Thus it appears that relatively little of the variability (15%) of the <u>PIA</u> measure of children's health knowledge was explained by the GCI and PARR, and none of the variability can be accounted for by the other child and family measures observed in the present study.

An examination of the residuals for this model in which GCI and PARR served as significant predictors for children's health knowledge indicated the following: (1) that there appears to be a random scattering of points when the residuals are plotted against the predicted values, and (2) that there may be possible outliers in the data. The plot of residuals against predicted values appeared as a horizontal band with relatively equal dispersion around zero. From this, it is assumed that the model provides a reasonable fit. These plots also provided evidence for linearity, normality and homogeneity of error variance.

A review of the standardized residuals revealed that five observations had values between 2.0 and 3.0 in absolute value. In a data set with 125 observations, it is likely there will be approximately seven residuals in the suspicious range due to chance alone. As it was stated above, there were five suspicious residuals in this data set; therefore, it is not likely these are true outliers but rather, are due to chance alone.

The GCI scores of three children fell within the borderline range (that is, scores lower than 80). These cases were deleted and the correlational and regression analyses were repeated. However, these deletion of these scores did not significantly influence the results.

Initially it had been decided to perform a second forced-entry multiple regression procedure with General Cognitive Index serving as the forced-entry variable and the remaining predictor variables free to enter in order of their importance. This analysis was planned to determine the extent to which experiential variables predict the child's health-related knowledge when cognitive abilities are controlled. However, in view of the zero-order correlations between the majority of the predictor variables and the PIA, it was deemed unnecessary to follow through with this analysis.

Regression 2: Predicting children's PIA performance from child and school variables. A forward regression procedure was performed to examine the combined influence of children and classroom variables on children's health knowledge (PIA). The predictor variables were to be (1) the child's general cognitive index (GCI), (2) the child's health status (CHS), (3) the degree of emphasis placed upon health-related curriculum units in the overall curriculum (CURRIC), and (4) the observed evidence of health-related routines used in the classroom (CLRR). The level of analysis for this multiple regression procedure was the early childhood classroom. Although data for the child variables were available for each individual, the school data were available on a classroom basis only. After the data were sorted by class, mean scores averaging over children for each classroom were calculated for the independent variables, GCI, CHS, CURRIC (using only the ratings for the health-related units), CLRR and the dependent variable PIA. This procedure yielded an average student profile for each classroom.

These scores were averaged by classroom (n=14) in order not to violate the independence assumption so critical to multiple regression analysis, or to reduce artifically the variability of the data by using class values for each individual. When the scores are averaged by classroom, each class remains independent and no class is over- or under-represented on the basis of the number of children per class. However, this procedure posed a serious problem. With such a small sample size of classrooms, the ability to detect variability is reduced. Since the minimum requirement of cases per variable (4 to 5 times more cases than independent variables) for multiple regression was violated, one strategy that can be utilized is to reduce the number of independent variables by deleting some of the independent variables (Tabachnick & Fidell, 1983). It was decided to eliminate CHS from the analysis because of its nonsignificant correlation with PIA.

To determine if the dependent variable, PIA, and the independent variables, GCI, CURRIC, and CLRR, were normally distributed, plots were visually inspected and the values for kurtosis and skewness checked. All of the variables were normally distributed. The bivariate plots between PIA and the independent variables indicated a general linear relationship. This finding was supported by an examination of the plot of the residuals against the predicted values.

Table 9 shows the correlation matrix for these variables. Moderate, but nonsignificant, correlation coefficients were found between the dependent variable, PIA, and the two school-related variables, CURRIC (r = .362, p = .204) and CLRR (r =.475, p = .086). Table 10 summarizes the findings of the forward regression analysis for GCI and school predictor variables. As can be seen from this table, none of the variables was a

Table 9

Correlation matrix of independent and dependent variables for child and school variables (with p values)

	GCI	CURRIC	CLRR
PIA	.117 (.680)	.362 (.204)	.475 (.086)
GCI		-.098 (.738)	-.205 (.482)
CURRIC			-.288 (.319)

Note: CURRIC = Health-related classroom curricular units

CLRR = Health-related classroom routines

Table 10

Results of the forward multiple regression for child and school variables

Step	Variable	b	Std. Error	*t*	*p* value
1	CLRR	2.186	1.170	1.87	.082
2	CURRIC	-0.353	.385	.92	.378
3	GCI	.053	.076	.70	.502

Intercept 14.77

R-square = .314

Overall F = 1.53 (p = .268)
df= 3, 13

significant contributor to the model at $p < .05$ level.

When the residuals for the regression model were examined, there appeared to be a positive, linear trend between the residuals and CLRR. An attempt to improve the model was made by using a second order term, CLRR squared. The regression was re-submitted; however, the results remained the same regardless of the use of the squared term. The residual plots of the other variables were not suspicious, and there was no suggestion of any troublesome outliers.

Measurement Properties of the Picture Identification Assessment of Children's Health Knowledge (PIA)

Three types of reliability of the PIA were examined here: test-retest reliability, item reliability, and internal consistency. Item difficulty was also examined. To examine test-retest reliability, seventy-two randomly selected children were re-administered the PIA approximately two weeks after its initial administration. A Pearson correlation between PIA and PIA-R was calculated to assess test-retest reliability of the entire scale; this procedure yielded a correlation coefficient of r = .72 (p = .0001). This correlation, although of a modest magnitude, meets the minimal level that is acceptable for test development, but falls short of the preferred retest reliabilities of r = .90 or above (Nunnally, 1978). It should be noted here that the PIA was administered initially to all children during the morning. Approximately three-quarters of the children were retested during the same time period. The remaining children were retested in the afternoon following the children's nap and snack. This change was not believed to have adversely affected the reliability since the children demonstrated comparable attention skills to the test during the two time periods.

Item reliability was assessed by computing Pearson moment correlations between individual item scores and the total test score. Table 11 shows the correlation matrix for this analysis. A correlation of $r = .30$ between an item and the total score is considered good (Nunnally, 1978). There were only 12 questions (48%) with correlations equal to or exceeding $r = .30$ with p-values less than .0001. The low correlations obtained for the majority of the items, coupled with the percentages of children answering them correctly (see Table 13), suggest that most questions were too easy. Upon further inspection, it appeared that the majority of items that correlated more highly with the total test scores tended to be the most difficult ones. Internal consistency is an estimate of reliability based on the average correlation among items within a test. It describes the consistency of an individual's responses to a set of test items and then totals this consistency for all individuals (Nunnally, 1978). A minimal level of $r = .80$ for the coefficient alpha is preferred. Table 12 presents a summary of the coefficient alphas for the overall scale and its subscales. As can be seen, a coefficient alpha of

Table 11

Item correlations with total score for the PIA

(with p values)

N=125

	Item number				
	1	**2**	**3**	**4**	**5**
TOTAL	.124 (.170)	.298 (.0007)	.256 (.004)	.440 (.0001)	.243 (.006)
	6	**7**	**8**	**9**	**10**
TOTAL	.000 (1.00)	.255 (.004)	.456 (.0001)	.356 (.0001)	.431 (.0001)
	11	**12**	**13**	**14**	**15**
TOTAL	.294 (.0009)	.434 (.0001)	.208 (.020)	.443 (.0001)	.398 (.0001)
	16	**17**	**18**	**19**	**20**
TOTAL	.276 (.002)	.176 (.049)	.502 (.0001)	.297 (.0008)	.463 (.0001)
	21	**22**	**23**	**24**	**25**
TOTAL	.164 (.068)	.267 (.002)	.357 (.0001)	.374 (.0001)	.382 (.0001)

TABLE 12

Alpha correlation coefficients for the PIA

Scale and its subscales

Subscale	Coefficient alpha
Desirable health practices (Item 1, 8, 14, 20, 24)	.358
Dental health (Item 6, 10, 12, 18, 23)	.365
Safety (Item 5, 9, 16, 17, 22)	.210
Function of body parts (Item 3, 11, 15, 19, 25)	.225
Illness causality/prevention (Item 2, 4, 7, 13, 21)	.155
Total (Items 1- 25)	.651

.651 was obtained for the overall scale, thereby failing to meet the minimal criterion. What is more disappointing is that the alpha coefficients found for the subscales ranged from a high of .358 (dental health subscale) to a low of .155 (illness subscale). Clearly, the PIA in its present form does not have sufficient internal consistency to justify its further use. Since reliability is greatly influenced by the level of variability within the group, the low coefficients found for these subscales, as well as for the total scale, may be largely the result of lower variability, a fact which tends to attenuate the obtained coefficient.

The percentages of children answering each question of the PIA correctly are shown in Table 13. As can be seen, 19 questions (76%) were answered correctly by 80% or more of the children, and 10 questions (40%) were answered correctly by 90% or more of the children. Thus, it appears that the PIA did not sufficiently discriminate among the children.

The pattern of responses to the distractors was also examined. The results are shown in Table 13. The low percentage of children selecting distractors for most questions may indicate that the distractors are obviously incorrect to the children, thus reducing the level of difficulty of the scale.

Content Analysis

At the end of the testing session, children were asked seven open-ended questions that related to various

Table 13

Numbers and percentages of children with correct and incorrect answers to each PIA question

(N = 125)

Question	N	% Correct	Distractor 1	Distractor 2
1	119	95.2	1.6	3.2
2	112	89.6	3.2	6.4
3	122	97.6	1.6	0.8
4	108	86.4	4.8	7.2
5	105	84.0	9.6	6.4
6	125	100.0	.0	.0
7	118	94.4	.8	4.8
8	88	70.4	7.2	17.6
9	101	80.8	.8	17.6
10	107	85.6	6.4	8.0
11	120	96.0	2.4	1.6
12	119	95.2	4.0	.8
13	111	88.8	4.8	6.4
14	88	70.4	12.0	16.6
15	71	56.8	16.0	23.2
16	116	92.8	6.4	.8
17	121	96.8	2.4	.8
18	104	83.2	2.4	13.6
19	92	73.6	3.2	21.6
20	74	59.2	10.4	29.6
21	114	91.2	8.8	.0
22	117	93.6	4.0	2.4
23	108	87.1	3.2	7.3
24	100	80.0	10.4	8.0
25	89	71.2	11.2	15.2

dimensions of health knowledge. A content analysis was used to examine the responses to each of these questions. Appendix E, Tables 1 through 7, contains the responses of the children organized into categories and subcategories with the corresponding frequencies. A brief summary of responses to each question is presented below. Forty-nine percent of the children gave one or more responses to each of the seven questions, whereas 8% of the children answered none of the questions. The remaining 43% of the children answered some but not all of the questions.

The first open-ended question the children were asked was, "what kind of things can children do to keep their bodies strong and healthy?" (see Table E-1). One hundred nine children (87%) generated a total of 307 responses to this question. Approximately two-thirds of the responses identified diet as an important aspects of staying healthy. Relatively few of the responses focused on traditional health practices, such as exercise (17%) and sleep (3%), as important aspects of health.

The second question the children were asked was, "tell me the names of all of the different body parts that you can think of." (see Table E-2). This question produced the highest total number of responses (454) with approximately 85% of the children responding. However, over three-quarters of the responses focused on body extremities (e.g., arms and feet) and facial features (e.g., head and eyes). As expected from previous research (e.g., Gellert, 1981), few of the children's responses (approximately 15%) focused on non-observable, internal organs. In view of the national attention given to heart and lung disease, it was surprising that only five children mentioned the heart and two children mentioned the lungs.

The third question asked, "how do children get sick?", produced fewer responses (n = 198) and was answered by approximately 75% of the children (see Table E-3). More than half of the responses included poor eating habits (e.g., "eating too much junk food"), ingesting hazardous substances (e.g., "if you drink something that is poison"), and specific symptoms of illness (e.g., "when you get an earache") as causes of illness. Approximately 15% of the children referred specifically to the causal agents of illness, such as "if you eat too many apples, then you get diahrrea," and "if you kiss someone who has a cold and you catch their germs, you get sick." This finding was unexpected since previous research (e.g., Perrin & Gerrity, 1981) had suggested that preoperational children do not associate illness with germs or provide causal explanations for getting sick.

The fourth question, "what kind of things can children do so they will not get sick?", has been discussed by Piagetian researchers (e.g., Perrin & Gerrity, 1981) as one that children of this age answer by listing rules associated with illness that must be followed. Their findings have also suggested that the concept of illness prevention is particularly difficult for children to understand as reflected in their lowered response rates. In the present study relatively few responses (n = 179) were produced for this question (see Table E-4). As it was found for some of the earlier questions concerning prevention, diet and exercise tended to be mentioned most frequently. The health practices children described were similar to the rules described by Perrin & Gerrity (1981). However, nearly one-third of the responses were related to specific medical and pharmaceutical interventions. Many of these children seemed to have one or more definite ideas of actions they can take to prevent illness.

The fifth question, "what can children do to get better when they are sick?", produced a total of 206 responses from approximately 75% of the children (see Table E-5). Two-thirds of children's answers focused on external interventions, such as taking medicine and going to the doctor. Almost one-quarter of the children's answers reflected traditional health practices, such as getting enough sleep and eating healthy foods, that the children themselves could implement. Some children's answers (10%) indicated that they understood the idea that treatments are illness-specific (e.g., using eardrops if you have an earache).

The sixth question, "what can you do to stay safe so accidents won't happen?" was answered by approximately 78% of the children. As can be seen from Table E-6, the largest response category was related to car safety. As it is shown below, this finding parallels the parents' tendencies to list car safety when they were asked to provide additional health-related rules. This finding suggests that the new law and media campaign regarding seat belt use are producing successful results.

The final question, "what can children do to keep their teeth strong and healthy?", was answered by 92% of the children and produced the least variability in the response categories. The results of their answers are summarized in Table E-7. The majority of the responses focused on the importance of brushing their teeth (118 responses) and going to the dentist (45 responses).

Appendix F contains the summary of parent's written responses to three open-ended questions. When asked, "do you have any rules for health or safety that were not covered above?" (referring to the pre-established list of health-related behaviors on the questionnaire), 11 categories emerged as important family rules (see Table F-1). Over 90% of the additional rules parents described pertained to safety. In fact, during informal discussions, parents indicated their concern that the pre-established list of health-related behavior did not contain enough items related to safety. It should be noted that many of the children's answers regarding safety pertained to car and bike safety as did the parents' answers.

The second open-ended question asked parents "how do you help your child learn about ways to stay healthy?"

(see Table F-2). The most frequently reported method for teaching children about health was talking (81 responses). Only 5% of the responses were related to parents' enforcing rules related to health practices. This finding suggests that parents may not take advantage of the potential learning embedded in the enforcement of health-related rules and provides support for the contention that parental enforcement is not necessarily tied to a child's acquisition of health knowledge.

The last open-ended question, "what are the most important things you think a child this age needs to know about health?", is summarized in Table F-3. Approximately half of the parents responses cited traditional health routines, such a hygiene, nutrition, and dental care, as being of primary importance. Again, safety appears as an important concern for parents with this category receiving the next highest frequency of responses.

CHAPTER V

DISCUSSION AND RECOMMENDATIONS

The purpose of the present research was to examine the interrelationships and contributions of selected child characteristics and family and school variables to the early development of health knowledge among preschool-aged children. The discussion of the findings of the research will focus on (1) interpretations of the results of the tests of the research hypotheses and (2) the measurement properties of the PIA and its utility as a measure of children's health knowledge.

Tests of the Primary Hypotheses

Hypothesis One. Hypothesis One specified that the levels of health knowledge in preschool-aged children vary systematically with children's cognitive maturity. Consistent with this prediction, the GCI was positively and significantly correlated with PIA scores (r = .35, p < .0001) and was found to be a significant predictor of PIA scores (t = 4.27, p < .0001) in the regression analysis. This finding is consistent with previous research documenting the relationship between cognitive maturity and children's illness concepts. However, the magnitude of this relationship was less than expected, accounting for only 12% of the variance of PIA scores. This low correlation may reflect the difficulties encountered in attempting to measure health knowledge with the PIA.

Hypothesis Two. Hypothesis Two specified that children's experiences with illness, as measured by parental ratings of the children's health status, would serve as an important source of information and learning and would be positively related to children's health knowledge. This hypothesis was rejected, inasmuch as the correlation between health knowledge and child health status approached zero. The findings from previous studies (e.g., Brewster, 1982; Cook, 1975) examining the correlations between children's health status, illness and hospitalization and children's illness concepts have failed to establish any conclusive relationships. The present findings fail to clarify the relationship among these variables and fail to support the contention that children's experiences with illness contribute to added knowledge of health-related issues.

One explanation for the nonsignificant association between health knowledge and health status is the low variability found for both of these measures and the skewness of the distribution of the health status scores. Children's health status scores were generally high, a fact indicating a homogeneous population with regard to illness. In fact, more than 90% of parents indicated that their children's health was excellent and that their children were healthier and resisted illness better than did other children. However, it should be noted that the occurrence of illness may or may not serve as a vehicle for concentrated learning about illness. It may be fruitful in future research to examine communicative events associated with the illness experiences in order to gain a better assessment of the quality of learning that may occur.

Another aspect of children's medical experiences that may be important to consider is their experience in preventive care and well-child visits. Some children, in response to the open-ended question "what can children do so they don't get sick," were quite explicit in noting the importance of going to the doctor for check-ups and shots (e.g., "my five-year-old shots"). Moreover, some of the parents indicated through informal conversation that they take advantage of medical visits as an opportunity to teach their child about health-related issues. Therefore, although experiences with hospitalization and illness may be contributing factors to children's health knowledge, other preventive experiences in health care settings may be equally important.

Hypothesis Three. Hypothesis Three specified that the family's socioeconomic status, the family's attention to health (via the establishment of health rules), and the family's adherence to these health rules (as measured by the degree to which parents purport themselves to enforce the health rules) would be positively associated with children's health knowledge. This hypothesis also failed to gain support in the present study since none of these measures served as a positive predictor of the children's health knowledge. The failure to predict children's health knowledge with this set of variables is likely to stem from several sources. The ensuing discussion will focus separately on each of these independent variables.

On the one hand, there was low variability with regard to the socioeconomic status of the families sampled. All of the families fell within the top two categories of the <u>Hollingshead Four Factor Index.</u> Moreover, all of the families reported having health insurance, and almost all reported having regular doctors or pediatricians. Taken together, these findings suggest that the present sample may have been too homogeneous with regard to health care practices to detect the relationships expected here.

In addition, the sample studied was not sufficiently representative of the population at large. In a society where the incidence of divorced and single-parent families is widespread, only 7% of the participating families were representative of these two groups. Another striking characteristic of this sample was the level of education reported for both parents, with 75% reporting a college degree or graduate training. Although the early childhood programs were selected randomly from a list of qualifying centers, the list itself may have been a biased representation of the available centers. This factor, coupled with the voluntary participation of families, limits the generalizability of the results.

The number of health-related rules that parents reported for their household (PARR) entered the regression as a significant predictor of children's health knowledge; however, it was an inverse relationship. Several explanations may account for the unexpected finding. As discussed in the previous chapter, it may be the case that parents tend to impose more rules for children who seem to be insufficiently aware of health-related issues. Children who are more knowledgeable about health-related issues may incorporate this information into their daily behaviors spontaneously and require fewer formalized rules from parents.

Another possible explanation for the inverse relationship is that an abundance of formalized rules related to any dimension of home life may desensitize children to that domain. Instead of raising children's awareness as to the importance of health-related issues, parents who impose larger numbers of formalized rules may overwhelm their children. When this occurs, children often tune out and cease to pay attention to the information a parent is trying to convey. There may be a threshold beyond which children no longer attend, thus decreasing their exposure to health knowledge.

The establishment of health-related rules in and of itself may not necessarily involve teaching about health concepts nor does it necessarily provide children with a rationale as to why certain behaviors are important. Children may be told of expected behaviors without any discussion of the importance of these behaviaors or how they are related to health and health concepts. For the child, the rules may simply call for ritualized behaviors without the child's understanding their health implications. The content analysis revealed some interesting illustrations of this point. One parent admitted that eating breakfast is a rule but "not one that is talked about very much; we just do it." Similarly, some parents noted that, "I think it is a rule, but I don't know if my child knows it is a rule." One can speculate that if the child is unaware of the rule, he is also likely to be unaware of how that rule relates to health information.

The present measure of the parental rule enforcement of health-related behaviors (ENFORCE) was also unrelated to the PIA assessment of children's health knowledge. It had been assumed that in families where health was important there would be attention to health via the establishment of health-related rules, and the enforcement of these rules would reinforce their importance and contribute to the child's knowledge base about health. Several explanations may account for the nonsignificant finding. As it was indicated earlier in the discussion about the failure of the rules measure to predict health knowledge, enforcement of health-related rules does not necessarily assure that children are being taught health-related information. Explanations are not always given when rules and limits are being enforced.

A second explanation for the nonsignificant relationship between rule enforcement and health knowledge is that parental rule enforcement may reflect different rationales and serve different goals for children having different levels of health knowledge. Parents whose children have less health knowledge may enforce rules as a compensatory technique when their children demonstrate less awareness and self-direction in the area of health care. Their goal may be to bring the child to compliance with the rules. In contrast, other parents engaging in high degrees of enforcement may have health knowledgeable children and may use enforcement as a means to provide further explanations as to why these rules are important. In these cases, providing a rationale for rules not only serves to enrich the child's knowledge base for health concepts, but also may provide a much needed link between health concepts and health behaviors.

This ENFORCE scale also presents another problem in that its items may interact with a shift that is occurring from parental regulation, to co-regulation, to child independence. The establishment of certain rules for very young children, such as eating breakfast, brushing teeth, and toileting, may lead to daily routines around which family life is organized. Once these routines are established, often by the time the child is three and four years of age, strict parental enforcement of the rules is no longer required. The role of the parent may shift as the degree of parental involvement lessens. As children begin to share the responsibility with the parent and demonstrate their independence in certain health-related areas, it may be that rules are not monitored and enforced as often. However, parents may not make the discrimination when reporting rule enforcement. Thus, the present measure may tap past and present rules established by parents and, thereby, not reflect those that are currently in use to reflect educational enrichment.

Hypothesis Four. The fourth hypothesis specified that the early childhood education programs' emphases on health-related curriculum units and the establishment of health-related rules and routines in the classroom would be positively associated with children's health knowledge. Contrary to the prediction, the classroom measures failed to contribute significantly to children's health knowledge. Most of the classrooms had perfect or near perfect scores on the self-rating and observation measures, resulting in minimum variability and discriminability among children in the different classrooms.

Although the classroom teachers were not informed of the specific goals of the present study, all of them were aware of its general purpose. It may be that this created a response bias and that the teacher ratings of the health-related units reflect a social desirability factor. Informal discussions with the ECE program directors indicated that the units of safety and body and sensory awareness were a part of the yearly program. However, although there were no specific units planned for "ways to stay healthy," this item received the second highest rating of the health-related units. It may be that other ratings were inflated as well.

Measurement Properties of the PIA

Notwithstanding the above mentioned measurement difficulties associated with each of the independent variables examined here, there are fundamental weaknesses in the measurement properties of the PIA as well. As described earlier, the PIA was a newly constructed measure believed to contain the best items from each of two previously constructed instruments, The Preschool Health Knowledge Test (Jubb, 1982) and The Preschool Health Knowledge Inventory (Hendricks & Peterson, 1991). However, the present failure to predict children's health knowledge from the family and school variables selected here is likely to stem from several sources of measurement difficulty associated with the PIA. These measurement problems are as follows: (1) the marginal test-retest reliability of the total instrument; (2) the low internal consistency of the overall scale and its subscales; (3) the low correlations observed between the items and the total score; and (4) the unacceptably high percentage of correct responses on the scale.

The present study's findings suggested that the PIA was too easy for this sample of advantaged children. Although its basic content may be more appropriate for a less advantaged group of children, there appear to be several fundamental weaknesses of the instrument.

One source of difficulty with the PIA in its present form may be the poor quality of the distractors. One dimension in which the distractors are problematic is that some are likely to be obviously incorrect choices to the children. This problem seems to apply to a substantial number of questions. For example, item 16 asks children to identify the item(s) they should never play with: matches, hairbrush, and pencil. Another item, showing a child cooking at a stove, reading, and playing with a kite, asks the respondent to identify the picture that shows "how you could get burned." The distractors for these two questions represent common objects and activities for children and, therefore, are ones easily ruled out as answers.

Each item on the PIA has three pictures from which the child is to choose the correct answer, thereby ensuring a 33% chance of answering correctly. There may need to be more distractors for each item of the PIA in addition to having more difficult distractors.

Another source of difficulty concerns the limited sampling of concepts associated with each domain of the PIA. Children develop and maintain good health practices through the establishment of good dietary habits, safety practices, physical exercise, and health care. The items of the PIA attempt to assess children's knowledge in some of these areas, but there are some notable omissions, specifically the importance of physical exercise and car safety. For example, the content analysis indicates that the categories of physical exercise and wearing seat belts occurred with relatively high frequencies in the children's responses. The fact that the children frequently mentioned these categories of behaviors, in spite of the fact that these categories are not reflected in the PIA's content, further indicates there are deficits associated with the PIA.

Recommendations

The measurement of children's health knowledge. This study has revealed limitations of the PIA as an assessment of children's health knowledge. The estimates of reliability did not meet acceptable standards. The low correlations observed on the item reliability analysis, coupled with the high percentage of correct answers, suggest that the questions were too easy. In addition, the content of the instrument may not adequately sample important concepts of young children's health knowledge. It is important that work continue on the development of an appropriate measure of children's health knowledge. As with any measure, it is critical to further address the issues of validity and reliability. First and foremost, it is recommended that the content of the PIA be examined and revised.

A broad concept of health recognizes the importance of environmental factors that are positive and promote good health. These factors include balanced nutrition, physical exercise, adequate rest, medical and dental care, and safe and sanitary environment (Marotz, Rush & Cross, 1987). Central to the philosophy of preventive health care is the principle that the individual can control many factors that affect his health (Gephart, Eagan, & Hutchins, 1984).

From these definitions of health, one can begin to consider domains and specific items within domains that need to be included in an assessment of young children's health knowledge. One strategy for revision of the PIA would be to limit the number of domains and to expand the number of items per domain in order to get an adequate sampling of each specific domain. If children are to be more responsible for their own well-being, they must be knowledgeable about health concepts that will directly affect their decisions. Therefore, the domains selected for a revised instrument will focus on concepts that most directly influence the child's decisions regarding health-care behaviors. The present instrument, the PIA, contained the following domains: general health practices; the function of body parts; causes, prevention, and treatment of illness; safety; and dental health. Since the domain of the function of body parts has little direct influence on children's health behaviors, it will be omitted in a revised form of the PIA.

It is recommended that four of the five domains of the PIA be retained with some modifications. The domains of health promotion (formerly general health practices), safety, disease prevention (formerly causes, prevention, and treatment of illness), and dental health would represent the general categories of health knowledge.

Within the domain of health promotion, question pertaining to nutrition, physical exercise, and rest appear to be reasonable indices. Potential items include concepts related to drinking milk and eating nutritious snacks (both of which were contained in the original PIA) and balanced meals. Concepts related to the physical exercise, which were not included in the present form of the PIA, might tap (1) children's knowledge of exercise as a way to stay healthy and (2) the kind of activities that make their bodies strong. The importance of rest as a means of staying healthy could be expanded to include the concept of how children feel when they do not get enough rest.

Safety is a special concern for young children because a safe environment directly affects the well-being of the child. The domain of safety would be better represented by including the following items: wearing seat belts, identifying/avoiding toxic substances, handling scissors properly, bike safety, and avoiding electrical sockets. The current safety questions would be retained with some modifications of the wording or of the distractors (especially for questions 16 and 17).

The domain of disease prevention would include the following items, with modifications, from the PIA: washing one's hands before eating and after handling animals, covering one's mouth when sneezing or coughing, and going to the doctor for check-ups. In an attempt to have a more comprehensive examination of this domain, different situations could be added and might include not sharing personal items, not drinking out of a glass someone else has used, and washing one's hands after toileting.

The domain of dental health should include the items on the current PIA with some modification of the distractors for question six. The current questions seem to be a reasonable index of this domain.

The items described above do not constitute an exhaustive list of ones which could be added to the current form of the PIA, but do reflect an initial attempt to improve the assessment of children's health knowledge. Once the test revision is completed, it needs to be examined for content validity and reliability. Hopefully, the pool of items will be sufficiently large so that ones which prove to be of poor quality can be discarded.

Measurement of family and school variables. Since the family is the primary arena in which self-regulatory behaviors are learned early in life, the child's learning may be supported by parents who explicitly take on the task of teaching. The content analysis indicated that parents are using basically eight strategies for teaching their children health-related information. Parents who reported using modeling, teaching in context, explanations, and practice as methods of teaching may be providing information that is more concrete and experientially based than are parents who reported methods that were primarily "talking" strategies. It may be that the strategies that parents choose to teach their children are related to parenting style. It seems likely that some strategies and techniques parents use to teach health-related information are more effective than are other strategies. Measures that can assess the strategies and context of parent's teaching may be better indices for exploring the relationship between family variables and children's health knowledge, and eventually, health behavior.

Another interesting area for further investigation concerns the postulated continuum from parent-regulation-to-coregulation-to-child-independence regarding health-related behaviors. This proposed continuum from parent regulation to coregulation to child independence could be examined empirically by looking at the ENFORCE scale. Factor analysis could be used to examine the scale to see if it is really two or three subscales. It may be that there is a parental regulated subscale that would include the item of bedtime, taking medicine, crossing the street, and operating appliances. A co-regulation subscale might consist of the items of choosing clothing, snacking, and putting toys away. Items that tap the independence domain might include toileting, handwashing, and brushing teeth. Confirmatory factory analysis would examine which items load on which factors. LISREL analysis could confirm if the factors are loading where one might expect, and if not, where they are loading.

The ability to detect any relationships between child health knowledge and school variables was hampered by the low variability associated with the measurement tools and by the low power associated with an inadequate sample size of the participating classrooms. The refinement of instruments that can assess the impact of health-related instruction and daily routines upon children's health knowledge is recommended. The sampling of ECE programs needs to include a less homogeneous group and a larger number of classrooms than the present study included. It may be that the health-related routines of the ECE classroom would have been statistically significant had the sample size been larger (as it was, it was significant at $p = .08$ level).

The goal of the present study was to examine the relative contributions and interrelationships of child characteristics and family and school variables to the early development of children's health knowledge. This continues to be an interesting question, but one that can only be answered adequately when the basic methodological problems of valid and reliable instruments are addressed.

BIBLIOGRAPHY

Banks, E. (1985). Concepts of health and sickness of preschool aged children. Paper presented at the Biennial Meeting of the Society for Research in Child Development, Toronto, Canada.

Beales, J., Holt, P., Keen, J., & Mellor, V. (1983). Children with juvenile chronic arthritis: Their beliefs about their illness and therapy. Annals of the Rheumatic Diseases, 42, 481-486.

Bibace, R., & Walsh, M. (1981). Children's conceptions of illness. In R. Bibace & M. Walsh (Eds.), Children's conceptions of health, illness, and bodily functions. New Directions in Child Development, 14 (pp. 31-48). San Francisco: Jossey-Bass.

Bibace, R., & Walsh, M. (1979). Developmental stages of children's conceptions of illness. In G. Stone, F. Cohen, & N. Adler (Eds.), Health psychology: A handbook (pp. 285-301). San Francisco: Jossey-Bass.

Brewster, A. (1982). Chronically ill hospitalized children's concepts of their illness. Pediatrics, 69, 355-362.

Brodie, B. (1974). View of healthy children toward illness. American Journal of Public Health, 64, 1156-1159.

Burbach, D. & Peterson, L. (1986). Children's concepts of physical illness: A review and critique of the cognitive-developmental literature. Health Psychology, 5, 307-325.

Bruhn, J. & Parcel, G. (1982b). Preschool Health Education Program (PHEP): An analysis of baseline data. Health Education Quarterly, 9, 116-129.

Campbell, J. (1975). Illness in a point of view: The development of children's concepts of illness. Child Development, 46, 92-100.

Campbell, J. D. (1978). The child in the sick role: Contributions of age, sex, parental status, and parental values. Journal of Health and Social Behavior, 19, 35-51.

Carandang, M., Folkins, C., Hines, P., & Steward, M. (1979). The role of cognitive level and sibling illness in children's conceptualizations of illness. American Journal of Orthopsychiatry, 49, 474-481.

Christiano, M. (1982). Health care of children. Early Childhood Development and Care, 8, 45-53.

Cook, S. D. (1975). The development of causal thinking with regard to physical illness among French children. Unpub. doctoral dissertation, University of Kansas.

Crider, C. (1981). Children's conceptions of the body interior. In R. Bibace & M. Walsh (Eds.), Children's conceptions of health, illness, and bodily functions. New directions in child development, 14, San Francisco: Jossey-Bass.

Dielman, T., Leach, S., Becker, M., Rosenstock, I., Horvath, W., & Radius, S. (1980). Parental and child health beliefs and behavior. Health Education

Quarterly, 9, 156-173.

Eiser, C., Patterson, D. & Eiser, J. (1983). Children's knowledge of health and illness: Implications for health education. Child: Care, Health and Development, 9, 285-292.

Eiser, C. (1985). The Psychology of Childhood Illness. New York: Springer-Verlag.

Gellert, E. (1962). Children's conceptions of the content and function of the human body. Genetic Psychology Monographs, 65, 293-411.

Gephart, J., Egan, M. & Hutchins, V. (1984). Perspectives on the health of school age children. Journal of School Health, 54, 11-17.

Gochman, D. (1985). Family determinants of children's concepts of health and illness. In D. Funk & R. Kerns (Eds.), Health, illness and families: A life-span perspective (pp. 23-50). New York: J. Wiley & Sons.

Gochman, D. (1971). Some steps toward a psychological matrix for health behavior. Canadian Journal of Behavioral Science, 12, 148-154.

Gochman, D. (1972). Development of health beliefs, Psychological Reports, 31, 259-266.

Gochman, D. & Saucier, J. (1982). Perceived vulnerability in children and adolescents. Health Education Quarterly, 9, 142-155.

Gottfried, A. (1984). Home environment and early cognitive development: Longitudinal research. Orlando: Academic Press, Inc.

Gottfried, A. (1985). Measure of socioeconomic status in child development research: Data and recommendations. Merrill-Palmer Quarterly, 31, 85-92.

Gratz, R. & Piliarin, J. A. (1984). What makes kids sick: Children's beliefs about the causative factors of illness. Children's Health Care, 12, 156-162.

Hendricks, C. & Peterson, F. (1991). The Preschool Health Knowledge Inventory. (Available from Educational Testing Service, Princeton, N.J.)

Hendricks, C., Peterson, F., Windsor, R., Pochler, D. and Young, M. (1988). Reliability in health knowledge measurement in very young children. Journal of School Health, 58, 21-25.

Hergenrather, J. & Rabinowitz, M. (1991). Age-related differences in the organization of children's knowledge of illness. Developmental Psychology, 27, 952-959.

Jubb, W. (1982). The development of an instrument to assess health knowledge of children prior to first grade. Dissertation Abstracts International, 43, 1513A.

Kalnins, I. & Love, R. (1982). Children's concepts of health and illness and implications for health education: An overview. Health Education Quarterly, 9, 104-115.

Kaufman, A. (1977). A McCarthy short form for rapid screening of preschool, kindergarten, and first-grade children. Contemporary Educational Psychology, 2, 149-157.

Kaufman, A. & Kaufman, N. (1977). Clinical evaluation of young children with the McCarthy Scales. New York: Grune & Stratton.

Kister, M. & Patterson, C. (1980). Children's conceptions of the causes of illness: Understanding of contagion and use of imminent justice. Child Development, 51, 839-846.

Lewis, C., Pantell, R. and Kieckhefer (1989). Assessment of children's health status. Medical Care, 27, 554-565.

Maheady, D. (1986). Health concepts of preschool children. Pediatric Nursing, 12, 195-197.

Mahoney, M. (1982). Attitudes affecting child health care: A perspective on 1980's. Advances in Pediatrics, 29, 247-257.

Marotz, L., Rush, J., & Cross, J. (1987). Health, safety, and nutrition for the young child. New York: Delmar.

Miles, M. & Huberman, A. (1984). Qualitative data analysis: A sourcebook of new methods. Beverly Hills: Sage.

Mobley, C. (1991). Assessment of health knowledge in preschoolers. Poster session presented at the Biennial Meeting of the Society for Research in Child Development, Seattle, Washington.

Myers-Vando, R., Steward, M., Folkins, C., & Hines, P. (1979). The effects of congenital heart disease on cognitive development, illness causality concepts, and vulnerability. American Journal of Orthopsychiatry, 49, 617-625.

Natapoff, J. (1982). A developmental analysis of children's ideas of health. Health Education Quarterly, 9, 130-141.

Neuhauser, C., Amsterdam, B., Hines, P., & Steward, M. (1978). Children's concepts of healing: Cognitive development and laws of control factors. American Journal of Orthopsychiatry, 48, 335-341.

Nunnally, J. (1978). Psychometric Theory. New York: McGraw-Hill.

Parcel, G., & Meyer, M. (1978). Development of an instrument to measure children's locus of control. In B. Wallston & K. Wallston (Eds.), Health locus of control. Health Education Monographs, 6, 149-159.

Perrin, E. & Gerrity, S. (1981). There's a demon in your belly: Children's understanding of illness. Pediatrics, 67, 841-849.

Porter, C. (1974). Grade school children's perceptions of their internal body parts. Nursing Research, 23, 384-391.

Potter, P. & Roberts, M. (1984). Children's perceptions of chronic illness: The roles of disease symptoms, cognitive development, and information. Pediatric Psychology, 9, 13-27.

Pratt, L. (1976). Family structure and effective health behaviors. The energized family. Boston: Houghton-Mifflin.

Redpath, C. & Rogers, C. (1984). Healthy young children's concepts of hospitals, medical personnel, operations, and illness. Journal of Pediatric Psychology, 9, 29-40.

Rosenstock, I. (1974). The health belief model and preventive health behavior. In M. Beeker (Ed.), The health belief models and personal health behavior, Thorofare, N.J.: C. B. Slack.

Schilder, P. & Wechsler, D. (1935). What do children know about the interior of the body? International Journal of Psychoanalysis, 16, 345-350.

Shagena, M., Sandler, H., and Perrin, E. (1988). Concepts of illness and perception of control in healthy children and in children with chronic illnesses. Developmental and Behavioral Pediatrics, 9, 252-256.

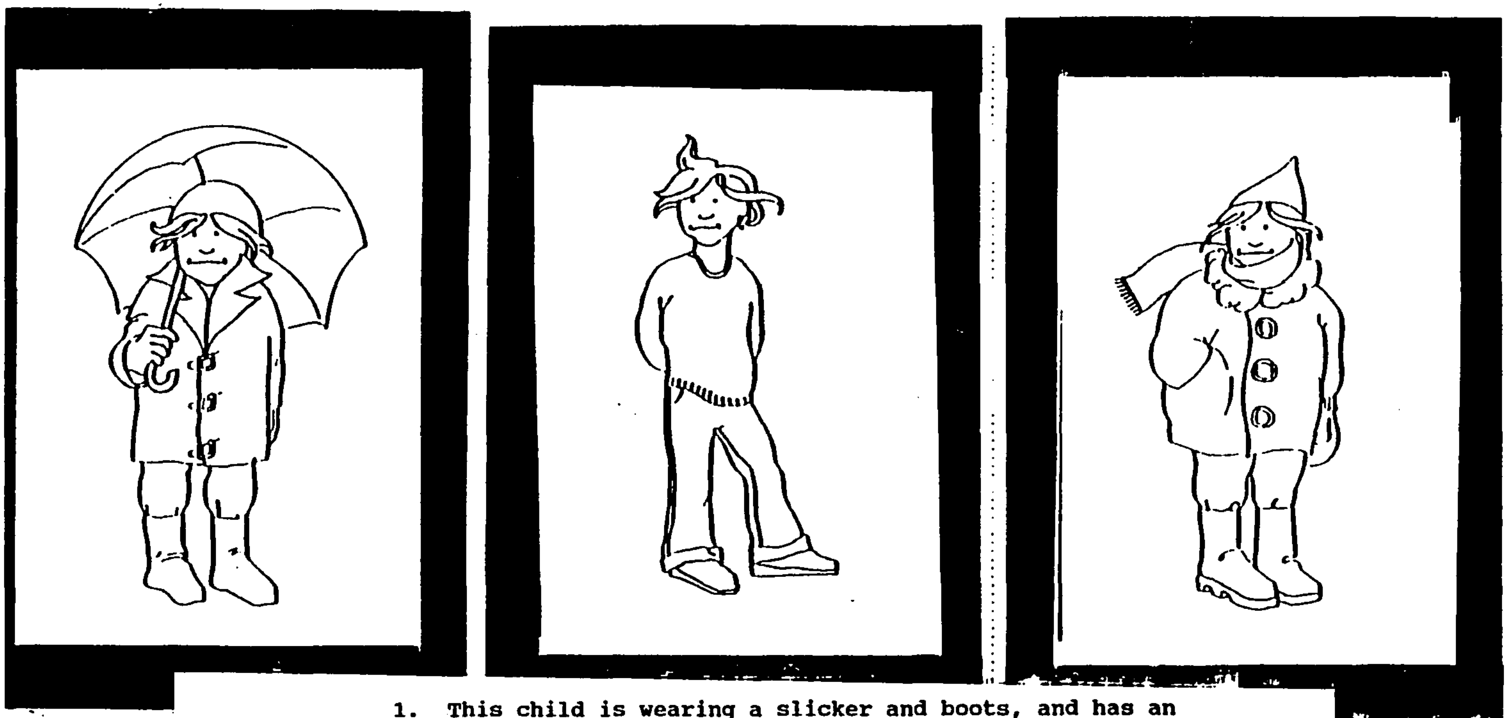
Siegal, M. (1988). Children's knowledge of contagion and contamination as causes of illness. Child Development, 59, 1353-1359.

Simeonsson, R., Buckley, L. & Monson, L. (1979). Conceptions of illness causality in hospitalized children. Journal of Pediatric Psychology, 4, 77-84.

Tabachnick, B. & Fidell, L. (1983). Using multivariate statistics. New York: Harper & Row.

APPENDIX A

The Picture Identification Assessment of Children's Health Knowledge



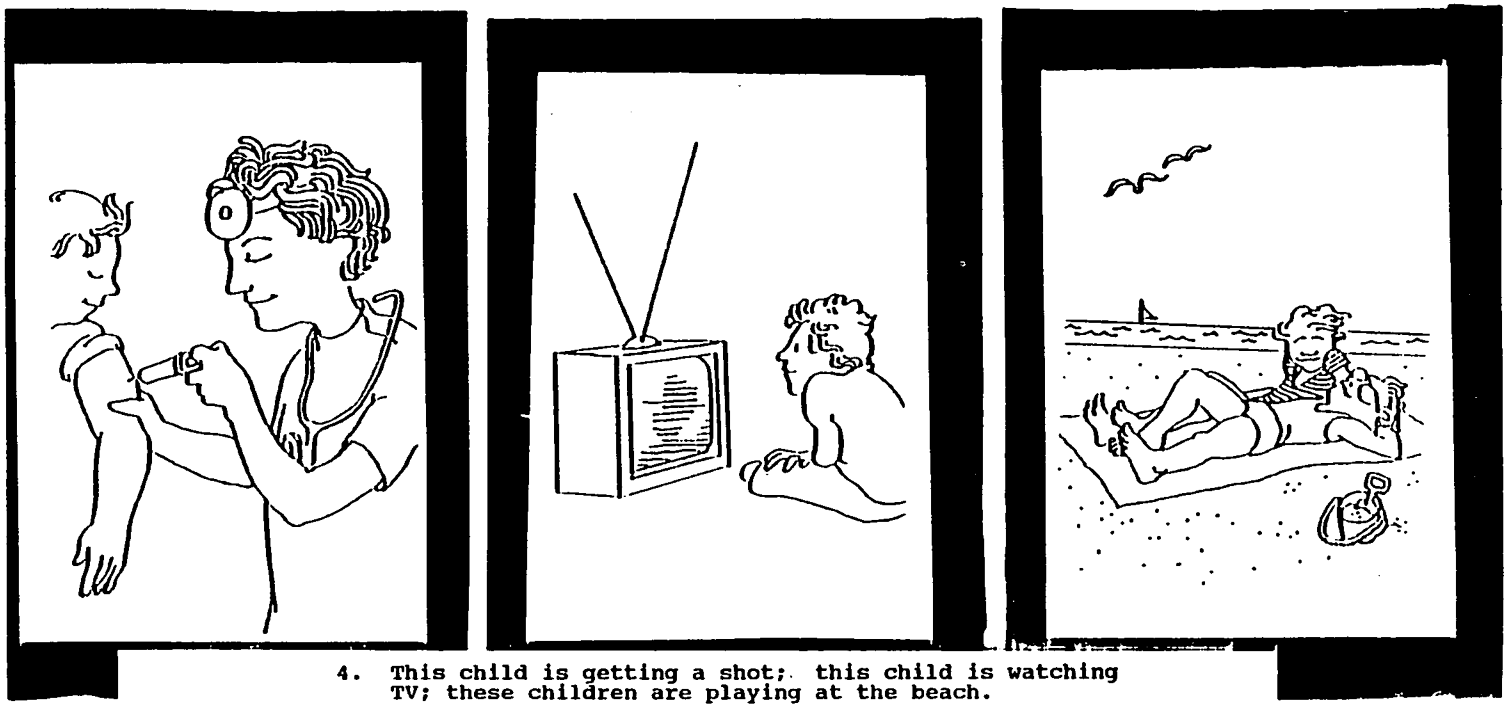
1. This child is wearing a slicker and boots, and has an umbrella. This child is wearing jeans and a sweatshirt. This child is wearing a jacket, hat, scarf, and gloves.

Point to what you should wear when it is raining outside.

2. This child is watching TV; this child is swimming; this child is washing his hands.

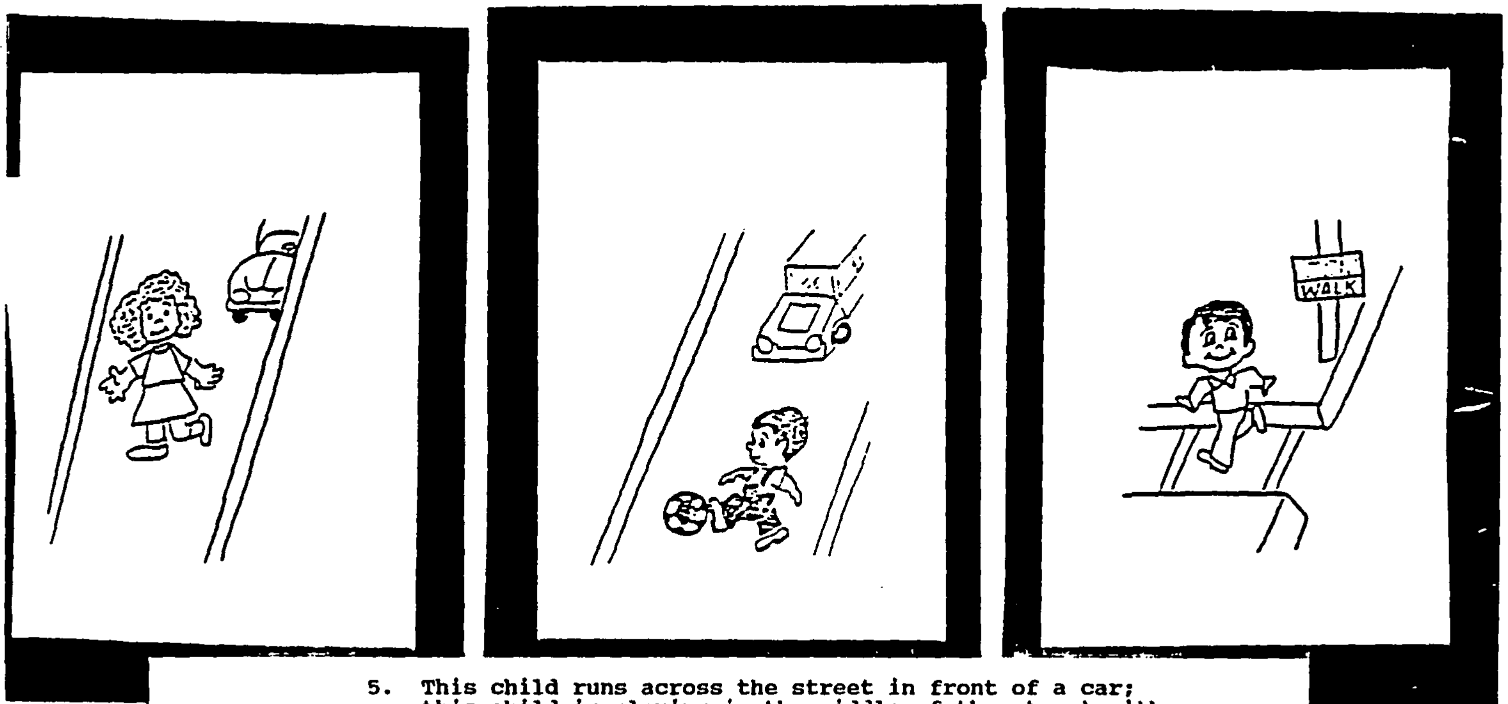
Show me which one you should do before you eat so you will not spread germs.

3. Here is an eye, an ear, and a foot. Point to the one you hear with.



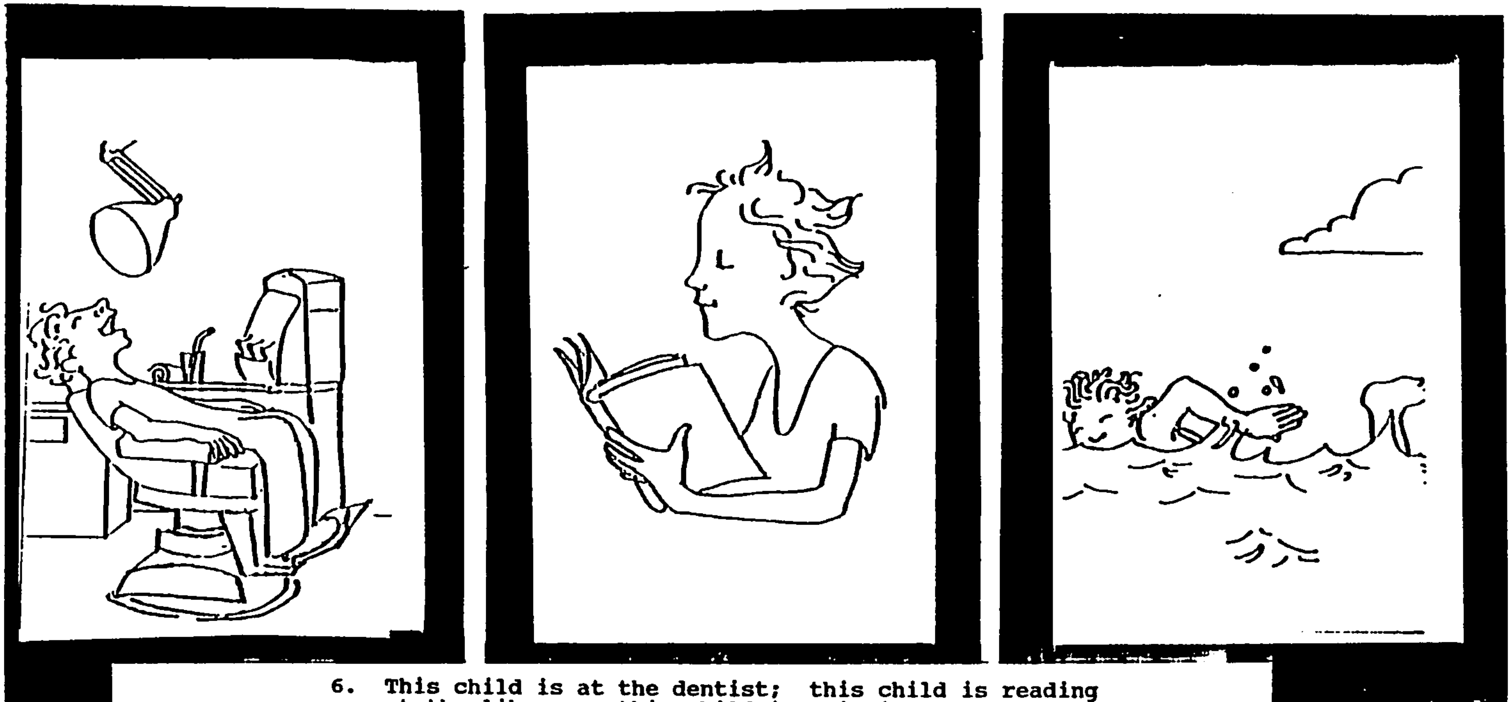
4. This child is getting a shot; this child is watching TV; these children are playing at the beach.

Show me which one you could do so you do not get sick



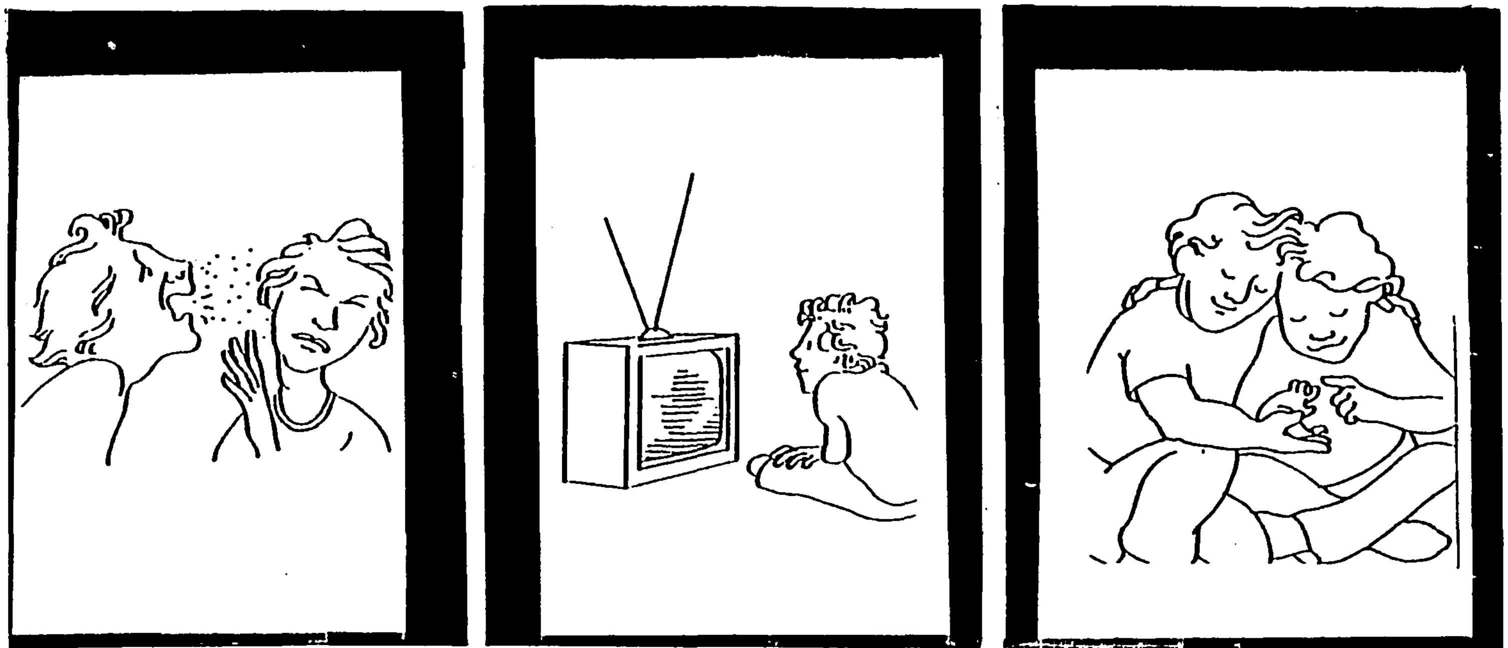
5. This child runs across the street in front of a car; this child is playing in the middle of the street with cars coming; this child stops and looks before crossing the street.

Point to the child who is crossing the street safely.



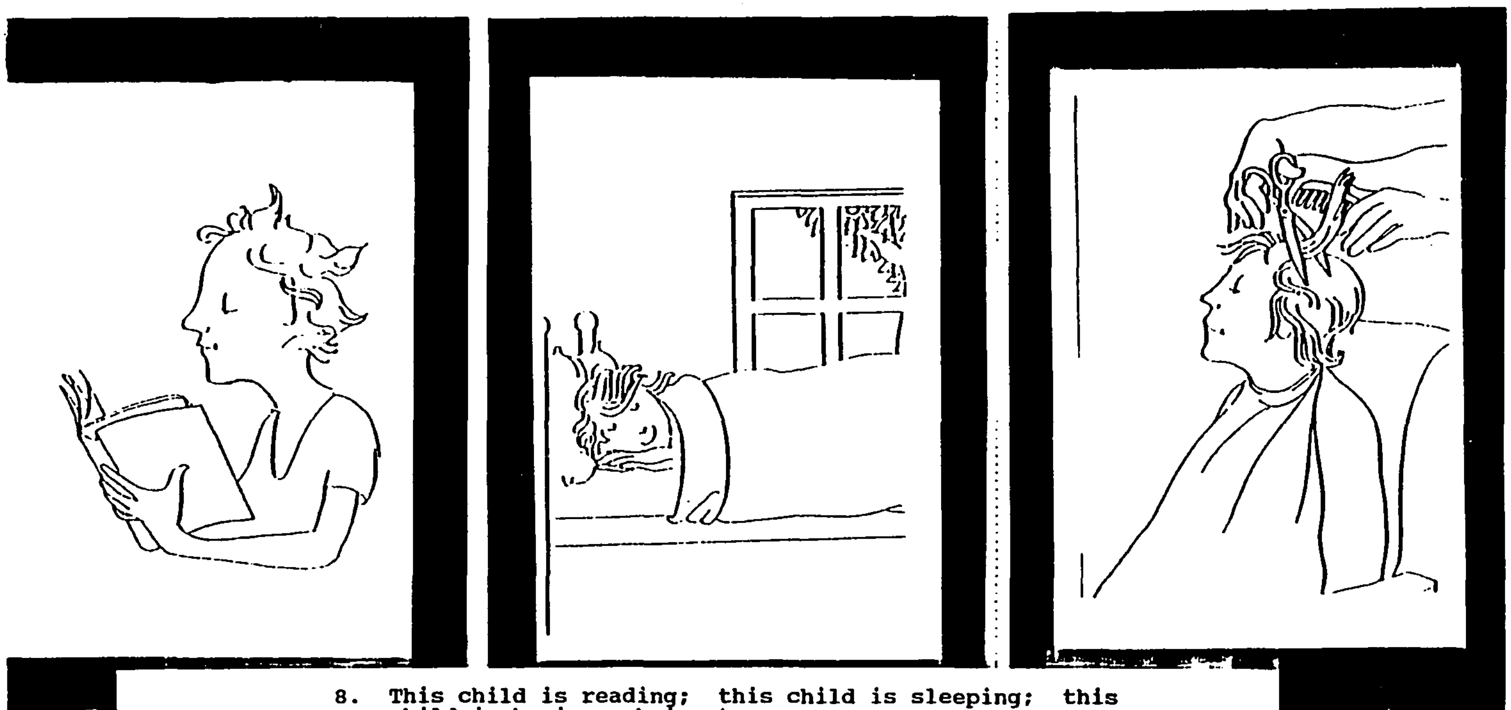
6. This child is at the dentist; this child is reading at the library; this child is swimming at the pool.

Which picture show where you go to have your teeth checked?



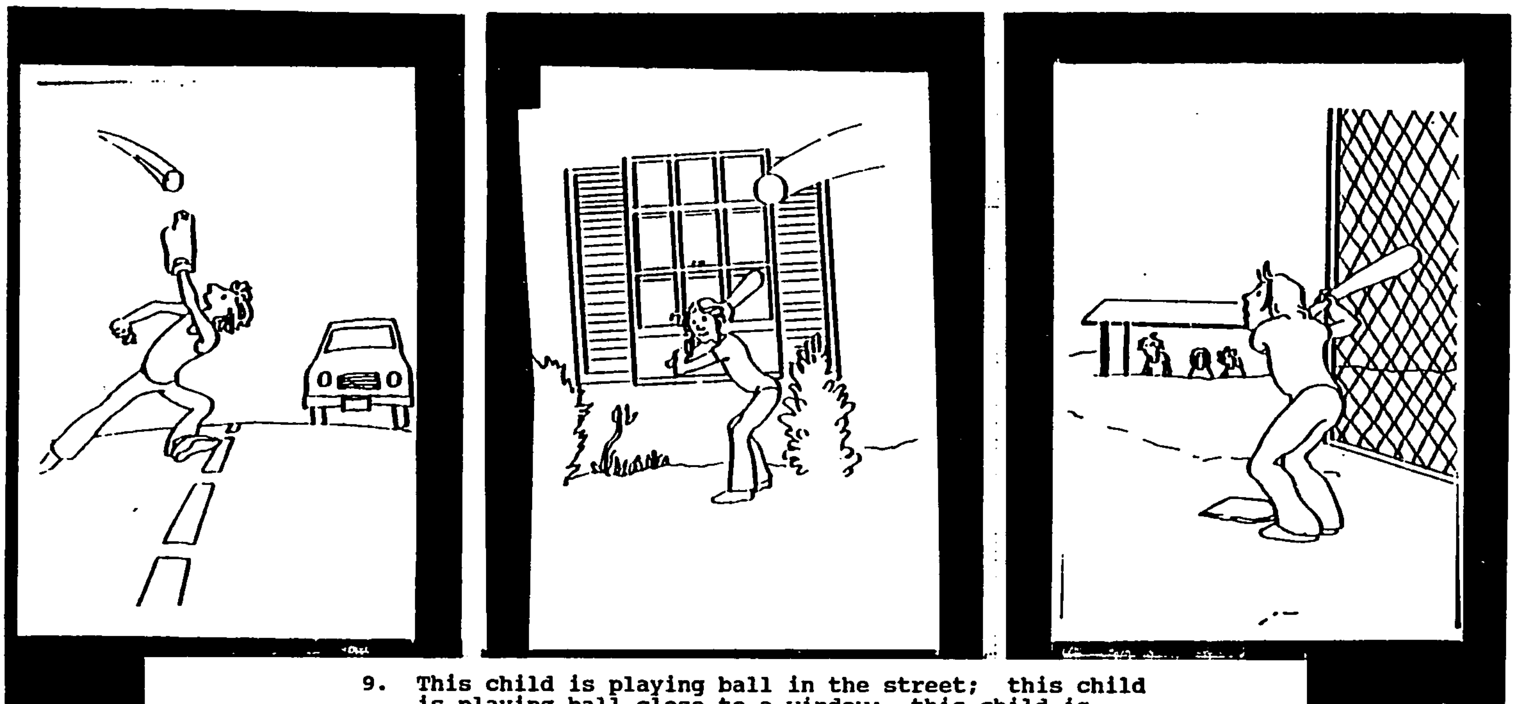
7. This child is coughing in someone's face; this child is watching TV; this child is playing with a friend.

Show me the child who is spreading germs.



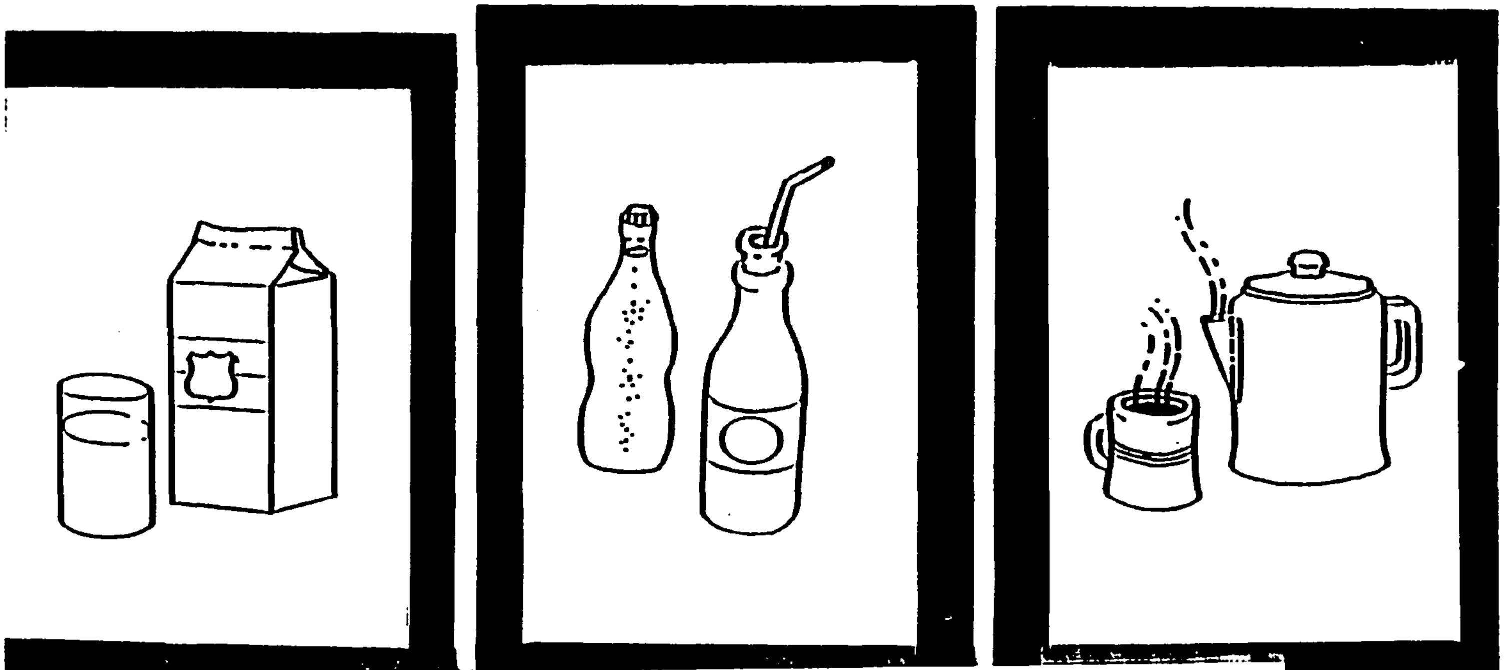
8. This child is reading; this child is sleeping; this child is having a haircut.

Point to the picture that shows one way that helps you stay healthy.



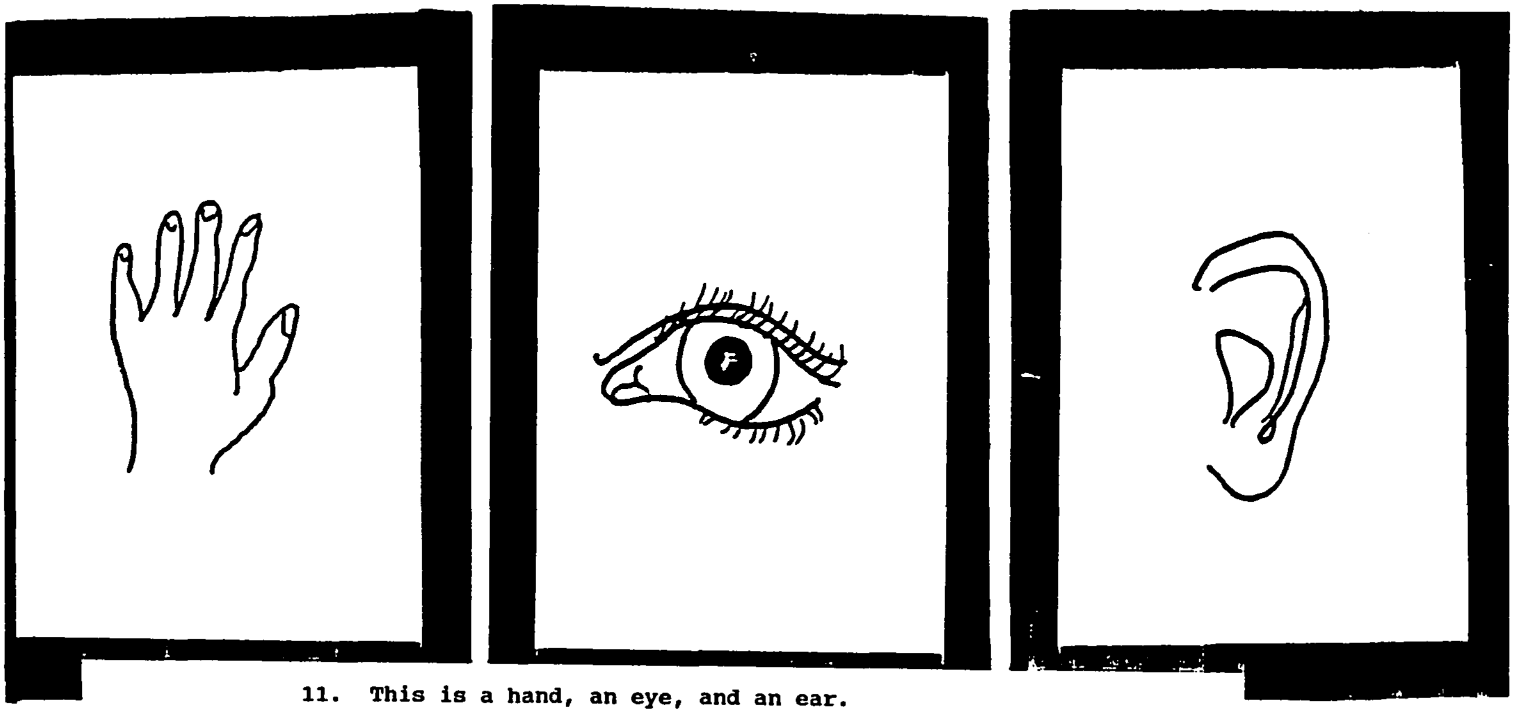
9. This child is playing ball in the street; this child is playing ball close to a window; this child is playing ball at the park.

Show me the place where it is safest to play.



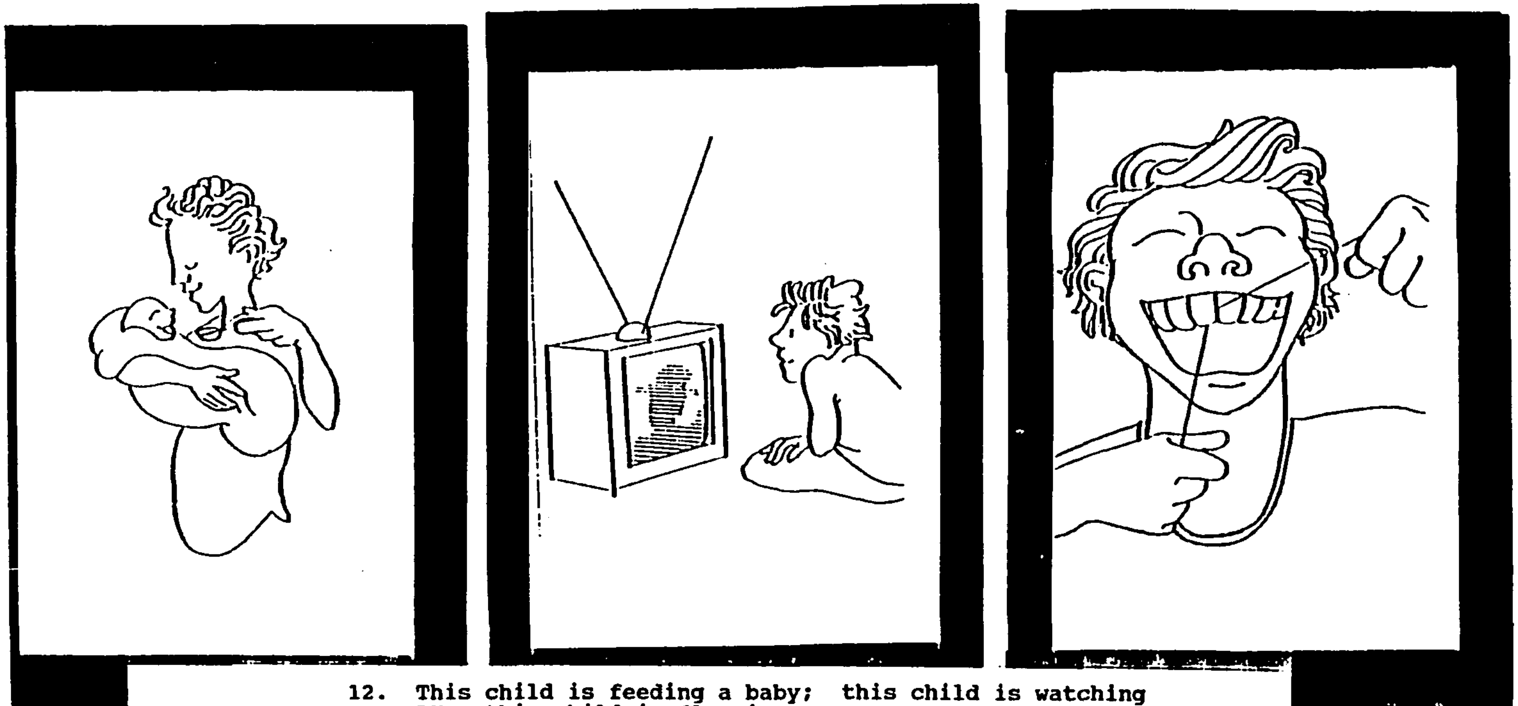
10. This is milk; this is soda pop; this is coffee.

Show me what you drink so your teeth will be strong and healthy.



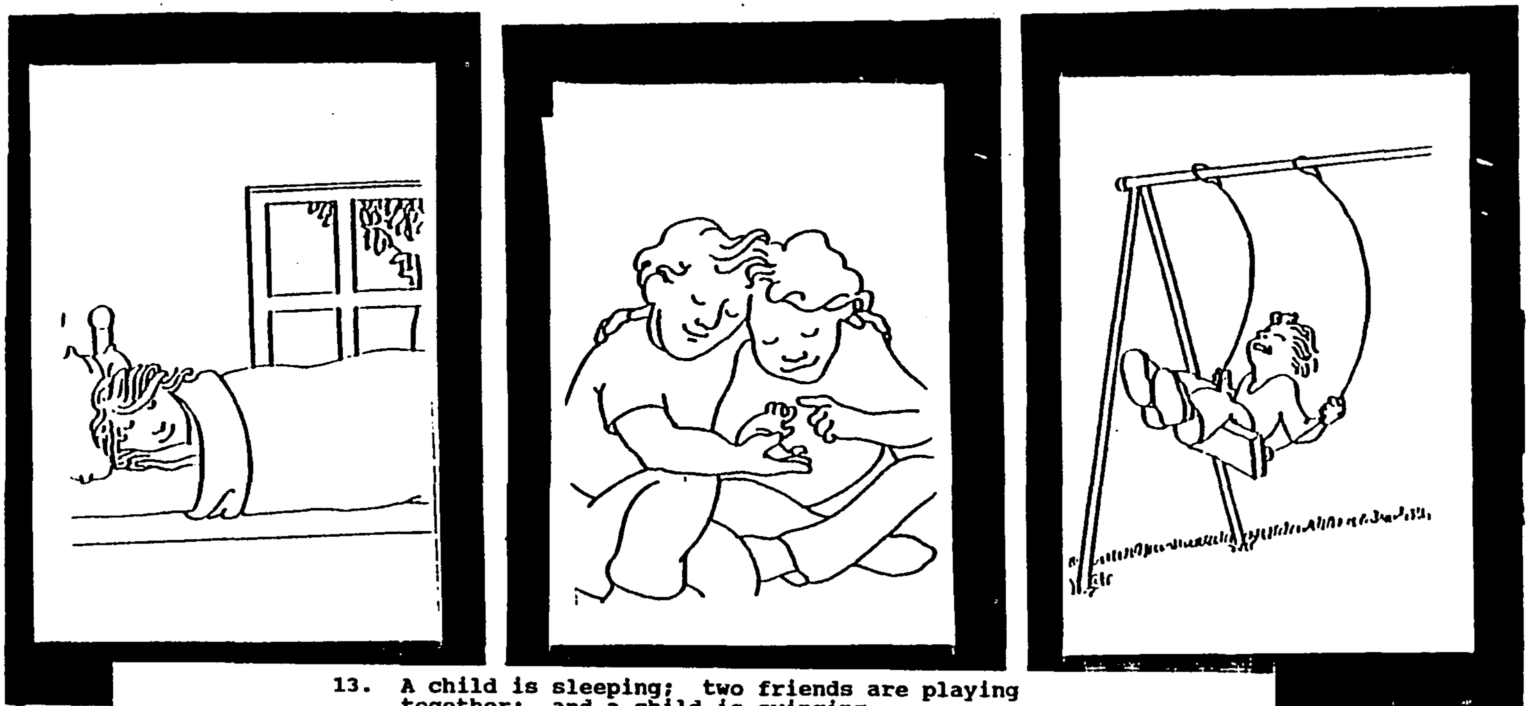
11. This is a hand, an eye, and an ear.

Point to the one that you touch and feel if things are smooth or cold.



12. This child is feeding a baby; this child is watching TV; this child is flossing.

Which should you do to keep your teeth strong and healthy?

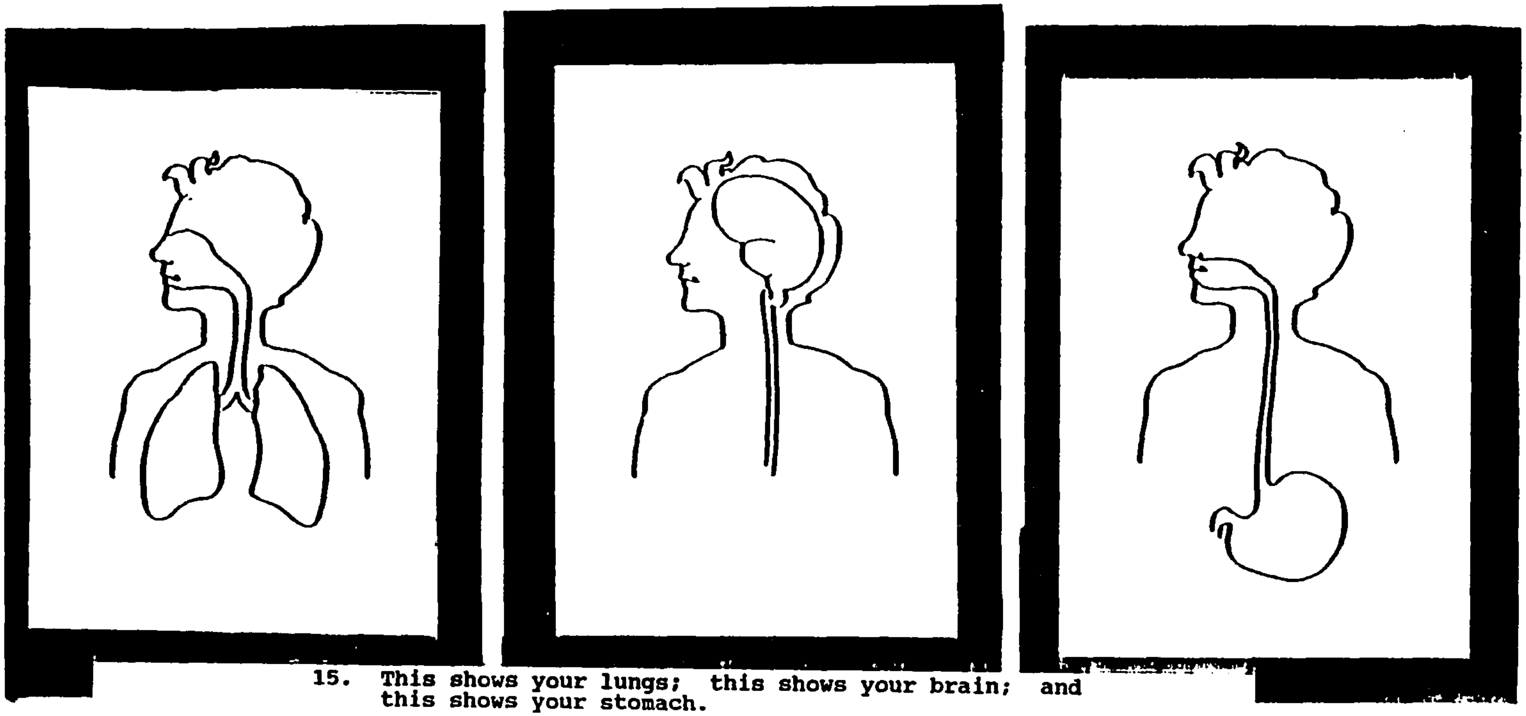


13. A child is sleeping; two friends are playing together; and a child is swinging.

Show me what you should do when you are sick so other children won't get sick.

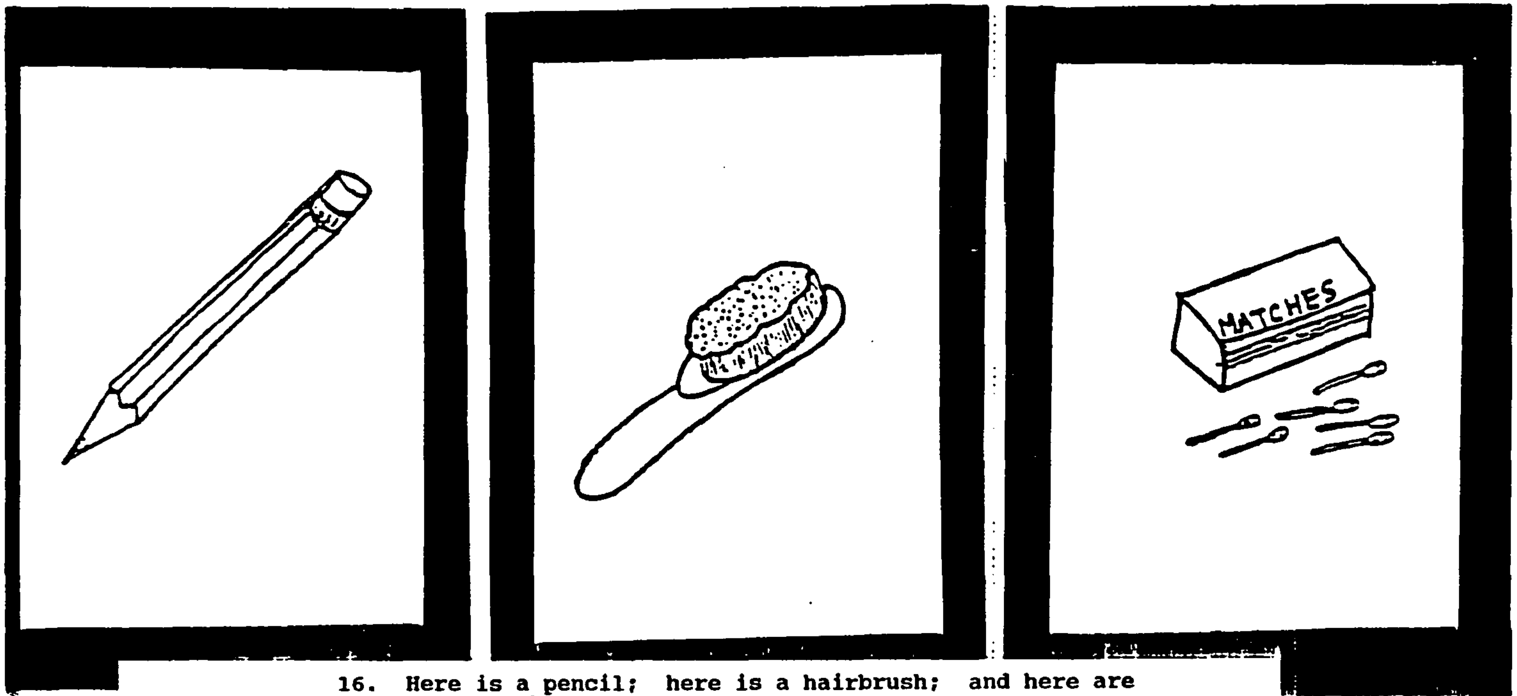
14. Here is an apple, here is a piece of cake; and here is a popsicle.

Point to the snack food that is healthy for you to eat.



15. This shows your lungs; this shows your brain; and this shows your stomach.

Show me the one that allows you to breathe.



16. Here is a pencil; here is a hairbrush; and here are some matches.

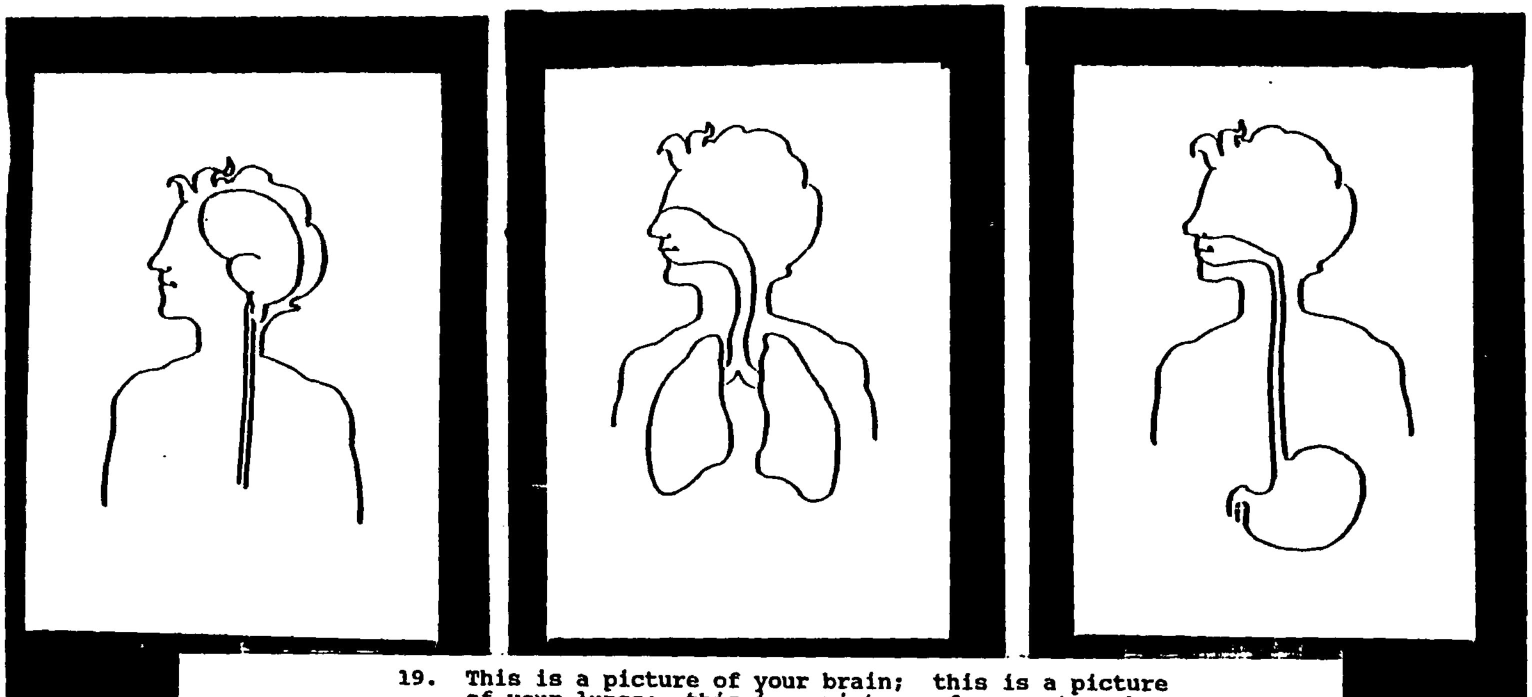
Point to the one you should never play with.

17. This child is cooking on the stove without adult help; this child is reading; this child is playing with a kite.

Show me the picture of how you might get burned.

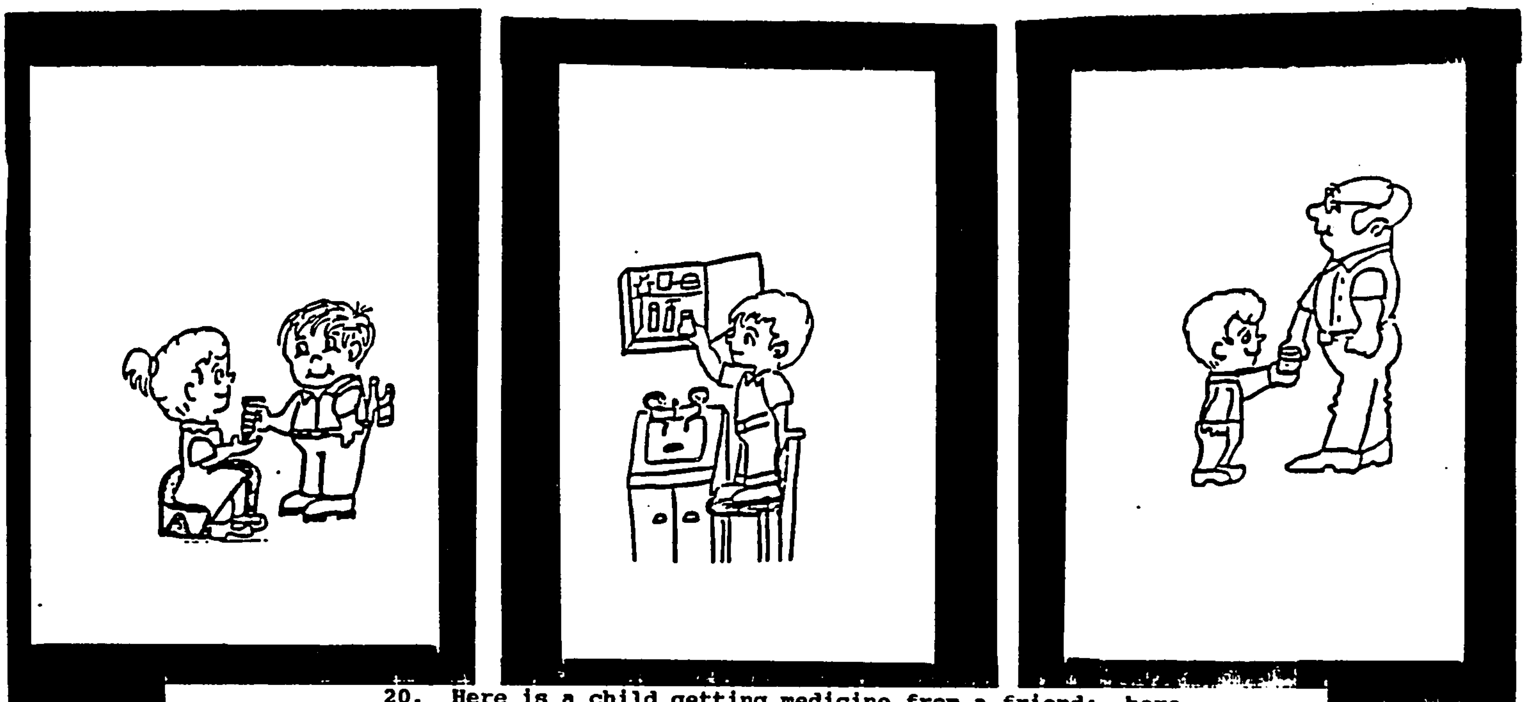
18. Here is a child using a brush and comb; this child is using toothbrush and toothpaste; and this child is using soap and a washcloth.

Which do you use to keep from getting cavities?



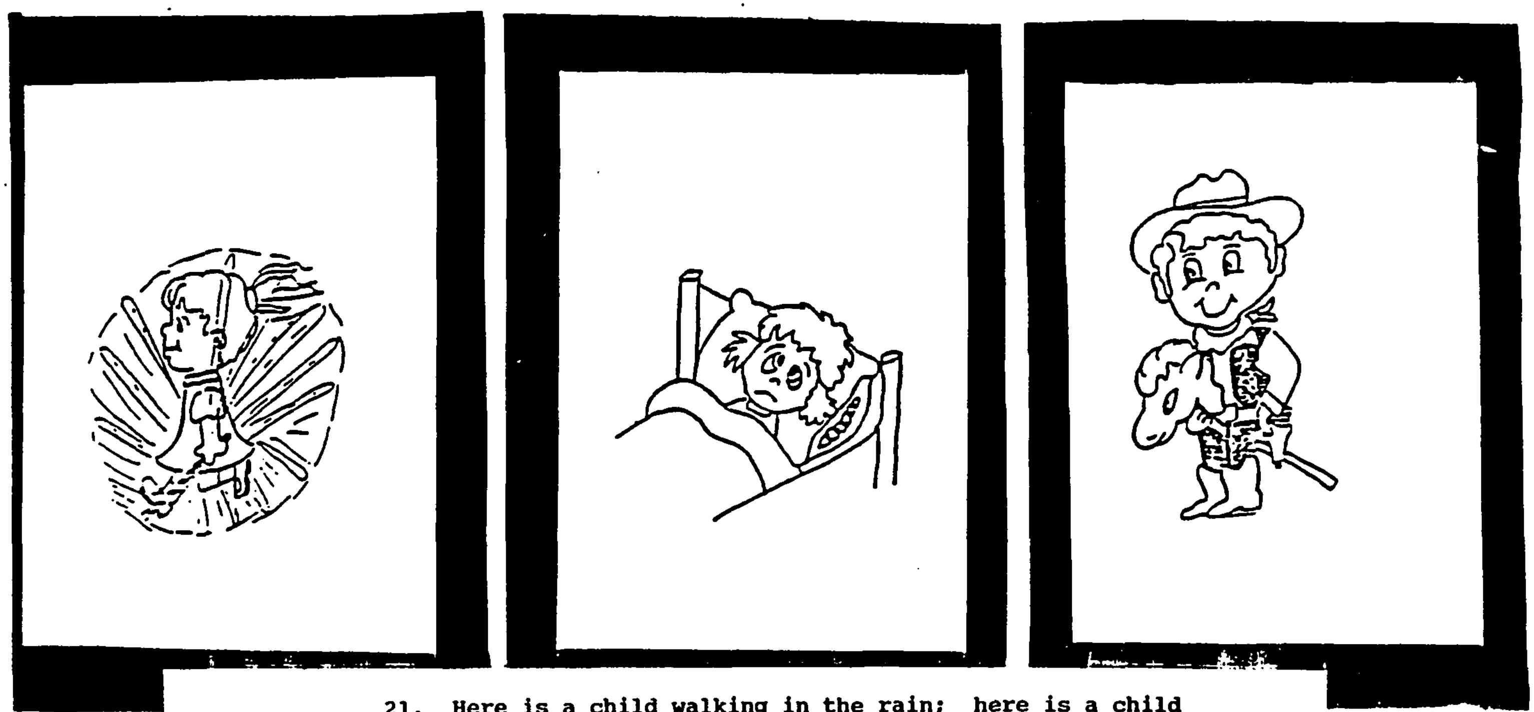
19. This is a picture of your brain; this is a picture of your lungs; this is a picture of your stomach.

Show me where the food goes after you swallow it.1



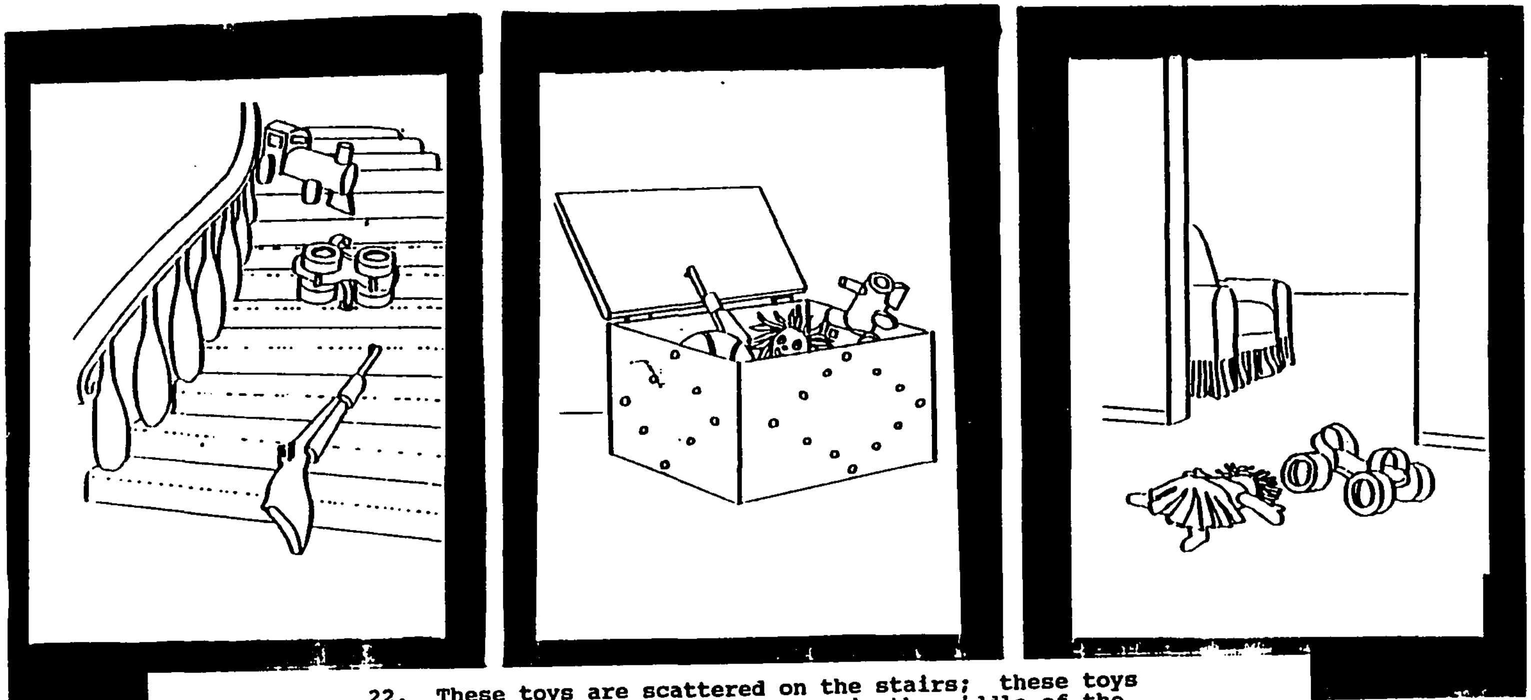
20. Here is a child getting medicine from a friend; here is a child getting medicine from a cabinet; here is a child getting medicine from his parent.

Point to the picture that show where you should get your medicine.



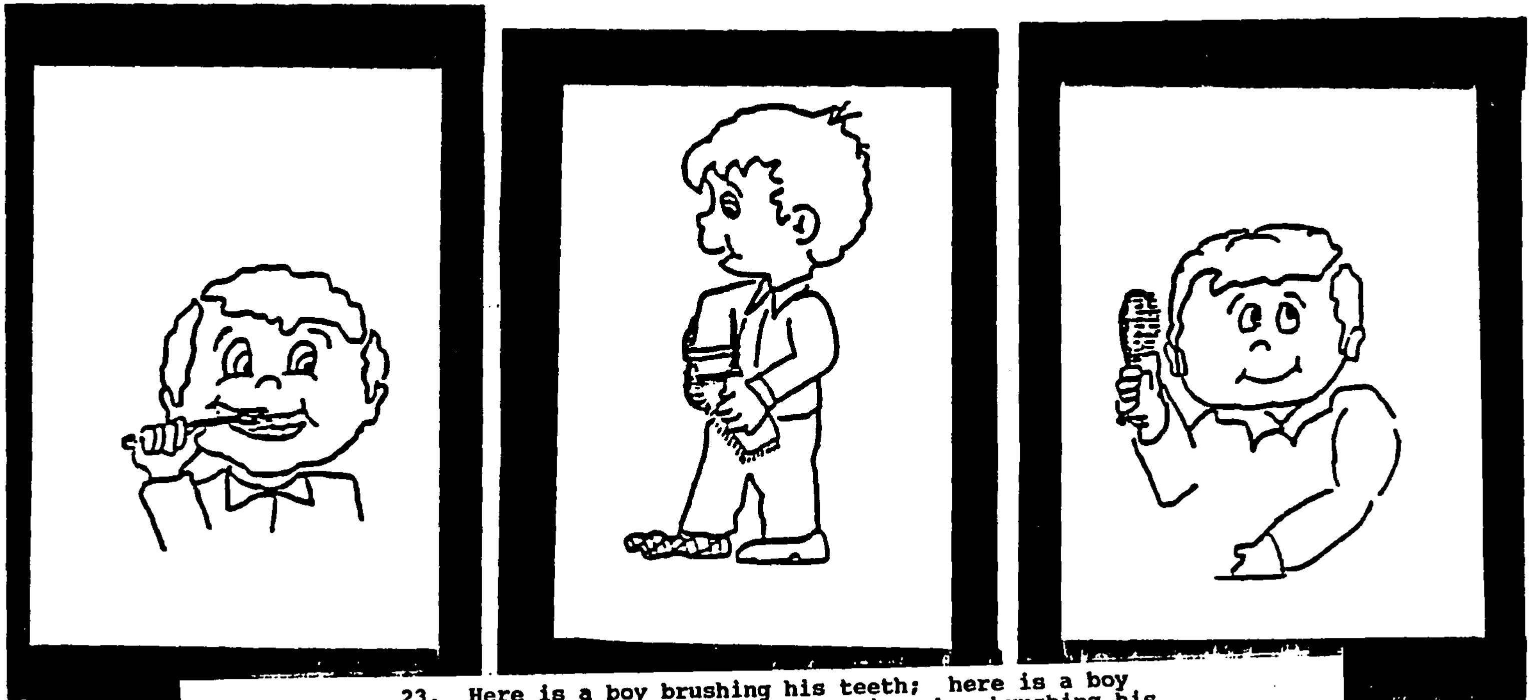
21. Here is a child walking in the rain; here is a child in bed; here is a child playing.

Point to the child who might need medicine.



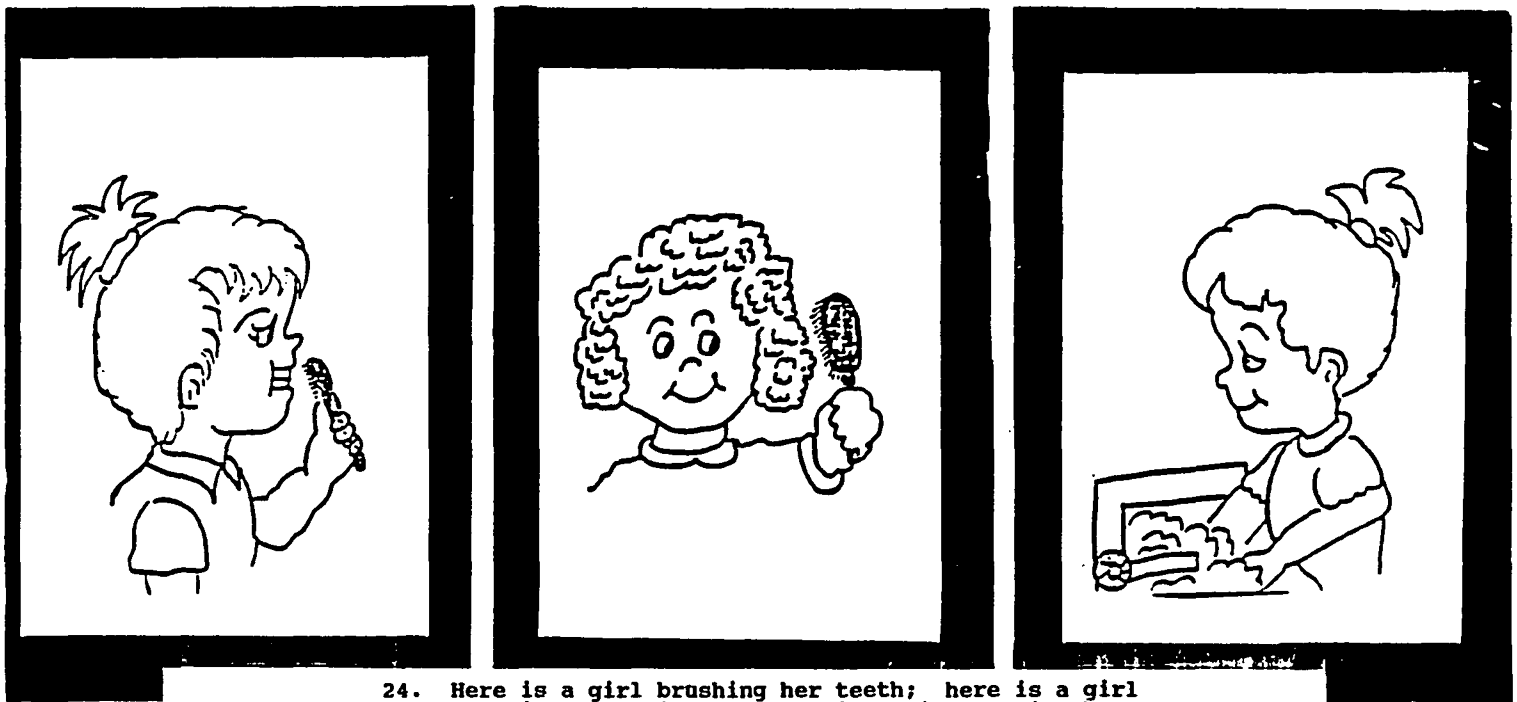
22. These toys are scattered on the stairs; these toys are in a box; these toys are in the middle of the floor.

Which picture shows a safe place for toys to be kept so no one gets hurt?



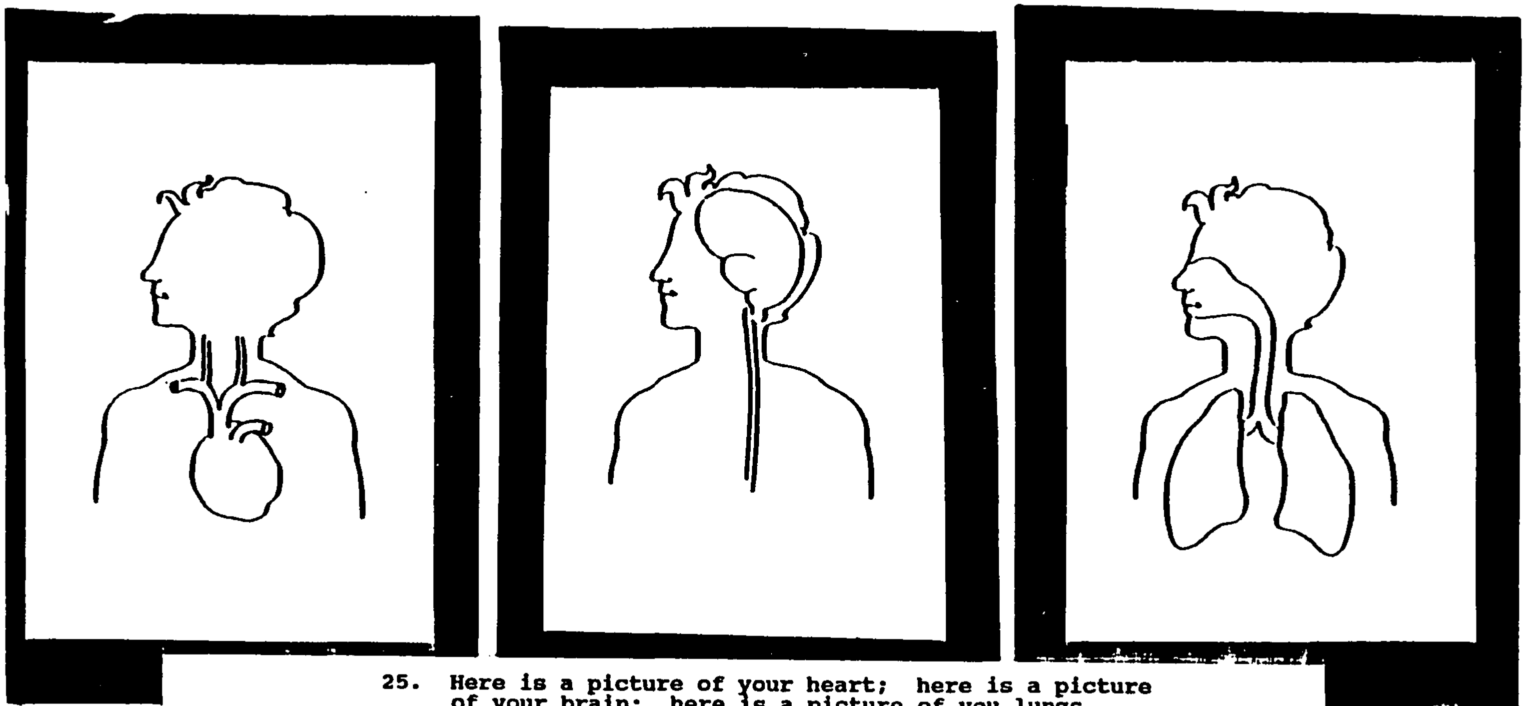
23. Here is a boy brushing his teeth; here is a boy brushing his shoe; and here is a boy brushing his hair.

Which boy is showing what you should do after you eat?



24. Here is a girl brushing her teeth; here is a girl brushing her hair; and here is a girl washing her hands.

Point to the picture that shows you what to do after you play with pets or animals.



25. Here is a picture of your heart; here is a picture of your brain; here is a picture of you lungs.

Point to the part of your body that pumps blood.

APPENDIX B

The Family Information Form

Dear Parents:

Thank you for your willingness to participate in this study on the development of young children's health knowledge. Please fill out the attached questionnaire as completely as possible and return it (in the envelope provided) to your child's teacher. As I indicated to you on the consent form, I will call you shortly after I receive the completed questionnaire.

I very much appreciate your participation and cooperation.

Sincerely,

Kathryn Summers Clark

ID number __________

FAMILY INFORMATION FORM

Part A: Family Background

1 a. What is your age? __________

b. Sex? (Circle your answer) Male Female

c. What is your relationship to this young child?

____

2. How many years of education have you completed?

(Circle your answer)

6	12
7	13 (1 yr. college)
8	14 (2 yrs. college)
9	15 (3 yrs. college)
10	16 (4 yrs. college
11	16+ (graduate/postgraduate)

3. What is your occupation? __________________________

4. What is your present marital status? (Circle your answer)

1 Single
2 Married
3 Separated/divorced

5. If currently married how many years of education has your spouse completed? (Circle your answer)

6	12
7	13 (1 yr. college)
8	14 (2 yrs. college)
9	15 (3 yrs. college)
10	16 (4 yrs. college)
11	16+ (graduate/postgraduate)

6. If currently married, what is your spouse's occupation? ______________________________________

7. What was your total household income before taxes for 1990 (including child support, if applicable)?

1 $5,000 or less	7 $30,001 - $35,000
2 $5,001 - $10,000	8 $35,001 - $40,000
3 $10,001 - $15,000	9 $40,001 - $45,000
4 $15,001 - $20,000	10 $45,001 - $50,000
5 $20,001 - $25,000	11 $50,001 or more
6 $25,001 - $30,000	

Part B: Your Child's Health

Please read each of the following statements carefully. Circle the number of the answer that best applies to your child. Some statements are similar, but please answer each one. There are no right or wrong answers.

8. In general, would you say your child's health is excellent, good, fair, or poor?

    1 Poor
    2 Fair
    3 Good
    4 Excellent

9. During the last year, how much have you worried about your child's health?

    1 A great deal
    2 Somewhat
    3 A little
    4 None at all

10. During the last year, has your child's health caused him/her any pain or distress?

    1 A great deal
    2 Some
    3 A little
    4 None at all

11. My child's health is excellent.

    1 Definitely false
    2 Mostly false
    3 Don't know
    4 Mostly true
    5 Definitely true

12. My child seems to be less healthy than other children I know.

    1 Definitely true
    2 Mostly true
    3 Don't know
    4 Mostly false
    5 Definitely false

13. My child seems to resist illness very well.

    1 Definitely false
    2 Mostly false
    3 Don't know
    4 Mostly true
    5 Definitely true

14. When there is something going around, my child usually catches it.

1 Definitely true
2 Mostly true
3 Don't know
4 Mostly false
5 Definitely false

Part C: Families and Health

15. Where do you think your child has learned the most about health and illness?

Using the rating system below, please rate each source of information according to how important you think it is to your child's knowledge about health and illness.

	Not influential at all		Moderately		Most influential
a. Day care	1	2	3	4	5
b. Books	1	2	3	4	5
c. Other caregivers	1	2	3	4	5
d. Brothers/sisters	1	2	3	4	5
e. Mom	1	2	3	4	5
f. Doctors/nurses	1	2	3	4	5
g. Dad	1	2	3	4	5
h. Other children	1	2	3	4	5
i. Television	1	2	3	4	5
j. Previous illness	1	2	3	4	5
k. Other:	1	2	3	4	5

(specify: ______________________________)

16. Do you have health insurance for your family, including your child? (Circle your answer)

1 Yes
2 No

17. Do you have a regular family doctor or pediatrician for your child? (Circle your answer)

1 Yes
2 No

18. Has your child had a major illness(es) in the last two years? (Circle the number)

1 Yes IF YES, please describe below:

Name of Illness	Length of Illness	Age of Child

2 No

19. Some children are very interested in how the body works; other children are not as interested. How much interest has your child shown? (Circle the number of your answer)

1 No interest
2 Little interest
3 Some interest
4 More interest
5 Great interest

Part D: Home Health Rules

We all know that family life is difficult with many stressors and strains. Families can devote more time to some things than to others. Families sometimes establish rules for certain behaviors related to health.

Below are rules some parents may have for health-related behaviors. If you have no rules for those listed below, please circle "No rule". If you do have one or more rules, please circle the answer that indicates how often you enforce them.

20. How frequently do you enforce any of the rules about (Circle your answer)

		No rule	Almost never	2 times a week	4 times a week	Almost daily
a.	the amount of time your child can watch television?	1	2	3	4	5
b.	your child eating breakfast?	1	2	3	4	5
c.	when your child brushes his teeth?	1	2	3	4	5
d.	when your child goes to bed?	1	2	3	4	5
e.	when your child washes his hands?	1	2	3	4	5
f.	what your child chooses to wear each day?	1	2	3	4	5
g.	your child putting his toys away?	1	2	3	4	5
h.	your child crossing the street?	1	2	3	4	5
i.	the kinds of snacks your child can eat?	1	2	3	4	5
j.	the amount of time your child needs to play outdoors?	1	2	3	4	5
k.	the times your child needs to take medicine?	1	2	3	4	5
l.	toileting routines for your child?	1	2	3	4	5
m.	when he is sick or has a cold?	1	2	3	4	5
n.	your child plugging in or operating electrical appliances?	1	2	3	4	5
o.	what your child eats at mealtime?	1	2	3	4	5

21. Do you have any rules for health or safety that are not covered above? If so please list them.

22. Given your busy schedule, do you ever have the opportunity to talk with your child about things he can do to stay healthy?

1 Yes IF YES, how often do you talk with your child about staying healthy?

1 Once every six months
2 Once every three months
3 Once a month
4 Once a week
5 Daily

2 No

23. When you compare your child to other children the same age, how would you describe how much he knows about staying healthy? (Circle your answer)

1 Much less
2 A little less
3 About the same
4 Somewhat more
5 Much more

24. How do you help your child learn about ways to stay healthy? (Please describe)

25. What are the most important things you think a child this age needs to know about health? (Please explain)

FOLLOW-UP QUESTIONS FOR TELEPHONE CONTACT

If Question 18 was answered positively:

26. Were there any positive aspects to your child's illness?

    1 Yes IF YES, please describe:

    ____

    ____

    2 No

27. How did the illness affect your family? (Please describe)

    ____

28. Did the illness require hospitalization? (Circle)

    1 Yes
    2 No

29. In your opinion, did your child's having this illness contribute to his/her general knowledge about health and illness.

30. Follow-up for Question 20: Where parents indicated a rule, ask them to specify the rule and list below.

APPENDIX C

Letter of Consent

Letter of Consent

Dear Parents:

This letter is to introduce myself, Kathryn Clark, and to ask if you would be willing to participate in a study of young children's understanding of everyday health behaviors and how families contribute to children's understanding of health and illness.

This study is being conducted as part of my doctoral studies at the University of North Carolina at Greensboro (UNCG) in the Department of Child Development and Family Relations. It has been approved by the University Institutional Review Board which ensures that research projects involving human participants follow regulations. I have also spoken with (name of the director) and have received her permission to contact you.

If you choose to participate in this study, your child will spend a total of 45 minutes with me at his/her (day care center or preschool) which may be divided into two short time periods. During this time, I will ask your child some questions about health care practices. My purpose for this is to better understand what young children know about health. This information is needed to help professionals design better educational programs for young children.

I would also like for you to complete a questionnaire about your family background and your child's current health status. This questionnaire will be given to you by your child's teacher. It will take approximately 20 minutes of your time to complete. After you have completed the questionnaire and placed it in a sealed envelope, it is to be turned in to your child's teacher. I will collect and review the questionnaire and then contact you by telephone with several follow-up questions at a later date.

All information collected will be kept strictly confidential and used only for research purposes. Each family choosing to participate in the study will be given an individual code number. After all the information is collected, the names will be discarded so there will be no way to identify any individual person or family.

Please complete the attached consent form and return it to your child's teacher. Please be assured that if your child chooses not to participate, I will respect his/her wishes. A decision not to participate in this study will in no way affect your child's activities at school.

If further questions arise, you may contact me at my home (919-998-6251) or leave a message for me at UNCG (919-334-5307). You may also contact Dr. Garrett Lange at UNCG with any questions you may have. If you have questions as to whether this research follows federal regulations, you may contact the UNCG Office of Research Services (919-334-5878).

Thank you very much for your consideration.

Kathryn Summers Clark, Ph. D. Candidate

CONSENT TO PARTICIPATE

Complete and return to your child's teacher

______ NO I, ___________________________, prefer not to participate in this study.

______ YES I, ___________________________, agree to participate in the study entitled "The Development of Children's Health Knowledge."

I have read the letter explaining the study and understand that Mrs. Clark will ask me questions about my child's health and his/her understanding of health. She will also ask my child questions about health and illness.

I have been given the opportunity to ask questions regarding the research and I have been given the names and telephone numbers of the principal researchers in the study should further questions arise. I understand that I am free to withdraw my consent to participate in the project at any time without penalty or prejudice. Also, I understand that should my child not agree to participate those wishes will be honored. I understand that confidentiality will be maintained and that I will not be identified by name as a participant in this project.

Signature of Parent(s) or Guardian:

____ ______________
Signature Date

Phone: (Home)__________________ (Work)________________

In the space below, please specify convenient times when I may call you to complete the follow-up questions by telephone. Thank you.

___________________________________ ____________________
Time(s) Telephone no.

___________________________________ ____________________
Time(s) Telephone no.

Regardless of whether you decide to participate, please check here if you would like to receive a summary of the results of this project:

_____________Yes

_____________No

Address to which summary should be sent (list below):

APPENDIX D

School Rating Forms

Teacher Ratings

Please read carefully the items on the scale shown below. Choose the rating which best describes the degree to which each curricular area is emphasized in your classroom. There are no right or wrong answers. Circle the number of your answer.

	No emphasis		Moderate emphasis		Most emphasis
Safety	1	2	3	4	5
Numbers & letters	1	2	3	4	5
Getting along with other children & making friends	1	2	3	4	5
Taking care of the body	1	2	3	4	5
Other cultures	1	2	3	4	5
Nutrition	1	2	3	4	5
Holidays	1	2	3	4	5
Health workers (e.g., doctors, nurses)	1	2	3	4	5
Transportation	1	2	3	4	5
Machines	1	2	3	4	5
Physical fitness	1	2	3	4	5
Family life	1	2	3	4	5
Pre-reading skills	1	2	3	4	5
Ways to stay healthy	1	2	3	4	5
Colors, shapes, sizes	1	2	3	4	5
Self-concept	1	2	3	4	5
Function of body	1	2	3	4	5
Sensory awareness	1	2	3	4	5
Plants and animals	1	2	3	4	5
Illness prevention	1	2	3	4	5

Classroom Ratings

_____ 1. Toilet facilities are clean and easily accessible to children at all times; toilet paper is located where children can reach.

_____ 2. Children and adults wash their hands after toileting and before handling food.

_____ 3. Soap and paper towels are available where children can reach.

_____ 4. Tables are cleaned prior to meals and snacks.

_____ 5. There are scheduled times for health routines.

_____ 6. Children brush their teeth after meals and toothbrushes are stored appropriately.

_____ 7. Tissues are available where children can reach, and teachers assist if necessary.

_____ 8. Nutritious snacks and meals are provided.

_____ 9. The environment is safe for the children: electrical outlets are covered, no hazardous substances are within children's reach, no extension cords are exposed, and traffic paths are cleared of obstructions during play.

_____ 10. Children are supervised.

Scoring: 1 = Never

2 = Seldom

3 = Sometimes

4 = Often

5 = Always

APPENDIX E

Tables Summarizing Content Analysis of Children's Responses

Table E-1

Categories and frequencies of children's responses of ways to stay strong and healthy

Category	f	Overall f
Diet		195
Eat food	25	
Eat nutritious food	54	
Avoid junk food	6	
Drink milk	79	
Drink water	16	
Get exercise		54
Get sleep & rest		12
Get health care		10
From doctor	4	
From dentist	6	
Have good hygiene		9
Baths	6	
Handwashing	3	
Take vitamins/medicine		9
Vitamins	6	
Medicine	3	
Treating illnesses		3
Safety		3
General health knowledge		3
Attitudes		2
Inappropriate responses		7
Total		307

Table E-2

Categories and frequencies of children's knowledge of body parts

Category	f	Overall f
Extremities		179
Arms	35	
Ankles	2	
Elbows	6	
Feet	38	
Fingers	10	
Fingernails	3	
Hands	21	
Knees	10	
Legs	40	
Thumb	1	
Toes	10	
Wrist	4	
Face and head		154
Cheeks	1	
Chin	1	
Ears	21	
Eyes	27	
Eyebrows	1	
Face	1	
Forehead	1	
Hair	8	
Head	30	
Mouth	27	
Teeth	5	
Tongue	1	
Neck	11	
Nose	21	
Internal organs		66
Blood	4	
Bones	21	
Brain	5	
Heart	5	
Lungs	2	
Muscles	4	
Skeleton	1	
Skull	2	
Stomach	20	
Taste buds	1	
Vocal cords	1	

Table E-2

(Continued)

Category	f	Overall f
Trunk		55
Back	4	
Belly	2	
Bottom/fanny	3	
Hips	2	
Shoulder	7	
Waist	2	
Total		454

Table E-3

Categories and frequencies of children's knowledge of how they get sick

Category	f
Poor eating habits Eating the wrong foods Eating excessively	41
Hazardous substances Poisons Teratogens	25
Specific symptoms	24
Germs as causal agents	22
Contagion	22
Weather & temperature	16
Allergies	9
Circular thinking	9
Personal injury	8
Ingesting non-edibles	7
Contamination	6
Other	4
Punishment	2
Dental care	2
Lack of sleep	1
Total	198

Table E-4

Categories and frequencies of children's knowledge of what they can do to prevent illness

Category	f	Overall f
General health practices		90
Eat healthy foods	20	
Preventing illness	19	
Drink liquids	14	
Exercise	14	
Avoiding junk food	8	
Rest/sleep	8	
Proper clothing	6	
Dental care	1	
Medical interventions		52
What to take	30	
Where to go	11	
Preventive care	11	
Avoiding dangers		13
Circular thinking		18
Punishment		5
Physiologic/internal		1
Total		179

Table E-5

Categories and frequencies of children's knowledge of what they can do to get better when they are sick

Category	f	Overall f
External interventions		126
Take medicine	64	
Other medications	8	
Go to doctor	43	
Go to hospital	7	
Tell parents	2	
Other	2	
General health practices		57
Rest/sleep	18	
Eat appropriate foods	17	
Drink liquids	15	
Hygiene	2	
Stay warm	2	
Inappropriate	6	
Specific treatments		22
Get shots	8	
Vitamins	3	
Bandaids	3	
For earaches	2	
Other	6	
Physiologic/internal		1
Total		206

Table E-6

Categories and frequencies of children's knowledge of safety

Category	f	Overall f
Car safety		39
Equipment	30	
Precautions	9	
Avoiding hazards		23
By walking	14	
By being careful	6	
By not climbing	3	
Bike safety		19
Equipment	6	
Precautions	13	
Street safety		18
Crossing street	10	
Stay away from cars	8	
Stranger safety		15
Out in public	7	
At home	8	
Illogical		18
Appropriate social behavior		11
Tool and object safety		11
Playground safety		10
Natural dangers		7
Poisons	2	
Animals	3	
Weather	2	
Misunderstood question		4
Water safety		3
Classroom safety		2

Table E-6

(Continued)

Category	f	Overall f
Inappropriate responses		3
Total		183

Table E-7

Categories and frequencies of children's knowledge of dental health

Category	f	Overall f
Brushing teeth		118
What to do	89	
Why to brush	9	
When to brush	8	
What to use	8	
How to brush	4	
Go to the dentist		45
Where to go	35	
Why to go	10	
Related health practices		38
Avoid junk food	12	
Eat nutritious foods	15	
Floss	5	
Drink milk	3	
Other	3	
Illogical responses		6
Total		207

APPENDIX F

Tables Summarizing Content Analysis of Families' Responses

TABLE F-1

Categories and frequencies of parental responses regarding additional health rules/routines

Category	f	Overall f
Car safety		37
Wear seat belts	27	
Don't play in car	6	
Door/hand safety	4	
Preventive measures		32
Small objects	8	
Bathing	8	
Exercise	4	
Vitamins	4	
Sunscreen	3	
Shoes	2	
Medicine	2	
Other	2	
Stranger safety		25
External environments	18	
Internal environments	7	
Tool and object safety		21
Sharp tools	11	
Ropes	3	
Running	3	
Toys	2	
Plastic bags	2	
Household safety		21
Climbing/jumping	8	
Stairs	6	
Medicine/cleaning supplies	3	
Running	3	
Garage doors	1	
Bicycle safety		15
Equipment	10	
Riding guidelines	5	

Table F-1

(Continued)

Category	f	Overall f
Environmental hazards		12
Water safety	6	
Animal precautions	4	
Other	2	
Proactive measures		9
Emergency plans	4	
Fire escape plans	2	
Knowing phone & address	2	
Other	1	
Bathing		7
Diet		3
Social responsibility		1
Total		183

Table F-2

Frequencies and categories of parental responses to ways they teach their children about health

Category	f	Overall f
Talking		81
Q & A sessions	8	
Discussions	70	
Other	3	
Modeling		46
Teaching resources		26
Books	22	
School	2	
Other	2	
Explanations		19
Reasons/routines	17	
Other	2	
Teaching in context		18
Teachable moments	10	
Health checks	7	
Other	1	
Encouragement		13
Of good habits	7	
Praise	6	
Enforcing rules/limits		11
Practice		11
Practice skills	9	
Other	2	
Total		255

Table F-3

Frequencies and categories of parental responses to important things children need to know about health and safety

Category	f	Overall f
Health routines		255
Hygiene	96	
Nutrition	91	
Dental care	41	
Rest/sleep	27	
Safety		76
General safety	17	
Stranger danger	11	
Street safety	9	
Fire safety	6	
Wear seat belts	6	
Other	29	
Preventive measures		56
Exercise	40	
Proper dress	9	
Vitamins	3	
Sunscreen	3	
Other	1	
General health knowledge		45
Spreading diseases	19	
Related concepts	17	
Body concepts	9	
Illness prevention		44
Avoid germs	19	
Regular check-ups	5	
Other	1	
Positive attitude		17
Habits		4
Treatments		3
Total		500

APPENDIX G

Miscellaneous Tables

Table G-1

Enrollment in early childhood education programs

Program/Class	n	%
Boxwood Preschool		
Class 1	12	9.6
Class 2	13	10.4
Children's Center		
Class 1	7	5.6
Class 2	7	5.6
St. John's School	7	5.6
St. Anne's Preschool	7	5.6
Children's Center	7	5.6
N. Philadelphia Moravian Preschool		
Class 1	8	6.4
Class 2	8	6.4
Class 3	8	6.4
First Christian Preschool		
Class 1	10	8.0
Class 2	9	7.2
St. Paul's Preschool	9	7.2
Thru-the-Week School	13	10.4

Table G-2

Recent childhood illnesses reported by families

Illness	n	%
Infectious diseases		
Chicken pox	19	44.2
Strep throat	3	7.0
Gastrointestinal virus	1	2.3
Urinary tract infections	2	4.7
Congenital abnormalities		
Spina bifida	1	2.3
Endocrine, nutritional, & metabolic diseases		
Diabetes	1	2.3
Allergies (soy)	1	2.3
Respiratory diseases		
Upper respiratory infections	1	2.3
Pneumonia	3	7.0
Injury and poisoning		
Salmonella poisoning	1	2.3
Fall	1	2.3
Disease of nervous and sense organs		
Otitis media	4	9.3
Amblyopia	1	2.3